MITSUBISHI MATERIALS

BD01A

2022
NEW PRODUCTS DIGEST

AHB
TOOLING & MACHINERY
COMPLETE METALWORKING SOLUTIONS
(800) 991-4225 www.ahbinc.com
ISO Certified customerservice@ahbinc.com

DIAEDGE

DIAEDGE

Your manufacturing success is our success.

It’s simple. We want to provide high-quality cutting tool products that deliver unparalleled performance and control to help you to manufacture precisely perfect products every day. Our long heritage of building partnerships through providing cutting tool solutions for metal manufacturers has given Mitsubishi Materials U.S.A. a reputation as an industry leader. We understand the importance of getting it right the first time by delivering high-quality cutting tool product brands to help overcome machining challenges and improve machining processes.

Your success is our success, and is the driving force behind our innovative products. Our product brand, DIAEDGE, is trusted globally in the metal manufacturing industries for delivering expertly designed tools of the trade for highly specialized industries like yours. Our traditional Mitsubishi Materials U.S.A. cutting tool product line is now sold under the DIAEDGE product brand name.

MITSUBISHI MATERIALS U.S.A.

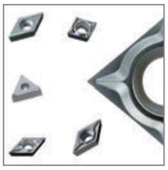
INDEX

DIAEDGE

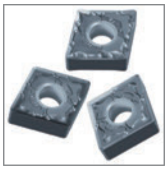
DIAEDGE

NEW PRODUCT LIST

A - TURNING INSERTS



MS6015/
7025/
9025
PG.11

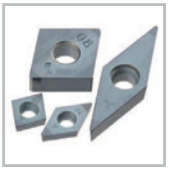


9000
SERIES
PG.39

MC6100
PG.63

B - CBN & PCD TURNING INSERTS

BC8200
PG.85

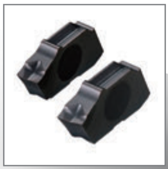


BC5110
PG.115

MD220
PG.123

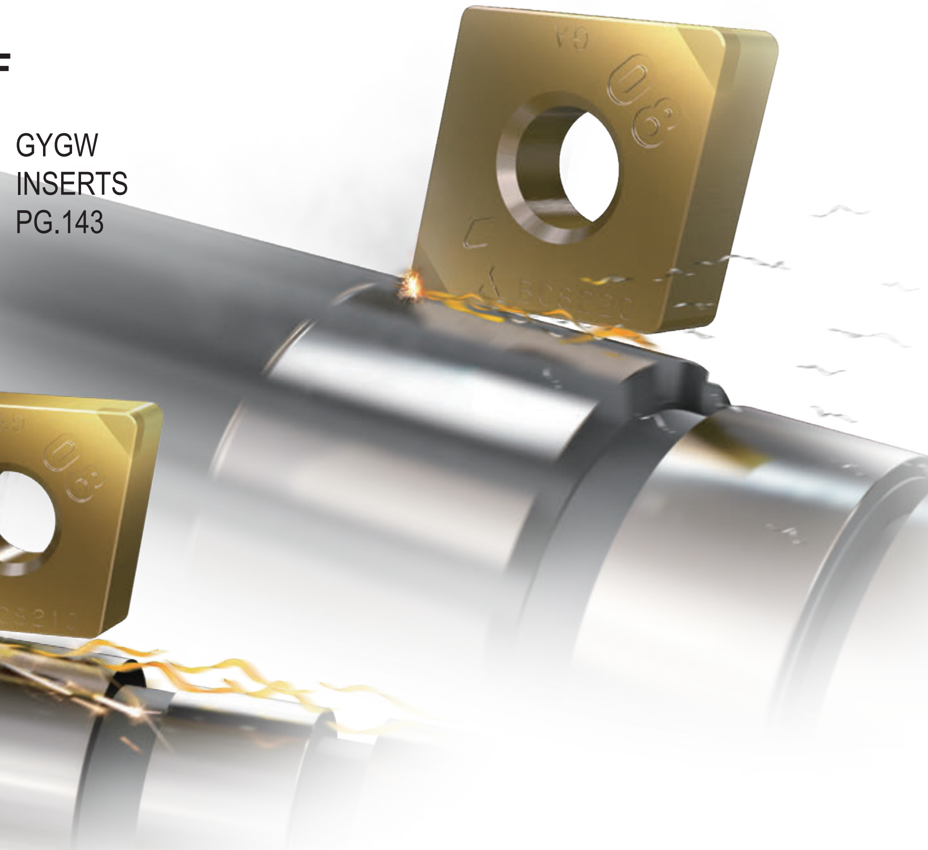
F - GROOVING/CUTTING OFF

GYGW
SWISS
TOOL
PG.125

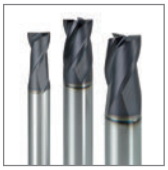


GYGW
INSERTS
PG.143

GY PSC
PG.175



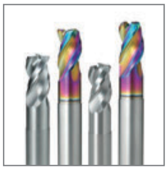
I - SOLID END MILLS


MP2ES/
3ES/4EC
PG.191


VQ4MRB-FB
PG.205


VFR
PG.211


VQ4WB
PG.239


ALIMASTER
PG.247

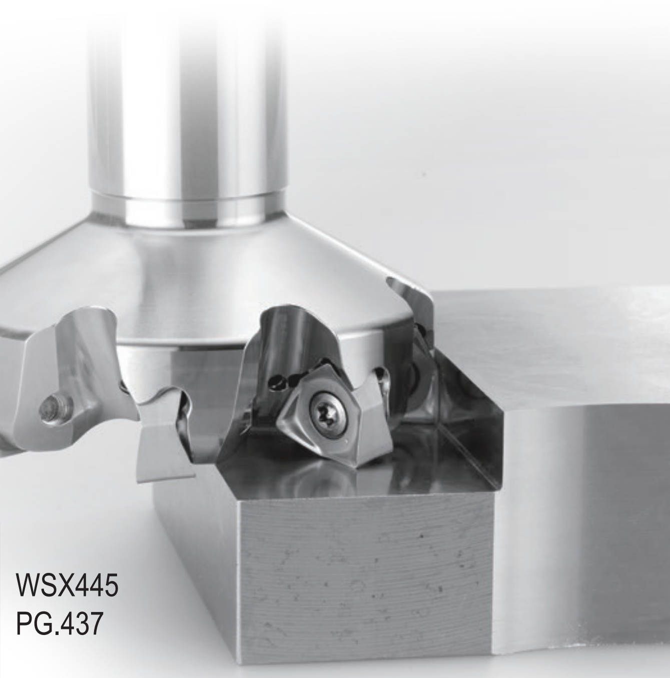

DLC4LATB/
C4LATB
PG.259


VQN
PG.267


VQ DENTAL
PG.281


VQ5MHV/
MHVRB
PG.293


VQT5MVRB
PG.301



J - EXCHANGEABLE HEAD END MILLS


iMX
PG.309

L - INDEXABLE MILLING


WWX400
PG.399


WSF406W
PG.425


WSX445
PG.437


WJX
PG.461


VPX
PG.499


AJX
PG.567


ARP
PG.601


AXD4000A
PG.621


FMAX
PG.631


ASPX
PG.649

M - DRILLING


DLE
PG.659


DWAE
PG.675


DSA
PG.691

ASPX

VIBRATION CONTROL END MILL PROVIDES HIGH EFFICIENCY FOR MACHINING TITANIUM ALLOYS

- Suppression of Regenerative Chatter
- Improved Chip Discharge
- Reduced Cutting Resistance

PG.649 ▶

VPX

MULTI-FUNCTIONAL CUTTER FOR HIGH EFFICIENCY MACHINING AND DEEP SHOULDER MILLING

- Longer Insert Tool Life
- Better Surface Finish
- Higher Feed Rates

PG.499 ▶

BC8210

EXCELLENT COATED CBN GRADE FOR NEXT GENERATION TURNING OF HARDENED STEELS

BC8220

- Outstanding Tool Life
- Excellent Wear Resistance
- Heat Resistant Binder

PG.85 ▶

WWX400

DOUBLE SIDED INSERT TYPE SHOULDER MILL HIGH RIGIDITY AND HIGH QUALITY PERFORMANCE

- Strong X Geometry
- High Quality Surface Finish
- Low Cutting Resistance

PG.399 ▶

ALIMASTER

HIGHLY EFFICIENT, MULTI-FUNCTIONAL MACHINING OF ALUMINUM ALLOYS

- Strong Center Cutting Edges
- Ideal Flute Geometry
- DLC Coating with Excellent Adhesion and Weld-Resistance

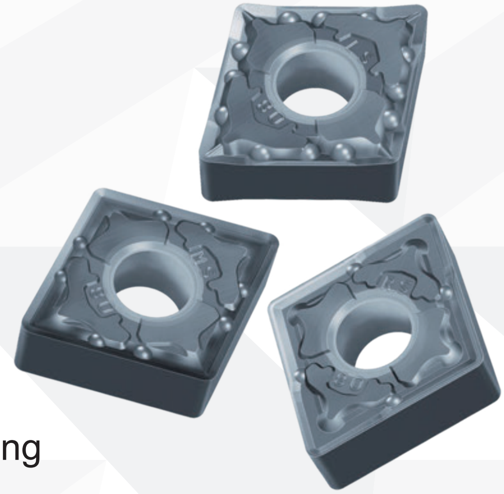
PG.247

DWAE

SOLID CARBIDE DRILL FOR SWISS-TYPE AUTOMATIC & SMALL CNC LATHES

- Sharp and Durable
- Excellent Lubricity
- Unique Flute Form for Greater Rigidity

PG.675



MP9000

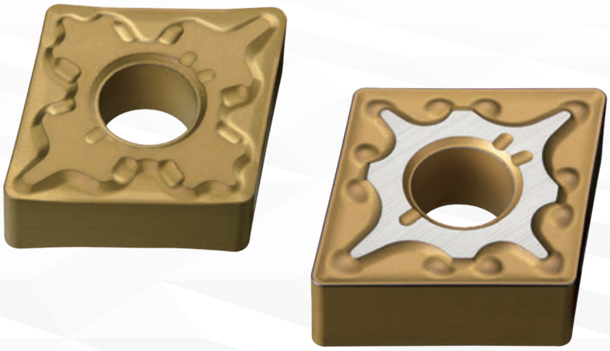
FOR DIFFICULT-TO-CUT MATERIALS

- Significantly Reduced Edge Fracturing
- Enhanced Chip Control
- Improved Wear, Crater and Welding Resistance

PG.39

MC6115

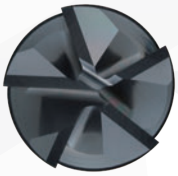
CVD COATED GRADE FOR STEEL TURNING



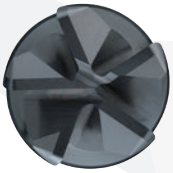
- Improved Outer Coating
- Outstanding Wear Resistance at Hight Temperatures
- Improved Process Efficiency

MC6125

PG.63 ▶



VQ5MHV



VQ5MHVRB

THE COMBINATION OF 5 FLUTES AND IRREGULAR HELIX FOR REDUCING VIBRATION ENABLES HIGHLY EFFICIENT MACHINING OF DIFFICULT-TO-CUT MATERIALS.

- Optimal Flute Shape Improves Chip Evacuation
- Excellent Chatter Resistance
- Improved Flank Wear through the use of SMART MIRACLE Coating

PG.293 ▶

MTEC
MACHINING TECHNOLOGY
& EDUCATION CENTER

Welcome to our new world-class Machining Technology and Education Center (MTEC) in Mooresville, NC providing year round support and services to North America.

ABOUT MTEC

TOOLING PROPOSALS & EVALUATION

We will review your current processes or outline a new process. From this review, we will improve productivity, analyze programming methods and output a solution with programming, tooling and time savings.

MACHINING SIMULATION

Using the latest CAD/CAM software and our cutting tool experience, we will outline a new process using proper machining techniques to maximize tool life and productivity.

TECHNICAL SUPPORT

Dedicated local professionals to answer any of your order, product or technical questions.

TRAINING

We are excited to offer several levels of training with goals to reach our highest level--Craftsman Machining Technology. At MTEC NC, we will train using a combination of classroom and hands-on machine time to develop skills and real-world understanding of materials, tools and applications. In addition to multi-day courses, we will have Machining Technology skills seminars, as well as seminars from our partners to complement our apprentice level courses, our journeyman courses, and up to our craftsman level courses.

PROCESS IMPROVEMENTS

Review of the complete part processing and recommend changes of speed, feed, new tooling, reduction of passes, modifying programming and other solutions to reduce cycle time, save money and be proactive.

TRAINING COURSES

Programs are designed for several levels of skill development – from basic understanding to advance manufacturing with digital solutions, complementing to your valued experience in CNC machining environment.

- New Machining Technology
  Distributors
- New Machining Technology
  Mitsubishi Materials Customers
- Advanced Milling & Drilling Technology
- Advanced Turning Technology

ONLINE TRAINING

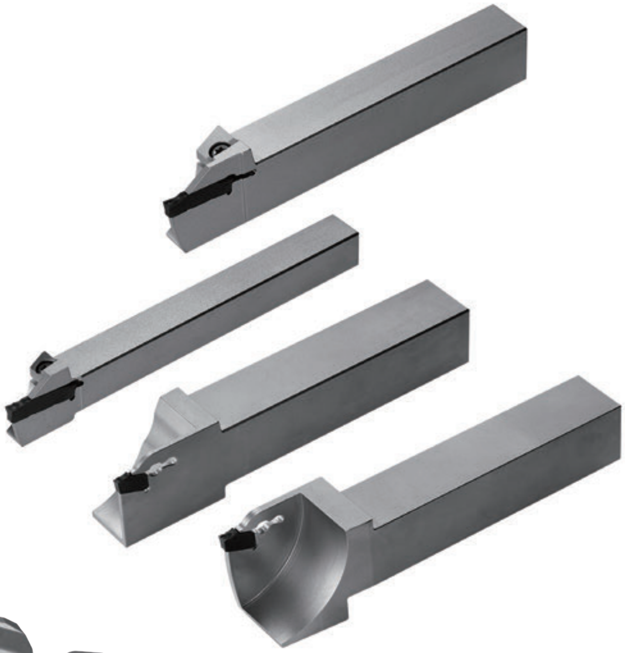
Our FREE e-learning program offers 11 courses in drilling, milling, turning, threading, tool grades and workpiece materials. Once each course is completed, you will be given the opportunity to print a certificate.

- Basic Drilling
- Basic Milling
- Basic Turning
- Advanced Drilling
- Advanced End Milling
- Advanced Turning
- Basic Threading
- Advanced Face Milling
- Basic Workpiece Materials
- Tool Grades
- Advanced Workpiece Materials

INFORMATION ON COURSE SCHEDULE,
COURSE DESCRIPTION, AND ACCOMMODATIONS

MTECTRAINING.INFO

FOLLOW THE QR CODE FOR
A VIRTUAL FACILITY TOUR
REALLYINTERACTIVE.MEDIA




WJX09-063A07AR
(5585)

DIAEDGE

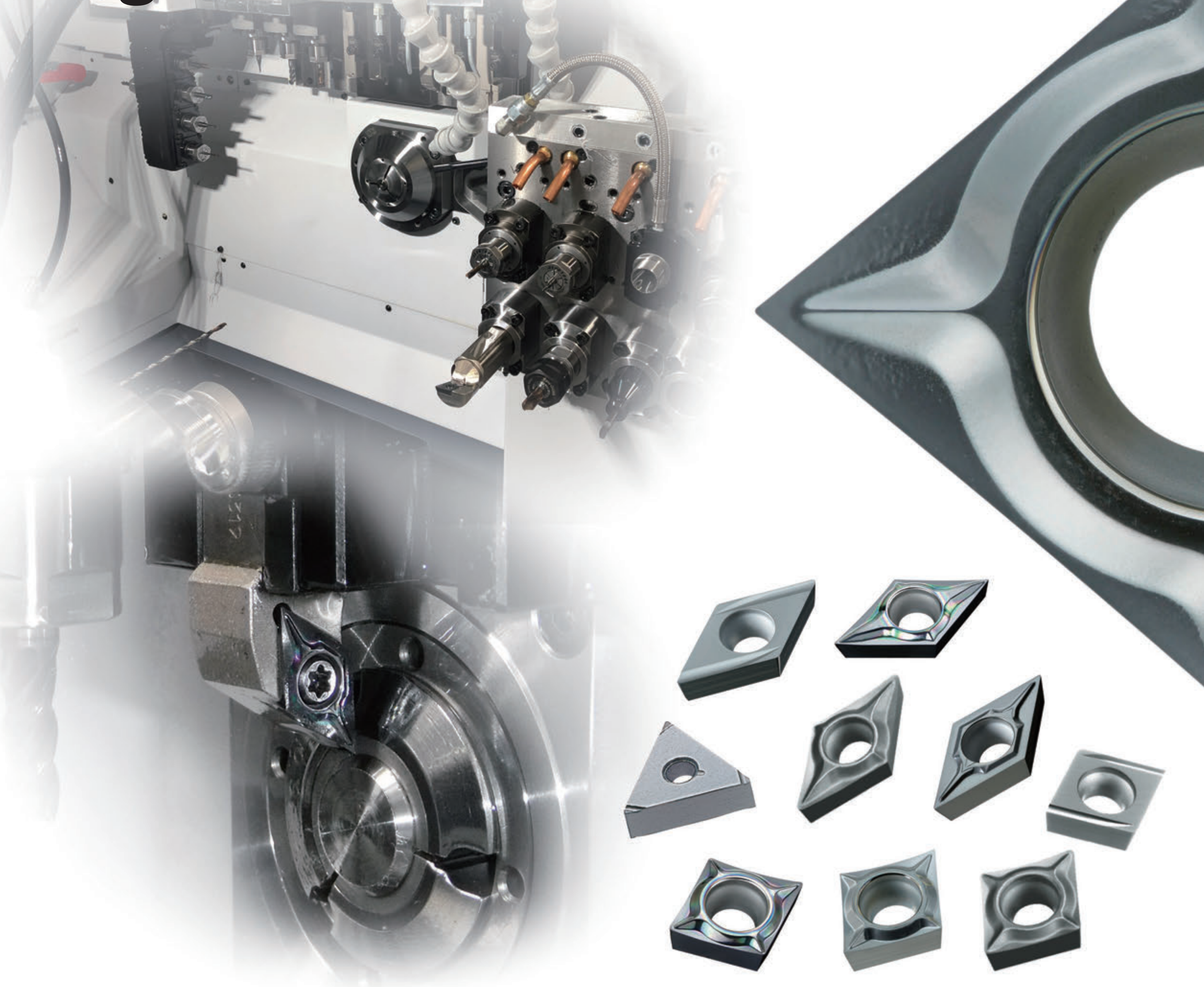
TOOL NEWS B275A

MS Series - PVD Coated Grades for High Precision and Small Parts Machining

MS6015/MS7025/MS9025

Series Expansion

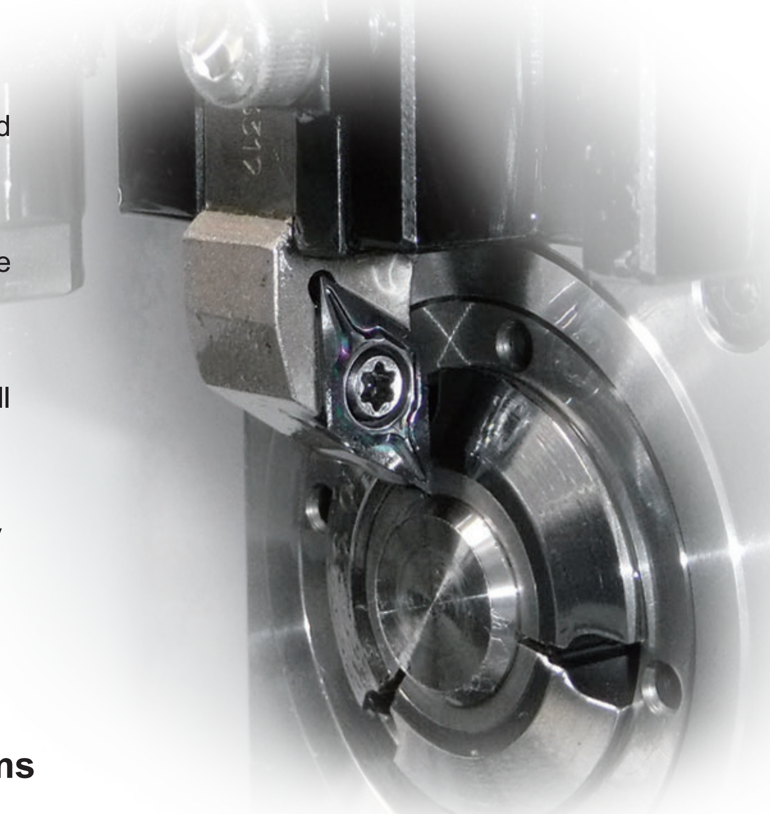
Modern Day Machining of High-Precision Small Parts



MITSUBISHI MATERIALS CORPORATION

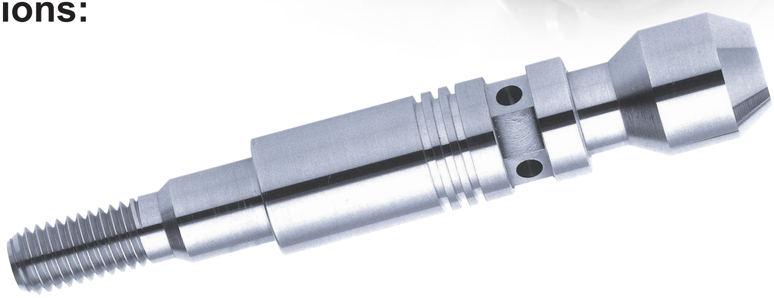
Transformation of Machining on Swiss-Type Automatic Lathes

The first parts to be machined on Swiss-type automatic lathes were watch components. The use soon expanded to machining electrical parts for home appliances and printers, as well as automobile component applications, such as sensors and electrification technology parts. The high precision capability of Swiss-type lathes has also lent itself to the machining of parts essential to daily life. These parts include robotic and medical implants as well as simple but essential parts for water taps.
With the continued expansion of applications; higher precision, increased productivity and unwavering quality has become a necessity.



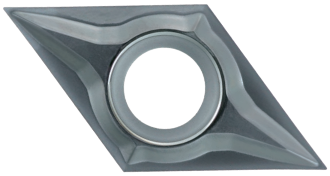
Due to changes in materials and component geometries, various problems have arisen that necessitate solutions:

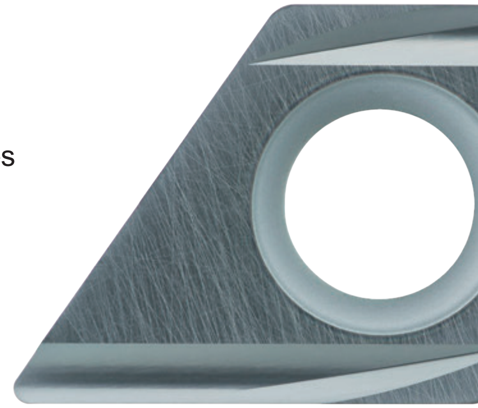
- Complex workpiece shapes
- Ever more difficult-to-cut materials
- Tighter dimensional tolerances



Mitsubishi Materials is committed to product development and bringing new tools to market that have the cutting capability and machine tool adaptability that customers desire such as:

- New Coatings adapted for evolving workpiece materials and machining methods
- Optimization of welding, wear and fracture resistance
- High precision machining enabled by new high quality cutting edge geometries





MS Series - PVD Coated Grades for High Precision and Small Parts Machining

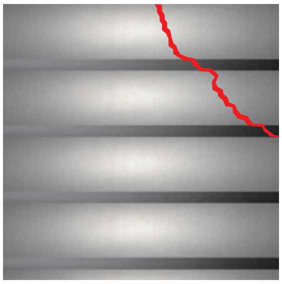
MS7025 **NEW**

Dramatically improved welding and wear resistance in low feed machining with a more precise nano-multilayer coating

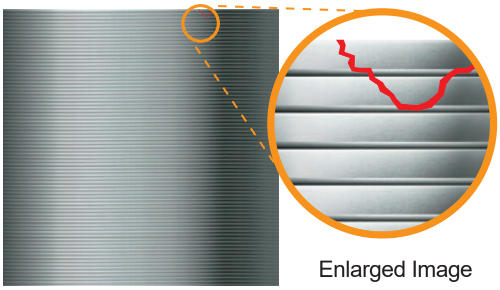
Features

Nano-Multilayer Coating

By combining a high lubrication layer with excellent welding resistance and a high hardness layer with greater wear resistance that suppresses the progress of wear at nano-level, edge damage is significantly reduced and the welding and wear resistance are dramatically improved.



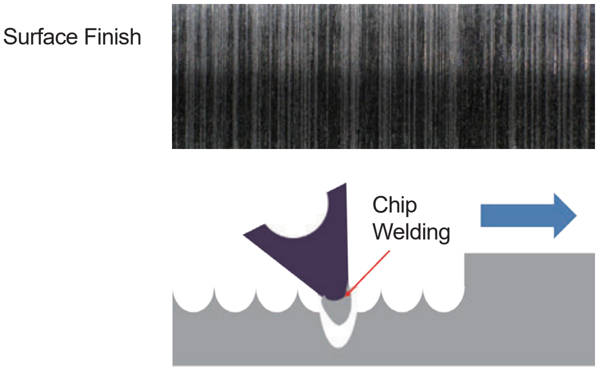
Conventional Multilayer Coating



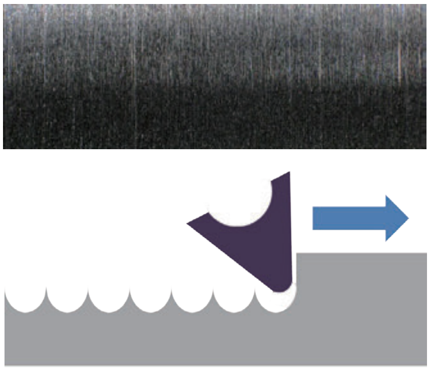
Nano-multilayer Coating

Effects of the High Lubrication Layer

The nano-level, high lubrication layer suppresses build-up on the cutting edge caused by chip welding which occurs when machining at low feed and additionally, provides a greatly improved surface finish.



Conventional



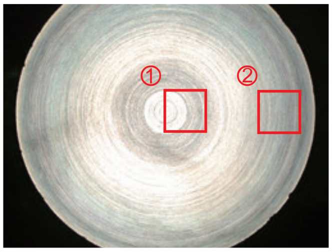
MS7025

Cutting Performance

Comparison of End Face Machined Surfaces Using 3D Analysis

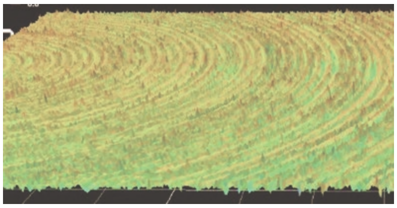
Achieves stable machining even during end face machining where the cutting speed is prone to vary.

Workpiece Material : AISI 1045



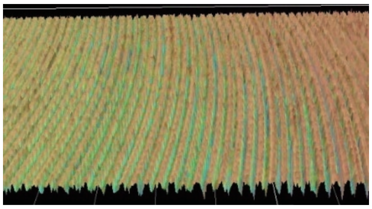
MS7025

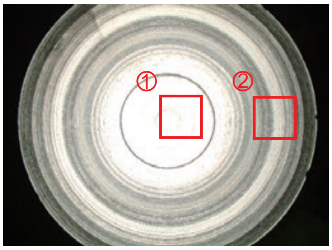
①



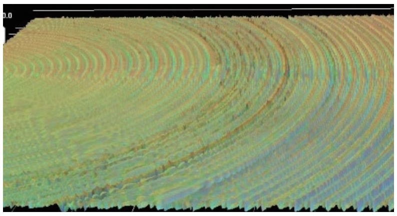
Good Surface Finish

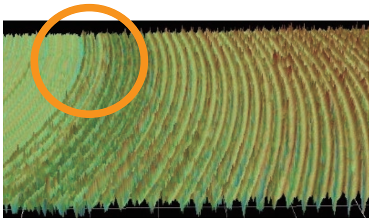
②





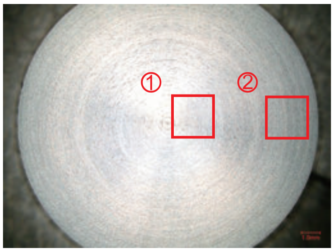
Conventional





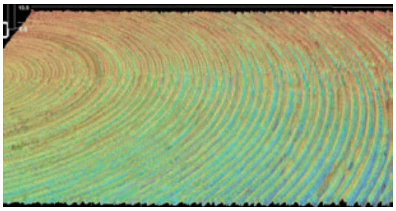
Changes in surface quality that cause machining marks

Workpiece Material : AISI 304



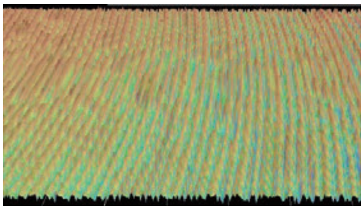
MS7025

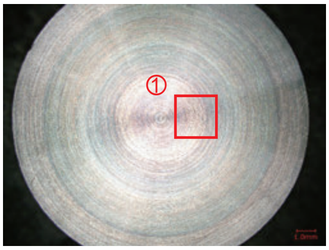
①



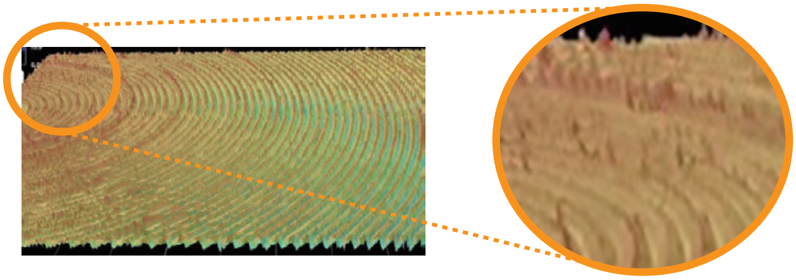
Good Surface Finish

②



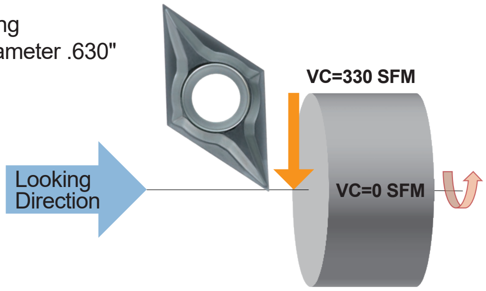


Conventional



Rougness can occur in the low speed area
(near the center)

Image of Facing
Workpiece Diameter .630"

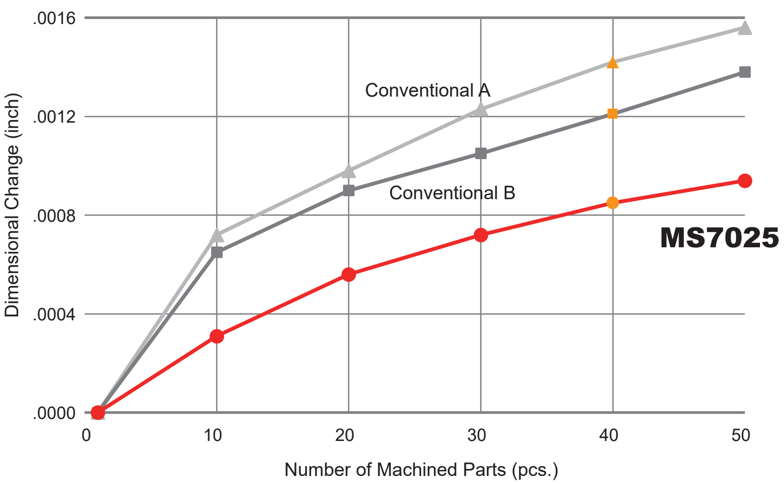


<Cutting Conditions>
Workpiece Material : Notation Above
Inserts : DCGT32.50.5
Cutting Speed : vc = Max. 330 SFM
Feed per Rev. : f =.0008 IPR
Depth of Cut : ap = .008 inch
Cutting Mode : Wet Cutting (Oil)

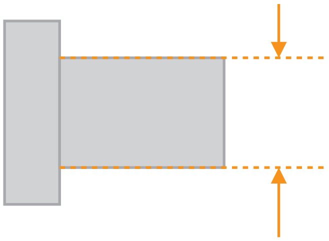
Comparison of Dimensional Change in Low Feed Machining

When machining at a low feed rate, dimensional changes are minimized and the quality of the machined surface finish is improved.

Workpiece Material : AISI 440C



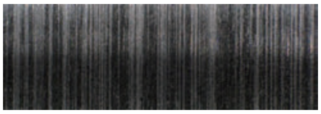
Dimensional Change
The amount of dimensional change is based on the first machining



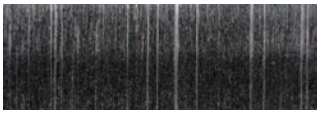
<Cutting Conditions>
Workpiece Material : AISI 440C
Inserts : DCGT32.50.2
Cutting Speed : vc = 230 SFM
Feed per Rev. : f =.0008 IPR
Depth of Cut : ap = .059 inch
Cutting Mode : Wet Cutting (Oil)

After machining 40 pieces

MS7025

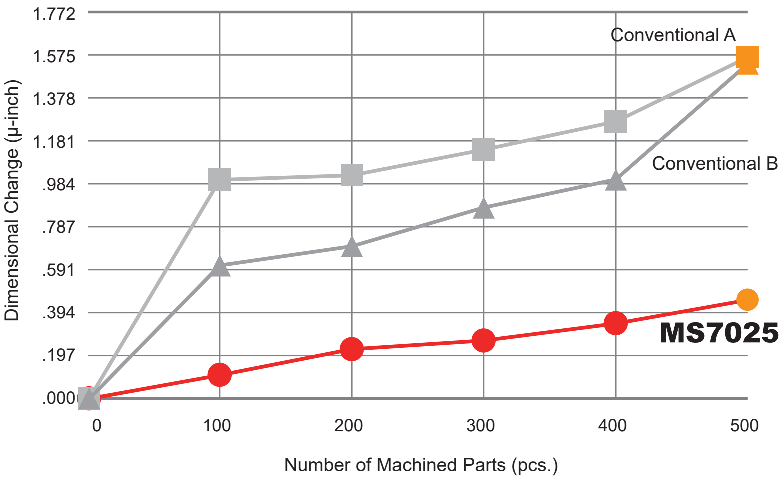


Conventional A



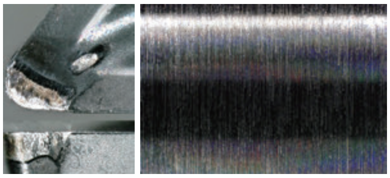
Conventional B

Workpiece Material : ELCH2S

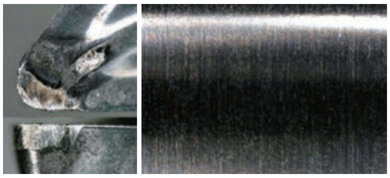


<Cutting Conditions>
Workpiece Material : ELCH2S
Inserts : DCGT32.50.5
Cutting Speed : vc = 785 SFM
Feed per Rev. : f =.0012 IPR
Depth of Cut : ap = .012 inch
Workpiece Material Length : .591 inch
Cutting Mode : Wet Cutting (Oil)

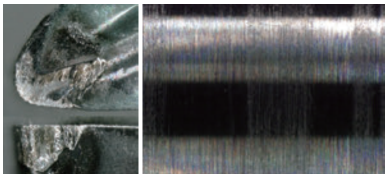
After machining 500 pieces



MS7025



Conventional A



Conventional B

MS Series - PVD Coated Grades for High Precision and Small Parts Machining

MS9025

NEW

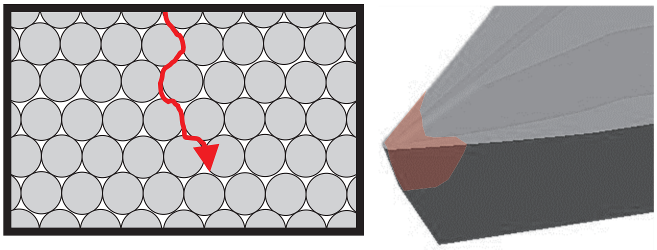
Effective reduction of notch wear achieved with an optimal balance of wear and fracture resistance.

Features

Improved Cemented Carbide

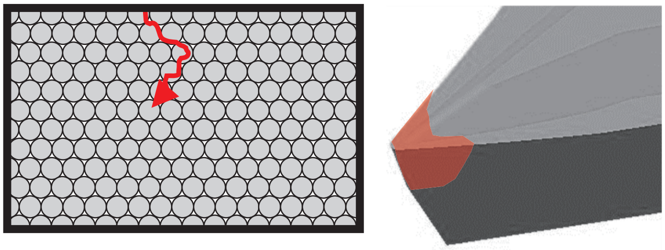
Thermal conductivity has been improved by optimizing the grain size and therefore reducing the boundary contact between the WC particles. This optimization reduces the temperature of the cutting edge during machining.

MS9025



Reducing the cutting edge temperature by improved thermal conductivity.

Conventional



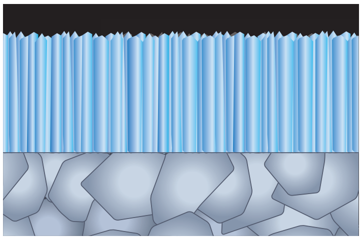
Higher cutting edge temperatures due to more particle boundary contact.

Smooth Coating Surface

The level surface of the coating has been achieved by first making the carbide substrate smooth followed by promoting straight growth of the coating crystals. This leads to excellent welding resistance.

*By Image

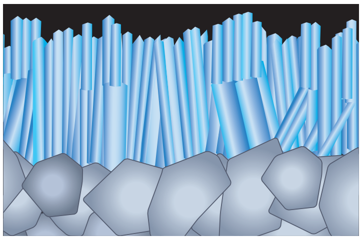
MS9025



Smooth Cemented Carbide

Straight crystal growth.
Smooth carbide surface.
Excellent welding resistance.

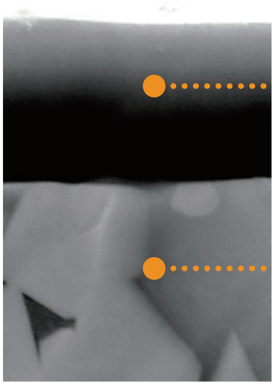
Conventional



Rough Cemented Carbide

Random crystal growth direction.
Performance is variable due to defects and voids in the surface.

High Al-rich(Al,Ti)N Single Layer Coating Technology



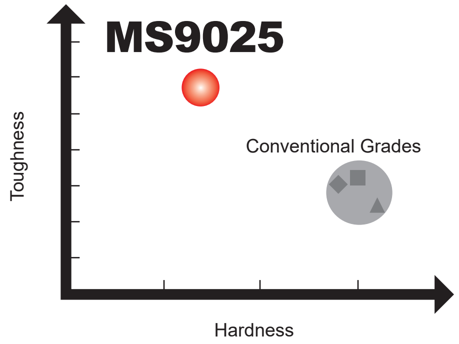
Al-rich (Al,Ti)N

Superior Flank Wear Resistance
Superior Crater Wear Resistance
Excellent Welding Resistance

Special Cemented Carbide for MS9025

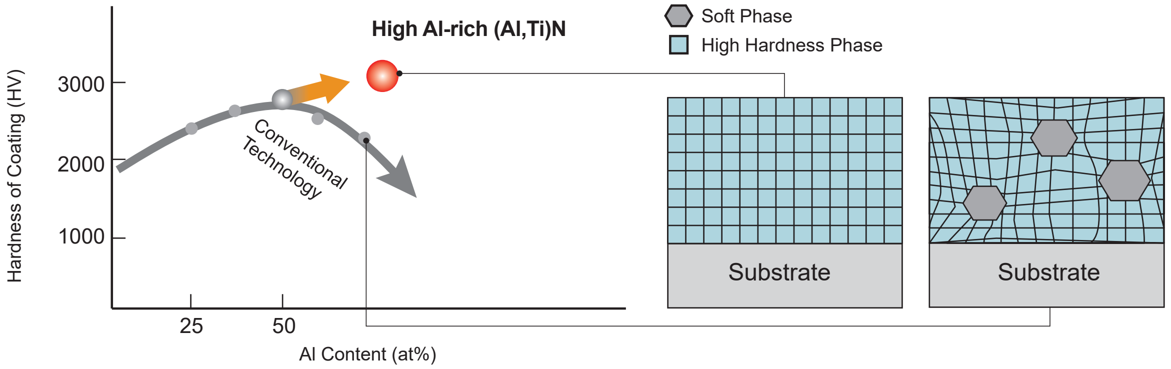
Superior Fracture Resistance
Excellent Chipping Resistance

Cemented Carbide Base Material Properties



High Al and Conventional Coating Comparison

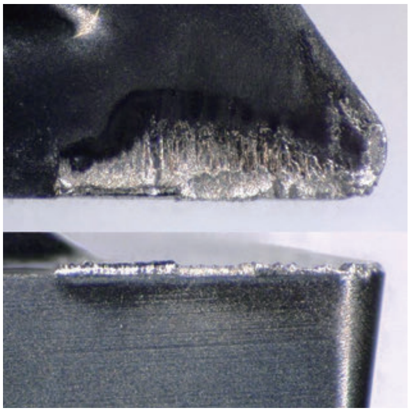
The high Al-rich (Al,Ti)N single layer coating provides stabilization of the high hardness phase and succeeds in dramatically improving wear, crater and welding resistance.



Stainless Steel AISI 304, Cutting Edge Comparison

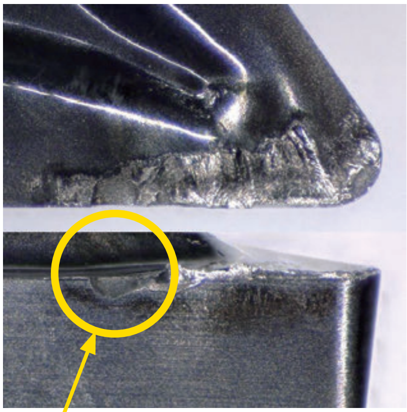
After machining 500 pieces

MS9025



VB=.001 inch

Conventional



Notch Wear

VB=.003 inch

<Cutting Conditions>
Workpiece Material : AISI 304
Inserts : DCGT32.50.5
Machining Methods : External Continuous Cutting
Cutting Speed : vc =185 SFM
Feed per Rev. : fr=.0012 IPR
Depth of Cut : Rough ap =.002 inch
Finish ap =.001 inch
Cutting Mode : Wet Cutting (Oil)

MS Series - PVD Coated Grades for High Precision and Small Parts Machining

MS6015

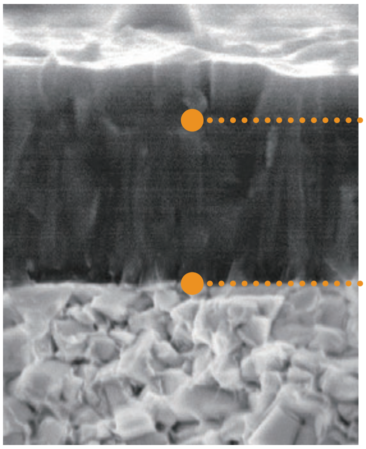
Skilled at turning pure irons, carbon steels and free cutting steels, achieving consistent surface finishes and excellent dimensional accuracy.

Features

A fine compatible collaboration of a special carbide substrate and a new PVD coating greatly improves wear resistance.

	MS6015	Conventional
Coating	TiCN Multilayer	TiAlN
Hardness (HV)	3000	2800
Wear Coefficient (Carbon Steels)	Low	High
Base Material Hardness (HRA)	92.0	92.0
T.R.S (GPa)	2.0	2.0

Ti-C-N Multilayer Coating



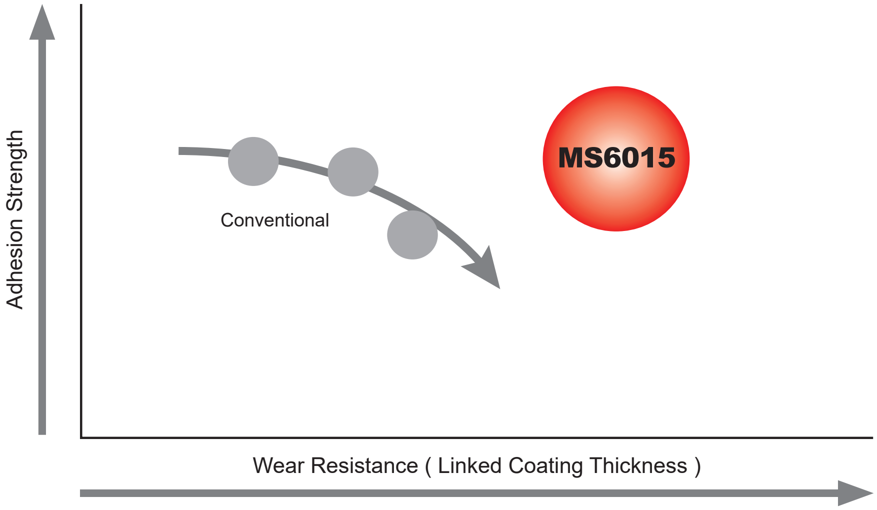
Superior wear and welding resistance while demonstrating the best possible results for carbon steels.

Minute multilayers remarkably improve welding resistance.

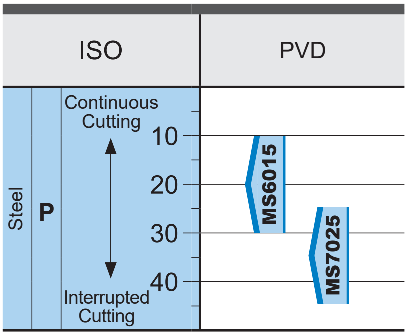
Excellent chip discharge with a reduced coefficient of friction creates a stabilized turning surface.

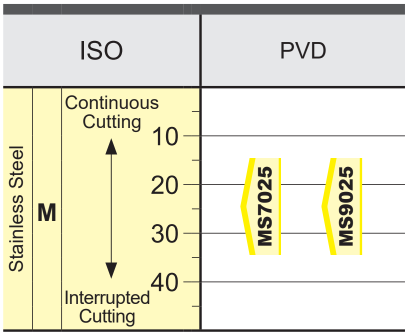
Optimizing the Laminated Structure

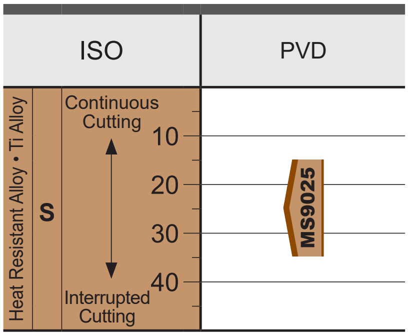
Optimizing the laminated structure enables the thickening of coating which leads to significant wear resistance.



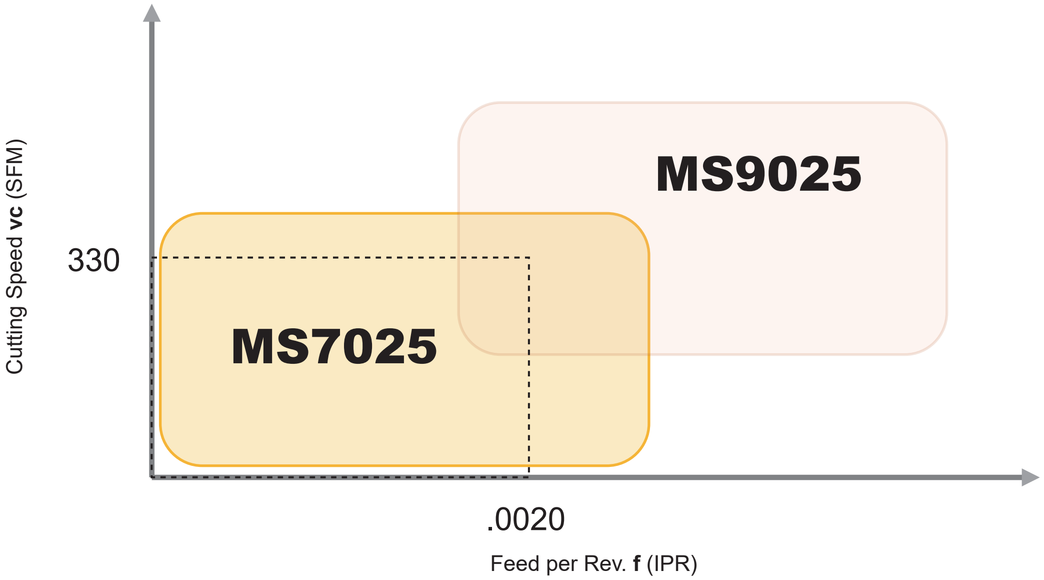
Application Range







Correct Use for Cutting Stainless Steel



PVD Coated Grade for High Precision and Small Parts Machining

MS6015/MS7025/MS9025

Ideal Inserts for Turning Small Parts.

Set the corner radius to a minus tolerance.

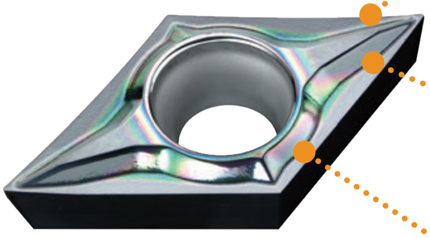
Order Number		
	DCGT32.50.5 M R-SN	50.5M R.008 inch (R.006-R.008 inch)
	DCGT32.51 M -SMG	51M R.016 inch (R.014-R.016 inch)

New Breaker System for Front Turning

FS-P Breaker **LS-P** Breaker

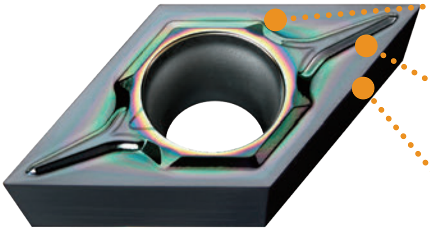
For Micro-Low Depth of Cut

FS-P Breaker



For Medium to High Depth of Cut

LS-P Breaker



Curved Cutting Edge

The curved cutting edge reduces cutting resistance and enables smooth chip evacuation. It also enables good initial entry to the workpiece and resists vibration and oscillation during machining.

High Breaker Wall

The high chip breaker wall ensures that the chips separate properly and prevents the workpiece from being damaged when chips are discharged.

Polishing (Mirror-Surface)

Welding resistance and chip evacuation are greatly improved.

Large Pocket

The large pocket enhances chip evacuation during high depths of cut and suppresses chip clogging.

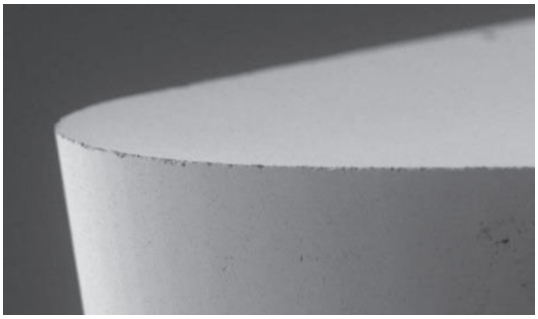
Parallel Cutting Edge

The parallel cutting edge greatly improves fracture resistance during high depths of cut.

Extremely High Quality Cutting Edge

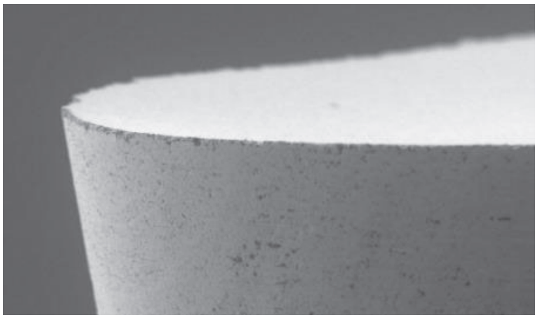
Technology that provides superior dimensional stability and reduces burrs.

MS9025



Rz=.006 μ-inch

Conventional



Rz=.024 μ-inch

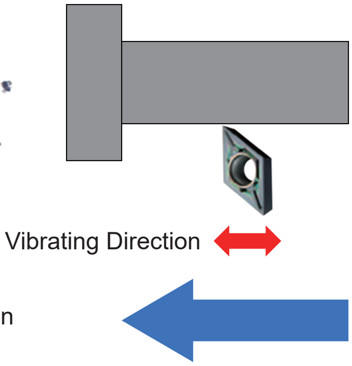
New Technology - Controlled Vibration of the Cutting Tool

Using new machine technology to deliberately vibrate the tool in relation to the cutting direction is an effective way of breaking chips.
This reduces production costs by reducing chip entanglement.

Without controlled vibration

With controlled vibration
frequency = 0.5/rev.

With controlled vibration
frequency = 1.5/rev.

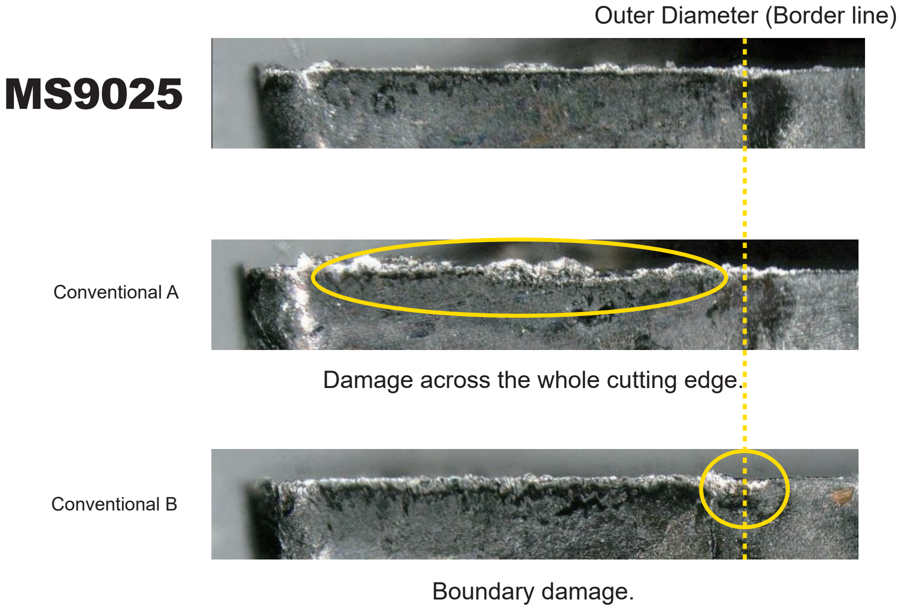


Challenge of controlled vibration machining:
Compared to standard machining there is a greater chance of edge chipping due to the extra stress on the cutting edge and the impact of work hardening.

Benefits of using MS9025 for Controlled Vibration Machining

1. Excellent fracture resistance due to the inherent toughness of the base material.
2. Effectively suppresses boundary wear damage during machining of difficult-to-cut materials. This is achieved by the optimized cemented carbide grain size that reduces thermal conductivity and heating of the cutting edge.

After 500 passes at 49 feet per pass (Total cutting length 24500 feet)



Damage across the whole cutting edge.

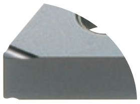
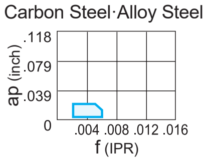
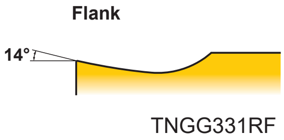
Boundary damage.

<Cutting Conditions>

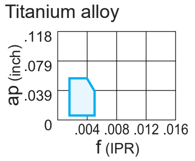
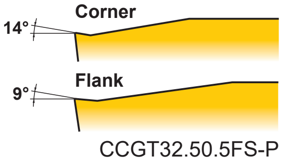
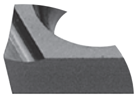
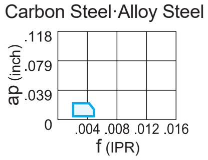
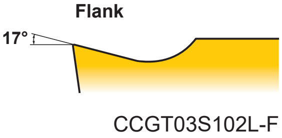
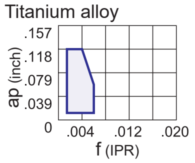
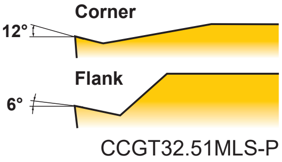
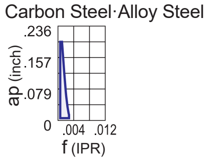
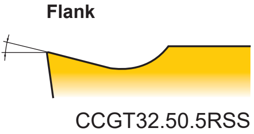
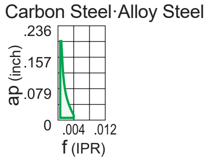
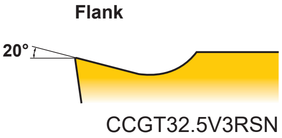
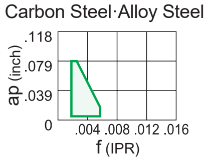
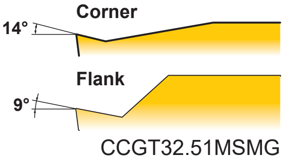
Workpiece Material	: AISI 304
Inserts	: DCGT32.50.5M
Cutting Speed	: vc =330 SFM
Feed per Rev.	: fr=.0031 IPR
Depth of Cut	: ap =.039 inch
The Number of Vibration	: Mode 1
Cutting Mode	: External Continuous Cutting Wet Cutting (Oil)

Breaker System

Negative Inserts

Application	Tolerance	Breaker Name and Picture	Features	Cross Section Geometry
Finish Cutting	G	**R/L-FS** 	**Precise finishing** Double sided chipbreaker. A narrow angled chipbreaker for good control. The sharp edge produces a good surface finish.	 

Positive Inserts

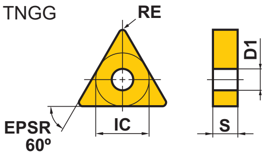
Application	Tolerance	Breaker Name and Picture	Features	Cross Section Geometry
Finish Cutting	G	**FS-P** 	**Recommendation for finishing titanium alloy** Ideal for titanium alloys and copper alloys. Sharp cutting edges provide excellent surface precision and finish. Highly efficient chip discharge is possible due to curved cutting edges. Polished (mirror-surface) finish of insert surfaces drastically improves welding resistance extending tool life.	 
	G	**R/L-F** 	**Chipbreaker for finishing** Lead chipbreaker controls chip flow. Sharp cutting edge gives a good surface finish.	 
Light Cutting	G	**LS-P** 	**Recommendation for light cutting of titanium alloy** Ideal for aluminum and copper. The parallel cutting edge. Breaker protrusion suitable for depth of cut area achieves a wide range of chip control. The polished insert face prevents built up edge.	 
	G	**R/L-SS** 	**Chipbreaker for light cutting of automatic lathe machining** A parallel chipbreaker. Excellent chip control at low feed rates.	 
Medium Cutting	G	**R/L-SN** 	**General purpose for Swiss-type lathe machining** The parallel chipbreaker. Excellent chip control for low to medium feed rates.	 
	G	**SMG** 	**Medium cutting for Swiss-type lathes machining** 3D molded chipbreaker provides good chip control. G class insert gives sharp cutting action, allowing high precision machining. Breaker geometry appropriate for copying and back turning. M = minus radius tolerance	 

MS6015/MS7025/MS9025

Negative Inserts (With Hole)

G Class

Finish		
R/L-FS 		



(inch)

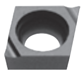
Order Number	Cutting Area	MS6015	MS7025	MS9025	IC	S	RE	D1
TNGG330.5RFS	F	●			.375	.187	.008	.150
TNGG330.5LFS	F	●			.375	.187	.008	.150
TNGG331RFS	F	●			.375	.187	.016	.150
TNGG331LFS	F	●			.375	.187	.016	.150
TNGG332RFS	F	●			.375	.187	.031	.150
TNGG332LFS	F	●			.375	.187	.031	.150

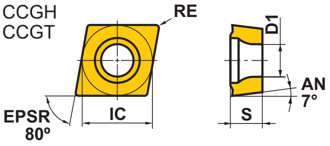
● : USA Stock
(10 inserts in one case)

MS6015/MS7025/MS9025

7° Positive Inserts (With Hole)

G Class

Finish	Finish	
FS-P 	R/L-F 	



(inch)

Order Number	Cutting Area	MS6015	NEW MS7025	NEW MS9025	IC	S	RE*2	D1
CCGT21.50.2MFS-P	F		●	●	.250	.094	.004	.110
CCGT21.50.5MFS-P	F		●	●	.250	.094	.008	.110
CCGT32.50.2MFS-P	F		●	●	.375	.156	.004	.173
CCGT32.50.5MFS-P	F		●	●	.375	.156	.008	.173
CCGT32.51MFS-P	F		●	●	.375	.156	.016	.173
CCGT03S101MR-F	F	●			.141*1	.055	.004	.079
CCGT03S101ML-F	F	●			.141*1	.055	.004	.079
CCGT03S102MR-F	F	●			.141*1	.055	.008	.079
CCGT03S102ML-F	F	●			.141*1	.055	.008	.079
CCGT03S104MR-F	F	●			.141*1	.055	.016	.079
CCGT03S104ML-F	F	●			.141*1	.055	.016	.079
CCGT04T001MR-F	F	●			.172*1	.070	.004	.094
CCGT04T001ML-F	F	●			.172*1	.070	.004	.094
CCGT04T002MR-F	F	●			.172*1	.070	.008	.094
CCGT04T002ML-F	F	●			.172*1	.070	.008	.094
CCGT04T004MR-F	F	●			.172*1	.070	.016	.094
CCGT04T004ML-F	F	●			.172*1	.070	.016	.094
CCGH21.50.5MRF	F	●			.250	.094	.008	.110
CCGH21.50.5MLF	F	●			.250	.094	.008	.110
CCGH21.51MRF	F	●			.250	.094	.016	.110
CCGH21.51MLF	F	●			.250	.094	.016	.110

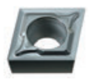
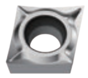
*1 Diameter of inscribed circle is non-ISO standard. (For SCLC type)

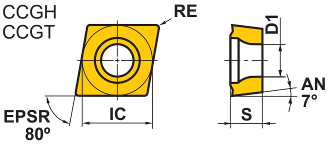
*2 Nominal Value (Max.)

● : USA Stock
(10 inserts in one case)

7° Positive Inserts (With Hole)

G Class

Light	Light	Medium
LS-P 	R/L-SS 	R/L-SN 
Medium		
SMG 		



(inch)

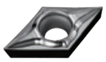
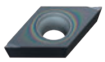
Order Number	Cutting Area	MS6015	NEW MS7025	NEW MS9025	IC	S	RE*	D1
CCGT21.50.2MLS-P	L	●	●	●	.250	.094	.004	.110
CCGT21.50.5MLS-P	L	●	●	●	.250	.094	.008	.110
CCGT32.50.2MLS-P	L	●	●	●	.375	.156	.004	.173
CCGT32.50.5MLS-P	L	●	●	●	.375	.156	.008	.173
CCGT32.51MLS-P	L	●	●	●	.375	.156	.016	.173
CCGT21.50.2MRSS	L	●			.250	.094	.004	.110
CCGT21.50.2MLSS	L	●			.250	.094	.004	.110
CCGT21.50.5MRSS	L	●			.250	.094	.008	.110
CCGT21.50.5MLSS	L	●			.250	.094	.008	.110
CCGT32.50.2MRSS	L	●			.375	.156	.004	.173
CCGT32.50.2MLSS	L	●			.375	.156	.004	.173
CCGT32.50.5MRSS	L	●			.375	.156	.008	.173
CCGT32.50.5MLSS	L	●			.375	.156	.008	.173
CCGT32.51MRSS	L	●			.375	.156	.016	.173
CCGT32.51MLSS	L	●			.375	.156	.016	.173
CCGT21.50.2MRSN	M	●	●	●	.250	.094	.004	.110
CCGT21.50.2MLSN	M	●			.250	.094	.004	.110
CCGT21.50.5MRSN	M	●	●	●	.250	.094	.008	.110
CCGT21.50.5MLSN	M	●			.250	.094	.008	.110
CCGT32.50.2MRSN	M	●	●	●	.375	.156	.004	.173
CCGT32.50.2MLSN	M	●			.375	.156	.004	.173
CCGT32.50.5MRSN	M	●	●	●	.375	.156	.008	.173
CCGT32.50.5MLSN	M	●			.375	.156	.008	.173
CCGT32.51MRSN	M	●	●	●	.375	.156	.016	.173
CCGT32.51MLSN	M	●			.375	.156	.016	.173
CCGT21.50.2MSMG	M	●			.250	.094	.004	.110
CCGT21.50.5MSMG	M	●			.250	.094	.008	.110
CCGT21.51MSMG	M	●			.250	.094	.016	.110
CCGT32.50.2MSMG	M	●			.375	.156	.004	.173
CCGT32.50.5MSMG	M	●			.375	.156	.008	.173
CCGT32.51MSMG	M	●			.375	.156	.016	.173

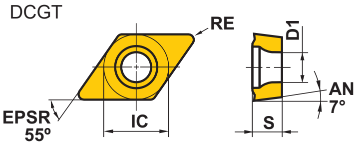
* Nominal Value (Max.)

MS6015/MS7025/MS9025

7° Positive Inserts (With Hole)

G Class

Finish	Finish	Light
FS-P 	R-SRF 	LS-P 
Light		
R/L-SS 		



(inch)

Order Number	Cutting Area	MS6015	NEW MS7025	NEW MS9025	IC	S	RE*	D1
DCGT21.50.2MFS-P	F		●	●	.250	.094	.004	.110
DCGT21.50.5MFS-P	F		●	●	.250	.094	.008	.110
DCGT21.51MFS-P	F		●	●	.250	.094	.016	.110
DCGT32.50.2MFS-P	F		●	●	.375	.156	.004	.173
DCGT32.50.5MFS-P	F		●	●	.375	.156	.008	.173
DCGT32.51MFS-P	F		●	●	.375	.156	.016	.173
DCGT32.50.2MRSRF	F		●	●	.375	.156	.004	.173
DCGT32.50.5MRSRF	F		●	●	.375	.156	.008	.173
DCGT32.51MRSRF	F		●	●	.375	.156	.016	.173
DCGT21.50.2MLS-P	L	●	●	●	.250	.094	.004	.110
DCGT21.50.5MLS-P	L	●	●	●	.250	.094	.008	.110
DCGT21.51MLS-P	L	●	●	●	.250	.094	.016	.110
DCGT32.50.2MLS-P	L	●	●	●	.375	.156	.004	.173
DCGT32.50.5MLS-P	L	●	●	●	.375	.156	.008	.173
DCGT32.51MLS-P	L	●	●	●	.375	.156	.016	.173
DCGT21.50.2MRSS	L	●			.250	.094	.004	.110
DCGT21.50.2MLSS	L	●			.250	.094	.004	.110
DCGT21.50.5MRSS	L	●			.250	.094	.008	.110
DCGT21.50.5MLSS	L	●			.250	.094	.008	.110
DCGT32.50.2MRSS	L	●			.375	.156	.004	.173
DCGT32.50.2MLSS	L	●			.375	.156	.004	.173
DCGT32.50.5MRSS	L	●			.375	.156	.008	.173
DCGT32.50.5MLSS	L	●			.375	.156	.008	.173
DCGT32.51MRSS	L	●			.375	.156	.016	.173
DCGT32.51MLSS	L	●			.375	.156	.016	.173

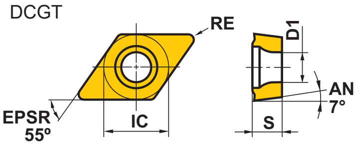
* Nominal Value (Max.)

● : USA Stock
(10 inserts in one case)

7° Positive Inserts (With Hole)

G Class

Medium	Medium	
R/L-SN 	SMG 	



(inch)

Order Number	Cutting Area	MS6015	NEW MS7025	NEW MS9025	IC	S	RE*	D1
DCGT21.50.2MRSN	M	●	●	●	.250	.094	.004	.110
DCGT21.50.2MLSN	M	●			.250	.094	.004	.110
DCGT21.50.5MRSN	M	●	●	●	.250	.094	.008	.110
DCGT21.50.5MLSN	M	●			.250	.094	.008	.110
DCGT21.51MRSN	M		●	●	.250	.094	.016	.110
DCGT32.50.2MRSN	M	●	●	●	.375	.156	.004	.173
DCGT32.50.2MLSN	M	●			.375	.156	.004	.173
DCGT32.50.5MRSN	M	●	●	●	.375	.156	.008	.173
DCGT32.50.5MLSN	M	●			.375	.156	.008	.173
DCGT32.51MRSN	M	●	●	●	.375	.156	.016	.173
DCGT32.51MLSN	M	●			.375	.156	.016	.173
DCGT21.50.2MSMG	M	●			.250	.094	.004	.110
DCGT21.50.5MSMG	M	●			.250	.094	.008	.110
DCGT21.51MSMG	M	●			.250	.094	.016	.110
DCGT32.50.2MSMG	M	●			.375	.156	.004	.173
DCGT32.50.5MSMG	M	●			.375	.156	.008	.173
DCGT32.51MSMG	M	●			.375	.156	.016	.173

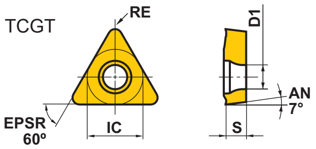
* Nominal Value (Max.)

MS6015/MS7025/MS9025

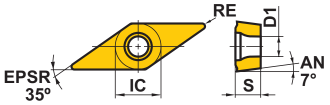
7° Positive Inserts (With Hole)

G Class

TCGT



VCGT



Finish	Light	
R/L-F 	LS-P 	

(inch)

Order Number	Cutting Area	MS6015	NEW MS7025	MS9025	IC	S	RE*	D1
TCGT1.210.2MRF	F	●			.156	.063	.004	.091
TCGT1.210.2MLF	F	●			.156	.063	.004	.091
TCGT1.210.5MRF	F	●			.156	.063	.008	.091
TCGT1.210.5MLF	F	●			.156	.063	.008	.091
TCGT1.211MRF	F	●			.156	.063	.016	.091
TCGT1.211MLF	F	●			.156	.063	.016	.091
VCGT220.2MLS-P	L		●		.250	.125	.004	.110
VCGT220.5MLS-P	L		●		.250	.125	.008	.110
VCGT221MLS-P	L		●		.250	.125	.016	.110

* Nominal Value (Max.)

● : USA Stock
(10 inserts in one case)

Recommended Cutting Conditions

(inch)

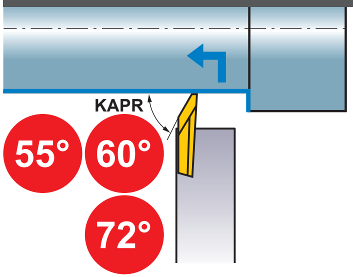
Workpiece Material		Properties	Cutting Area		Chip Breaker	Grade	Cutting Speed **vc** (SFM)	Feed per Rev. **f** (IPR)	Depth of Cut **ap**
P	Pure Irons Free Cutting Steels	–	●	F	FS	MS6015	490(165–820)	.0004–.0059	.008–.028
			●	F	R/L-F	MS6015	490(165–820)	.0004–.0059	.004–.020
			◐	L	LS-P	MS6015	490(165–820)	.0004–.0059	.012–.118
			◐	L	R/L-SS	MS6015	490(165–820)	.0004–.0059	.008–.039
			◐	M	R/L-SN	MS6015	490(165–820)	.0004–.0059	.004–.020
			◐	M	SMG	MS6015	490(165–820)	.0004–.0059	.004–.079
	Carbon Steels Alloy Steels	180–280HB	●	F	FS	MS6015	330(165–490)	.0004–.0059	.008–.028
			●	F	R/L-F	MS6015	330(165–490)	.0004–.0059	.004–.020
			◐	L	LS-P	MS6015	330(165–490)	.0004–.0059	.012–.118
			◐	L	R/L-SS	MS6015	330(165–490)	.0004–.0059	.008–.039
			◐	M	R/L-SN	MS6015	330(165–490)	.0004–.0059	.004–.020
			◐	M	SMG	MS6015	330(165–490)	.0004–.0059	.004–.079
M	Austenitic Stainless Steels	–	●	F	FS	MS7025	195(130–330)	.0004–.0031	.008–.028
			●	F	FS-P	MS9025	330(195–490)	.0016–.0059	.008–.028
			●	F	R/L-F	MS7025	195(130–330)	.0004–.0031	.004–.020
			◐	F	R-SRF	MS9025	330(195–490)	.0016–.0059	.004–.020
			◐	L	LS-P	MS7025	195(130–330)	.0004–.0031	.012–.118
			◐	L	LS-P	MS9025	330(195–490)	.0020–.0059	.012–.118
			◐	M	R-SN	MS7025	195(130–330)	.0004–.0031	.004–.197
			◐	M	R-SN	MS9025	330(195–490)	.0020–.0059	.004–.197
	Ferritic and Martensitic Stainless Steels	–	●	F	FS-P	MS7025	195(130–330)	.0004–.0031	.008–.028
			◐	F	R-SRF	MS7025	195(130–330)	.0004–.0031	.004–.020
			◐	L	LS-P	MS7025	195(130–330)	.0004–.0031	.012–.118
			◐	L	R-SN	MS7025	195(130–330)	.0004–.0031	.004–.197
	Electromagnetic Stainless Steels (AISI 440C, AISI 420J2 etc.)	Hardness 230HBW	●	F	FS-P	MS7025	260(130–525)	.0008–.0031	.008–.071
			●	F	FS-P	MS9025	330(165–590)	.0016–.0047	.008–.071
			◐	F	R-SRF	MS7025	260(130–525)	.0012–.0031	.004–.020
			◐	F	R-SRF	MS9025	330(165–590)	.0020–.0047	.004–.020
			◐	L	LS-P	MS7025	260(130–525)	.0008–.0039	.012–.118
			◐	L	LS-P	MS9025	330(165–590)	.0016–.0059	.012–.118
			◐	M	R-SN	MS7025	260(130–525)	.0004–.0039	.004–.197
			◐	M	R-SN	MS9025	330(165–590)	.0004–.0039	.004–.197
	Precipitation Hardening Stainless Steels (AISI 630, AISI 631 etc.)	<450HB	●	F	FS-P	MS7025	195(130–260)	.0004–.0039	.004–.055
			●	F	FS-P	MS9025	230(165–330)	.0012–.0059	.004–.055
			◐	F	R-SRF	MS7025	195(130–260)	.0004–.0039	.004–.020
			◐	F	R-SRF	MS9025	230(165–330)	.0012–.0059	.004–.020
			◐	L	LS-P	MS7025	195(130–260)	.0016–.0039	.008–.118
			◐	L	LS-P	MS9025	230(165–330)	.0016–.0059	.008–.118
			◐	M	R-SN	MS7025	195(130–260)	.0012–.0039	.012–.118
			◐	M	R-SN	MS9025	230(165–330)	.0016–.0059	.008–.118
S	Heat Resistant Alloys (HNV6, EV8, AISI 446 etc.)	–	●	F	FS-P	MS9025	260(130–460)	.0016–.0047	.008–.055
			◐	F	R-SRF	MS9025	260(130–460)	.0020–.0047	.004–.020
			◐	L	LS-P	MS9025	260(130–460)	.0016–.0059	.012–.118
			◐	M	R-SN	MS9025	260(130–460)	.0004–.0039	.004–.197

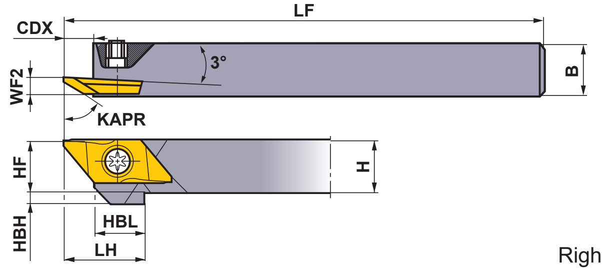
Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✣ : Unstable Cutting

BACK TURNING TOOLS (FOR GANG TYPE TOOL POSTS)

INCH STANDARD

BTAH





Right hand tool holder shown.

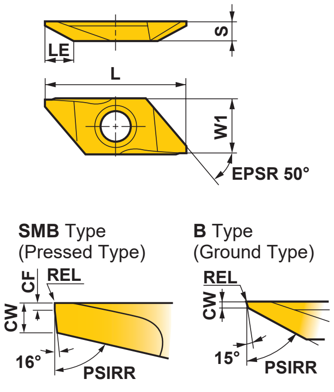
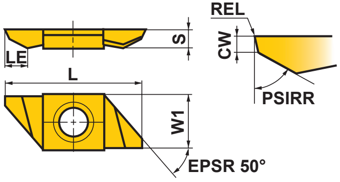
Order Number	Stock		Insert Number		Dimensions (inch)									*	
	R	L			H	B	LF	LH	HF	WF2	HBH	HBL	CDX	Clamp Screw	Wrench
BTAHR/L-062	●	●	BTAT	5528◌◌R/L-B 6035◌◌R/L-B 605000RX 7235◌◌R-SMB	.375	.375	4.724	.591	.375	.138	.125	.374	.217	NS402W	NKY15S
BTAHR/L-082	●	●			.500	.500	4.724	.591	.500	.138	—	.374	.217	NS403W	NKY15S
BTAHR/L-102	●				.625	.625	4.724	.591	.625	.138	—	.374	.217	NS403W	NKY15S

* Clamp Torque (lbf-in) : NS402W=6.2, NS403W=6.2

Note 1) Please use right hand insert for right hand holder and left hand insert for left hand holder.

Note 2) Set the maximum depth of cut at under 60% of the effective cutting edge length (LE).

INSERTS

Order Number	Hand	Coated		Dimensions(inch)							LE* (inch)	Geometry
		VP15TF	MS6015	PSIRR/L*	REL	CF	L	W1	CW	S		
BTAT7235V5R-SMB	R	●		72°	.002	.012	.787	.315	.055	.098	.138	With Breaker  **SMB** Type (Pressed Type) **B** Type (Ground Type) Right hand insert shown.
BTAT723501MR-SMB	R	●		72°	.004*	.012	.787	.315	.055	.098	.138	
BTAT723502MR-SMB	R	●		72°	.008*	.012	.787	.315	.055	.098	.138	
BTAT552800R-B	R	●	●	55°	.000	.000	.787	.315	.020	.098	.110	
BTAT552800L-B	L	●		55°	.000	.000	.787	.315	.020	.098	.110	
BTAT552801R-B	R	●	●	55°	.004	.000	.787	.315	.020	.098	.110	
BTAT552801L-B	L	●		55°	.004	.000	.787	.315	.020	.098	.110	
BTAT603500R-B	R	●	●	60°	.000	.000	.787	.315	.020	.098	.138	
BTAT603500L-B	L	●		60°	.000	.000	.787	.315	.020	.098	.138	
BTAT603501MR-B	R		●	60°	.004*	.000	.787	.315	.020	.098	.138	
BTAT603501R-B	R	●	●	60°	.004	.000	.787	.315	.020	.098	.138	
BTAT603501L-B	L	●		60°	.004	.000	.787	.315	.020	.098	.138	
BTAT605000RX	R	●		60°	.000	.000	.787	.315	.049	.098	.197	Without Breaker 

* Numeric value set insert on holder.

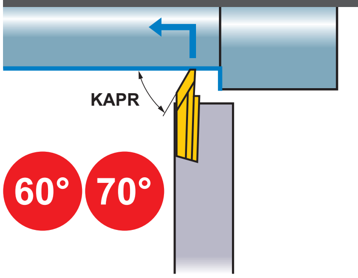
* REL: Nominal Value (Max.)

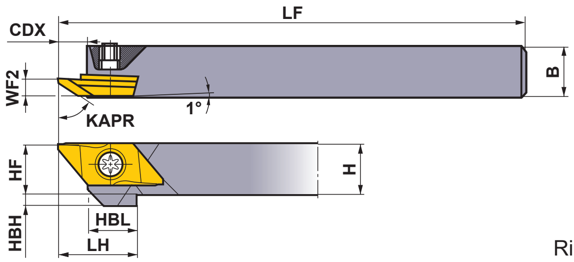
Note 1) REL, PSIRR dimensions for Right Hand Tool and RER,
PSIRL dimensions for Left Hand Tool.

● : USA Stock
<5 inserts in one case>

INCH STANDARD

CTBH





Right hand tool holder shown.

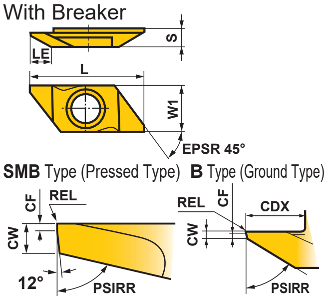
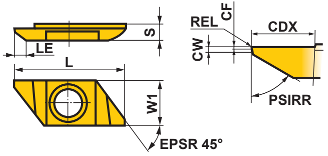
Order Number	Stock		Insert Number		Dimensions (inch)									Clamp Screw *	Wrench
	R	L			H	B	LF	LH	HF	WF2	HBH	HBL	CDX		
CTBHR/L-062	●	●	BTBT	60450◌R/L-B 606000R/L 7055◌◌R-SMB	.375	.375	4.724	.768	.375	.133	.125	.472	.295	NS402W	NKY15S
CTBHR/L-082	●	●			.500	.500	4.724	.768	.500	.133	—	.472	.295	NS403W	NKY15S
CTBHR/L-102	●	●			.625	.625	4.724	.768	.625	.133	—	.472	.295	NS403W	NKY15S

* Clamp Torque (lbf-in) : NS402W=6.2, NS403W=6.2

Note 1) Please use right hand insert for right hand holder and left hand insert for left hand holder.

Note 2) Set the maximum depth of cut at under 60% of the effective cutting edge length (LE).

INSERTS

Order Number	Hand	Coated		Dimensions(inch)								LE*	Geometry
		VP15TF	MS6015	PSIRR/L*	REL	CF	L	W1	CW	S	CDX		
BTBT7055V5R-SMB	R	●		70°	.002	.012	.984	.370	.053	.138	.256	.217	With Breaker  Right hand insert shown.
BTBT705501MR-SMB	R	●		70°	.004*	.012	.984	.370	.053	.138	.256	.217	
BTBT705502MR-SMB	R	●		70°	.008*	.012	.984	.370	.053	.138	.256	.217	
BTBT604500R-B	R	●	●	60°	.000	.008	.984	.370	.028	.138	.217	.177	
BTBT604500L-B	L	●		60°	.000	.008	.984	.370	.028	.138	.217	.177	
BTBT604501MR-B	R		●	60°	.004*	.012	.984	.370	.028	.138	.217	.177	
BTBT604501R-B	R	●	●	60°	.004	.012	.984	.370	.028	.138	.217	.177	
BTBT604501L-B	L	●		60°	.004	.012	.984	.370	.028	.138	.217	.177	
BTBT606000R	R	●		60°	.000	.008	.984	.370	.028	.138	.276	.236	Without Breaker  Right hand insert shown.
BTBT606000L	L	●		60°	.000	.008	.984	.370	.028	.138	.276	.236	

* Numeric value set insert on holder.
* REL: Nominal Value (Max.)

Note 1) REL, PSIRR dimensions for Right Hand Tool and RER, PSIRL dimensions for Left Hand Tool.

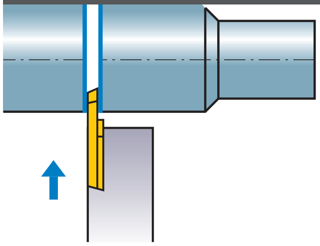
RECOMMENDED CUTTING CONDITIONS

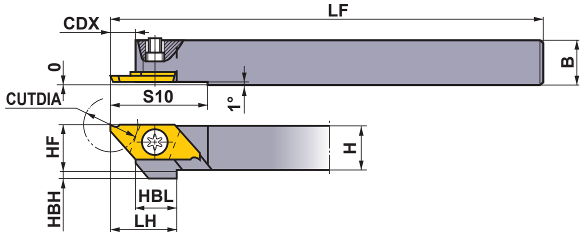
	Work Material	Hardness	Grade	Cutting Speed (SFM)	Feed (IPR)
P	Carbon Steel · Alloy Steel	180HB–280HB	**MS6015/VP15TF**	165–490	.0004–.006
	Free Cutting Steel	–	**MS6015**	100–590	.0004–.006
M	Stainless Steel	≤200HB	**VP15TF**	165–395	.0008–.004
N	Non-Ferrous Metal	–	**MS6015**	230–755	.0012–.006

CUTTING OFF TOOLS (FOR GANG TYPE TOOL POSTS)

INCH STANDARD

CTAH



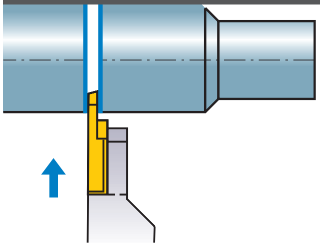


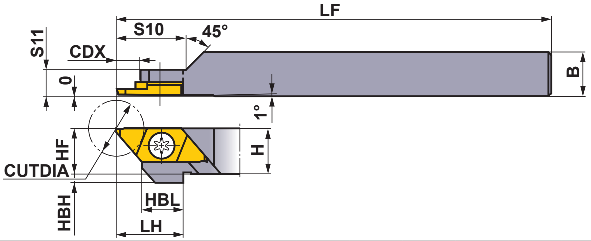
Right hand tool holder shown.

Order Number	Stock		Insert Number		Dimensions (inch)									CUTDIA (inch)	*2 Clamp Screw	Wrench
	R	L			H	B	HF	LF	LH	CDX	HBH	HBL	S10			
CTAHR/L-062	●	●	CTAT	○○○○	.375	.375	.375	4.724	.591	.217	.125	.374	.866	.472 (.315)*1	NS402W	NKY15S
CTAHR/L-082	●	●		○○○○	.500	.500	.500	4.724	.591	.217	—	.374	.866		NS402W	NKY15S
CTAHR/L-102	●	●		○○○○	.625	.625	.625	4.724	.591	.217	—	.374	.866		NS403W	NKY15S

*1 When the width of cutting off (CW) is .028 inch.
*2 Clamp Torque (lbf-in) : NS402W=6.2, NS403W=6.2

CTAH-S





Right hand tool holder only.

Order Number	Stock	Insert Number		Dimensions (inch)										CUTDIA (inch)	*2 Clamp Screw	Wrench
	R			H	B	HF	LF	LH	CDX	HBH	HBL	S10	S11			
CTAHR-062S	●	CTAT	○○○○	.375	.375	.375	3.150	.591	.217	.125	.374	.630	.217	.472 (.315)*1	NS401	NKY25R
CTAHR-082S	●		○○○○	.500	.500	.500	3.150	.591	.217	—	.374	.630	.217		NS401	NKY25R

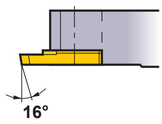
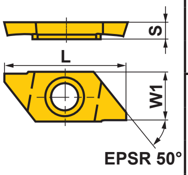
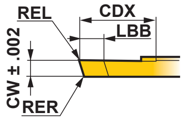
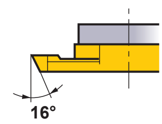
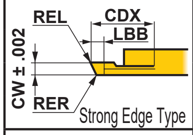
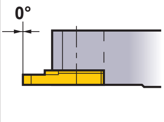
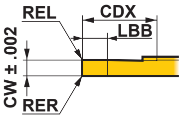
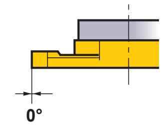
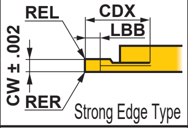
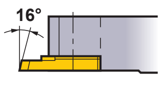
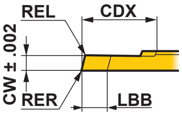
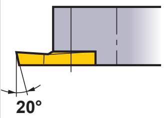
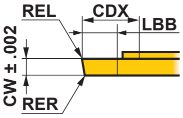
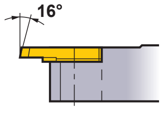
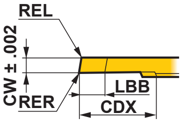
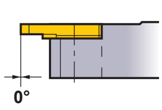
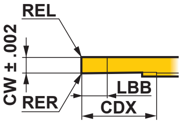
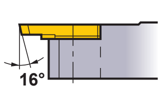
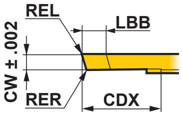
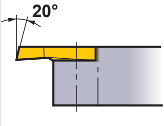
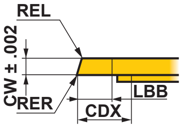
*1 When the width of cutting off (CW) is .028 inch.
*2 Clamp Torque (lbf-in) : NS401=31

RECOMMENDED CUTTING CONDITIONS

	Work Material	Hardness	Grade	Cutting Speed (SFM)	Feed (IPR)
P	Carbon Steel · Alloy Steel	180HB–280HB	**MS6015/VP15TF**	165–490	.0008–.0035
	Free Cutting Steel	–	**MS6015**	100–590	.0004–.0035
M	Stainless Steel	≤200HB	**VP15TF**	165–395	.0008–.0019
N	Non-Ferrous Metal	–	**MS6015**	230–755	.0012–.0043

● : USA Stock
<5 inserts in one case>

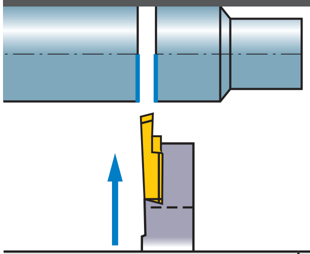
INSERTS

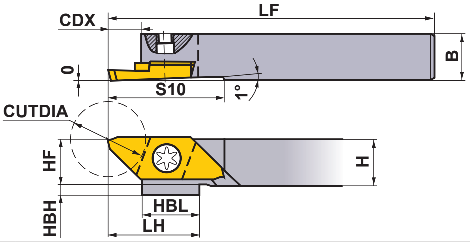
Holder	Setting Geometry	Breaker	Geometry	Insert Geometry	Order Number	Hand	Coated		Dimensions (inch)							CUTDIA (inch)
							VP15TF	MS6015	CW	CDX	RER/L	L	W1	S	LBB	
Right Hand (R)		With Breaker	 Right hand insert shown.		**CTAT07080V5RR-B**	R	●		.028	.177	.002	.787	.315	.098	.059	.315
					CTAT10120V5RR-B	R	●	●	.039	.264	.002	.787	.315	.098	.059	.472
					CTAT15120V5RR-B	R	●	●	.059	.264	.002	.787	.315	.098	.059	.472
					CTAT20120V5RR-B	R	●	●	.079	.264	.002	.787	.315	.098	.059	.472
					**CTAT15120V5RR-BX**	R	●		.059	.264	.002	.787	.315	.098	.059	.472
					CTAT20120V5RR-BX	R	●		.079	.264	.002	.787	.315	.098	.059	.472
					**CTAT10120V5RN-B**	N	●	●	.039	.264	.002	.787	.315	.098	.059	.472
					CTAT15120V5RN-B	N	●	●	.059	.264	.002	.787	.315	.098	.059	.472
					CTAT20120V5RN-B	N	●	●	.079	.264	.002	.787	.315	.098	.059	.472
					**CTAT15120V5RN-BX**	N	●		.059	.264	.002	.787	.315	.098	.059	.472
					CTAT20120V5RN-BX	N	●		.079	.264	.002	.787	.315	.098	.059	.472
					**CTAT10110V5RL-B**	L	●		.039	.264	.002	.787	.315	.098	.059	.433
					CTAT15110V5RL-B	L	●		.059	.264	.002	.787	.315	.098	.059	.433
					CTAT20110V5RL-B	L	●		.079	.264	.002	.787	.315	.098	.059	.433
		Without Breaker			**CTAT1012000RR**	R	●	●	.039	.264	.000	.787	.315	.098	.138	.472
					CTAT1512000RR	R	●	●	.059	.264	.000	.787	.315	.098	.138	.472
					CTAT2012000RR	R	●	●	.079	.264	.000	.787	.315	.098	.138	.472
Left Hand (L)		With Breaker			**CTAT07080V5LL-B**	L	●		.028	.177	.002	.787	.315	.098	.059	.315
					CTAT10120V5LL-B	L	●		.039	.264	.002	.787	.315	.098	.059	.472
					CTAT15120V5LL-B	L	●		.059	.264	.002	.787	.315	.098	.059	.472
					CTAT20120V5LL-B	L	●		.079	.264	.002	.787	.315	.098	.059	.472
					**CTAT10120V5LN-B**	N	●	●	.039	.264	.002	.787	.315	.098	.059	.472
					CTAT15120V5LN-B	N	●	●	.059	.264	.002	.787	.315	.098	.059	.472
					CTAT20120V5LN-B	N	●	●	.079	.264	.002	.787	.315	.098	.059	.472
					**CTAT10110V5LR-B**	R	●	●	.039	.264	.002	.787	.315	.098	.059	.433
					CTAT15110V5LR-B	R	●	●	.059	.264	.002	.787	.315	.098	.059	.433
					CTAT20110V5LR-B	R	●	●	.079	.264	.002	.787	.315	.098	.059	.433
		Without Breaker			**CTAT1012000LL**	L	●		.039	.264	.000	.787	.315	.098	.138	.472
					CTAT1512000LL	L	●		.059	.264	.000	.787	.315	.098	.138	.472
					CTAT2012000LL	L	●		.079	.264	.000	.787	.315	.098	.138	.472

CUTTING OFF TOOLS (FOR GANG TYPE TOOL POSTS)

METRIC STANDARD

CTBH



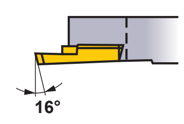
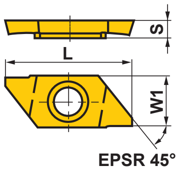
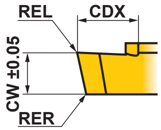
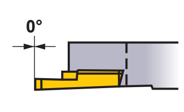
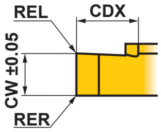
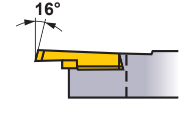
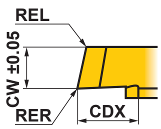
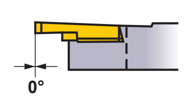
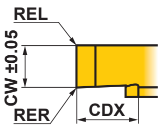
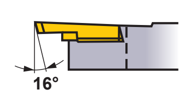
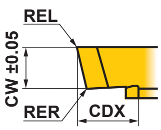


Right hand tool holder shown.

Order Number	Stock		Insert Number		Dimensions (mm)									CUTDIA (mm)	Clamp Screw *	Wrench
	R	L			H	B	HF	LF	LH	CDX	HBH	HBL	S10			
CTBHR/L1010-160	●	●	CTBT	○○○○	10	10	10	120	19.5	7.5	2	9.5	25	16	NS402W	NKY15S
CTBHR/L1212-160	●	●		○○○○	12	12	12	120	19.5	7.5	—	9.5	25	16	NS403W	NKY15S
CTBHR/L1616-160	●	●		○○○○	16	16	16	120	19.5	7.5	—	9.5	25	16	NS403W	NKY15S

* Clamp Torque (lbf-in) : NS402W=6.2, NS403W=6.2

INSERTS

Holder	Setting Geometry	Breaker	Geometry	Insert Geometry	Order Number	Hand	Coated		Dimensions (mm)						CUTDIA (mm)
							VP15TF	MS6015	CW	CDX	RER/L	L	W1	S	
Right Hand (R)		With Breaker	 Right hand insert shown.		CTBT15160V5RR-B	R	●	●	1.5	9.2	0.05	25	9.4	3.5	16
					CTBT20160V5RR-B	R	●	●	2.0	9.2	0.05	25	9.4	3.5	16
					CTBT20160V5RN-B	N	●	●	2.0	9.2	0.05	25	9.4	3.5	16
Left Hand (L)					CTBT20160V5LL-B	L	●		2.0	9.2	0.05	25	9.4	3.5	16
					CTBT20160V5LN-B	N	●	●	2.0	9.2	0.05	25	9.4	3.5	16
					CTBT20145V5LR-B	R	●	●	2.0	9.2	0.05	25	9.4	3.5	14.5

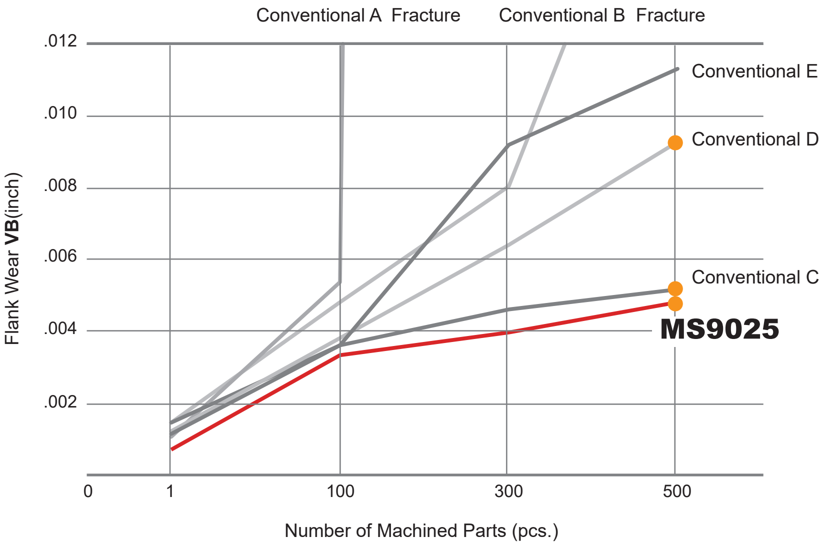
RECOMMENDED CUTTING CONDITIONS

	Work Material	Hardness	Grade	Cutting Speed (SFM)	Feed (IPR)
P	Carbon Steel · Alloy Steel	180HB–280HB	MS6015/VP15TF	165–490	.0008 –.0035
	Free Cutting Steel	–	MS6015	100–590	.0004 –.0035
M	Stainless Steel	≤200HB	VP15TF	165–395	.0008 –.0019
N	Non-Ferrous Metal	–	MS6015	230–755	.0012 –.0043

● : USA Stock
<5 inserts in one case>

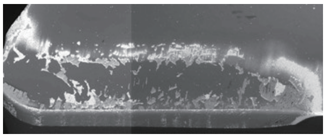
Cutting Performance

Stainless Steel AISI 440C, Wear Resistance Comparison

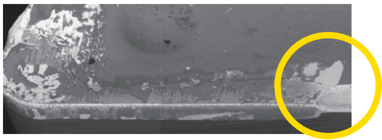


<Cutting Conditions>
Workpiece Material : AISI 440C
Inserts : DCGT32.50.5
Machining Methods : External
Continuous Cutting
Cutting Speed : vc =330 SFM
Feed per Rev. : fr=.0031 IPR
Depth of Cut : ap =.039 inch
Cutting Mode : Wet Cutting (Oil)

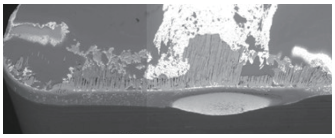
Taken after machining 500 Parts



MS9025

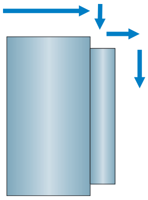
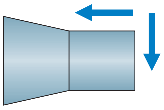
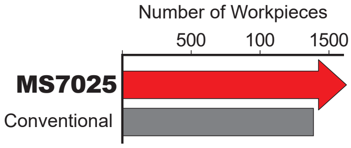


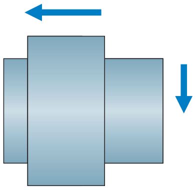
Conventional C : Flaking



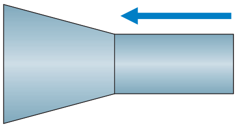
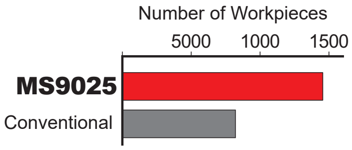
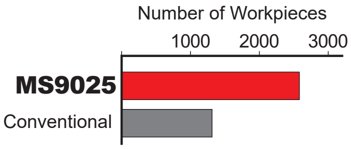
Conventional D : Base material exposure

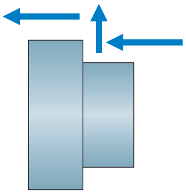
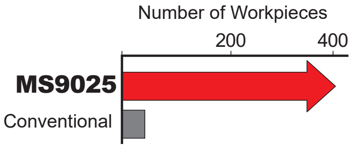
Application Examples

Insert		DCGT21.50.5MFS-P (MS7025)	DCGT32.50.5MFS-P (MS7025)
Workpiece Material		AISI 440C 	AISI 430F 
Component		Valve	Shaft Parts
Application		External and Face Turning	External and Face Turning
Cutting Conditions	Cutting Speed **vc** (SFM)	190	425
	Feed per Rev. **f** (IPR)	.0016	.0012
	Depth of Cut **ap** (inch)	.006	.022
Cutting Mode		Wet Cutting (Oil)	Wet Cutting (Oil)
Results		 Compared to conventional products, the dimensional accuracy is stable and high machining quality is maintained.	Chip control has been improved and the quality of the machined surface is also good.

Insert		DCGT32.50.5MFS-P (MS7025)
Workpiece Material		AISI 430 
Component		Machine Parts
Application		External and Face Turning
Cutting Conditions	Cutting Speed **vc** (SFM)	330
	Feed per Rev. **f** (IPR)	.0024
	Depth of Cut **ap** (inch)	.010
Cutting Mode		Wet Cutting (Oil)
Results		By suppressing chip welding, cutting edge damage is reduced and the surface quality can be improved.

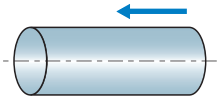
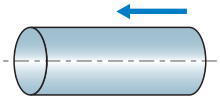
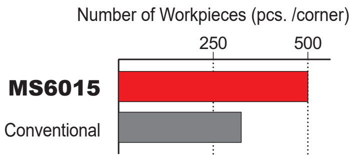
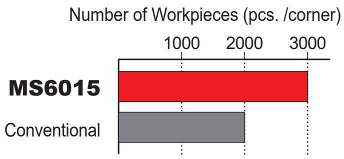
The application examples are from customers workpieces and can therefore differ from the recommended cutting conditions.

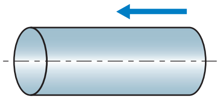
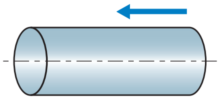
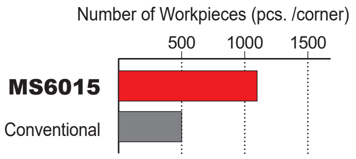
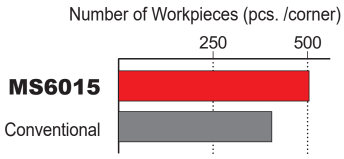
Insert		**DCGT32.50.5MLS-P (MS9025)**	**DCGT21.50.2MFS-P (MS9025)**
Workpiece Material		AISI 420 Stainless Steel 	AISI 440C Electromagnetic Stainless Steel 
Component		Solenoid Parts	Brake Parts
Application		External Continuous Turning	External Continuous Turning
Cutting Conditions	Cutting Speed **vc** (SFM)	385	125
	Feed per Rev. **f** (IPR)	.0039	.0020
	Depth of Cut **ap** (inch)	.008	.008
Cutting Mode		Wet Cutting (Oil)	Wet Cutting (Oil)
Results		 Improved wear resistance and tool life increased by a factor of 1.7.	 Improved welding resistance and double tool life when compared to a conventional tool.

Insert		**DCGT32.51MLS-P (MS9025)**
Workpiece Material		JIS SUH3 Heat Resistant Alloy 
Component		Valve
Application		External and Face Continuous Turning
Cutting Conditions	Cutting Speed **vc** (SFM)	260
	Feed per Rev. **f** (IPR)	.0047-.0059
	Depth of Cut **ap** (inch)	.012-.020
Cutting Mode		Wet Cutting (Oil)
Results		 Conventional products tend to have a worsened surface during processing. On the other hand, the machined surface of MS9025 is stable even with a tool life of 5 times or more.

The application examples are from customers workpieces and can therefore differ from the recommended cutting conditions.

Application Examples

	Insert (Grade)	**DCGT32.50.5MSMG (MS6015)**	**DCGT32.50.2MRSN (MS6015)**
	Workpiece Material	Iron-based Soft Magnetic Material (ELCH2) 	Free Cutting Steel (AISI 12L14) 
Cutting Conditions	Cutting Speed **vc** (SFM)	645 (4500min^{-1})	410 (5000min^{-1})
	Feed per Rev. **f** (IPR)	.004	.002
	Depth of Cut **ap** (inch)	.004	.012
	Cutting Mode	Wet Cutting (Water-insoluble)	Wet Cutting (Water-insoluble)
	Machine	Swiss-type Lathes	Swiss-type Lathes
	Results	 An excellent finished surface and 1.4 times longer life compared with conventional products. Stable SMG breaker and chip discharge management.	 MS6015 has minimal welding and maintains secure dimensional accuracy.

	Insert (Grade)	**DCGT32.50.5MRSN (MS6015)**	**DCGT32.50.5MSMG (MS6015)**
	Workpiece Material	Carbon Steel (AISI 1045) 	Mild Steel (AISI 1015) 
Cutting Conditions	Cutting Speed **vc** (SFM)	370 (3000min^{-1})	330 (1300min^{-1})
	Feed per Rev. **f** (IPR)	.001	.005
	Depth of Cut **ap** (inch)	.039	.051
	Cutting Mode	Wet Cutting (Water-insoluble)	Wet Cutting (Water-insoluble)
	Machine	Swiss-type Lathes	Swiss-type Lathes
	Results	 MS6015 has superior wear resistance and achieves double longer life compared with conventional products.	 MS6015 has superior welding resistance and achieves 1.3 times longer life compared with conventional products.

The application examples are from customers workpieces and can therefore differ from the recommended cutting conditions.

For your safety
●Don't handle inserts and chips without gloves. ●Please machine within the recommended application range and exchange expired tools with new ones in advance of breakage. ●Please use safety covers and wear safety glasses. ●When using compounded cutting oils, please take fire precautions. ●When using rotating tools, please make a trial run to check run-out, vibration and abnormal sounds etc.

DIAEDGE

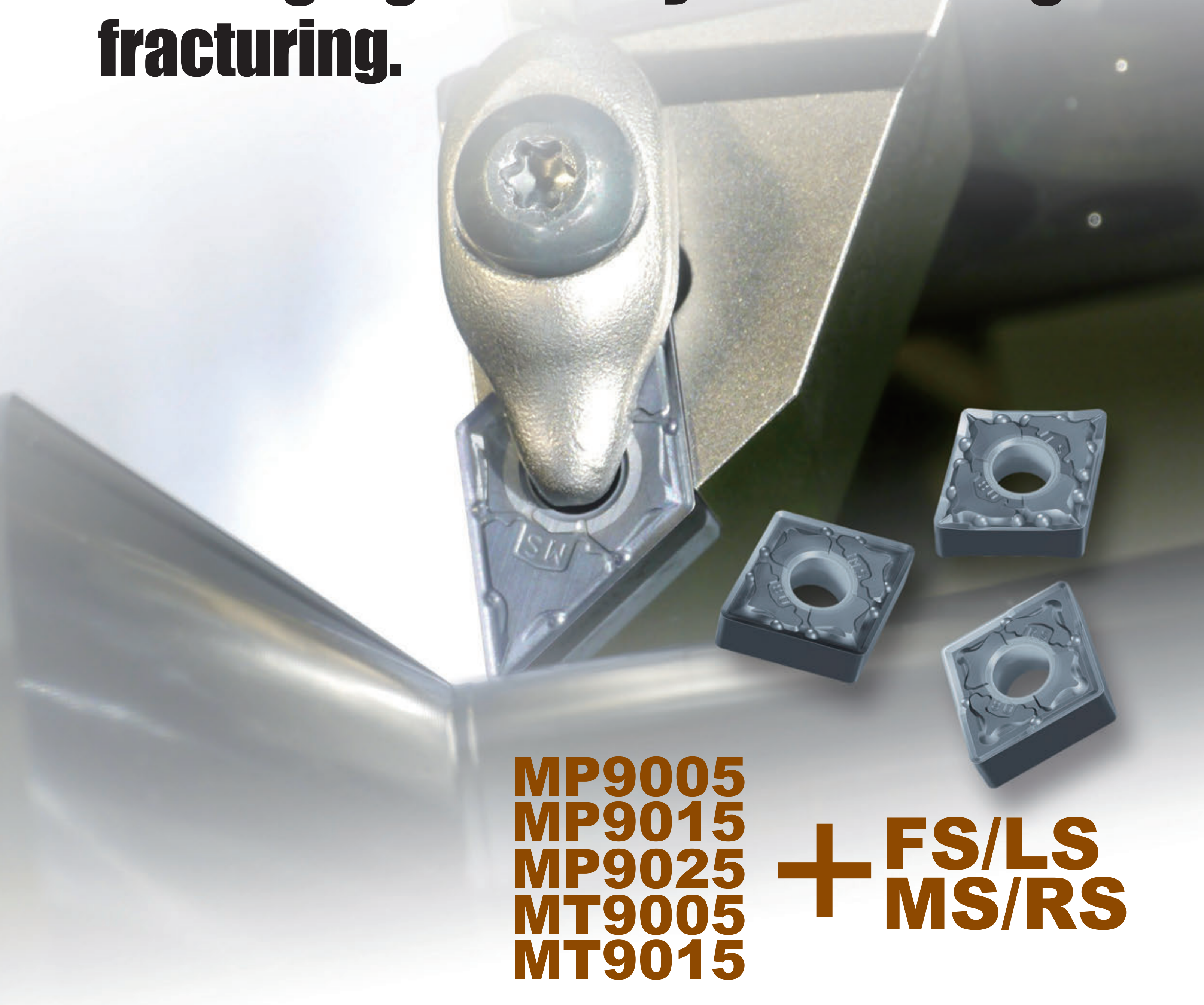
TOOL NEWS

2022.3 Update
B214A

9000 Series Grades for Difficult-to-cut Materials

Series Addition

The high Al-rich (Al,Ti)N single layer coating significantly reduces edge fracturing.



MP9005
MP9015
MP9025
MT9005
MT9015

+ FS/LS MS/RS

MITSUBISHI MATERIALS CORPORATION

9000 Series Grades for Difficult-to-cut Materials

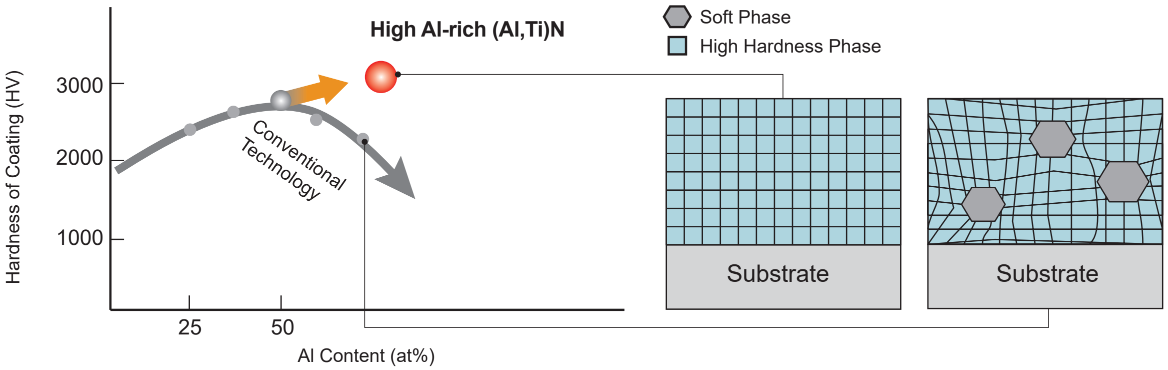
PVD Coated Grade NEW

MP9005/MP9015/MP9025

MP9005/MP9015/MP9025

High Al and Conventional Coating Comparison

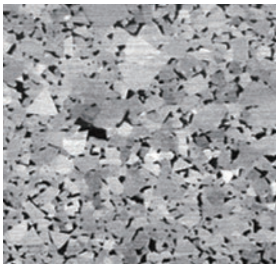
The high Al-rich (Al,Ti)N single layer coating provides stabilization of the high hardness phase and succeeds in dramatically improving wear, crater and welding resistance.



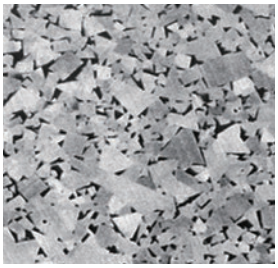
ISO Grade	Grade	Concept	Application
S01	**MP9005**	Top-quality grade focusing on wear resistance.	Heat Resistant Alloys Finish-Medium Cutting
S10	**MP9015**	First recommendation for general applications.	Heat Resistant Alloys Medium-Rough Cutting
S30	**MP9025**	Prevents severe damage for Increased stability.	Heat Resistant Alloys Interrupted • Light-Rough Cutting

Carbide Grade (Non Coated)

MT9005/MT9015

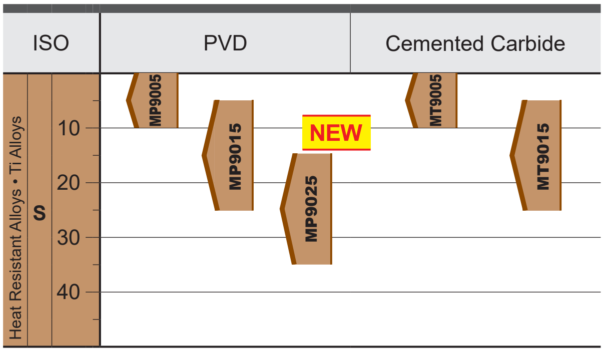


MT9005



MT9015

Application Range



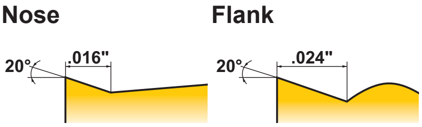
ISO Grade	Grade	Concept	Application
S01	**MT9005**	Cemented carbide with unmatched resistance to heat and plastic deformation.	Titanium Alloys High Speed Cutting
S10	**MT9015**	Cemented carbide with sharp cutting edge, excellent wear and fracture resistance.	Titanium Alloys General Cutting

Chip Breaker System

Negative Inserts

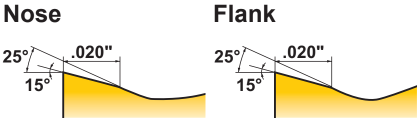
LS Breaker for Light Cutting

Enhanced chip disposal for depths of cut smaller than the corner R.



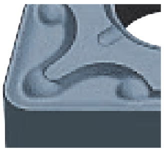
MS Breaker Newly Designed for Medium Cutting

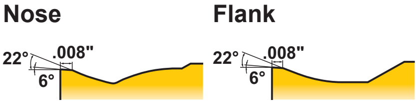
The large 2-step rake angle generates chips smoothly and without tangling during low feed cutting.



MA Breaker for Medium Cutting

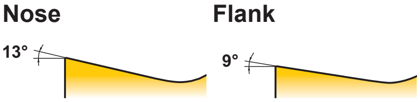
Suitable for medium cutting range.





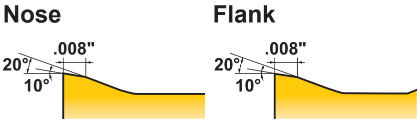
MJ Breaker Sub Breaker

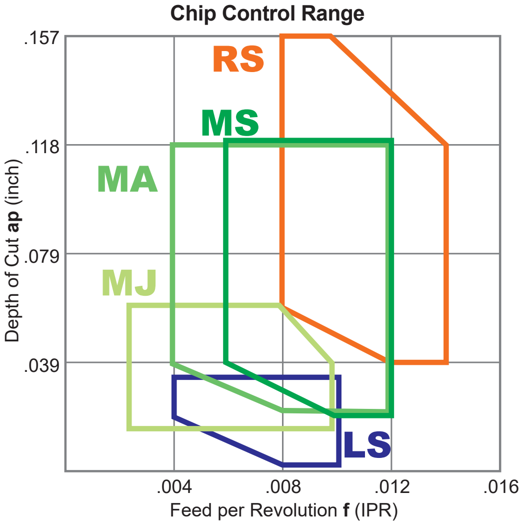
Alternative chip breaker of main chip breaker LS and MS.
Excellent notch wear resistance for light to medium cutting.



RS Breaker for Rough Cutting

During low speed cutting the positive land controls chip welding and abrasion at the depth of cut line.



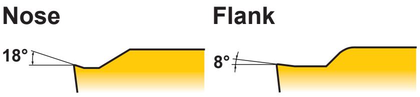


The chip breaker control range was tested for optimum chip evacuation when cutting Inconel718 with a CNMG432○○ insert.

Positive Inserts

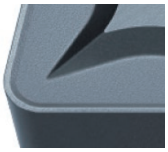
LS Breaker for Light Cutting

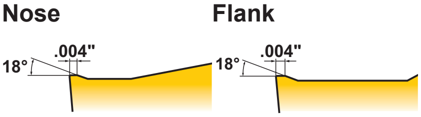
Prevents welding of the insert and controls white turbidity of the surface finish.

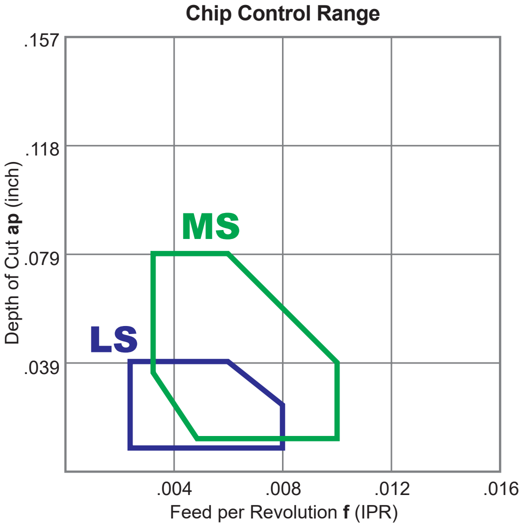


MS Breaker for Medium Cutting

The wide chip pocket reduces cutting resistance, vibration and chip jamming at large depths of cut.







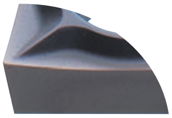
The chip breaker control range was tested for optimum chip evacuation when cutting Inconel718 with a DCMT32.51○○ insert.

Precision Chip Breaker System
Positive Inserts

Set the corner radius to a minus tolerance
CCGT21.51MLS → 1M RE .016 inch (RE .014-.016 inch)

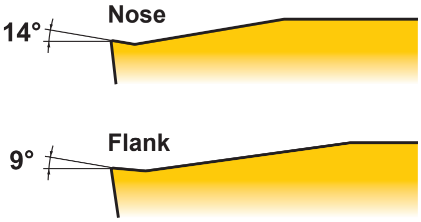
FS/FS-P Breaker for Finish Cutting

FS



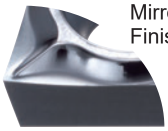
First Recommendation for Finish Cutting of Difficult-to-cut Materials

Ideal for heat resistant alloys, titanium alloys, and cobalt chromium alloys.
Sharp cutting edges provide excellent surface precision and finish.
Highly efficient chip discharge is possible due to curved cutting edges.



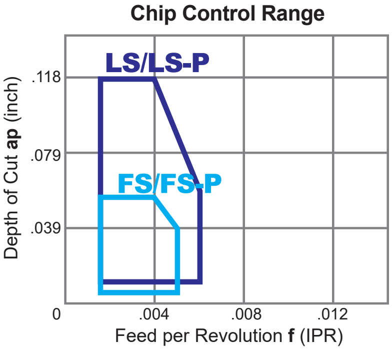
FS-P

Mirror Finish



First Recommendation for Finish Cutting of Titanium Alloys

Ideal for titanium alloys and copper alloys.
Sharp cutting edges provide excellent surface precision and finish.
Highly efficient chip discharge is possible due to curved cutting edges.
Polished (mirror-surface) finish of insert surfaces drastically improves welding resistance extending tool life.



LS/LS-P Breaker for Light Cutting

LS

First Recommendation for Light Cutting of Difficult-to-cut Materials

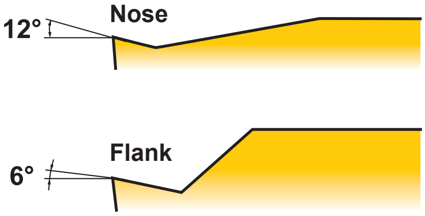
Ideal for heat resistant alloys, titanium alloys, and cobalt chromium alloys.
Designed with straight parallel cutting edges with high depth of cut capabilities.
Achieves stable chip control over a wide depth of cut range.

LS-P

Mirror Finish

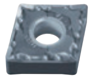
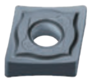
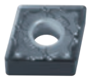
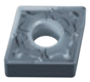
First Recommendation for Light Cutting of Titanium Alloys

Ideal for titanium alloys and copper alloys.
Designed with straight parallel cutting edges with high depth of cut capabilities.
Achieves stable chip control over a wide depth of cut range.
Polished (mirror-surface) finish of insert surfaces drastically improves welding resistance.

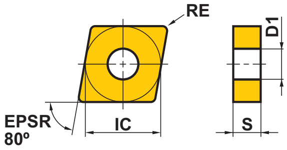


Negative Inserts (With Hole)

M Class

Light	Light	Medium
LS 	MJ 	MS 
Medium	Rough	
MA 	RS 	

CNMG



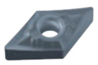
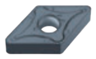
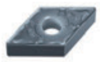
(inch)

Order Number	Cutting Area	MP9005	MP9015	NEW MP9025	MT9015	IC	S	RE	D1
CNMG321LS	L	●	●	●		.375	.125	.016	.150
CNMG322LS	L	●	●	●		.375	.125	.031	.150
CNMG430.5LS	L	●	●	●	●	.500	.187	.008	.203
CNMG431LS	L	●	●	●	●	.500	.187	.016	.203
CNMG432LS	L	●	●	●	●	.500	.187	.031	.203
CNMG431MJ	L	●	●			.500	.187	.016	.203
CNMG432MJ	L	●	●			.500	.187	.031	.203
CNMG433MJ	L	●	●			.500	.187	.047	.203
CNMG434MJ	L	●	●			.500	.187	.063	.203
CNMG321MS	M	●	●	●		.375	.125	.016	.150
CNMG322MS	M	●	●	●		.375	.125	.031	.150
CNMG431MS	M	●	●	●	●	.500	.187	.016	.203
CNMG432MS	M	●	●	●	●	.500	.187	.031	.203
CNMG433MS	M	●	●	●	●	.500	.187	.047	.203
CNMG543MS	M	●	●	●	●	.625	.250	.047	.250
CNMG544MS	M	●	●	●	●	.625	.250	.063	.250
CNMG431MA	M		●	●		.500	.187	.016	.203
CNMG432MA	M		●	●		.500	.187	.031	.203
CNMG433MA	M		●	●		.500	.187	.047	.203
CNMG434MA	M		●	●		.500	.187	.063	.203
CNMG432RS	R		●	●	●	.500	.187	.031	.203
CNMG433RS	R		●	●	●	.500	.187	.047	.203
CNMG434RS	R		●	●	●	.500	.187	.063	.203
CNMG543RS	R		●	●	●	.625	.250	.047	.250
CNMG544RS	R		●	●	●	.625	.250	.063	.250
CNMG643RS	R		●	●	●	.750	.250	.047	.312
CNMG644RS	R		●	●	●	.750	.250	.063	.312

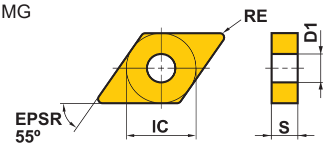
● : USA Stock (10 inserts in one case)

Negative Inserts (With Hole)

M Class

Light	Light	Medium
LS 	MJ 	MS 
Medium	Rough	
MA 	RS 	

DNMG



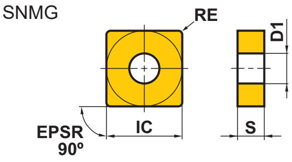
(inch)

Order Number	Cutting Area	MP9005	MP9015	NEW MP9025	MT9015	IC	S	RE	D1
DNMG430.5LS	L	●	●	●	●	.500	.187	.008	.203
DNMG431LS	L	●	●	●	●	.500	.187	.016	.203
DNMG432LS	L	●	●	●	●	.500	.187	.031	.203
DNMG441LS	L	●	●	●	●	.500	.250	.016	.203
DNMG442LS	L	●	●	●	●	.500	.250	.031	.203
DNMG431MJ	L	●	●			.500	.187	.016	.203
DNMG432MJ	L	●	●			.500	.187	.031	.203
DNMG433MJ	L	●	●			.500	.187	.047	.203
DNMG434MJ	L	●	●			.500	.187	.063	.203
DNMG441MJ	L	●	●			.500	.250	.016	.203
DNMG442MJ	L	●	●			.500	.250	.031	.203
DNMG443MJ	L	●	●			.500	.250	.047	.203
DNMG444MJ	L	●	●			.500	.250	.063	.203
DNMG431MS	M	●	●	●	●	.500	.187	.016	.203
DNMG432MS	M	●	●	●	●	.500	.187	.031	.203
DNMG433MS	M	●	●	●	●	.500	.187	.047	.203
DNMG441MS	M	●	●	●	●	.500	.250	.016	.203
DNMG442MS	M	●	●	●	●	.500	.250	.031	.203
DNMG443MS	M	●	●	●	●	.500	.250	.047	.203
DNMG431MA	M		●	●		.500	.187	.016	.203
DNMG432MA	M		●	●		.500	.187	.031	.203
DNMG433MA	M		●	●		.500	.187	.047	.203
DNMG441MA	M		●	●		.500	.250	.016	.203
DNMG442MA	M		●	●		.500	.250	.031	.203
DNMG443MA	M		●	●		.500	.250	.047	.203
DNMG432RS	R		●	●	●	.500	.187	.031	.203
DNMG433RS	R		●	●	●	.500	.187	.047	.203
DNMG434RS	R		●	●	●	.500	.187	.063	.203
DNMG442RS	R		●	●	●	.500	.250	.031	.203
DNMG443RS	R		●	●	●	.500	.250	.047	.203
DNMG444RS	R		●	●	●	.500	.250	.063	.203

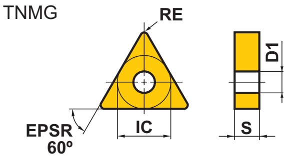
Negative Inserts (With Hole)

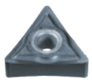
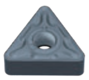
M Class

SNMG



TNMG



Medium	Medium	Rough		
MS	MA	RS		
				
Light	Light	Medium	Medium	Rough
LS	MJ	MA	MS	RS
				

(inch)

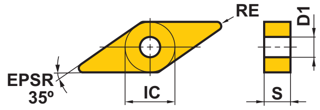
Order Number	Cutting Area	MP9005	MP9015	NEW MP9025	MT9015	IC	S	RE	D1
SNMG431MS	M	●	●	●	●	.500	.187	.016	.203
SNMG432MS	M	●	●	●	●	.500	.187	.031	.203
SNMG433MS	M	●	●	●	●	.500	.187	.047	.203
SNMG543MS	M	●	●	●	●	.625	.250	.047	.250
SNMG544MS	M	●	●	●	●	.625	.250	.063	.250
SNMG643MS	M	●	●	●		.750	.250	.047	.312
SNMG431MA	M		●	●		.500	.187	.016	.203
SNMG432MA	M		●	●		.500	.187	.031	.203
SNMG433MA	M		●	●		.500	.187	.047	.203
SNMG434MA	M		●	●		.500	.187	.063	.203
SNMG432RS	R		●	●	●	.500	.187	.031	.203
SNMG433RS	R		●	●	●	.500	.187	.047	.203
SNMG434RS	R		●	●	●	.500	.187	.063	.203
SNMG544RS	R		●	●	●	.625	.250	.063	.250
SNMG643RS	R		●	●		.750	.250	.047	.312
SNMG644RS	R		●	●	●	.750	.250	.063	.312
TNMG330.5LS	L	●	●	●	●	.375	.187	.008	.150
TNMG331LS	L	●	●	●	●	.375	.187	.016	.150
TNMG332LS	L	●	●	●	●	.375	.187	.031	.150
TNMG331MJ	L	●	●			.375	.187	.016	.150
TNMG332MJ	L	●	●			.375	.187	.031	.150
TNMG333MJ	L	●	●			.375	.187	.047	.150
TNMG331MS	M	●	●	●	●	.375	.187	.016	.150
TNMG332MS	M	●	●	●	●	.375	.187	.031	.150
TNMG333MS	M	●	●	●	●	.375	.187	.047	.150
TNMG432MS	M	●	●	●	●	.500	.187	.031	.203
TNMG433MS	M	●	●	●	●	.500	.187	.047	.203
TNMG331MA	M		●	●		.375	.187	.016	.150
TNMG332MA	M		●	●		.375	.187	.031	.150
TNMG333MA	M		●	●		.375	.187	.047	.150
TNMG432MA	M		●	●		.500	.187	.031	.203
TNMG433MA	M		●	●		.500	.187	.047	.203
TNMG434MA	M		●	●		.500	.187	.063	.203
TNMG544MA	M		●	●		.625	.250	.063	.250
TNMG666MA	M		●	●		.750	.375	.094	.312
TNMG332RS	R		●	●	●	.375	.187	.031	.150
TNMG333RS	R		●	●	●	.375	.187	.047	.150
TNMG432RS	R		●	●	●	.500	.187	.031	.203
TNMG433RS	R		●	●	●	.500	.187	.047	.203

● : USA Stock (10 inserts in one case)

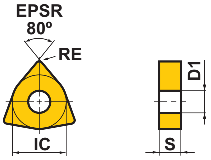
Negative Inserts (With Hole)

M Class

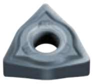
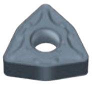
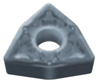
VNMG



WNMG



Light	Light	Medium		
LS 	MJ 	MS 		

Light	Light	Medium	Medium	Rough
LS 	MJ 	MS 	MA 	RS 

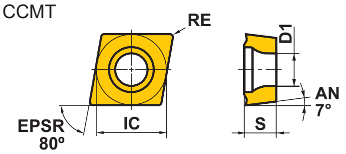
(inch)

Order Number	Cutting Area	MP9005	MP9015	NEW MP9025	MT9015	IC	S	RE	D1
VNMG330.5LS	L	●	●	●	●	.375	.187	.008	.150
VNMG331LS	L	●	●	●	●	.375	.187	.016	.150
VNMG332LS	L	●	●	●	●	.375	.187	.031	.150
VNMG331MJ	L	●	●			.375	.187	.016	.150
VNMG332MJ	L	●	●			.375	.187	.031	.150
VNMG333MJ	L	●	●			.375	.187	.047	.150
VNMG331MS	M	●	●	●	●	.375	.187	.016	.150
VNMG332MS	M	●	●	●	●	.375	.187	.031	.150
WNMG430.5LS	L	●	●	●	●	.500	.187	.008	.203
WNMG431LS	L	●	●	●	●	.500	.187	.016	.203
WNMG432LS	L	●	●	●	●	.500	.187	.031	.203
WNMG432MJ	L	●	●			.500	.187	.031	.203
WNMG433MJ	L	●	●			.500	.187	.047	.203
WNMG434MJ	L	●	●			.500	.187	.063	.203
WNMG431MS	M	●	●	●	●	.500	.187	.016	.203
WNMG432MS	M	●	●	●	●	.500	.187	.031	.203
WNMG433MS	M	●	●	●	●	.500	.187	.047	.203
WNMG431MA	M		●	●		.500	.187	.016	.203
WNMG432MA	M		●	●		.500	.187	.031	.203
WNMG433MA	M		●	●		.500	.187	.047	.203
WNMG434MA	M		●	●		.500	.187	.063	.203
WNMG432RS	R		●	●	●	.500	.187	.031	.203
WNMG433RS	R		●	●	●	.500	.187	.047	.203
WNMG434RS	R		●	●	●	.500	.187	.063	.203
WNMG543RS	R		●	●	●	.625	.250	.047	.250

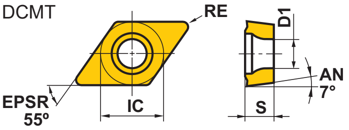
7° Positive Inserts (With Hole)

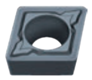
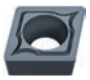
M Class

CCMT



DCMT



Light	Medium
LS	MS
	
Light	Medium
LS	MS
	

(inch)

Order Number	Cutting Area	MP9005	MP9015	NEW MP9025	MT9005	IC	S	RE	D1
CCMT21.50.5LS	L	●	●	●	●	.250	.094	.008	.110
CCMT21.51LS	L	●	●	●	●	.250	.094	.016	.110
CCMT32.50.5LS	L	●	●	●	●	.375	.156	.008	.173
CCMT32.51LS	L	●	●	●	●	.375	.156	.016	.173
CCMT32.52LS	L	●	●	●	●	.375	.156	.031	.173
CCMT21.50.5MS	M	●	●	●	●	.250	.094	.008	.110
CCMT21.51MS	M	●	●	●	●	.250	.094	.016	.110
CCMT21.52MS	M	●	●	●	●	.250	.094	.031	.110
CCMT32.50.5MS	M	●	●	●		.375	.156	.008	.173
CCMT32.51MS	M	●	●	●	●	.375	.156	.016	.173
CCMT32.52MS	M	●	●	●	●	.375	.156	.031	.173
CCMT431MS	M	●	●	●	●	.500	.187	.016	.217
CCMT432MS	M	●	●	●	●	.500	.187	.031	.217
CCMT433MS	M	●	●	●	●	.500	.187	.047	.217
DCMT21.50.5LS	L	●	●	●	●	.250	.094	.008	.110
DCMT21.51LS	L	●	●	●	●	.250	.094	.016	.110
DCMT32.50.5LS	L	●	●	●	●	.375	.156	.008	.173
DCMT32.51LS	L	●	●	●	●	.375	.156	.016	.173
DCMT32.52LS	L	●	●	●	●	.375	.156	.031	.173
DCMT21.51MS	M	●	●	●	●	.250	.094	.016	.110
DCMT21.52MS	M	●	●	●	●	.250	.094	.031	.110
DCMT32.51MS	M	●	●	●	●	.375	.156	.016	.173
DCMT32.52MS	M	●	●	●	●	.375	.156	.031	.173
DCMT32.53MS	M	●	●	●	●	.375	.156	.047	.173

● : USA Stock (10 inserts in one case)

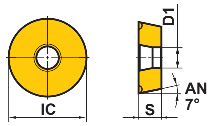
7° Positive Inserts (With Hole)

M Class

Medium

Standard

RCMT



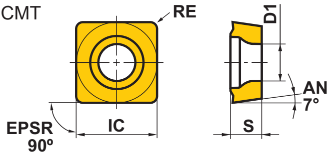
(inch)

	Order Number	Cutting Area	MP9005	MP9015	NEW MP9025	MT9005	MT9015	IC	S	RE	D1
NEW	**RCMT0602M0**	M	●	●	●	●	●	.236	.094	–	.110
NEW	**RCMT0803M0**	M	●	●	●	●	●	.315	.125	–	.134
NEW	**RCMT10T3M0**	M	●	●	●	●	●	.394	.156	–	.173
NEW	**RCMT1204M0**	M	●	●	●	●	●	.472	.187	–	.173
NEW	**RCMT1606M0**	M	●	●	●	●	●	.630	.250	–	.217

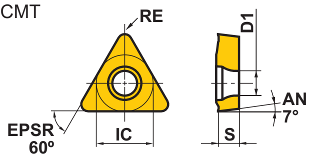
7° Positive Inserts (With Hole)

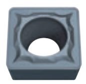
M Class

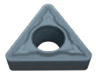
SCMT



TCMT



Medium	
MS 	

Light	Medium
LS 	MS 

(inch)

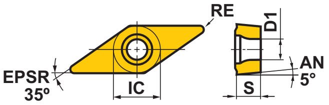
Order Number	Cutting Area	MP9005	MP9015	NEW MP9025	MT9005	IC	S	RE	D1
SCMT32.51MS	M	●	●	●	●	.375	.156	.016	.173
SCMT32.52MS	M	●	●	●	●	.375	.156	.031	.173
SCMT431MS	M	●	●	●	●	.500	.187	.016	.217
SCMT432MS	M	●	●	●	●	.500	.187	.031	.217
SCMT433MS	M	●	●	●	●	.500	.187	.047	.217
TCMT1.81.50.5LS	L	●	●	●	●	.219	.094	.008	.098
TCMT21.50.5LS	L	●	●	●	●	.250	.094	.008	.110
TCMT1.81.51MS	M	●	●	●	●	.219	.094	.016	.098
TCMT1.81.52MS	M	●	●	●	●	.219	.094	.031	.098
TCMT21.51MS	M	●	●	●		.250	.094	.016	.110
TCMT21.52MS	M	●	●	●		.250	.094	.031	.110
TCMT32.51MS	M	●	●	●	●	.375	.156	.016	.173
TCMT32.52MS	M	●	●	●	●	.375	.156	.031	.173
TCMT32.53MS	M	●	●	●	●	.375	.156	.047	.173

● : USA Stock (10 inserts in one case)

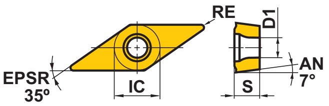
5° and 7° Positive Inserts (With Hole)

M Class

VBMT



VCMT



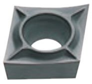
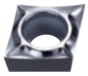
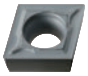
Light	Medium
LS 	MS 
Light	Medium
LS 	MS 

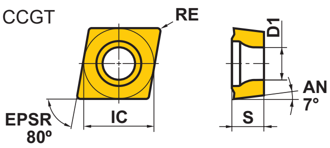
(inch)

Order Number	Cutting Area	MP9005	MP9015	NEW MP9025	MT9005	IC	S	RE	D1
VBMT220.5LS	L	●	●	●	●	.250	.125	.008	.115
VBMT221LS	L	●	●	●	●	.250	.125	.016	.115
VBMT222LS	L	●	●	●	●	.250	.125	.031	.115
VBMT331LS	L	●	●	●	●	.375	.187	.016	.173
VBMT332LS	L	●	●	●	●	.375	.187	.031	.173
VBMT330.5MS	M	●	●	●	●	.375	.187	.008	.173
VBMT331MS	M	●	●	●	●	.375	.187	.016	.173
VBMT332MS	M	●	●	●	●	.375	.187	.031	.173
VBMT333MS	M	●	●	●	●	.375	.187	.047	.173
VCMT220.5LS	L	●	●	●	●	.250	.125	.008	.110
VCMT221LS	L	●	●	●	●	.250	.125	.016	.110
VCMT331LS	L	●	●	●	●	.375	.187	.016	.173
VCMT332LS	L	●	●	●	●	.375	.187	.031	.173
VCMT220.5MS	M	●	●	●		.250	.125	.008	.110
VCMT221MS	M	●	●	●	●	.250	.125	.016	.110
VCMT222MS	M	●	●	●	●	.250	.125	.031	.110
VCMT331MS	M	●	●	●	●	.375	.187	.016	.173
VCMT332MS	M	●	●	●	●	.375	.187	.031	.173

7° Positive Inserts (With Hole)

G Class

Finish	Finish	Light	Light
FS	FS-P	LS	LS-P
			



(inch)

Order Number	Cutting Area	MP9005	MP9015	NEW MP9025	MT9005	IC	S	RE*	D1
CCGT21.50.2MFS	F	●	●	●		.250	.094	.004	.110
CCGT21.50.5MFS	F	●	●	●		.250	.094	.008	.110
CCGT32.50.2MFS	F	●	●	●		.375	.156	.004	.173
CCGT32.50.5MFS	F	●	●	●		.375	.156	.008	.173
CCGT32.51MFS	F	●	●	●		.375	.156	.016	.173
CCGT21.50.2MFS-P	F				●	.250	.094	.004	.110
CCGT21.50.5MFS-P	F				●	.250	.094	.008	.110
CCGT32.50.2MFS-P	F				●	.375	.156	.004	.173
CCGT32.50.5MFS-P	F				●	.375	.156	.008	.173
CCGT32.51MFS-P	F				●	.375	.156	.016	.173
CCGT21.50.2MLS	L	●	●	●		.250	.094	.004	.110
CCGT21.50.5MLS	L	●	●	●		.250	.094	.008	.110
CCGT32.50.2MLS	L	●	●	●		.375	.156	.004	.173
CCGT32.50.5MLS	L	●	●	●		.375	.156	.008	.173
CCGT32.51MLS	L	●	●	●		.375	.156	.016	.173
CCGT21.50.2MLS-P	L				●	.250	.094	.004	.110
CCGT21.50.5MLS-P	L				●	.250	.094	.008	.110
CCGT32.50.2MLS-P	L				●	.375	.156	.004	.173
CCGT32.50.5MLS-P	L				●	.375	.156	.008	.173
CCGT32.51MLS-P	L				●	.375	.156	.016	.173

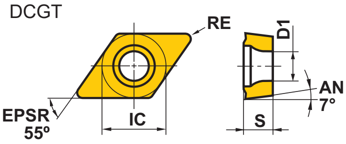
*Nominal Value (Max.)

● : USA Stock (10 inserts in one case)

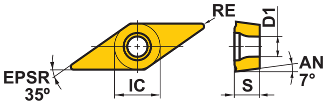
7° Positive Inserts (With Hole)

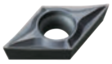
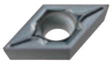
G Class

DCGT



VCGT



Finish	Finish	Light	Light
FS 	FS-P 	LS 	LS-P 
Light	Light		
LS 	LS-P 		

(inch)

Order Number	Cutting Area	MP9005	MP9015	NEW MP9025	MT9005	IC	S	RE*	D1
DCGT21.50.2MFS	F	●	●	●		.250	.094	.004	.110
DCGT21.50.5MFS	F	●	●	●		.250	.094	.008	.110
NEW **DCGT21.51MFS**	F	●	●	●		.250	.094	.016	.110
DCGT32.50.2MFS	F	●	●	●		.375	.156	.004	.173
DCGT32.50.5MFS	F	●	●	●		.375	.156	.008	.173
NEW **DCGT32.51MFS**	F	●	●	●		.375	.156	.016	.173
DCGT21.50.2MFS-P	F				●	.250	.094	.004	.110
DCGT21.50.5MFS-P	F				●	.250	.094	.008	.110
NEW **DCGT21.51MFS-P**	F				●	.250	.094	.016	.110
DCGT32.50.2MFS-P	F				●	.375	.156	.004	.173
DCGT32.50.5MFS-P	F				●	.375	.156	.008	.173
NEW **DCGT32.51MFS-P**	F				●	.375	.156	.016	.110
DCGT21.50.2MLS	L	●	●	●		.250	.094	.004	.110
DCGT21.50.5MLS	L	●	●	●		.250	.094	.008	.110
DCGT21.51MLS	L	●	●	●		.250	.094	.016	.110
DCGT32.50.2MLS	L	●	●	●		.375	.156	.004	.173
DCGT32.50.5MLS	L	●	●	●		.375	.156	.008	.173
DCGT32.51MLS	L	●	●	●		.375	.156	.016	.173
DCGT21.50.2MLS-P	L				●	.250	.094	.004	.110
DCGT21.50.5MLS-P	L				●	.250	.094	.008	.110
DCGT21.51MLS-P	L				●	.250	.094	.016	.110
DCGT32.50.2MLS-P	L				●	.375	.156	.004	.173
DCGT32.50.5MLS-P	L				●	.375	.156	.008	.173
DCGT32.51MLS-P	L				●	.375	.156	.016	.173
VCGT220.2MLS	L	●	●	●		.250	.125	.004	.110
VCGT220.5MLS	L	●	●	●		.250	.125	.008	.110
VCGT221MLS	L	●	●	●		.250	.125	.016	.110
VCGT2.520.2MLS	L	●	●	●		.313	.125	.004	.134
VCGT2.520.5MLS	L	●	●	●		.313	.125	.008	.134
VCGT2.521MLS	L	●	●	●		.313	.125	.016	.134
VCGT220.2MLS-P	L				●	.250	.125	.004	.110
VCGT220.5MLS-P	L				●	.250	.125	.008	.110
VCGT221MLS-P	L				●	.250	.125	.016	.110
VCGT2.520.2MLS-P	L				●	.313	.125	.004	.134
VCGT2.520.5MLS-P	L				●	.313	.125	.008	.134
VCGT2.521MLS-P	L				●	.313	.125	.016	.134

*Nominal Value (Max.)

Recommended Cutting Conditions

Negative Inserts

(inch)

	Workpiece Material	Cutting Conditions	Cutting Area	Chip Breaker	Grade	Cutting Speed **vc** (SFM)	Feed **f** (IPR)	Depth of Cut **ap**
M	Precipitation Hardening Stainless Steels (AISI 630)	Stable Cutting	Light Cutting	**LS**	**MP9005**	410—575	.004—.010	.008—.031
			Medium Cutting	**MS**	**MP9005**	375—525	.006—.012	.020—.118
		General Cutting	Light Cutting	**LS**	**MP9015**	395—540	.004—.010	.008—.031
			Medium Cutting	**MS**	**MP9015**	360—490	.006—.012	.020—.118
			Rough Cutting	**RS**	**MP9015**	330—460	.008—.014	.039—.157
		Unstable Cutting	Light Cutting	**LS**	**MP9025**	260—310	.004—.010	.008—.031
			Medium Cutting	**MS**	**MP9025**	245—295	.006—.012	.020—.118
			Rough Cutting	**RS**	**MP9025**	230—280	.008—.014	.039—.157
S	Titanium Alloys (Ti-6Al-4V)	Stable Cutting	Light Cutting	**LS**	**MT9015**	130—280	.004—.010	.008—.031
			Medium Cutting	**MS**	**MT9015**	130—260	.006—.012	.020—.118
			Rough Cutting	**RS**	**MT9015**	115—245	.008—.014	.039—.157
		General Cutting	Light Cutting	**LS**	**MT9015**	130—280	.004—.010	.008—.031
			Medium Cutting	**MS**	**MT9015**	130—260	.006—.012	.020—.118
			Rough Cutting	**RS**	**MT9015**	115—245	.008—.014	.039—.157
		Unstable Cutting	Light Cutting	**LS**	**MT9015**	130—280	.004—.010	.008—.031
			Medium Cutting	**MS**	**MT9015**	130—260	.006—.012	.020—.118
			Rough Cutting	**RS**	**MT9015**	115—245	.008—.014	.039—.157
	Ni Based Heat Resistant Alloys (Inconel718, Hastelloy, WASPALOY) Co Based Heat Resistant Alloys (Tribaloy, Stellite)	Stable Cutting	Light Cutting	**LS**	**MP9005**	100—360	.004—.010	.008—.031
				MJ	**MP9005**	100—360	.003—.010	.016—.059
			Medium Cutting	**MS**	**MP9005**	100—330	.006—.012	.020—.118
			Rough Cutting	**RS**	**MP9015**	65—245	.008—.014	.039—.157
		General Cutting	Light Cutting	**LS**	**MP9015**	80—280	.004—.010	.008—.031
				MJ	**MP9015**	80—280	.003—.010	.016—.059
			Medium Cutting	**MS**	**MP9015**	80—260	.006—.012	.020—.118
				MA	**MP9015**	80—260	.004—.012	.020—.118
			Rough Cutting	**RS**	**MP9015**	65—245	.008—.014	.039—.157
		Unstable Cutting	Light Cutting	**LS**	**MP9025**	65—100	.004—.010	.008—.031
			Medium Cutting	**MS**	**MP9025**	65—100	.006—.012	.020—.118
				MA	**MP9025**	65—100	.004—.012	.020—.118
			Rough Cutting	**RS**	**MP9025**	50—80	.008—.014	.039—.157

Note 1) When cutting conditions are unstable, please refer to page 42 for recommended chip breaker and grade.
Note 2) Verify the recommended conditions for each boring bar as cutting conditions for internal machining will vary depending on the length of overhang.
Note 3) MC7015,MC7025 and MP7035 grade are also recommended for precipitation hardening stainless steels.

Positive Inserts

(inch)

Workpiece Material		Cutting Conditions	Cutting Area	Chip Breaker	Grade	Cutting Speed **vc** (SFM)	Feed **f** (IPR)	Depth of Cut **ap**
M	Precipitation Hardening Stainless Steels (AISI 630)	Stable Cutting	Light Cutting	**LS**	**MP9015**	345—460	.002—.008	.008—.039
			Medium Cutting	**MS**	**MP9015**	280—395	.003—.010	.012—.079
		General Cutting	Light Cutting	**LS**	**MP9015**	345—460	.002—.008	.008—.039
			Medium Cutting	**MS**	**MP9015**	280—395	.003—.010	.012—.079
		Unstable Cutting	Light Cutting	**LS**	**MP9025**	230—280	.002—.008	.008—.039
			Medium Cutting	**MS**	**MP9025**	195—230	.003—.010	.012—.079
S	Titanium Alloys (Ti-6Al-4V)	Stable Cutting	Light Cutting	**LS**	**MT9005**	130—260	.002—.008	.008—.039
			Medium Cutting	**MS**	**MT9005**	115—210	.003—.010	.012—.079
		General Cutting	Light Cutting	**LS**	**MT9005**	130—260	.002—.008	.008—.039
			Medium Cutting	**MS**	**MT9005**	115—210	.003—.010	.012—.079
		Unstable Cutting	Light Cutting	**LS**	**MT9005**	130—260	.002—.008	.008—.039
			Medium Cutting	**MS**	**MT9005**	115—210	.003—.010	.012—.079
	Ni Based Heat Resistant Alloys (Inconel718, Hastelloy, WASPALOY) Co Based Heat Resistant Alloys (Tribaloy, Stellite)	Stable Cutting	Light Cutting	**LS**	**MP9005**	80—310	.002—.008	.008—.039
			Medium Cutting	**MS**	**MP9005**	65—260	.003—.010	.012—.079
		General Cutting	Light Cutting	**LS**	**MP9015**	65—245	.002—.008	.008—.039
			Medium Cutting	**MS**	**MP9015**	65—195	.003—.010	.012—.079
		Unstable Cutting	Light Cutting	**LS**	**MP9025**	50—80	.002—.008	.008—.039
			Medium Cutting	**MS**	**MP9025**	50—65	.003—.010	.012—.079

RCMT

(inch)

Workpiece Material		Cutting Conditions	Cutting Area	Grade	Cutting Speed **vc** (SFM)	Feed **f** (IPR)	Depth of Cut **ap**
M	Precipitation Hardening Stainless Steels (AISI 630)	Stable Cutting	Medium Cutting	**MP9015**	280—395	.010—.018	.059—.118
		General Cutting	Medium Cutting	**MP9015**	280—395	.010—.018	.059—.118
		Unstable Cutting	Medium Cutting	**MP9025**	195—230	.010—.018	.059—.118
S	Titanium Alloys (Ti-6Al-4V)	Stable Cutting	Medium Cutting	**MT9005**	115—210	.010—.018	.059—.118
		General Cutting	Medium Cutting	**MT9005**	115—210	.010—.018	.059—.118
		Unstable Cutting	Medium Cutting	**MT9015**	100—195	.010—.018	.059—.118
	Ni Based Heat Resistant Alloys (Inconel718, Hastelloy, WASPALOY) Co Based Heat Resistant Alloys (Tribaloy, Stellite)	Stable Cutting	Medium Cutting	**MP9005**	65—260	.010—.018	.059—.118
		General Cutting	Medium Cutting	**MP9015**	65—195	.010—.018	.059—.118
		Unstable Cutting	Medium Cutting	**MP9025**	50—65	.010—.018	.059—.118

Note 1) When cutting conditions are unstable, please refer to page 42 for recommended chip breaker and grade.
Note 2) Verify the recommended conditions for each boring bar as cutting conditions for internal machining will vary depending on the length of overhang.
Note 3) MC7015,MC7025 and MP7035 grade are also recommended for precipitation hardening stainless steels.

9000 Series Grades for Difficult-to-cut Materials

Precision Positive Inserts

(inch)

Workpiece Material		Cutting Conditions	Cutting Area	Chip Breaker	Grade	Cutting Speed **vc** (SFM)	Feed **f** (IPR)	Depth of Cut **ap**
M	Precipitation Hardening Stainless Steels (AISI 630)	Stable Cutting	Finish Cutting	**FS**	**MP9005**	360—490	.002—.005	.008—.055
			Light Cutting	**LS**	**MP9015**	345—460	.002—.006	.012—.118
		General Cutting	Finish Cutting	**FS**	**MP9015**	345—460	.002—.005	.008—.055
			Light Cutting	**LS**	**MP9015**	345—460	.002—.006	.012—.118
		Unstable Cutting	Finish Cutting	**FS**	**MP9025**	230—280	.002—.005	.008—.055
			Light Cutting	**LS**	**MP9025**	230—280	.002—.006	.012—.118
S	Titanium Alloys (Ti-6Al-4V)	Stable Cutting	Finish Cutting	**FS-P**	**MT9005**	130—260	.002—.005	.008—.055
			Light Cutting	**LS-P**	**MT9005**	130—260	.002—.006	.012—.118
		General Cutting	Finish Cutting	**FS-P**	**MT9005**	130—260	.002—.005	.008—.055
			Light Cutting	**LS-P**	**MT9005**	130—260	.002—.06	.012—.118
		Unstable Cutting	Finish Cutting	**FS-P**	**MT9005**	130—260	.002—.005	.008—.055
			Light Cutting	**LS-P**	**MT9005**	130—260	.002—.006	.012—.118
	Ni Based Heat Resistant Alloys (Inconel718, Hastelloy, WASPALOY) Co based Heat Resistant Alloys (Tribaloy, Stellite)	Stable Cutting	Finish Cutting	**FS**	**MP9005**	80—310	.002—.005	.008—.055
			Light Cutting	**LS**	**MP9005**	80—310	.002—.006	.012—.118
		General Cutting	Finish Cutting	**FS**	**MP9015**	65—245	.002—.005	.008—.055
			Light Cutting	**LS**	**MP9015**	65—245	.002—.006	.012—.118
		Unstable Cutting	Finish Cutting	**FS**	**MP9025**	50—80	.002—.005	.008—.055
			Light Cutting	**LS**	**MP9025**	50—80	.002—.006	.012—.118

Note 1) When cutting conditions are unstable, please refer to page 43 for recommended chip breaker and grade.
Note 2) Verify the recommended conditions for each boring bar as cutting conditions for internal machining will vary depending on the length of overhang.

For Effective Use of Large Corner Radius

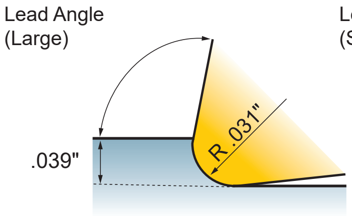
By setting the depth of cut smaller than the corner radius value, notching during cutting of heat resistant alloys can be greatly reduced.

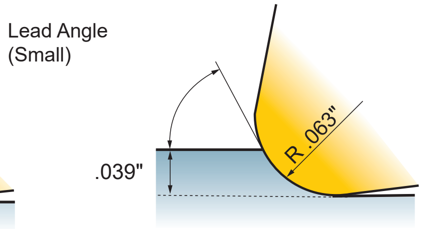
Corner Radius > 1.5 x Depth of Cut

Depth of cut : .039 inch. Corner radius over .059 is recommended.

Point

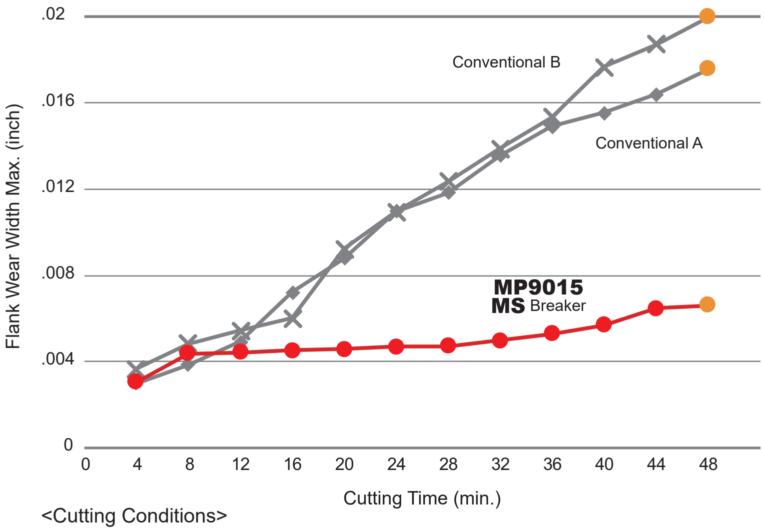
A smaller lead angle is the key to reduced notching.



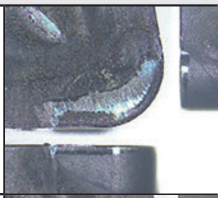
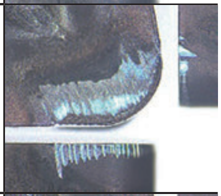
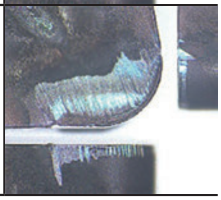


Cutting Performance

Comparison in Continuous Machining of AISI 630

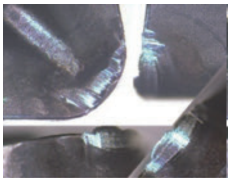


<Cutting Conditions>
Workpiece Material : AISI 630
Inserts : CNMG432◌◌
Machining Methods : External Continuous Cutting
Cutting Speed : vc=395 SFM
Feed per Rev. : f=.008 IPR
Depth of Cut : ap=.059 inch
Cutting Mode : Wet Cutting

Cutting Time : 48min (Wear Photo)	
MP9015 **MS** Breaker	
Conventional A	
Conventional B	

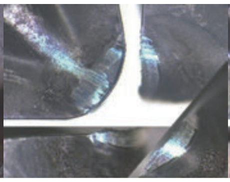
Achieved 2X tool life when machining Inconel718 during continuous machining.

MP9005+LS



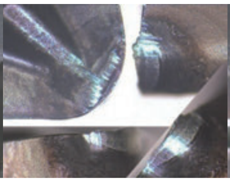
Wear - .0094 inch
Cutting Time 66 min

Conventional A (S10)



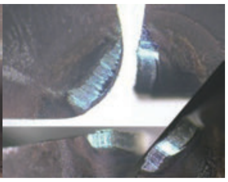
Wear - .0087 inch
Cutting Time 22 min

Conventional B (S10)



Wear - .0091 inch
Cutting Time 36 min

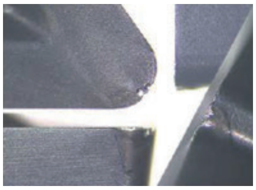
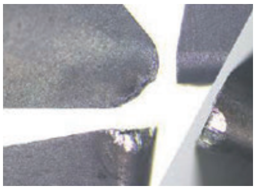
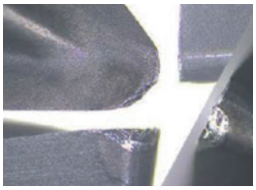
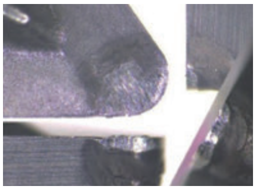
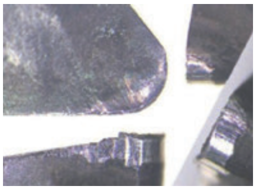
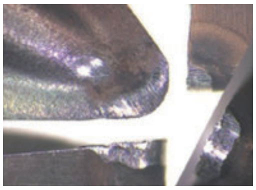
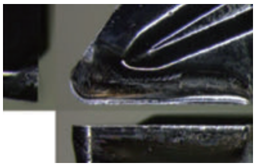
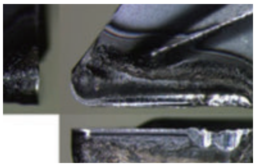
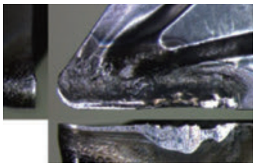
Conventional C (S10)



Wear - .0098 inch
Cutting Time 16 min

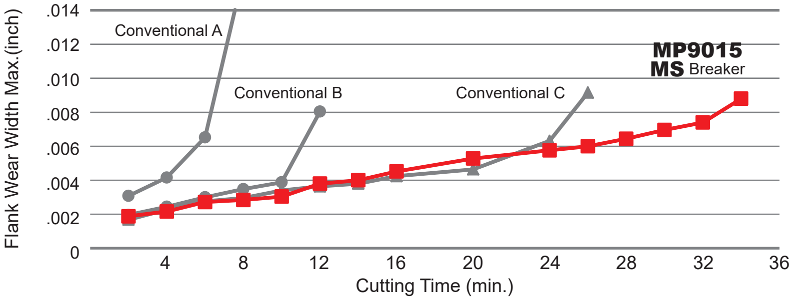
<Cutting Conditions>
Workpiece Material : Inconel718
Inserts : CNMG432◌◌
Cutting Speed : vc=165 SFM
Feed per Rev. : f=.006 IPR
Depth of Cut : ap=.020 inch
Cutting Mode : Wet Cutting

Comparison of Wear Resistance by Workpiece Material

Workpiece Materials and Cutting Conditions	Chip Breaker	Conventional A	Conventional B
Workpiece Material : Co-Cr-Mo Alloy Inserts : DCGT32.51MLS Grade : MP9005 Cutting Speed : vc=130 SFM Feed per Rev. : f=.002 IPR Depth of Cut : ap=.008 inch Cutting Mode : Wet Cutting (Water-soluble) Machine : Swiss-type Lathes Cutting Time : 12 min.			
Workpiece Material : Inconel718 Inserts : DCGT32.51MLS Grade : MP9015 Cutting Speed : vc=195 SFM Feed per Rev. : f=.002 IPR Depth of Cut : ap=.020 inch Cutting Mode : Wet Cutting (Water-soluble) Machine : Swiss-type Lathes Cutting Time : 20 min.			
Workpiece Material : Ti-6Al-4V ELI Inserts : DCGT32.51MLS-P Grade : MT9005 Cutting Speed : vc=260 SFM Feed per Rev. : f=.002 IPR Depth of Cut : ap=.118 inch Cutting Mode : Wet Cutting (Water-insoluble) Machine : Automatic Lathes	 35 Pieces (Non-coat)	 35 Pieces (PVD)	 15 Pieces (PVD)

Cutting Performance

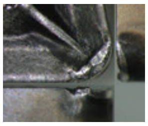
Inconel718, vc=195 SFM Continuous Machining



<Cutting Conditions>
Workpiece Material : Inconel718
Inserts : CNMG432◯◯
Cutting Speed : vc=195 SFM
Feed per Rev. : f=.006 IPR
Depth of Cut : ap=.030 inch
Cutting Mode : Wet Cutting


Conventional A
8 min

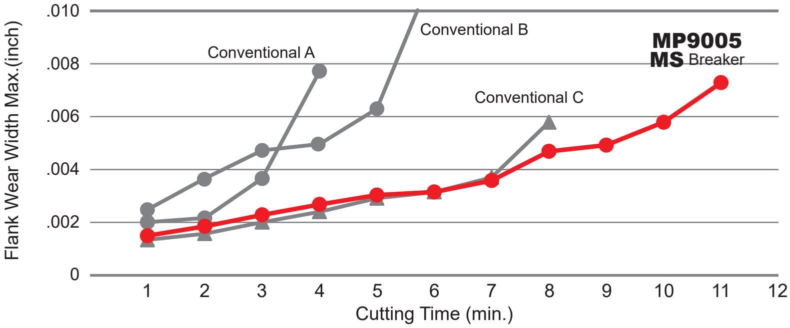

Conventional B
12 min


Conventional C
26 min


MP9015
MS Breaker, **34 min**

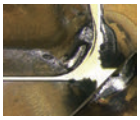
Increased 28% Tool Life

Inconel718, vc=330 SFM Continuous Machining



<Cutting Conditions>
Workpiece Material : Inconel718
Inserts : CNMG432◯◯
Cutting Speed : vc=330 SFM
Feed per Rev. : f=.006 IPR
Depth of Cut : ap=.020 inch
Cutting Mode : Wet Cutting


Conventional A
4 min

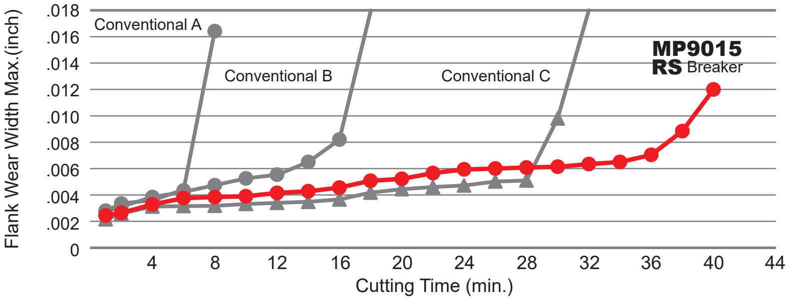

Conventional B
6 min


Conventional C
8 min


MP9005
MS Breaker, **11 min**

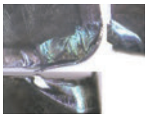
Increased 37% Tool Life

Inconel718, ap=.079 inch Continuous Machining



<Cutting Conditions>
Workpiece Material : Inconel718
Inserts : CNMG432◯◯
Cutting Speed : vc=130 SFM
Feed per Rev. : f=.008 IPR
Depth of Cut : ap=.079 inch
Cutting Mode : Wet Cutting


Conventional A
8 min


Conventional B
18 min


Conventional C
32 min


MP9015
RS Breaker, **40 min**

Increased 33% Tool Life

WASPALOY Continuous Machining

MP9015 with RS breaker was smallest damage.


Conventional A

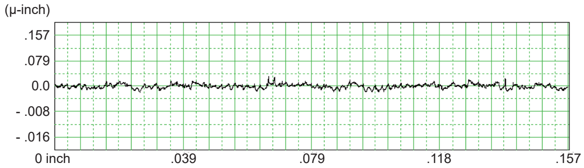

Conventional B


MP9015
RS Breaker

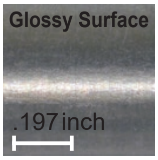
<Cutting Conditions>
Workpiece Material : WASPALOY
Inserts : CNMG432◯◯
Cutting Speed : vc=95 SFM
Feed per Rev. : f=.009 IPR
Depth of Cut : ap=.157 inch
Cutting Time : 7 min
Cutting Mode : Wet Cutting

Cutting Performance

Titanium Alloy, Comparison of Surface Finish (Depth of Cut: .01 inch)

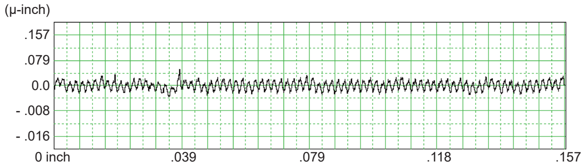


Ra : 5.303 μ-inch Rz : 37.323 μ-inch Rzjis : 24.567 μ-inch

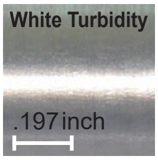


MT9015
LS Breaker

Excellent Finish



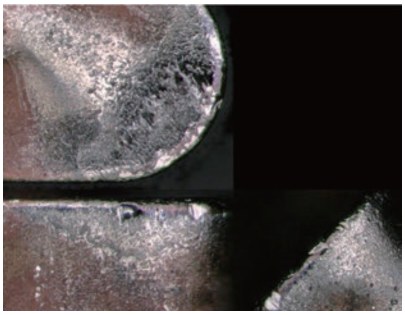
Ra : 10.992 μ-inch Rz : 63.402 μ-inch Rzjis : 51.591 μ-inch



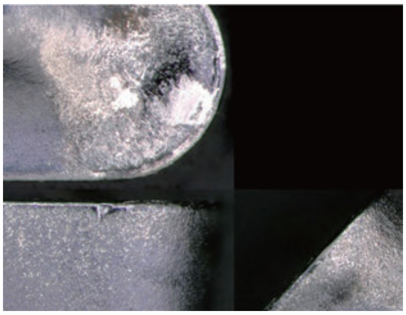
Conventional

<Cutting Conditions>
Workpiece Material : Ti-6Al-6V(325HB)
Inserts : CNMG432◌◌
Cutting Speed : vc=230 SFM
Feed per Rev. : f=.002 IPR
Depth of Cut : ap=.01 inch
Cutting Mode : Wet Cutting

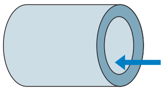
MP9015 with LS breaker was smallest damage.



Conventional



MP9015 LS Breaker



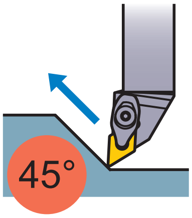
<Cutting Conditions>
Workpiece Material : Heat Resistant Cast Steel
Inserts : DCMT32.51◌◌
Cutting Speed : vc=330 SFM
Feed per Rev. : f=.004 IPR
Depth of Cut : ap=.010 inch
Cutting Mode : Wet Cutting

Chip Control when Back Turning

Non-tangling of chips when back turning Inconel718.

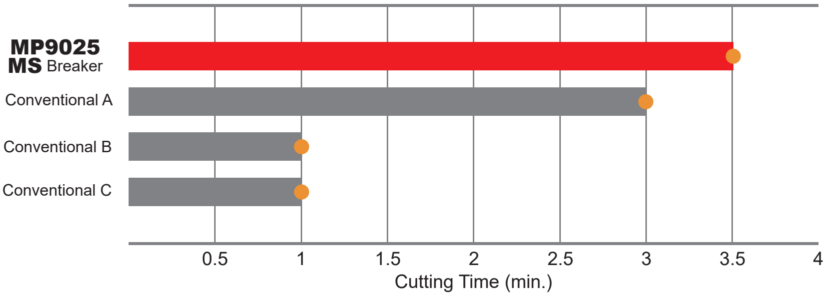
MS Breaker
New Design

Conventional



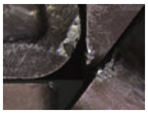
<Cutting Conditions>
Workpiece Material : Inconel718
Inserts : DNMG432◌◌
Cutting Speed : vc=130 SFM
Feed per Rev. : f=.008 IPR
Depth of Cut : ap=.0039 inch
Cutting Mode : Wet Cutting

Inconel718, vc=100 SFM Interrupted Machining



<Cutting Conditions>
Workpiece Material : Inconel718
Inserts : CNMG432○○
Cutting Speed : vc=100 SFM
Feed per Rev. : f=.004 IPR
Depth of Cut : ap=.01 inch
Cutting Mode : Wet Cutting


Conventional A
1 min


Conventional B
1 min


Conventional C
3 min


MP9025
MS Breaker
3.5 min

Increased 16 % Tool Life

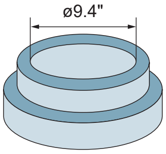
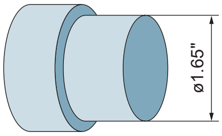
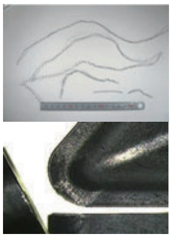
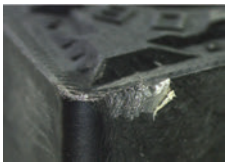
Application Examples

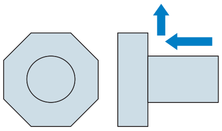
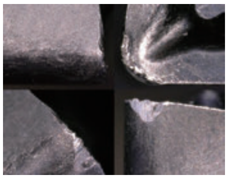
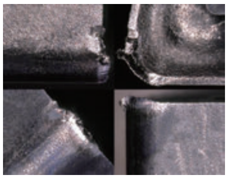
Inserts (Grade)		**DCGT32.51MLS (MP9015)**	**DCGT32.50.5MLS (MP9015)**
Workpiece Material		AISI 430 (Forgings)	AISI 630 (17-4PH)
Cutting Conditions	Cutting Speed **vc** (SFM)	260	195
	Feed per Rev. **f** (IPR)	.0031	.0016
	Depth of Cut **ap** (inch)	.012	.012
Cutting Mode		Wet Cutting (Water-insoluble Coolants)	Wet Cutting (Water-insoluble Coolants)
Machine		Swiss-type Lathes	Swiss-type Lathes
Results		Compared to conventional product with inconsistent tool life, whose unstable chip evacuation can cause entanglement of chips in workpiece materials, the LS breaker provided stable chip evacuation allowing machining to be performed up to machining constants. It also exhibited excellent wear conditions after turning.	Even when machining at 1.5X the existing conditions of conventional product, there were no variations in turning surface dimensions. The amount of wear was also extremely small, resulting in longer tool life and cost reduction.

Inserts (Grade)		**DCGT32.50.5MFS-P (MT9005)**	**DCGT21.50.2MFS (MP9015)**
Workpiece Material		Ti-6Al-4V ELI	AISI 304
Cutting Conditions	Cutting Speed **vc** (SFM)	210	260
	Feed per Rev. **f** (IPR)	.0024	.0020
	Depth of Cut **ap** (inch)	.030	.012
Cutting Mode		Wet Cutting (Water-insoluble Coolants)	Wet Cutting (Water-insoluble Coolants)
Machine		Swiss-type Lathes	Swiss-type Lathes
Results		Compared to conventional PVD coated product, the cemented carbide MT 9005 (uncoated) provided exceptional machined surface roughness even at 2X the number of cuts. The extremely small amount of wear and stable dimensional precision allowed further machining extension.	Compared to conventional product, the amount of wear was small and chip evacuation was excellent, making it possible to perform machining at 1.5X the existing conditions.

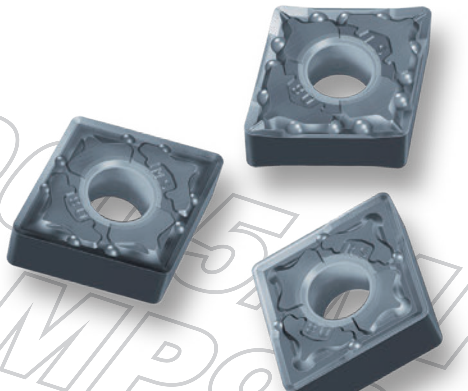
The above application examples are customer's applications, so it can be different from the recommended conditions.

Application Examples

	Inserts (Grade)	**DNMG432MS (MP9005)**	**CNMG432RS (MP9015)**
	Workpiece	Inconel718 (Ni Based Heat Resistant Alloy)  45HRC Aging Treatment	HAYNES Alloy 25 (Co Based Heat Resistant Alloy) 
	Component	Disk - Aerospace Component	Cover Plate - Aerospace Component
	Application	Internal Turning	External Turning
Cutting Conditions	Cutting Speed **vc** (SFM)	195	110
	Feed per Rev. **f** (IPR)	.006	.008
	Depth of Cut **ap** (inch)	.010 x .591	.059 × 1.654 (3 Pass)
	Cutting Mode	Wet Cutting	Wet Cutting
	Results	Conventional (S10)  **MP9005+MS**  MP9005 - Stable machining and less wear with long tool life without chip tangling.	Conventional (S10)  **MP9015+RS**  Both conventional and MP9015 display notch wear but the conventional grade wear was greater and exposed the substrate.

	Inserts (Grade)	**CNMG432MA (MP9025)**
	Workpiece	Inconel718 
	Component	Flange
	Application	External Turning and Facing
Cutting Conditions	Cutting Speed **vc** (SFM)	115
	Feed per Rev. **f** (IPR)	.006
	Depth of Cut **ap** (inch)	.020
	Cutting Mode	Wet Cutting
	Results	Conventional  1 Piece **MP9025**  2.5 Pieces MP9025 achieved a longer tool life of 2.5 workpieces compared to the conventional product fracturing in the first workpiece.

The above application examples are customer's applications, so it can be different from the recommended conditions.



MP9005/MP9015/MP9025
MT9005/MT9015

9000 Series Grades for Difficult-to-cut Materials

MP9005/MP9015/MP9025
MT9005/MT9015

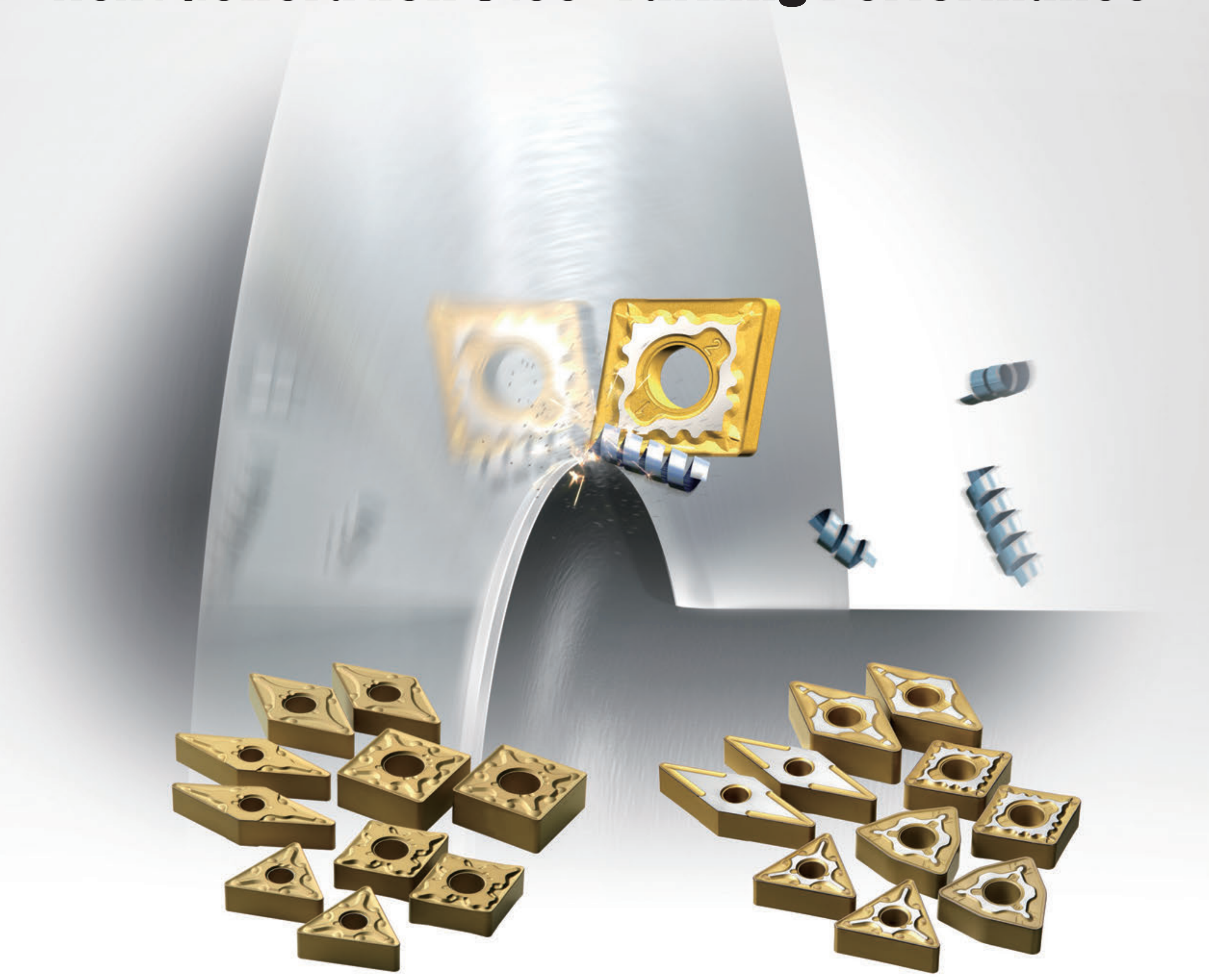
For your safety
●Don't handle inserts and chips without gloves. ●Please machine within the recommended application range and exchange expired tools with new ones in advance of breakage. ●Please use safety covers and wear safety glasses. ●When using compounded cutting oils, please take fire precautions. ●When using rotating tools, please make a trial run to check run-out, vibration and abnormal sounds etc.

CVD Coated Grade for Steel Turning

MC6100 Series

New Products

Next Generation Steel Turning Performance



For High Speed Turning
MC6115

First Recommendation
MC6125

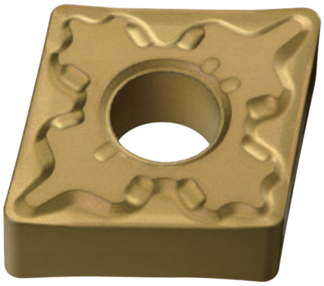
MITSUBISHI MATERIALS CORPORATION

CVD Coated Grade for Steel Turning

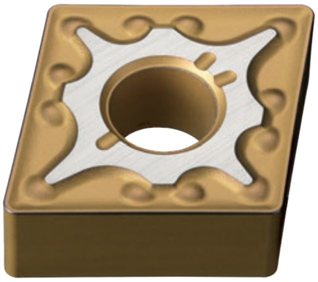
MC6100 Series

Dramatic increase in stability and wear resistance resulting from improved coating adhesion and crystal orientation technology.

For High Speed Turning
MC6115



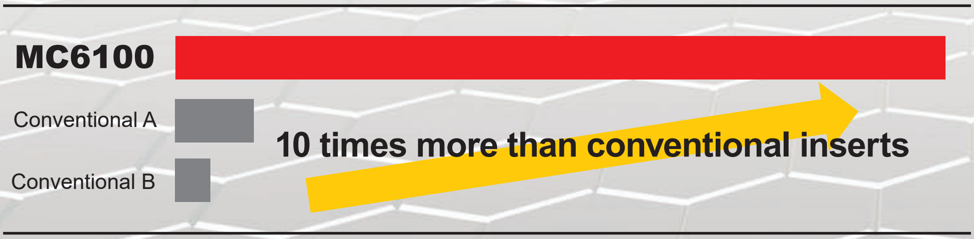
First Recommendation
MC6125



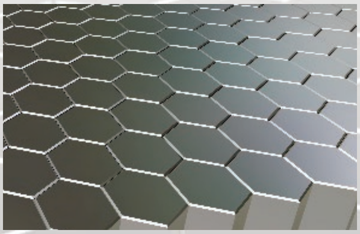
Features

"Super" Nano Texture Technology

The standard Nano Texture Technology has been improved and developed to be an industry leading standard for crystal growth of Al_2O_3 coatings. This Super Nano Texture Technology increases tool life and wear resistance due to the fine, dense crystal growth process.



The ratio of Al_2O_3 crystal grains with the same orientation



*By Image

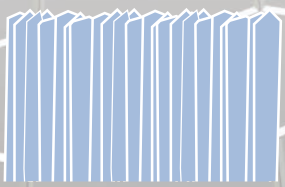
Crystal Orientation

Conventional CVD inserts

Grain size and growth direction are uneven.

Nano Texture

Uniformity of the grain size and growth direction has improved.

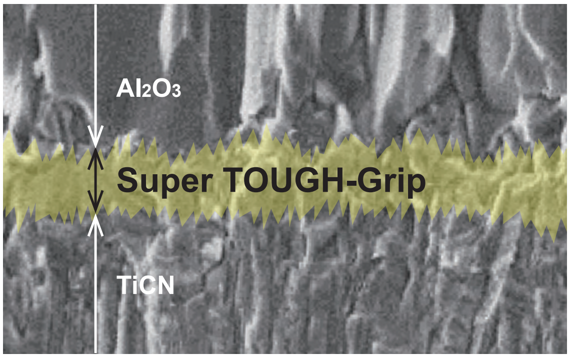


"Super" Nano Texture

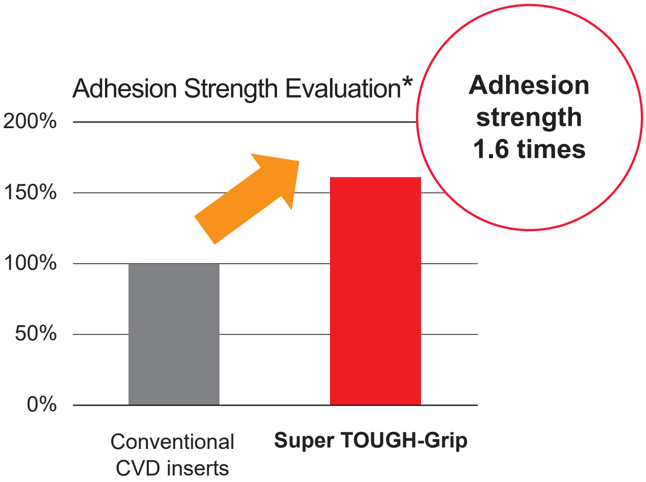
Uniformity of the growth direction has drastically improved.

Super TOUGH-Grip

The Super TOUGH-Grip layer has finer crystal grains that enhance the strength of the adhesion between the coating layers.



*By Image

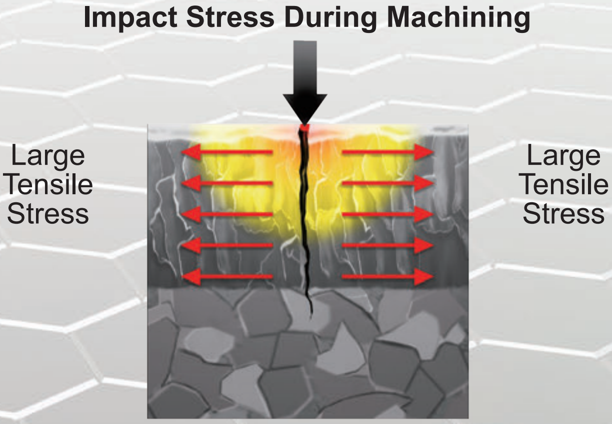


*Adhesion strength measurement is obtained from a scratch test that records the force needed to peel the coating layers.

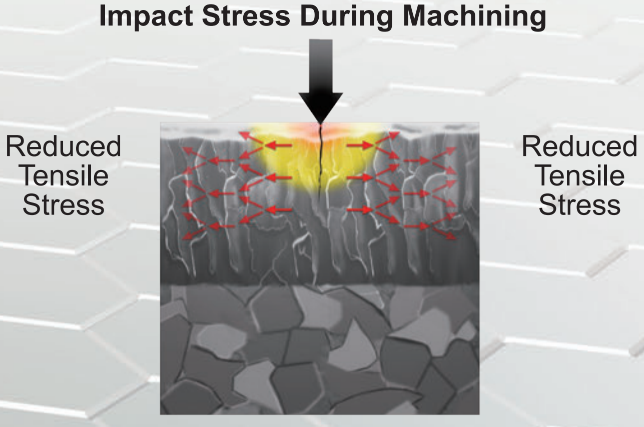
Protection Against Sudden Fracturing

Cracks that occur during unstable machining are prevented due to the relaxing of the tensile stress in the coating. MC6100 series has an 80% reduction in coating tensile stress compared to conventional CVD inserts.

Relaxing of the Tensile Stress



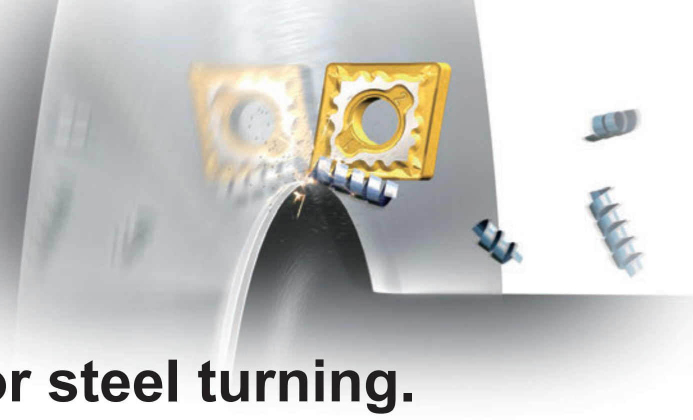
Conventional CVD inserts



MC6100 Series

Cracks are generated in the surface of coatings during machining. They propagate through the coating into the substrate due to the large tensile stress in the coating structure. This creates one of the main causes of sudden insert breakage.

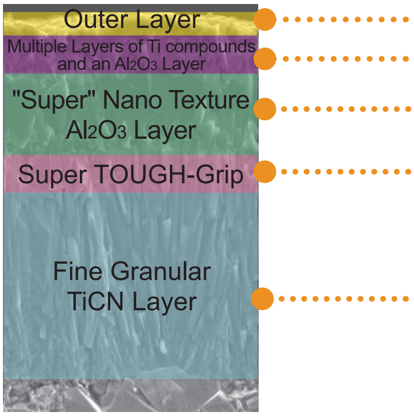
MC6100 series has a much lower level of stress than conventional CVD coatings due to the surface treatment. This divides the force of impacts during machining and protects from sudden fracturing.



CVD Coated Grade for Steel Turning

MC6125

First recommended grade for steel turning. Increased tool life plus stable performance covering a wide range of applications.



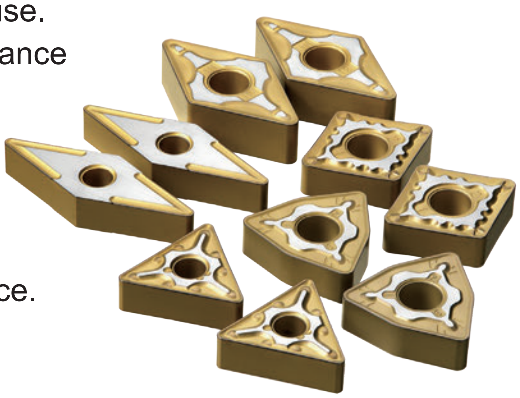
Better identification of corner use.

Achieves excellent wear resistance

Outstanding wear resistance especially at high temperatures.

Strong adhesion between the tough coating layers.

Coating for high wear resistance.

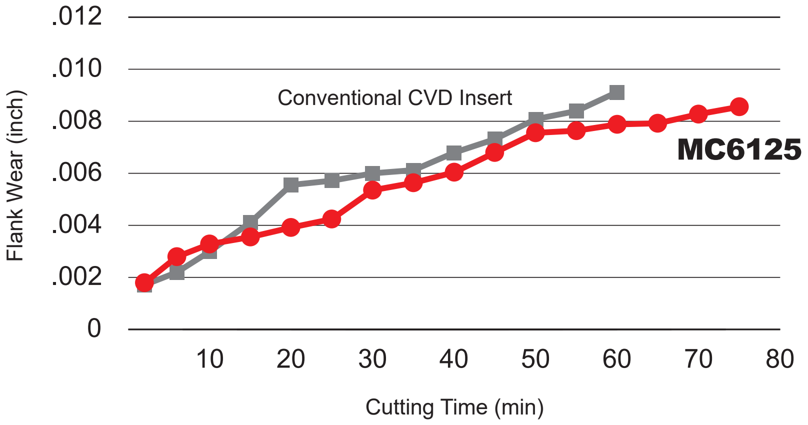


Special Smooth Surface Treatment

MC6125 uses a new surface treatment for the cutting edge for increased stability. Additionally, the seating faces also have a special smooth surface treatment that provides improved clamping stability to enable a wider range of applications.

Machining AISI 1045 : Comparison of Wear Resistance

Increased tool life plus stable performance covering a wide range of applications.

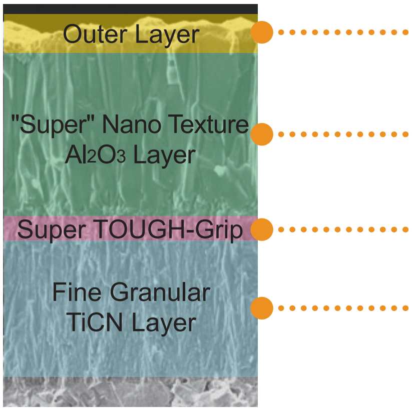


<Cutting Conditions>
Workpiece Material : AISI 1045
Inserts : CNMG432MA
Cutting Speed : vc = 655 SFM
Feed per Rev. : f=.012 IPR
Depth of Cut : ap =.059 inch
Cutting Mode : Wet Cutting

CVD Coated Grade for Steel Turning

MC6115

MC6115 improves high speed machining and process efficiency with a dramatic increase in resistance to wear and heat.

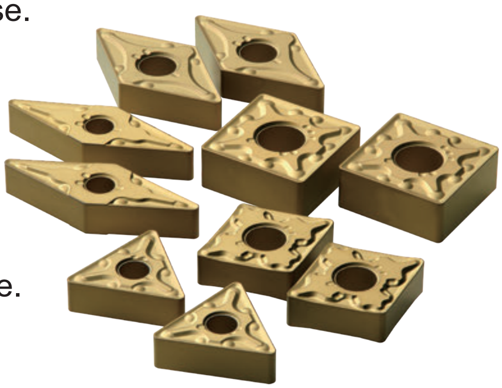


Better identification of corner use.

Outstanding wear resistance especially at high temperatures.

Strong adhesion between the tough coating layers.

Coating for high wear resistance.



Improved Outer Coating (Layer)

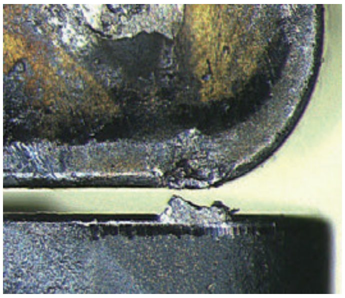
The outer layer of MC6115 restricts chip welding thereby improving the dimensional accuracy and surface roughness of components. This also enables easy recognition of whether the corner can continue machining.

Example when machining AISI 5120H

When comparing the high edge strength MH breaker with a conventional low resistance chip breaker, it shows that MC6115 accomplishes both high welding and wear resistance.

After 2 Minutes Machining

MC6115 MH Breaker



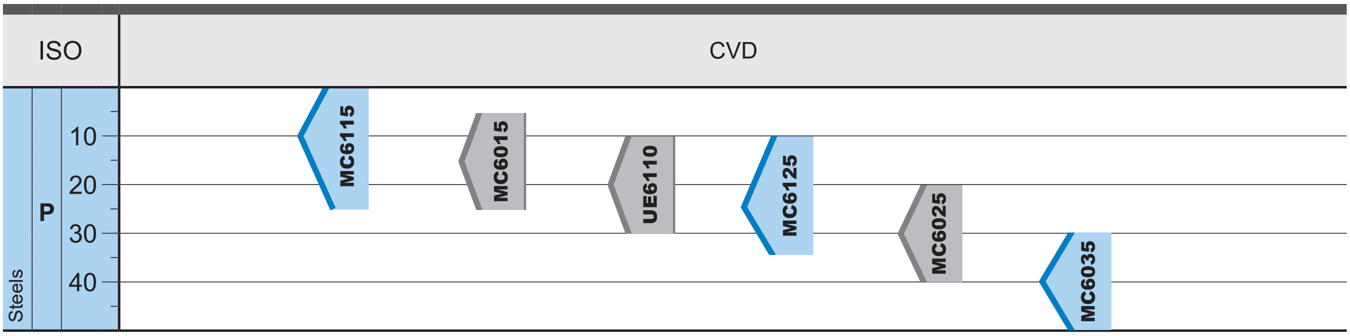
Conventional CVD Insert

<Cutting Conditions>

Workpiece Material	: AISI 5120H 170HB
Inserts	: CNMG432MH
Cutting Speed	: vc = 655 SFM
Feed per Rev.	: f=.012 IPR
Depth of Cut	: ap =.059 inch
Cutting Mode	: Dry Cutting

CVD Coated Grade for Steel Turning

Application Range

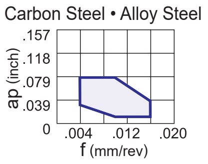
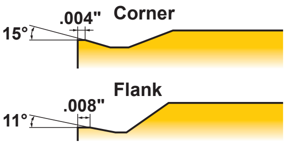
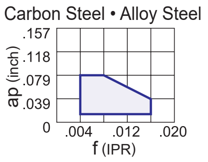
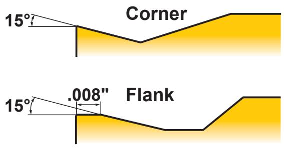
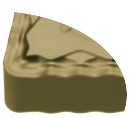
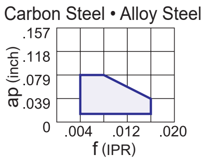
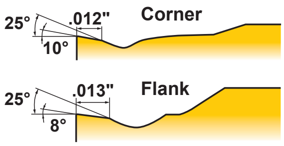
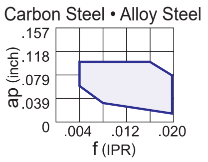
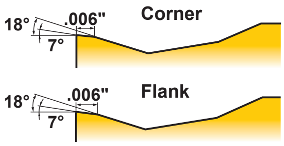
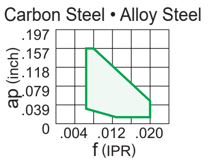
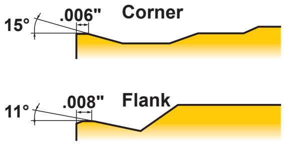
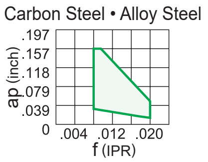
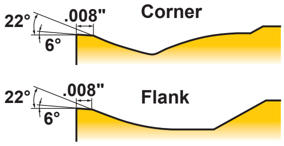
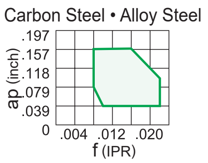
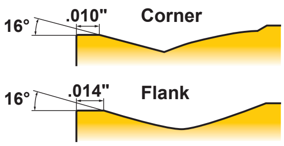
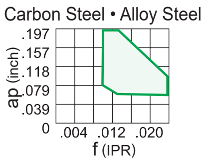
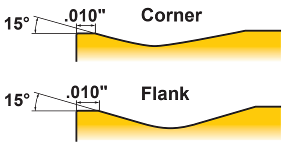
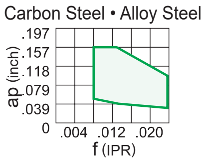
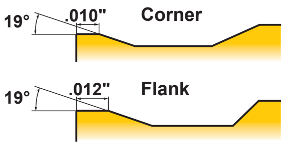


Selection Criteria

Workpiece Material		Cutting Mode	Grade
P	Steels	Continuous Cutting Low	**MC6115**
		Medium	**MC6125**
		High Interrupted Cutting	**MC6035**

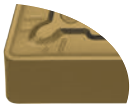
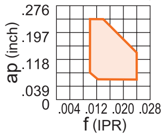
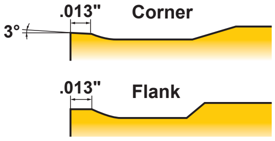
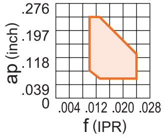
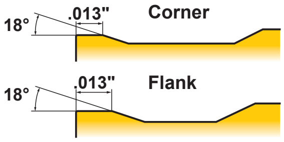
Chip Breaker System for Steel Turning

Negative Inserts

Application	Tolerance	Chip Breaker Name and Picture	Features	Cross Section Geometry
Light Cutting	M	**LP** 	**First recommendation for light cutting of carbon steel and alloy steel** Stable chip control in the light cutting range. The curved edge allows smooth chip discharge.	  CNMG432LP
		SH 	**Alternative chipbreaker for light cutting of carbon steel and alloy steel** Can be used at low depth of cuts and high feed rates. The curved edge allows smooth chip discharge. Recommended for workpieces in the 160—250HB range.	  CNMG432SH
		SA 	**Alternative chipbreaker for light cutting of carbon steel and alloy steel** Superior chip control at small depth of cuts. Covers copying and back turning with wavy edge. Recommended for workpieces in the 200—300HB range.	  CNMG432SA
		SW 	**Wiper insert for light cutting of carbon steel, alloy steel, stainless steel and cast iron** In comparison to conventional chip breakers, the surface finish is maintained even if the feed per revolution is doubled. Wiper design for increased productivity and improved surface finish.	  CNMG432SW
Medium Cutting	M	**MP** 	**First recommendation for medium cutting of carbon steel and alloy steel** Suitable for medium to light cutting. Breaker geometry appropriate for copying and back turning. Cutting edge geometry for an optimum balance of sharpness and fracture resistance.	  CNMG432MP
		MA 	**For medium cutting of carbon steel and alloy steel** Ideal for general cutting applications. Positive land provides sharp cutting action.	  CNMG432MA
		MH 	**Alternative chipbreaker for medium cutting of carbon steel and alloy steel** Flat land offers high edge strength. Good chip control with suitable chip pocket.	  CNMG432MH
		Standard 	**Alternative chipbreaker for medium cutting of carbon steel and alloy steel** Flat land offers high edge strength. Flat top breaker shape offers high edge strength.	  CNMG432
		MW 	**Wiper insert for medium cutting carbon steel, alloy steel, stainless steel and cast iron** The wiper allows up to two times higher feed. A wide chip pocket prevents chip jamming.	  CNMG432MW

Chip Breaker System for Steel Turning

Negative Inserts

Application	Tolerance	Chip Breaker Name and Picture	Features	Cross Section Geometry
Rough Cutting	M	**RP** 	**First recommendation for rough cutting of carbon steel and alloy steel** For interrupted cuts and removing scale. Good balance of cutting edge strength and low cutting resistance because of suitable rake angle.	Carbon Steel • Alloy Steel   CNMG432RP
		GH 	**Alternative chip breaker for rough cutting of carbon steel, alloy steel and cast iron** For interrupted cuts and removing scale. A combination of wide land and a large chip pocket allows high feed rates.	Carbon Steel • Alloy Steel   CNMG432GH

Recommended Cutting Conditions

Negative Inserts (For External Turning)

(inch)

Workpiece Material		Properties	Cutting Range		Priority	Grade	Chip Breaker	Cutting Speed vc (SFM)	Feed f (IPR)	Depth of Cut ap
P	Carbon and Alloy Steels	180—280HB	●	L	1	**MC6115**	**LP**	820—1575	.004—.016	.012—.079
			●	L	2	**MC6125**	**LP**	900—1395	.004—.016	.012—.079
			●	L	3	**MC6115**	**SH**	820—1575	.004—.016	.012—.079
			●	L	4	**MC6125**	**SH**	900—1395	.004—.016	.012—.079
			●	L	5	**MC6115**	**SA**	820—1575	.004—.016	.012—.079
			●	L	6	**MC6125**	**SA**	900—1395	.004—.016	.012—.079
			●	L	7	**MC6115**	**SW**	820—1575	.004—.020	.012—.098
			●	L	8	**MC6125**	**SW**	900—1395	.004—.020	.012—.098
			●	M	1	**MC6115**	**MP**	755—1445	.006—.020	.012—.157
			●	M	2	**MC6125**	**MP**	820—1280	.006—.020	.012—.157
			●	M	3	**MC6115**	**MA**	755—1445	.008—.020	.012—.157
			●	M	4	**MC6125**	**MA**	820—1280	.008—.020	.012—.157
			●	M	5	**MC6115**	**Std**	755—1445	.010—.024	.059—.197
			●	M	6	**MC6125**	**Std**	820—1280	.010—.024	.059—.197
			●	M	7	**MC6115**	**MW**	755—1445	.008—.024	.035—.157
			●	M	8	**MC6125**	**MW**	820—1280	.008—.024	.035—.157
			●	R	1	**MC6115**	**RP**	705—1360	.010—.024	.059—.236
			●	R	2	**MC6125**	**RP**	770—1215	.010—.024	.059—.236
			●	R	3	**MC6115**	**GH**	705—1360	.010—.024	.059—.236
			●	R	4	**MC6125**	**GH**	770—1215	.010—.024	.059—.236
			◐	L	1	**MC6115**	**LP**	820—1575	.004—.016	.012—.079
			◐	L	2	**MC6125**	**LP**	900—1395	.004—.016	.012—.079
			◐	L	3	**MC6115**	**SH**	820—1575	.004—.016	.012—.079
			◐	L	4	**MC6125**	**SH**	900—1395	.004—.016	.012—.079
			◐	L	5	**MC6115**	**SA**	820—1575	.004—.016	.012—.079
			◐	L	6	**MC6125**	**SA**	900—1395	.004—.016	.012—.079
			◐	L	7	**MC6115**	**SW**	820—1575	.004—.020	.012—.098
			◐	L	8	**MC6125**	**SW**	900—1395	.004—.020	.012—.098
			◐	M	1	**MC6125**	**MP**	820—1280	.006—.020	.012—.157
			◐	M	2	**MC6115**	**MP**	755—1445	.006—.020	.012—.157
			◐	M	3	**MC6125**	**MA**	820—1280	.008—.020	.012—.157
			◐	M	4	**MC6115**	**MA**	755—1445	.008—.020	.012—.157
			◐	M	5	**MC6125**	**MH**	820—1280	.008—.022	.039—.157
			◐	M	6	**MC6115**	**MH**	755—1445	.008—.022	.039—.157
			◐	M	7	**MC6125**	**Std**	820—1280	.010—.024	.059—.197
			◐	M	8	**MC6115**	**Std**	755—1445	.010—.024	.059—.197
			◐	M	9	**MC6125**	**MW**	820—1280	.008—.024	.035—.157
			◐	M	10	**MC6115**	**MW**	755—1445	.008—.024	.035—.157
			◐	R	1	**MC6125**	**RP**	770—1215	.010—.024	.059—.236
			◐	R	2	**MC6115**	**RP**	705—1360	.010—.024	.059—.236
			◐	R	3	**MC6125**	**GH**	770—1215	.010—.024	.059—.236
			◐	R	4	**MC6115**	**GH**	705—1360	.010—.024	.059—.236
			✣	L	1	**MC6125**	**LP**	900—1395	.004—.016	.012—.079
			✣	L	2	**MC6125**	**SH**	900—1395	.004—.016	.012—.079
			✣	L	3	**MC6125**	**SA**	900—1395	.004—.016	.012—.079
			✣	M	1	**MC6125**	**MP**	820—1280	.006—.020	.012—.157
			✣	M	2	**MC6125**	**MA**	820—1280	.008—.020	.012—.157
			✣	M	3	**MC6125**	**MH**	820—1280	.008—.022	.039—.157
			✣	M	4	**MC6125**	**Std**	820—1280	.010—.024	.059—.197
			✣	M	5	**MC6125**	**MW**	820—1280	.008—.024	.035—.157
			✣	R	1	**MC6125**	**RP**	770—1215	.010—.024	.059—.236
			✣	R	2	**MC6125**	**GH**	770—1215	.010—.024	.059—.236

Note1) Verify the recommended conditions for each boring bar as cutting conditions for internal machining will vary depending on the length of overhang.

Cutting Conditions : ● : Stable Cutting ◐ : General Cutting ✣ : Unstable Cutting
Cutting Area : **L** : Light Cutting **M** : Medium Cutting **R** : Rough Cutting

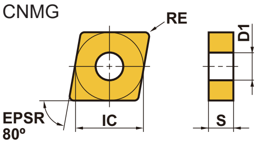
CVD Coated Grade for Steel Turning

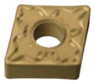
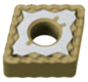
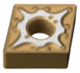
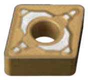
MC6100 Series NEW

Negative Inserts (With Hole)

M Class

CNMG



Light	Light	Light	Light	Medium	Medium
LP 	SH 	SA 	SW  (Wiper)	MP 	MA 
Medium	Medium	Medium	Rough	Rough	
MH 	Standard 	MW  (Wiper)	RP 	GH 	

(inch)

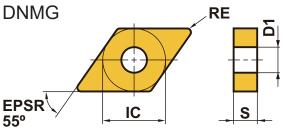
Order Number	Cutting Area	MC6115	MC6125	IC	S	RE	D1
CNMG431LP	L	●	●	.500	.187	.016	.203
CNMG432LP	L	●	●	.500	.187	.031	.203
CNMG433LP	L	●	●	.500	.187	.047	.203
CNMG431SH	L	●	●	.500	.187	.016	.203
CNMG432SH	L	●	●	.500	.187	.031	.203
CNMG433SH	L	●	●	.500	.187	.047	.203
CNMG431SA	L	●	●	.500	.187	.016	.203
CNMG432SA	L	●	●	.500	.187	.031	.203
CNMG433SA	L	●	●	.500	.187	.047	.203
CNMG431SW	L	●	●	.500	.187	.016	.203
CNMG432SW	L	●	●	.500	.187	.031	.203
CNMG433SW	L	●	●	.500	.187	.047	.203
CNMG431MP	M	●	●	.500	.187	.016	.203
CNMG432MP	M	●	●	.500	.187	.031	.203
CNMG433MP	M	●	●	.500	.187	.047	.203
CNMG434MP	M	●	●	.500	.187	.063	.203
CNMG542MP	M	●	●	.625	.250	.031	.250
CNMG543MP	M	●	●	.625	.250	.047	.250
CNMG544MP	M	●	●	.625	.250	.063	.250
CNMG431MA	M	●	●	.500	.187	.016	.203
CNMG432MA	M	●	●	.500	.187	.031	.203
CNMG433MA	M	●	●	.500	.187	.047	.203
CNMG434MA	M	●	●	.500	.187	.063	.203
CNMG542MA	M	●	●	.625	.250	.031	.250
CNMG543MA	M	●	●	.625	.250	.047	.250
CNMG544MA	M	●	●	.625	.250	.063	.250
CNMG643MA	M	●	●	.750	.250	.047	.312
CNMG644MA	M	●	●	.750	.250	.063	.312

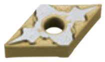
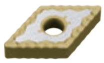
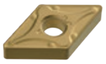
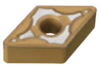
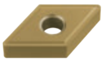
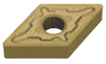
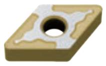
Order Number	Cutting Area	MC6115	MC6125	IC	S	RE	D1
CNMG431MH	M	●	●	.500	.187	.016	.203
CNMG432MH	M	●	●	.500	.187	.031	.203
CNMG433MH	M	●	●	.500	.187	.047	.203
CNMG434MH	M	●	●	.500	.187	.063	.203
CNMG542MH	M	●	●	.625	.250	.031	.250
CNMG543MH	M	●	●	.625	.250	.047	.250
CNMG544MH	M	●	●	.625	.250	.063	.250
CNMG643MH	M	●	●	.750	.250	.047	.312
CNMG644MH	M	●	●	.750	.250	.063	.312
CNMG431	M	●	●	.500	.187	.016	.203
CNMG432	M	●	●	.500	.187	.031	.203
CNMG433	M	●	●	.500	.187	.047	.203
CNMG434	M	●	●	.500	.187	.063	.203
CNMG542	M	●	●	.625	.250	.031	.250
CNMG543	M	●	●	.625	.250	.047	.250
CNMG544	M	●	●	.625	.250	.063	.250
CNMG642	M	●	●	.750	.250	.031	.312
CNMG643	M	●	●	.750	.250	.047	.312
CNMG644	M	●	●	.750	.250	.063	.312
CNMG432MW	M	●	●	.500	.187	.031	.203
CNMG433MW	M	●	●	.500	.187	.047	.203
CNMG432RP	R	●	●	.500	.187	.031	.203
CNMG433RP	R	●	●	.500	.187	.047	.203
CNMG434RP	R	●	●	.500	.187	.063	.203
CNMG543RP	R	●	●	.625	.250	.047	.250
CNMG544RP	R	●	●	.625	.250	.063	.250
CNMG643RP	R	●	●	.750	.250	.047	.312
CNMG644RP	R	●	●	.750	.250	.063	.312
CNMG432GH	R	●	●	.500	.187	.031	.203
CNMG433GH	R	●	●	.500	.187	.047	.203
CNMG434GH	R	●	●	.500	.187	.063	.203
CNMG543GH	R	●	●	.625	.250	.047	.250
CNMG544GH	R	●	●	.625	.250	.063	.250
CNMG643GH	R	●	●	.750	.250	.047	.312
CNMG644GH	R	●	●	.750	.250	.063	.312

● : USA Stock
(10 inserts in one case)

Negative Inserts (With Hole)

M Class



Light	Light	Light			
LP 	SH 	SA 			
Medium	Medium	Medium	Medium	Rough	Rough
MP 	MA 	MH 	Standard 	RP 	GH 

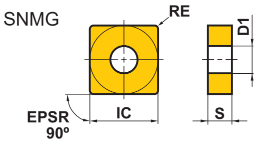
(inch)

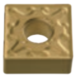
Order Number	Cutting Area	MC6115	MC6125	IC	S	RE	D1
DNMG431LP	L	●	●	.500	.187	.016	.203
DNMG432LP	L	●	●	.500	.187	.031	.203
DNMG433LP	L	●	●	.500	.187	.047	.203
DNMG441LP	L	●	●	.500	.250	.016	.203
DNMG442LP	L	●	●	.500	.250	.031	.203
DNMG443LP	L	●	●	.500	.250	.047	.203
DNMG431SH	L	●	●	.500	.187	.016	.203
DNMG432SH	L	●	●	.500	.187	.031	.203
DNMG433SH	L	●	●	.500	.187	.047	.203
DNMG441SH	L	●	●	.500	.250	.016	.203
DNMG442SH	L	●	●	.500	.250	.031	.203
DNMG443SH	L	●	●	.500	.250	.047	.203
DNMG431SA	L	●	●	.500	.187	.016	.203
DNMG432SA	L	●	●	.500	.187	.031	.203
DNMG433SA	L	●	●	.500	.187	.047	.203
DNMG441SA	L	●	●	.500	.250	.016	.203
DNMG442SA	L	●	●	.500	.250	.031	.203
DNMG443SA	L	●	●	.500	.250	.047	.203
DNMG431MP	M	●	●	.500	.187	.016	.203
DNMG432MP	M	●	●	.500	.187	.031	.203
DNMG433MP	M	●	●	.500	.187	.047	.203
DNMG434MP	M	●	●	.500	.187	.063	.203
DNMG441MP	M	●	●	.500	.250	.016	.203
DNMG442MP	M	●	●	.500	.250	.031	.203
DNMG443MP	M	●	●	.500	.250	.047	.203
DNMG444MP	M	●	●	.500	.250	.063	.203
DNMG431MA	M	●	●	.500	.187	.016	.203
DNMG432MA	M	●	●	.500	.187	.031	.203
DNMG433MA	M	●	●	.500	.187	.047	.203
DNMG441MA	M	●	●	.500	.250	.016	.203
DNMG442MA	M	●	●	.500	.250	.031	.203
DNMG443MA	M	●	●	.500	.250	.047	.203
DNMG431MH	M	●	●	.500	.187	.016	.203
DNMG432MH	M	●	●	.500	.187	.031	.203
DNMG433MH	M	●	●	.500	.187	.047	.203
DNMG441MH	M	●	●	.500	.250	.016	.203
DNMG442MH	M	●	●	.500	.250	.031	.203
DNMG443MH	M	●	●	.500	.250	.047	.203
DNMG431	M	●	●	.500	.187	.016	.203
DNMG432	M	●	●	.500	.187	.031	.203
DNMG433	M	●	●	.500	.187	.047	.203
DNMG441	M	●	●	.500	.250	.016	.203
DNMG442	M	●	●	.500	.250	.031	.203
DNMG443	M	●	●	.500	.250	.047	.203
DNMG432RP	R	●	●	.500	.187	.031	.203
DNMG433RP	R	●	●	.500	.187	.047	.203
DNMG434RP	R	●	●	.500	.187	.063	.203
DNMG442RP	R	●	●	.500	.250	.031	.203
DNMG443RP	R	●	●	.500	.250	.047	.203
DNMG444RP	R	●	●	.500	.250	.063	.203
DNMG432GH	R	●	●	.500	.187	.031	.203
DNMG433GH	R	●	●	.500	.187	.047	.203
DNMG442GH	R	●	●	.500	.250	.031	.203
DNMG443GH	R	●	●	.500	.250	.047	.203

MC6100 Series NEW

Negative Inserts (With Hole)

M Class



Light	Light	Light			
LP 	SH 	SA 			
Medium	Medium	Medium	Medium	Rough	Rough
MP 	MA 	MH 	Standard 	RP 	GH 

(inch)

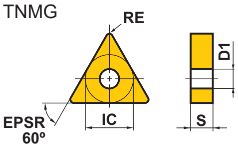
Order Number	Cutting Area	MC6115	MC6125	IC	S	RE	D1
SNMG431LP	L	●	●	.500	.187	.016	.203
SNMG432LP	L	●	●	.500	.187	.031	.203
SNMG433LP	L	●	●	.500	.187	.047	.203
SNMG432SH	L	●	●	.500	.187	.031	.203
SNMG432SA	L	●	●	.500	.187	.031	.203
SNMG431MP	M	●	●	.500	.187	.016	.203
SNMG432MP	M	●	●	.500	.187	.031	.203
SNMG433MP	M	●	●	.500	.187	.047	.203
SNMG431MA	M	●	●	.500	.187	.016	.203
SNMG432MA	M	●	●	.500	.187	.031	.203
SNMG433MA	M	●	●	.500	.187	.047	.203
SNMG542MA	M	●	●	.625	.250	.031	.250
SNMG543MA	M	●	●	.625	.250	.047	.250
SNMG643MA	M	●	●	.750	.250	.047	.312
SNMG644MA	M	●	●	.750	.250	.063	.312
SNMG432MH	M	●	●	.500	.187	.031	.203
SNMG433MH	M	●	●	.500	.187	.047	.203
SNMG643MH	M	●	●	.750	.250	.047	.312
SNMG644MH	M	●	●	.750	.250	.063	.312
SNMG431	M	●	●	.500	.187	.016	.203
SNMG432	M	●	●	.500	.187	.031	.203
SNMG433	M	●	●	.500	.187	.047	.203
SNMG543	M	●	●	.625	.250	.047	.250
SNMG643	M	●	●	.750	.250	.047	.312
SNMG644	M	●	●	.750	.250	.063	.312
SNMG432RP	R	●	●	.500	.187	.031	.203
SNMG433RP	R	●	●	.500	.187	.047	.203
SNMG434RP	R	●	●	.500	.187	.063	.203
SNMG543RP	R	●	●	.625	.250	.047	.250
SNMG544RP	R	●	●	.625	.250	.063	.250
SNMG643RP	R	●	●	.750	.250	.047	.312
SNMG644RP	R	●	●	.750	.250	.063	.312
SNMG432GH	R	●	●	.500	.187	.031	.203
SNMG433GH	R	●	●	.500	.187	.047	.203
SNMG434GH	R	●	●	.500	.187	.063	.203
SNMG543GH	R	●	●	.625	.250	.047	.250
SNMG643GH	R	●	●	.750	.250	.047	.312
SNMG644GH	R	●	●	.750	.250	.063	.312

● : USA Stock
(10 inserts in one case)

Negative Inserts (With Hole)

M Class

TNMG



Light	Light	Light			
LP 	SH 	SA 			
Medium	Medium	Medium	Medium	Rough	Rough
MP 	MA 	MH 	Standard 	RP 	GH 

(inch)

Order Number	Cutting Area	MC6115	MC6125	IC	S	RE	D1
TNMG331LP	L	●	●	.375	.187	.016	.150
TNMG332LP	L	●	●	.375	.187	.031	.150
TNMG333LP	L	●	●	.375	.187	.047	.150
TNMG432LP	L	●	●	.500	.187	.031	.203
TNMG433LP	L	●	●	.500	.187	.047	.203
TNMG331SH	L	●	●	.375	.187	.016	.150
TNMG332SH	L	●	●	.375	.187	.031	.150
TNMG432SH	L	●	●	.500	.187	.031	.203
TNMG331SA	L	●	●	.375	.187	.016	.150
TNMG332SA	L	●	●	.375	.187	.031	.150
TNMG333SA	L	●	●	.375	.187	.047	.150
TNMG432SA	L	●	●	.500	.187	.031	.203
TNMG331MP	M	●	●	.375	.187	.016	.150
TNMG332MP	M	●	●	.375	.187	.031	.150
TNMG333MP	M	●	●	.375	.187	.047	.150
TNMG432MP	M	●	●	.500	.187	.031	.203
TNMG433MP	M	●	●	.500	.187	.047	.203
TNMG331MA	M	●	●	.375	.187	.016	.150
TNMG332MA	M	●	●	.375	.187	.031	.150
TNMG333MA	M	●	●	.375	.187	.047	.150
TNMG432MA	M	●	●	.500	.187	.031	.203
TNMG433MA	M	●	●	.500	.187	.047	.203
TNMG542MA	M	●	●	.625	.250	.031	.250
TNMG543MA	M	●	●	.625	.250	.047	.250
TNMG331MH	M	●	●	.375	.187	.016	.150
TNMG332MH	M	●	●	.375	.187	.031	.150
TNMG333MH	M	●	●	.375	.187	.047	.150
TNMG432MH	M	●	●	.500	.187	.031	.203
TNMG433MH	M	●	●	.500	.187	.047	.203
TNMG331	M	●	●	.375	.187	.016	.150
TNMG332	M	●	●	.375	.187	.031	.150
TNMG333	M	●	●	.375	.187	.047	.150
TNMG431	M	●	●	.500	.187	.016	.203
TNMG432	M	●	●	.500	.187	.031	.203
TNMG433	M	●	●	.500	.187	.047	.203
TNMG332RP	R	●	●	.375	.187	.031	.150
TNMG333RP	R	●	●	.375	.187	.047	.150
TNMG432RP	R	●	●	.500	.187	.031	.203
TNMG433RP	R	●	●	.500	.187	.047	.203
TNMG434RP	R	●	●	.500	.187	.063	.203
TNMG543RP	R	●	●	.625	.250	.047	.250
TNMG544RP	R	●	●	.625	.250	.063	.250
TNMG332GH	R	●	●	.375	.187	.031	.150
TNMG333GH	R	●	●	.375	.187	.047	.150
TNMG432GH	R	●	●	.500	.187	.031	.203
TNMG433GH	R	●	●	.500	.187	.047	.203
TNMG434GH	R	●	●	.500	.187	.063	.203
TNMG543GH	R	●	●	.625	.250	.047	.250
TNMG544GH	R	●	●	.625	.250	.063	.250

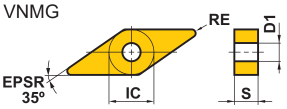
CVD Coated Grade for Steel Turning

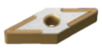
MC6100 Series NEW

Negative Inserts (With Hole)

M Class

VNMG



Light	Light		
LP 	SH 		
Medium	**Medium**	**Medium**	**Medium**
MP 	MA 	MH 	Standard 

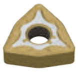
(inch)

Order Number	Cutting Area	MC6115	MC6125	IC	S	RE	D1
VNMG331LP	L	●	●	.375	.187	.016	.150
VNMG332LP	L	●	●	.375	.187	.031	.150
VNMG331SH	L	●	●	.375	.187	.016	.150
VNMG332SH	L	●	●	.375	.187	.031	.150
VNMG331MP	M	●	●	.375	.187	.016	.150
VNMG332MP	M	●	●	.375	.187	.031	.150
VNMG333MP	M	●	●	.375	.187	.047	.150
VNMG331MA	M	●	●	.375	.187	.016	.150
VNMG332MA	M	●	●	.375	.187	.031	.150
VNMG331MH	M	●	●	.375	.187	.016	.150
VNMG332MH	M	●	●	.375	.187	.031	.150
VNMG331	M	●	●	.375	.187	.016	.150
VNMG332	M	●	●	.375	.187	.031	.150
VNMG333	M	●	●	.375	.187	.047	.150

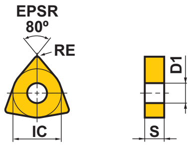
● : USA Stock
(10 inserts in one case)

Negative Inserts (With Hole)

M Class

Light	Light	Light	Light	Medium	Medium
LP 	SH 	SA 	SW  (Wiper)	MP 	MA 
Medium	Medium	Medium	Rough	Rough	
MH 	Standard 	MW  (Wiper)	RP 	GH 	

WNMG



(inch)

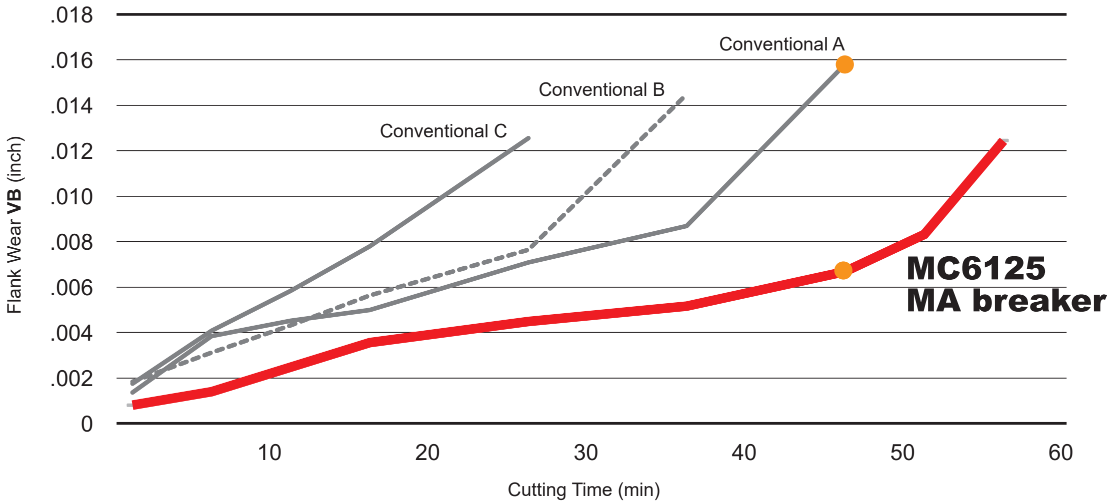
Order Number	Cutting Area	MC6115	MC6125	IC	S	RE	D1
WNMG431LP	L	●	●	.500	.187	.016	.203
WNMG432LP	L	●	●	.500	.187	.031	.203
WNMG433LP	L	●	●	.500	.187	.047	.203
WNMG431SH	L	●	●	.500	.187	.016	.203
WNMG432SH	L	●	●	.500	.187	.031	.203
WNMG433SH	L	●	●	.500	.187	.047	.203
WNMG431SA	L	●	●	.500	.187	.016	.203
WNMG432SA	L	●	●	.500	.187	.031	.203
WNMG433SA	L	●	●	.500	.187	.047	.203
WNMG431SW	L	●	●	.500	.187	.016	.203
WNMG432SW	L	●	●	.500	.187	.031	.203
WNMG433SW	L	●	●	.500	.187	.047	.203
WNMG431MP	M	●	●	.500	.187	.016	.203
WNMG432MP	M	●	●	.500	.187	.031	.203
WNMG433MP	M	●	●	.500	.187	.047	.203
WNMG434MP	M	●	●	.500	.187	.063	.203
WNMG431MA	M	●	●	.500	.187	.016	.203
WNMG432MA	M	●	●	.500	.187	.031	.203
WNMG433MA	M	●	●	.500	.187	.047	.203
WNMG434MA	M	●	●	.500	.187	.063	.203

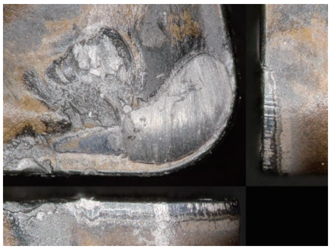
Order Number	Cutting Area	MC6115	MC6125	IC	S	RE	D1
WNMG431MH	M	●	●	.500	.187	.016	.203
WNMG432MH	M	●	●	.500	.187	.031	.203
WNMG433MH	M	●	●	.500	.187	.047	.203
WNMG431	M	●	●	.500	.187	.016	.203
WNMG432	M	●	●	.500	.187	.031	.203
WNMG433	M	●	●	.500	.187	.047	.203
WNMG432MW	M	●	●	.500	.187	.031	.203
WNMG433MW	M	●	●	.500	.187	.047	.203
WNMG432RP	R	●	●	.500	.187	.031	.203
WNMG433RP	R	●	●	.500	.187	.047	.203
WNMG432GH	R	●	●	.500	.187	.031	.203
WNMG433GH	R	●	●	.500	.187	.047	.203

Cutting Performance

Machining ANSI 5120H : Comparison of Wear Resistance During Continuous Wet Cutting

The thick coating exclusively for MC6125 highly suppresses early wear.





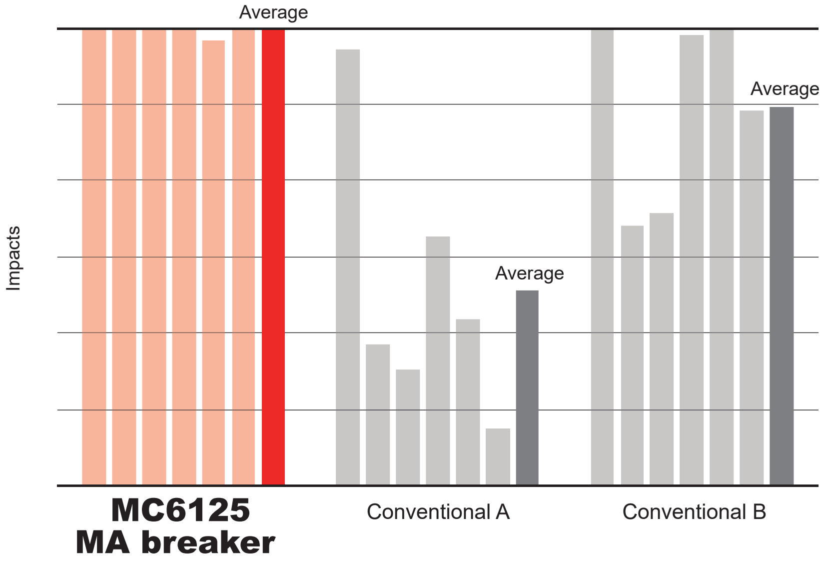
MC6125 46 min.
MA breaker

Conventional A 46 min.

<Cutting Conditions>
Workpiece Material : ANSI 5120H
Inserts : CNMG432-○○
Cutting Speed : vc=985 SFM
Feed per Rev. : f=.012 IPR
Depth of Cut : ap=.059 inch
Cutting Mode : Wet Cutting

Comparison of Toughness During Interrupted Cutting

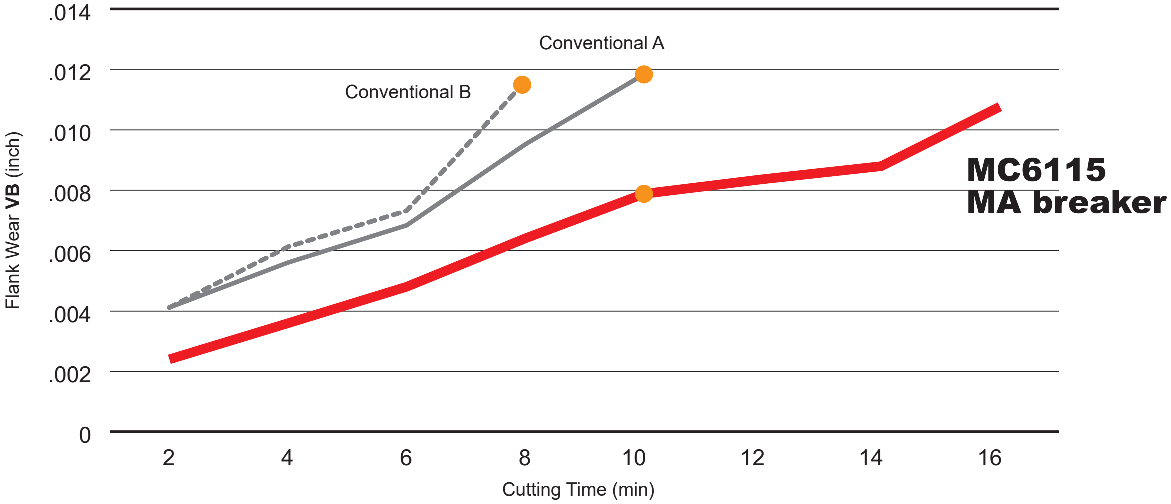
Provides stable cutting under severe cutting conditions that are likely to cause sudden fracturing.

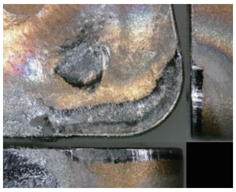


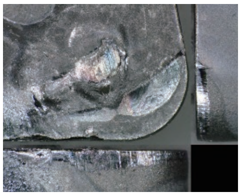
<Cutting Conditions>
Workpiece Material : AISI 4140
Inserts : CNMG432○○
Cutting Speed : vc=655 SFM
Feed per Rev. : f=.010 IPR
Depth of Cut : ap=.059 inch
Cutting Mode : Wet Cutting

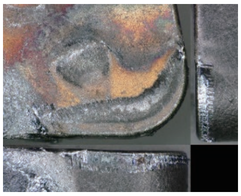
Machining AISI 1045 : Comparison of Wear Resistance During Continuous Dry Cutting

The "Super" Nano Texture Technology increases tool life even when dry cutting by suppressing crater wear.




MC6115 10 min.

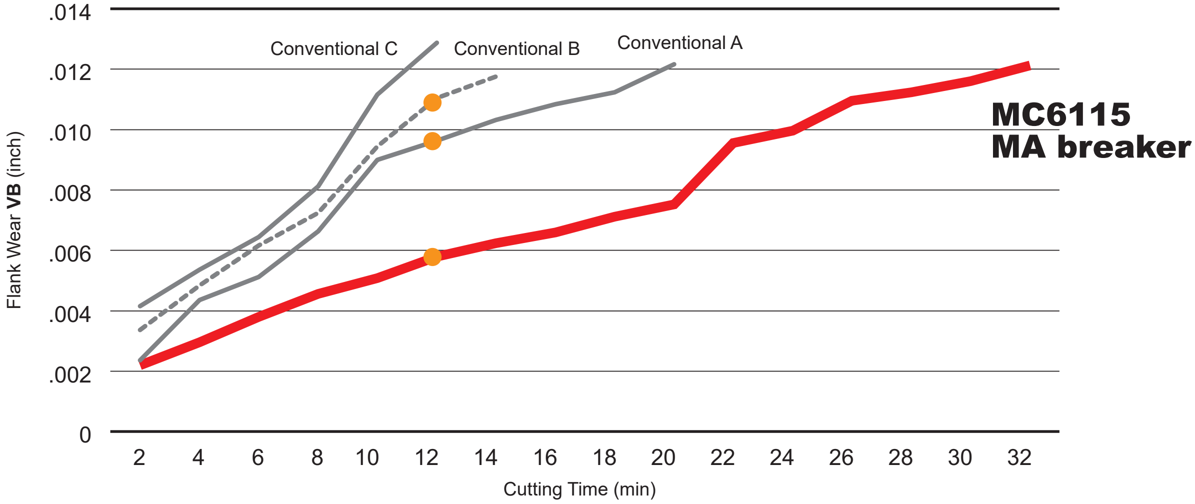

Conventional A 10 min.

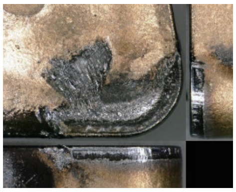

Conventional B 8 min.

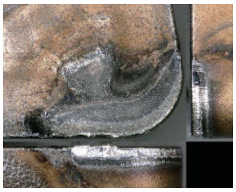
<Cutting Conditions>
Workpiece Material : AISI 1045
Inserts : CNMG432◌◌
Cutting Speed : vc=985 SFM
Feed per Rev. : f=.012 IPR
Depth of Cut : ap=.059 inch
Cutting Mode : Dry Cutting

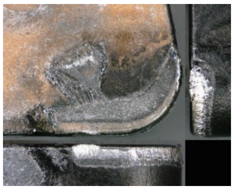
Machining AISI 52100 : Comparison of Wear Resistance During Continuous Wet Cutting

The thick coating provides high flank wear resistance.




MC6115 12 min.


Conventional A 12 min.

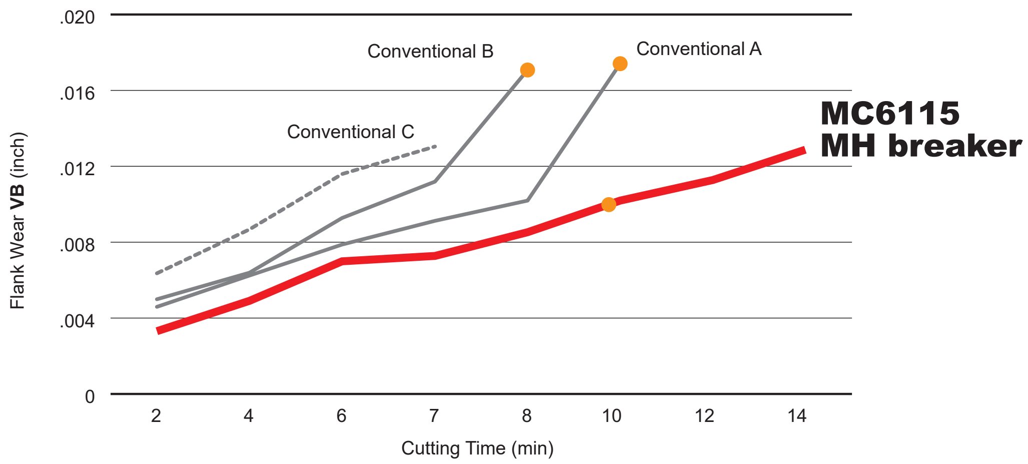

Conventional B 12 min.

<Cutting Conditions>
Workpiece Material : AISI 52100
Inserts : CNMG432◌◌
Cutting Speed : vc=985 SFM
Feed per Rev. : f=.012 IPR
Depth of Cut : ap=.059 inch
Cutting Mode : Wet Cutting

Cutting Performance

Machining AISI 4140 : Comparison of Wear Resistance During Continuous Wet Cutting

MC6115 with high edge strength breakers can also enable excellent wear resistance during high speed turning.



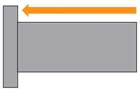
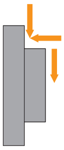
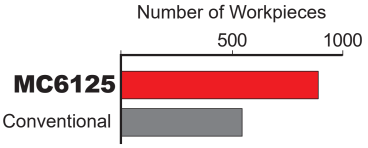
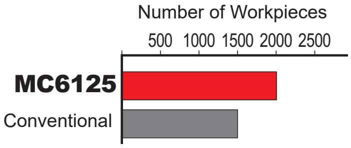
MC6115 10 min.

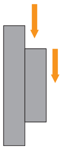
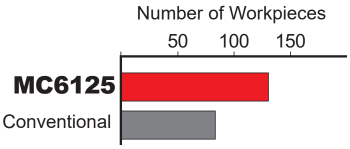
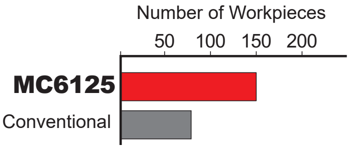
Conventional A 10 min.

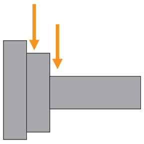
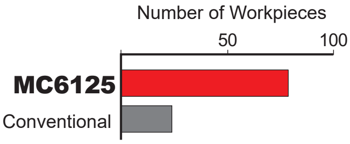
Conventional B 8 min.

<Cutting Conditions>
Workpiece Material : AISI 4140
Inserts : CNMG432◌◌
Cutting Speed : vc=1150 SFM
Feed per Rev. : f=.012 IPR
Depth of Cut : ap=.059 inch
Cutting Mode : Wet Cutting

Examples of Usage

Insert		CNMG432MA	WNMG432MP
Workpiece Material		AISI 1045 	Carbon Steel 
Component		Hex Bar Parts	Automotive Parts
Application		Interrupted Finish Turning	External Turning and Facing
Cutting Conditions	Cutting Speed vc (SFM)	490	260
	Feed per Rev. f (IPR)	.008	.004 - .020
	Depth of Cut ap (inch)	.079, .063	.020
Cutting Mode		Wet Cutting	Wet Cutting
Results		 Conventional products fractured after chipping but MC6125 formed good chip shapes and achieved a longer tool life.	 MC6125 achieved more than 1.3 times longer tool life due to its high wear resistance.

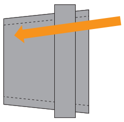
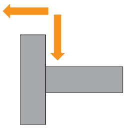
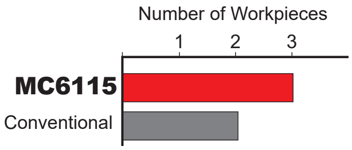
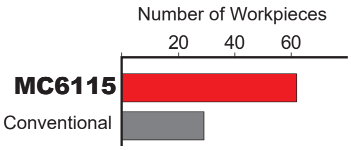
Insert		DNMG433S	CNMG432MH
Workpiece Material		AISI 1053 	General Structural Steel 
Component		–	Hun Parts
Application		Interrupted Finish Turning	Face Turning
Cutting Conditions	Cutting Speed vc (SFM)	655	655→785
	Feed per Rev. f (IPR)	.012	.010
	Depth of Cut ap (inch)	.047	.079
Cutting Mode		Wet Cutting	Wet Cutting
Results		 MC6125 provided a stable cutting action and achieved 1.5 times more tool life than conventional products.	 MC6125 improved efficiency and tool life by increasing the cutting speed.

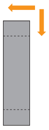
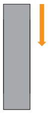
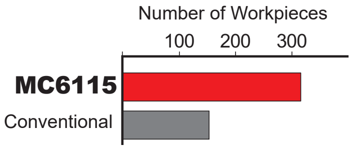
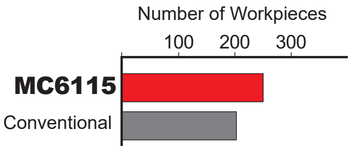
Insert		CNMG433RP
Workpiece Material		AISI 5135 
Component		Flange Parts
Application		External Turning and Facing
Cutting Conditions	Cutting Speed vc (SFM)	655
	Feed per Rev. f (IPR)	.010
	Depth of Cut ap (inch)	.059
Cutting Mode		Wet Cutting
Results		 Conventional products machined an inconsistent number of components. MC6125 was more consistent and improved tool life.

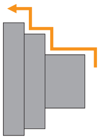
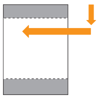
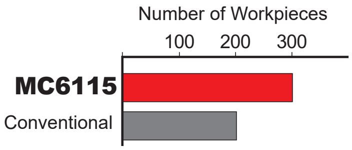
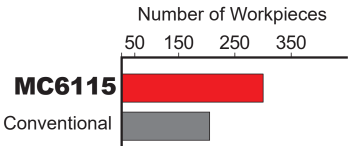
The application examples are from customers workpieces and can therefore differ from the recommended cutting conditions.

CVD Coated Grade for Steel Turning

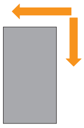
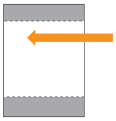
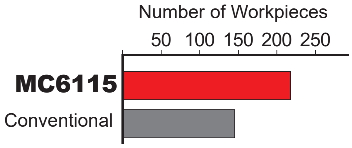
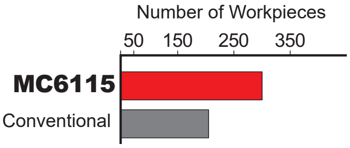
Examples of Usage

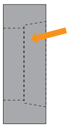
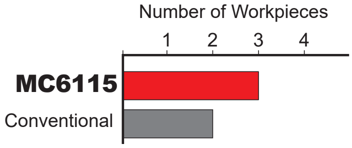
Insert		CNMG432MA	WNMG432MA
Workpiece Material		AISI 4140 	AISI 5140 
Component		Heavy Machinery Parts	Automotive Parts
Application		Internal Turning	External Face Turning
Cutting Conditions	Cutting Speed vc (SFM)	490	950
	Feed per Rev. f (IPR)	.012	.010
	Depth of Cut ap (inch)	.059	.039
Cutting Mode		Wet Cutting	Wet Cutting
Results		 Tool life increased x 1.5 on a large workpiece (inner diameter 16.929 inch)	 The excellent wear resistance of MC6115 helped achieve double tool life.

Insert		WNMG432MA	WNMG433MP
Workpiece Material		AISI 52100 	AISI 5120H 
Component		Bearing Parts	Machine Parts
Application		External Face Turning	Face Turning
Cutting Conditions	Cutting Speed vc (SFM)	650-910	770
	Feed per Rev. f (IPR)	.008-.012	.014
	Depth of Cut ap (inch)	.039	.039
Cutting Mode		Wet Cutting	Wet Cutting
Results		 The excellent wear resistance of MC6115 helped achieve double tool life.	 MC6115 achieved longer tool life compared to a conventional product.

Insert		WNMG432MP	WNMG434MA
Workpiece Material		AISI 5140 	AISI 1049 
Component		Hub	Joint Parts
Application		External Turning and Facing	Internal Turning and Facing
Cutting Conditions	Cutting Speed vc (SFM)	985	705
	Feed per Rev. f (IPR)	.010-.014	.010-.011
	Depth of Cut ap (inch)	.039-.098	.124
Cutting Mode		Wet Cutting	Wet Cutting
Results		 Superior wear resistance compared to conventional products meant tool life was extended.	 Excellent wear resistance during rough machining of forged product applications helped achieve 150% tool life.

The application examples are from customers workpieces and can therefore differ from the recommended cutting conditions.

Insert		**DNMG443SA**	**CNMG432MP**
Workpiece Material		Bearing Steel 	AISI 5140 
Component		Bearing Parts	Shaft Parts
Application		External Turning and Facing	Internal Turning
Cutting Conditions	Cutting Speed vc (SFM)	850	920
	Feed per Rev. f (IPR)	.012-.014	.011
	Depth of Cut ap (inch)	.020	.098
Cutting Mode		Wet Cutting	Wet Cutting
Results		 Extreme resistance to chipping achieved 150% tool life and enabled easy identification of wear.	 Number of components machined increased by 50% due to improved wear resistance.

Insert		**WNMG432MP**
Workpiece Material		Heated Tool Steel 
Component		Die Casting Parts
Application		Internal Turning
Cutting Conditions	Cutting Speed vc (SFM)	525
	Feed per Rev. f (IPR)	.010
	Depth of Cut ap (inch)	.079
Cutting Mode		Wet Cutting
Results		 MC6115 gave 1.5 x longer tool life even when machining heat treated materials.

The application examples are from customers workpieces and can therefore differ from the recommended cutting conditions.

CVD Coated Grade for Steel Turning

MC6100 Series

For your safety
●Don't handle inserts and chips without gloves. ●Please machine within the recommended application range and exchange expired tools with new ones in advance of breakage. ●Please use safety covers and wear safety glasses. ●When using compounded cutting oils, please take fire precautions. ●When using rotating tools, please make a trial run to check run-out, vibration and abnormal sounds etc.

DIAEDGE

TOOL NEWS

2022.4 Update
B249A

CBN Grade for Turning Hardened Steel

BC8200 Series

New Products

Excellent Coated CBN Grade for Next Generation Turning of Hardened Steels

MITSUBISHI MATERIALS CORPORATION

CBN Grade for Turning Hardened Steel

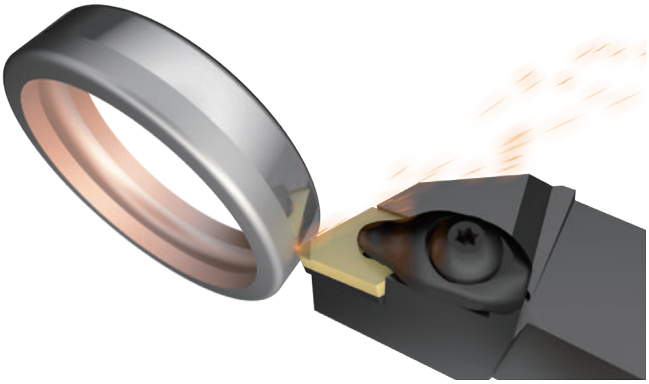
BC8200 Series

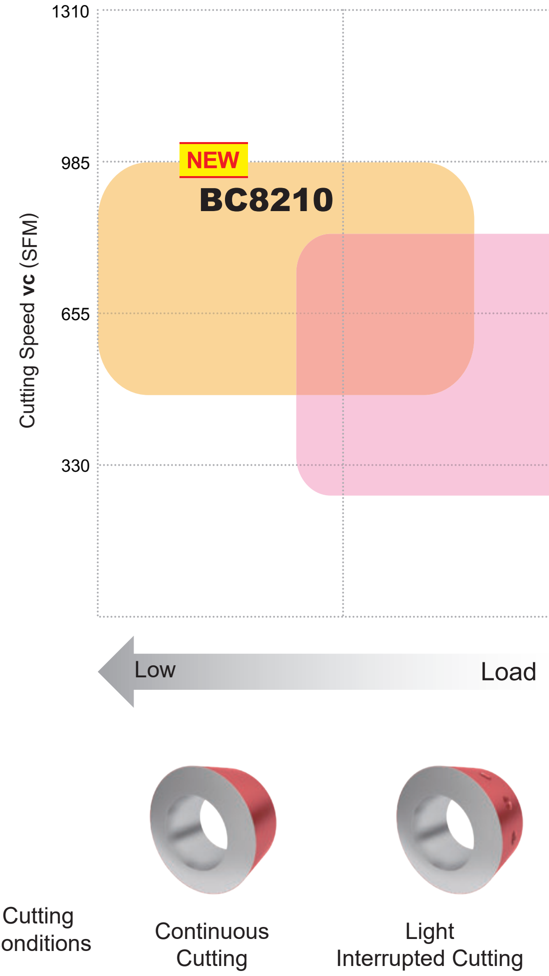
NEW

BC8210 For Continuous and Light Interrupted Cutting

Outstanding Tool Life with High-speed Machining

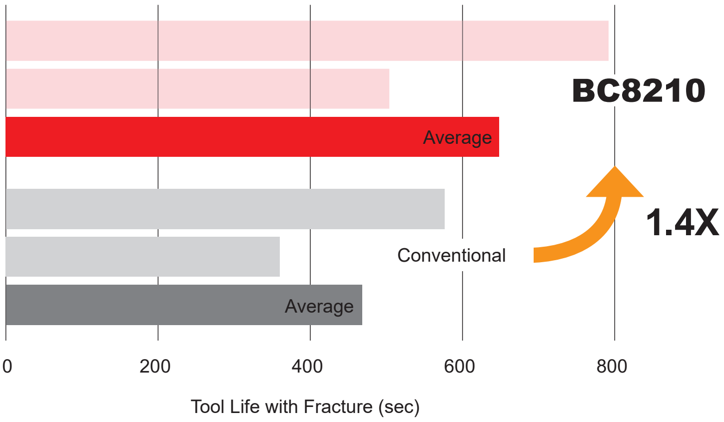
Suitable for continuous cutting and Light interrupted cutting. BC8210 exhibits excellent chipping, flank and crater wear resistance, thereby providing a stable machining process at high speed cutting conditions.



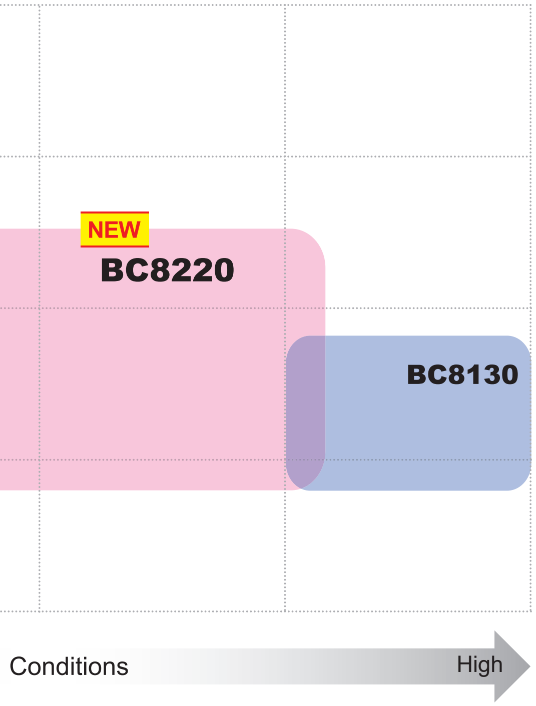


Comparison of Wear Resistance During Continuous Cutting

Defects due to crater wear are suppressed and tool life is improved when compared to conventional products.



<Cutting Conditions>
Workpieces Material : AISI 5120 (60 HRC)
Inserts : NP-CNGA432-GS2
Cutting Speed : vc=655 SFM
Feed per Rev. : f=.004 IPR
Depth of Cut : ap=.008 inch
Cutting Mode : Dry Cutting



Medium
Interrupted Cutting

Heavy
Interrupted Cutting

<Cutting Conditions>

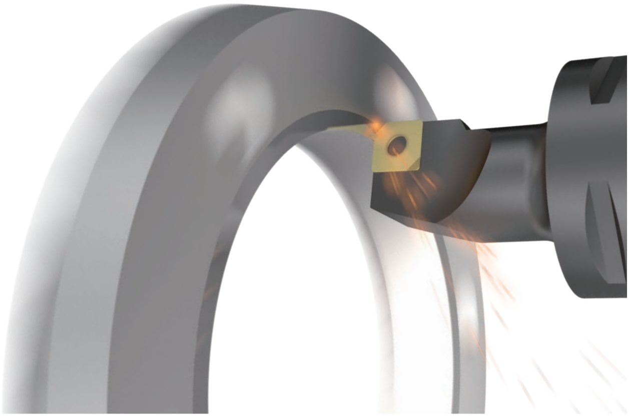
Workpieces Material	: AISI 5120 (60 HRC)
Inserts	: NP-CNGA432-VA2
Cutting Speed	: vc=820 SFM
Feed per Rev.	: f=.006 IPR
Depth of Cut	: ap=.004 inch
Cutting Mode	: Dry Cutting

NEW

BC8220 General Applications

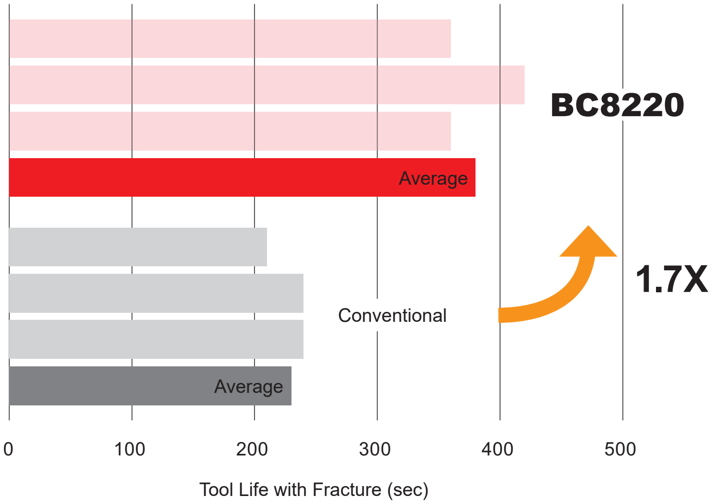
Achieves Impressive Tool Life Over a Wide Range of Cutting Conditions.

Highly suited to a wide application area from continuous through to heavy interrupted cutting. It also has excellent crater wear and fracture resistance due to the new CBN base material combined with a new coating to dramatically extend tool life.



Comparison of Fracture Resistance During Medium Interrupted Cutting

Excelling in suppression of chipping and cracks, it also improves fracture resistance after crater wear providing stable cutting action that improves tool life.



Features

BC8210

The newly developed, impact absorbing, AlCrSiN-base coating combined with the excellent wear-resistant, TiAlSiN-base coating, provides stable wear and chip resistance from continuous through to low interrupted cutting.

NEW

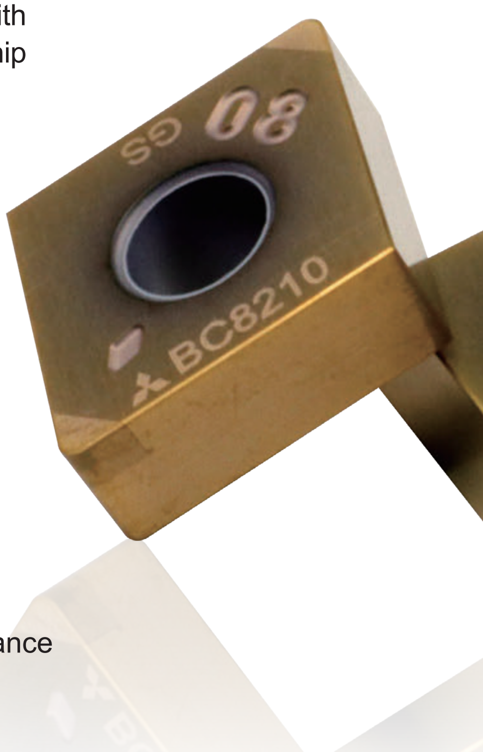
Gold color aids easy identification of edge use.

Excellent chipping resistance
Absorbs impact forces

Excellent wear resistance
Abrasion resistant layer

Improved strength of adhesion to the CBN substrate prevents peeling
High adhesion layer for BC8210

Excellent crater wear and chipping resistance
Exclusive BC8210 sintered body



Ultra Micro-particle/ Heat Resistant Binder Technology

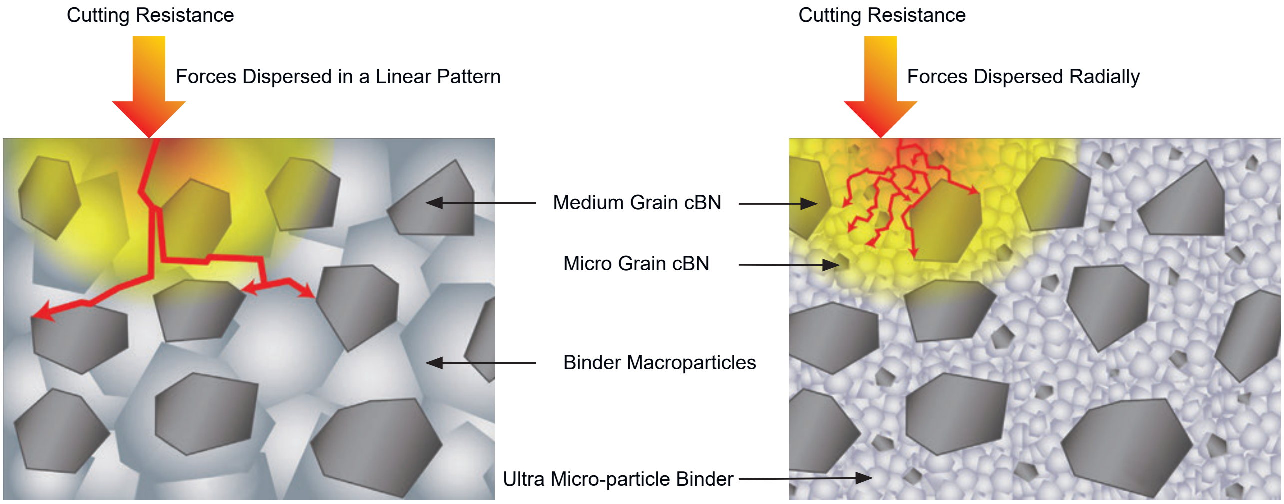
The new CBN substrate contains a new ultra micro-particle and heat resistant binder. This suppresses both chipping and crater wear that promote longer tool life.

Optimized Substrate Technology with Ultra Micro-particle Binder

The ultra micro-particle binder prevents linear crack development to avoid sudden fracturing.

Conventional

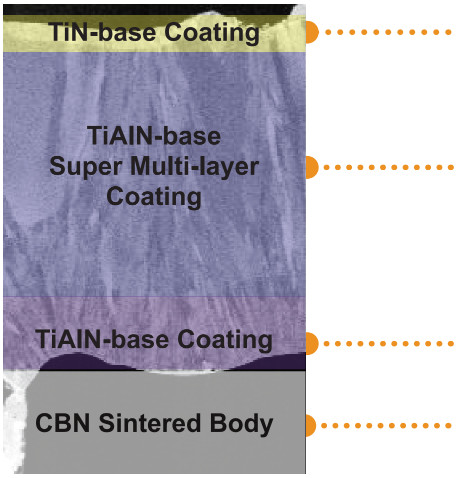
BC8200, BC8100 Series



BC8220

TiAIN-base coating, which has excellent wear resistance and a fine multi-layered structure suppresses the growth of cracks in the coating and thereby reduces edge chipping. This allows for stable cutting in a wide variety of applications.

NEW



Gold color aids easy identification of edge use.

High wear and chipping resistance
Super Multi-layer

Improved strength of adhesion to the CBN substrate prevents peeling
High adhesion layer for BC8220

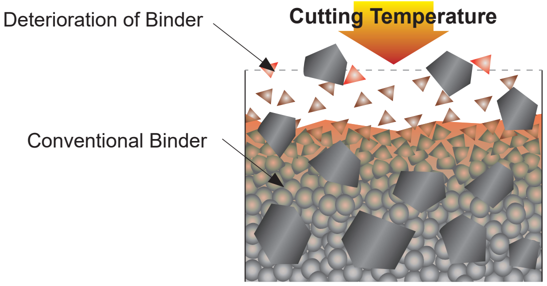
Excellent crater wear and chipping resistance
Exclusive BC8220 Sintered body

NEW

Positive Effect of the Newly Developed Heat Resistant Binder

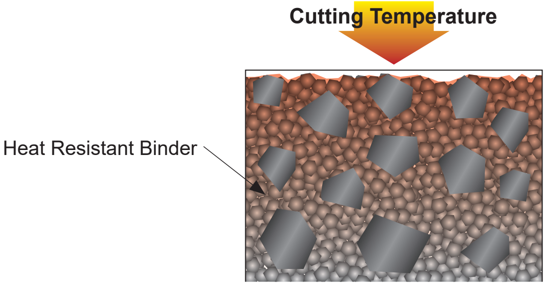
By increasing the heat resistance of the binder, wear resistance due to the deterioration of the binder component is increased, thereby suppressing crater wear, chipping and fracturing.

Conventional

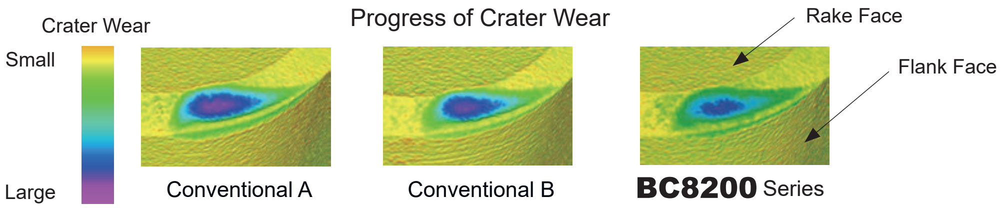


The binder deteriorates due to the heat produced during cutting, which reduces the wear resistance.

BC8200 Series



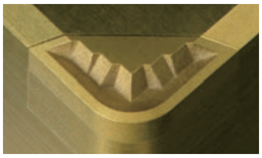
Deterioration of the binder is much reduced.



Features of the Insert

Chip Breaker

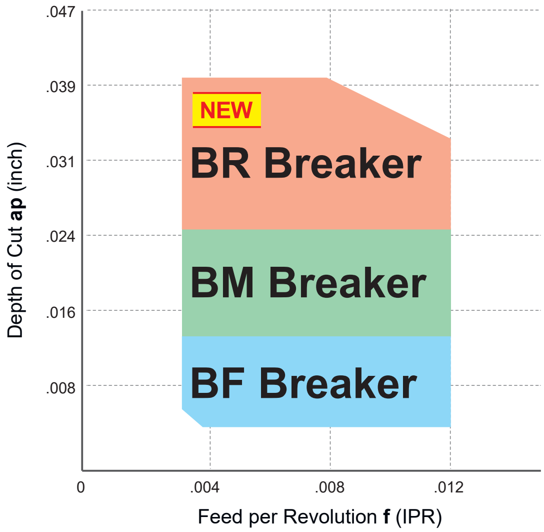
A BR breaker has been added to achieve better chip control at higher depths of cut.
A versatile range of chip breakers are available for a wide range of applications.



BR Breaker

BM Breaker

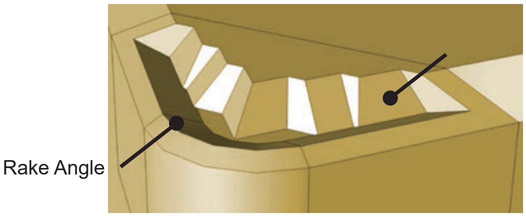
BF Breaker

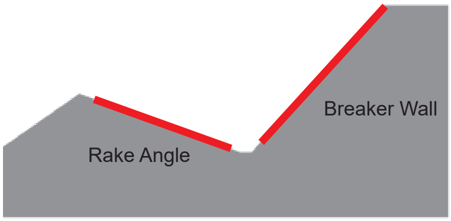


BR Breaker (BC8220) NEW

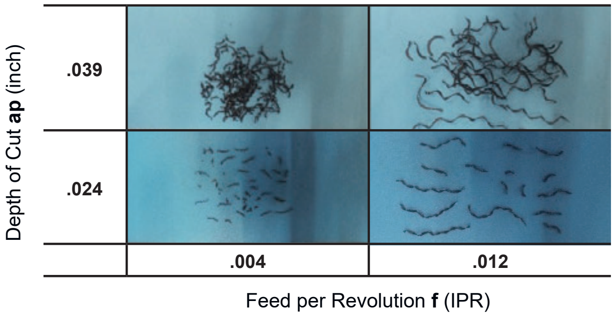
A reduced number of passes needed and improved chip control during high depth of cut.
Chips are formed with the effect from the rake angle, and the multi stage breaker wall supports a wide range of cuts.

Recommended Cutting Conditions : vc=260-655 SFM, f≤ .012 IPR, ap=.024-.039 inch





Achieves ideal chip control even at high depths of cut.

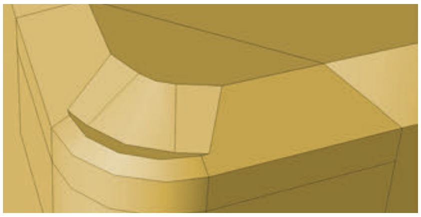


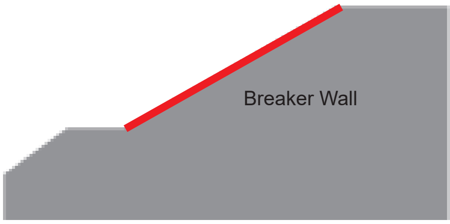
<Cutting Conditions>
Workpiece Material : AISI 5120H (60 HRC)
Inserts : BR-CNGM432-TA2
Cutting Speed : vc= 655 SFM
Feed per Rev. : f=.004 IPR
.012 IPR
Depth of Cut : ap=.024 inch
.039 inch
Cutting Mode : Dry Cutting

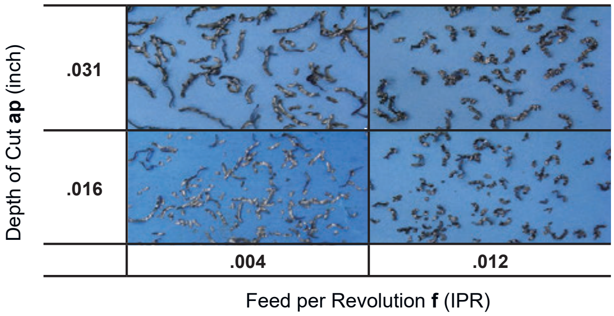
BM Breaker (BC8220)

Great chip control when machining at medium depths of cut. (.012-.031 inch)

Recommended Cutting Conditions : vc=260-655 SFM, f≤ .012 IPR, ap=.012-.031 inch





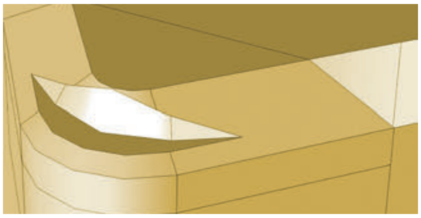


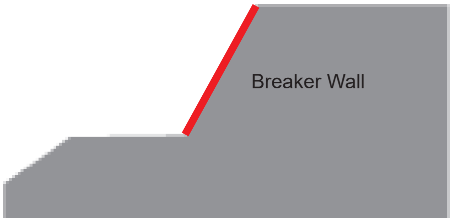
<Cutting Conditions>
Workpiece Material : JIS SCM415 (60 HRC)
Inserts : BM-CNGM432-TA2
Cutting Speed : vc= 525 SFM
Feed per Rev. : f=.004 IPR
.012 IPR
Depth of Cut : ap=.016 inch
.031 inch
Cutting Mode : Dry Cutting

BF Breaker (BC8210, BC8220)

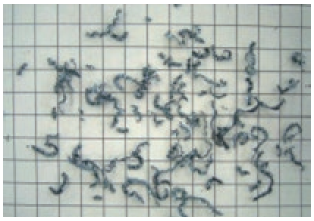
Achieves excellent chip control while finish cutting at depths of .012 inch or less.

Recommended Cutting Conditions : vc=260-655 SFM, f≤ .012 IPR, ap=.004-.012 inch



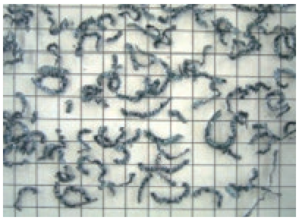


External Turning



Cutting Speed : vc = 330 SFM
Feed per Rev. : f=.008 IPR
Depth of Cut : ap = .012 inch

Boring

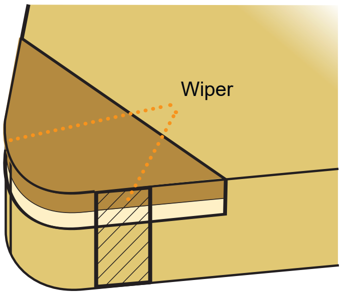


Cutting Speed : vc = 395 SFM
Feed per Rev. : f = .008 IPR
Depth of Cut : ap = .012 inch

<Cutting Conditions>
Workpiece Material : JIS SCM415 (60 HRC)
Inserts : BF-CNGM432-TS2
Cutting Mode : Dry Cutting

Wiper Insert

■ Features



Improving Surface Finish

Under the same machining conditions as conventional chip breakers, but with the feed rate increased, the surface finish of the workpiece can be improved.

Improving Efficiency

High feed rates not only shorten machining times but also make it possible to combine roughing and finishing operations.

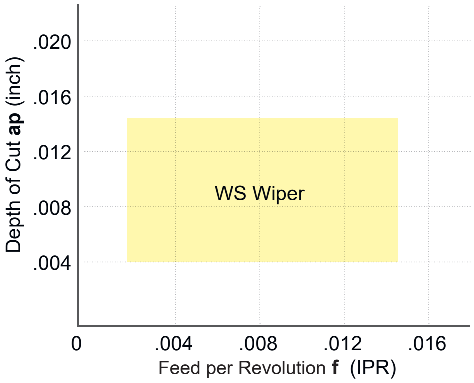
Increased Tool Life

When using at high feed conditions, the time required to cut one component is decreased, thus more parts can be machined with each insert. In addition, the high feed rate prevents rubbing, thereby, delaying the progression of wear and increasing tool life.

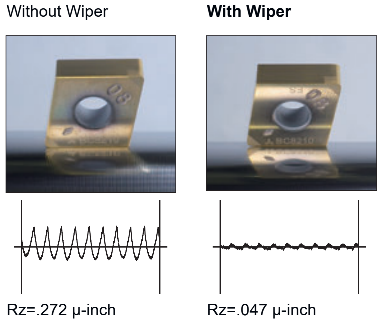
Improving Chip Control

Under high feed conditions, the chips generated become thicker and are more easily broken, thus, chip control is improved.

■ Recommended Cutting Conditions and Performance

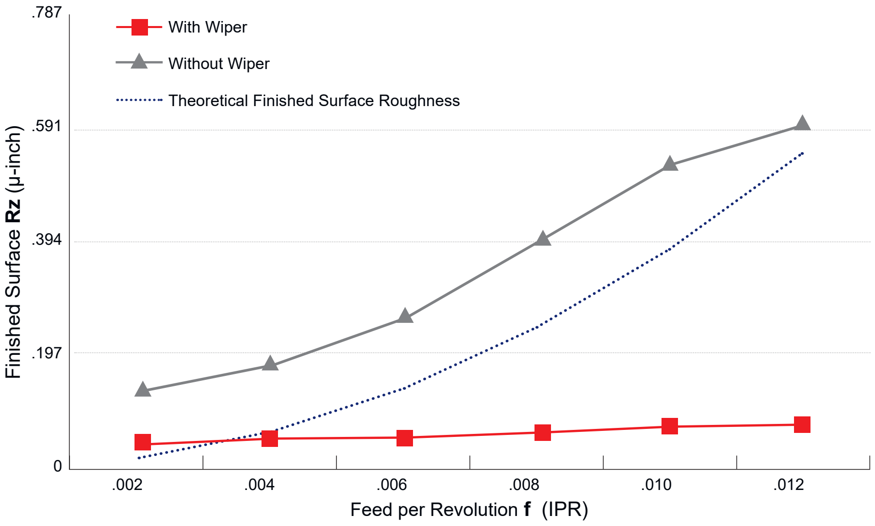


Cutting Speed: vc=490 SFM
Depth of Cut: ap=.004 inch
Feed per Rev.: f = .012 IPR
Cutting Mode: Dry Cutting



■ Cutting Performance

WL Wiper (External Turning)

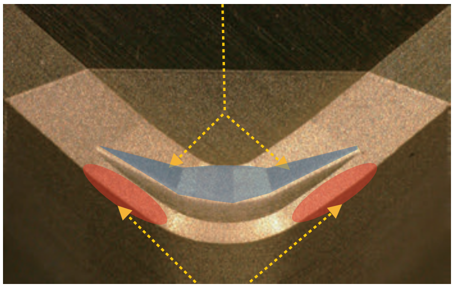


<Cutting Conditions>
Workpiece Material : Hardened Steel (60 HRC)
Insert : NP-CNGA432
Machining Methods : Continuous
Cutting Speed : vc = 395 SFM
Depth of Cut : ap = .004 inch
Cutting Mode : Dry Cutting

Combination of BF Breaker and WS Wiper Insert

CNGM and DNGM types are now available with new inserts that combine a BF chip breaker with a WS wiper Insert. (BC8210 : BF-◌NGM◌◌◌◌◌◌TSWS2, BC8220 : BF-◌NGM◌◌◌◌◌◌TAWS2)
It is effective for chip control and improvement of finished surface roughness without concerns about the hand of the tool even when continuous external or internal turning and facing.

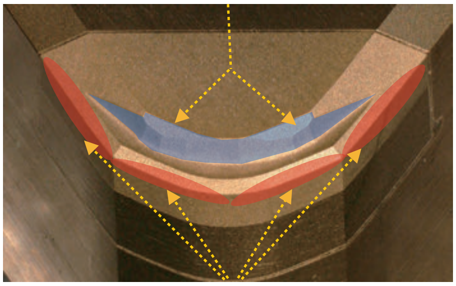
BF Breaker



WS Wiper Insert (Neutral)

BF-CNGM432-TSWS2

BF Breaker



WS Wiper Insert (Neutral)

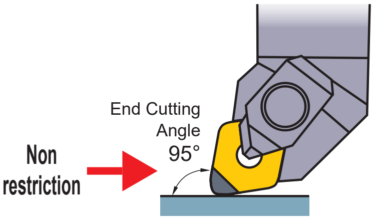
BF-DNGM433-TAWS2

Notes for Use

When using CNGM type

No Restriction for Holders

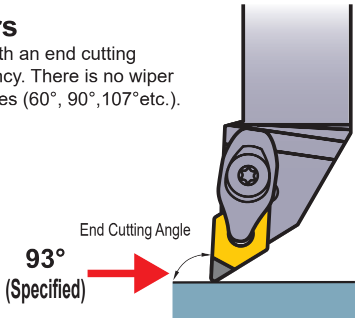
A standard holder can be used.
(*A double clamp, high rigidity tool is recommended.)



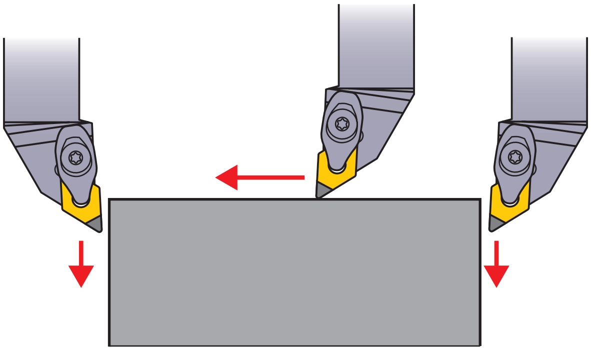
When using DNGM type

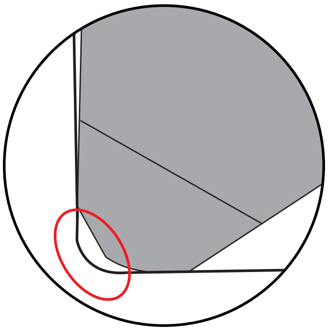
Restriction for Holders

Use PDJN holder or DDJN holder with an end cutting angle 93° for improving wiper efficiency. There is no wiper efficiency with other end cutting angles (60°, 90°,107°etc.).



Displays great wiper efficiency when machining the end face and outer diameter in both right-hand and left-hand machining.



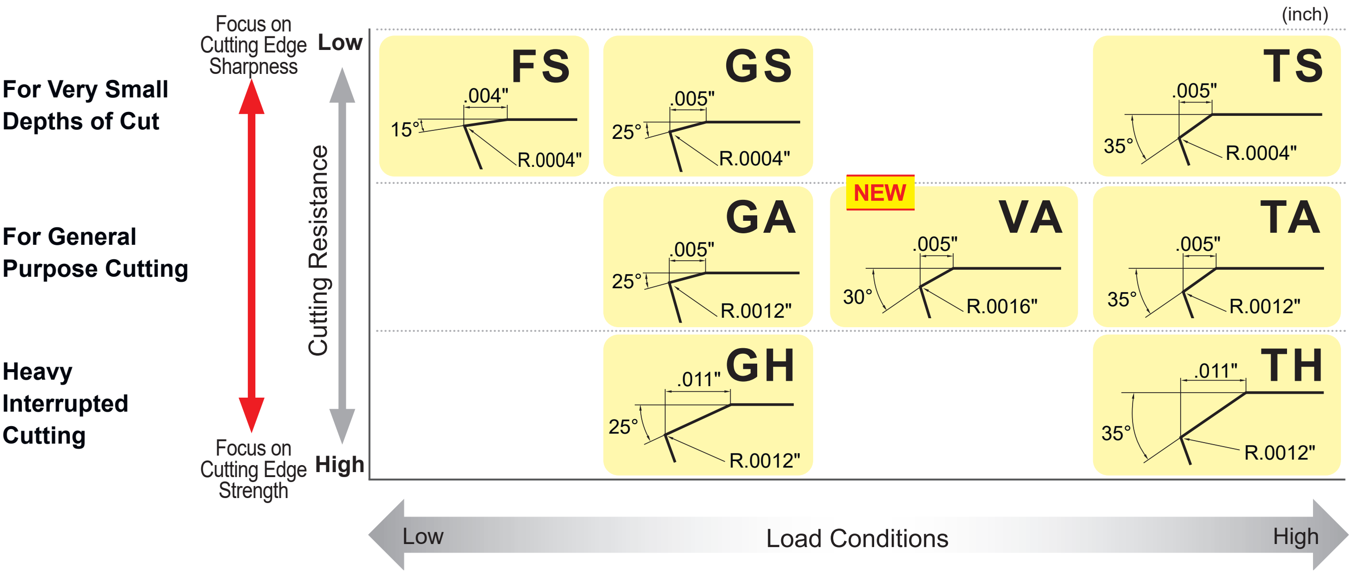


*The DNGM type is not suitable for machining the R that connects the end face and the outer diameter because it will leave uncut parts.

Features of the Insert

Edge Preparation (Honing)

New VA honing type with improved fracture resistance for high speeds and feed.
In addition, a range of different honing types that can be used for various applications is available.



	Continuous Cutting	General Purpose		For Fracture Resistance	Interrupted Cutting	
	General Cutting	General Cutting	High Feed and Depth	High Speeds and Feed	General Cutting	High Feed and Depth
BC8210	FS	GS	GH		TS	
BC8220		GA	GH	VA	TA	TH

Identification

BF - C N G M 4 3 2 - **TA** **WS** 2 **_ _**

Insert Geometry

BR	For High Depth of Cut Chip Breaker
BM	For Medium Depth of Cut Chip Breaker
BF	For Finish Cutting Chip Breaker
NP	New Petit Cut

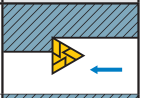
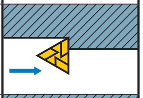
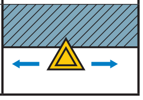
Edge Preperation

Symbol	Application
FS	Continuous Cutting
GS **GA** **GH**	General Cutting
VA	For High Speed, High Feed Cutting
TS **TA** **TH**	Interrupted Cutting

Wiper

WS	For High Rigidity Workpiece Material
No Mark	Without Wiper

Cutting Direction

Symbol	Hand	Figure
JR	Right	
JL	Left	
No mark	Neutral	

Memo

CBN Grade for Turning Hardened Steel

BC8200 Series

NEW

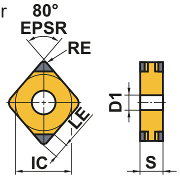
Negative Inserts (With Hole)

G Class

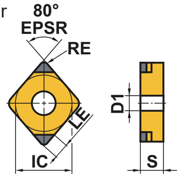
CNGA, CNGM

NEW PETIT CUT	NEW PETIT CUT	NEW PETIT CUT	NEW PETIT CUT
NP_○○4 	**NP_○○WS4**  (With Wiper)	**NP_○○2** 	**NP_○○WS2**  (With Wiper)
NEW PETIT CUT	NEW PETIT CUT		
BF_, BM_  (With Breaker)	**BR_**  (With Breaker)		

4 corner



2 corner



(inch)

Order Number	Coated CBN							Cutting Edges	IC	S	RE	D1	LE
	BC8210	BC8220											
NP-CNGA431-GA4		●						4	.500	.187	.016	.203	.071
NP-CNGA432-GA4		●						4	.500	.187	.031	.203	.079
NP-CNGA433-GA4		●						4	.500	.187	.047	.203	.087
NP-CNGA431-GS4	★							4	.500	.187	.016	.203	.071
NP-CNGA432-GS4	●							4	.500	.187	.031	.203	.079
NP-CNGA433-GS4	★							4	.500	.187	.047	.203	.087
NP-CNGA431-GH4	★	★						4	.500	.187	.016	.203	.071
NP-CNGA432-GH4	●	●						4	.500	.187	.031	.203	.079
NP-CNGA433-GH4	★	★						4	.500	.187	.047	.203	.087
NP-CNGA431-FS4	★							4	.500	.187	.016	.203	.071
NP-CNGA432-FS4	★							4	.500	.187	.031	.203	.079
NP-CNGA433-FS4	★							4	.500	.187	.047	.203	.087
NP-CNGA431-VA4		★						4	.500	.187	.016	.203	.071
NP-CNGA432-VA4		●						4	.500	.187	.031	.203	.079
NP-CNGA433-VA4		●						4	.500	.187	.047	.203	.087
NP-CNGA431-TA4		★						4	.500	.187	.016	.203	.071
NP-CNGA432-TA4		★						4	.500	.187	.031	.203	.079
NP-CNGA433-TA4		★						4	.500	.187	.047	.203	.087
NP-CNGA431-TS4	★							4	.500	.187	.016	.203	.071
NP-CNGA432-TS4	★							4	.500	.187	.031	.203	.079
NP-CNGA433-TS4	★							4	.500	.187	.047	.203	.087
NP-CNGA432-TH4		★						4	.500	.187	.031	.203	.079
NP-CNGA433-TH4		★						4	.500	.187	.047	.203	.087
NP-CNGA431-FSWS4	★							4	.500	.187	.016	.203	.071
NP-CNGA432-FSWS4	●							4	.500	.187	.031	.203	.079
NP-CNGA433-FSWS4	★							4	.500	.187	.047	.203	.087
NP-CNGA431-GAWS4		★						4	.500	.187	.016	.203	.071
NP-CNGA432-GAWS4		●						4	.500	.187	.031	.203	.079
NP-CNGA433-GAWS4		★						4	.500	.187	.047	.203	.087
NP-CNGA431-GSWS4	★							4	.500	.187	.016	.203	.071
NP-CNGA432-GSWS4	★							4	.500	.187	.031	.203	.079
NP-CNGA433-GSWS4	★							4	.500	.187	.047	.203	.087
NP-CNGA430.5-GA2		●						2	.500	.187	.008	.203	.067
NP-CNGA431-GA2		●						2	.500	.187	.016	.203	.071
NP-CNGA432-GA2		●						2	.500	.187	.031	.203	.079
NP-CNGA433-GA2		●						2	.500	.187	.047	.203	.087

● : USA Stock ★ : Stocked in Japan
(1 insert in one case)

(inch)

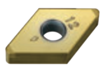
Order Number	Coated CBN							Cutting Edges	IC	S	RE	D1	LE
	BC8210	BC8220											
NP-CNGA430.5-GS2	●							2	.500	.187	.008	.203	.067
NP-CNGA431-GS2	●							2	.500	.187	.016	.203	.071
NP-CNGA432-GS2	●							2	.500	.187	.031	.203	.079
NP-CNGA433-GS2	●							2	.500	.187	.047	.203	.087
NP-CNGA431-GH2	★	★						2	.500	.187	.016	.203	.071
NP-CNGA432-GH2	●	●						2	.500	.187	.031	.203	.079
NP-CNGA433-GH2	★	★						2	.500	.187	.047	.203	.087
NP-CNGA430.5-FS2	●							2	.500	.187	.008	.203	.067
NP-CNGA431-FS2	●							2	.500	.187	.016	.203	.071
NP-CNGA432-FS2	●							2	.500	.187	.031	.203	.079
NP-CNGA433-FS2	★							2	.500	.187	.047	.203	.087
NP-CNGA431-VA2		●						2	.500	.187	.016	.203	.071
NP-CNGA432-VA2		●						2	.500	.187	.031	.203	.079
NP-CNGA433-VA2		●						2	.500	.187	.047	.203	.087
NP-CNGA431-TA2		●						2	.500	.187	.016	.203	.071
NP-CNGA432-TA2		●						2	.500	.187	.031	.203	.079
NP-CNGA433-TA2		●						2	.500	.187	.047	.203	.087
NP-CNGA431-TS2	★							2	.500	.187	.016	.203	.071
NP-CNGA432-TS2	★							2	.500	.187	.031	.203	.079
NP-CNGA433-TS2	★							2	.500	.187	.047	.203	.087
NP-CNGA432-TH2		★						2	.500	.187	.031	.203	.079
NP-CNGA433-TH2		●						2	.500	.187	.047	.203	.087
NP-CNGA431-FSWS2	★							2	.500	.187	.016	.203	.071
NP-CNGA432-FSWS2	★							2	.500	.187	.031	.203	.079
NP-CNGA433-FSWS2	★							2	.500	.187	.047	.203	.087
NP-CNGA431-GAWS2		●						2	.500	.187	.016	.203	.071
NP-CNGA432-GAWS2		●						2	.500	.187	.031	.203	.079
NP-CNGA433-GAWS2		●						2	.500	.187	.047	.203	.087
NP-CNGA431-GSWS2	●							2	.500	.187	.016	.203	.071
NP-CNGA432-GSWS2	●							2	.500	.187	.031	.203	.079
NP-CNGA433-GSWS2	★							2	.500	.187	.047	.203	.087
BF-CNGM432-TAWS2		●						2	.500	.187	.031	.203	.079
BF-CNGM433-TAWS2		●						2	.500	.187	.047	.203	.087
BF-CNGM431-TS2	★							2	.500	.187	.016	.203	.071
BF-CNGM432-TS2	★							2	.500	.187	.031	.203	.079
BF-CNGM433-TS2	★							2	.500	.187	.047	.203	.087
BF-CNGM432-TSWS2	★							2	.500	.187	.031	.203	.079
BF-CNGA433-TSWS2	★							2	.500	.187	.047	.203	.087
BM-CNGM431-TA2		★						2	.500	.187	.016	.203	.071
BM-CNGM432-TA2		●						2	.500	.187	.031	.203	.079
BM-CNGM433-TA2		●						2	.500	.187	.047	.203	.087
BR-CNGM431-TA2		★						2	.500	.187	.016	.203	.071
BR-CNGM432-TA2		★						2	.500	.187	.031	.203	.079
BR-CNGM433-TA2		★						2	.500	.187	.047	.203	.087

BC8200 Series NEW

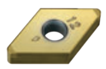
Negative Inserts (With Hole)

G Class
DNGA, DNGM

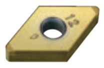
NEW PETIT CUT
NP_○○4



NEW PETIT CUT
NP_○○2

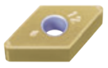


NEW PETIT CUT
NP_WS2JR/L



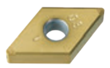
(With Wiper)

NEW PETIT CUT
BF_, BM_

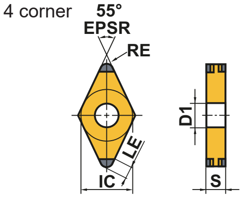


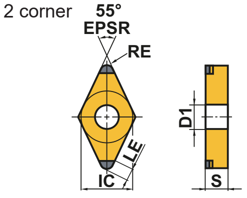
(With Breaker)

NEW PETIT CUT
BR_



(With Breaker)





(inch)

Order Number	Coated CBN						Cutting Edges	IC	S	RE	D1	LE
	BC8210	BC8220										
NP-DNGA431-GA4		●					4	.500	.187	.016	.203	.083
NP-DNGA432-GA4		●					4	.500	.187	.031	.203	.079
NP-DNGA433-GA4		★					4	.500	.187	.047	.203	.071
NP-DNGA441-GA4		★					4	.500	.250	.016	.203	.083
NP-DNGA442-GA4		★					4	.500	.250	.031	.203	.079
NP-DNGA443-GA4		★					4	.500	.250	.047	.203	.071
NP-DNGA431-GS4	★						4	.500	.187	.016	.203	.083
NP-DNGA432-GS4	★						4	.500	.187	.031	.203	.079
NP-DNGA433-GS4	★						4	.500	.187	.047	.203	.071
NP-DNGA441-GS4	★						4	.500	.250	.016	.203	.083
NP-DNGA442-GS4	★						4	.500	.250	.031	.203	.079
NP-DNGA443-GS4	★						4	.500	.250	.047	.203	.071
NP-DNGA431-GH4	★	●					4	.500	.187	.016	.203	.083
NP-DNGA432-GH4	★	★					4	.500	.187	.031	.203	.079
NP-DNGA433-GH4	★	★					4	.500	.187	.047	.203	.071
NP-DNGA441-GH4	★	★					4	.500	.250	.016	.203	.083
NP-DNGA442-GH4	★	★					4	.500	.250	.031	.203	.079
NP-DNGA443-GH4	★	★					4	.500	.250	.047	.203	.071
NP-DNGA431-FS4	★						4	.500	.187	.016	.203	.083
NP-DNGA432-FS4	★						4	.500	.187	.031	.203	.079
NP-DNGA433-FS4	★						4	.500	.187	.047	.203	.071
NP-DNGA441-FS4	★						4	.500	.250	.016	.203	.083
NP-DNGA442-FS4	★						4	.500	.250	.031	.203	.079
NP-DNGA443-FS4	★						4	.500	.250	.047	.203	.071
NP-DNGA431-VA4		★					4	.500	.187	.016	.203	.083
NP-DNGA432-VA4		●					4	.500	.187	.031	.203	.079
NP-DNGA433-VA4		★					4	.500	.187	.047	.203	.071
NP-DNGA441-VA4		★					4	.500	.250	.016	.203	.083
NP-DNGA442-VA4		★					4	.500	.250	.031	.203	.079
NP-DNGA443-VA4		★					4	.500	.250	.047	.203	.071
NP-DNGA431-TA4		★					4	.500	.187	.016	.203	.083
NP-DNGA432-TA4		★					4	.500	.187	.031	.203	.079
NP-DNGA433-TA4		●					4	.500	.187	.047	.203	.071
NP-DNGA441-TA4		★					4	.500	.250	.016	.203	.083
NP-DNGA442-TA4		★					4	.500	.250	.031	.203	.079
NP-DNGA443-TA4		★					4	.500	.250	.047	.203	.071

● : USA Stock ★ : Stocked in Japan
(1 insert in one case)

(inch)

Order Number	Coated CBN							Cutting Edges	IC	S	RE	D1	LE
	BC8210	BC8220											
NP-DNGA431-TS4	★							4	.500	.187	.016	.203	.083
NP-DNGA432-TS4	★							4	.500	.187	.031	.203	.079
NP-DNGA433-TS4	★							4	.500	.187	.047	.203	.071
NP-DNGA441-TS4	★							4	.500	.250	.016	.203	.083
NP-DNGA442-TS4	★							4	.500	.250	.031	.203	.079
NP-DNGA443-TS4	★							4	.500	.250	.047	.203	.071
NP-DNGA432-TH4		★						4	.500	.187	.031	.203	.079
NP-DNGA433-TH4		★						4	.500	.187	.047	.203	.071
NP-DNGA442-TH4		★						4	.500	.250	.031	.203	.079
NP-DNGA443-TH4		★						4	.500	.250	.047	.203	.071
NP-DNGA332-GA2		●						2	.375	.187	.031	.150	.079
NP-DNGA430.5-GA2		●						2	.500	.187	.008	.203	.087
NP-DNGA431-GA2		●						2	.500	.187	.016	.203	.083
NP-DNGA432-GA2		●						2	.500	.187	.031	.203	.079
NP-DNGA433-GA2		●						2	.500	.187	.047	.203	.071
NP-DNGA441-GA2		★						2	.500	.250	.016	.203	.083
NP-DNGA442-GA2		★						2	.500	.250	.031	.203	.079
NP-DNGA443-GA2		★						2	.500	.250	.047	.203	.071
NP-DNGA430.5-GS2	●							2	.500	.187	.008	.203	.087
NP-DNGA431-GS2	●							2	.500	.187	.016	.203	.083
NP-DNGA432-GS2	●							2	.500	.187	.031	.203	.079
NP-DNGA433-GS2	★							2	.500	.187	.047	.203	.071
NP-DNGA441-GS2	★							2	.500	.250	.016	.203	.083
NP-DNGA442-GS2	★							2	.500	.250	.031	.203	.079
NP-DNGA443-GS2	★							2	.500	.250	.047	.203	.071
NP-DNGA431-GH2	★	★						2	.500	.187	.016	.203	.083
NP-DNGA432-GH2	★	★						2	.500	.187	.031	.203	.079
NP-DNGA433-GH2	★	★						2	.500	.187	.047	.203	.071
NP-DNGA441-GH2	★	★						2	.500	.250	.016	.203	.083
NP-DNGA442-GH2	★	★						2	.500	.250	.031	.203	.079
NP-DNGA443-GH2	★	★						2	.500	.250	.047	.203	.071
NP-DNGA430.5-FS2	●							2	.500	.187	.008	.203	.087
NP-DNGA431-FS2	●							2	.500	.187	.016	.203	.083
NP-DNGA432-FS2	●							2	.500	.187	.031	.203	.079
NP-DNGA433-FS2	●							2	.500	.187	.047	.203	.071
NP-DNGA441-FS2	★							2	.500	.250	.016	.203	.083
NP-DNGA442-FS2	★							2	.500	.250	.031	.203	.079
NP-DNGA443-FS2	★							2	.500	.250	.047	.203	.071
NP-DNGA431-VA2		●						2	.500	.187	.016	.203	.083
NP-DNGA432-VA2		●						2	.500	.187	.031	.203	.079
NP-DNGA433-VA2		●						2	.500	.187	.047	.203	.071
NP-DNGA441-VA2		★						2	.500	.250	.016	.203	.083
NP-DNGA442-VA2		★						2	.500	.250	.031	.203	.079
NP-DNGA443-VA2		★						2	.500	.250	.047	.203	.071

CBN Grade for Turning Hardened Steel

BC8200 Series NEW

(inch)

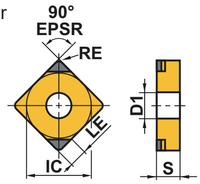
Order Number	Coated CBN						Cutting Edges	IC	S	RE	D1	LE
	BC8210	BC8220										
NP-DNGA431-TA2		●					2	.500	.187	.016	.203	.083
NP-DNGA432-TA2		●					2	.500	.187	.031	.203	.079
NP-DNGA433-TA2		●					2	.500	.187	.047	.203	.071
NP-DNGA441-TA2		★					2	.500	.250	.016	.203	.083
NP-DNGA442-TA2		★					2	.500	.250	.031	.203	.079
NP-DNGA443-TA2		★					2	.500	.250	.047	.203	.071
NP-DNGA431-TS2	★						2	.500	.187	.016	.203	.083
NP-DNGA432-TS2	★						2	.500	.187	.031	.203	.079
NP-DNGA433-TS2	★						2	.500	.187	.047	.203	.071
NP-DNGA441-TS2	★						2	.500	.250	.016	.203	.083
NP-DNGA442-TS2	★						2	.500	.250	.031	.203	.079
NP-DNGA443-TS2	★						2	.500	.250	.047	.203	.071
NP-DNGA432-TH2		★					2	.500	.187	.031	.203	.079
NP-DNGA433-TH2		★					2	.500	.187	.047	.203	.071
NP-DNGA442-TH2		★					2	.500	.250	.031	.203	.079
NP-DNGA443-TH2		★					2	.500	.250	.047	.203	.071
NP-DNGA431-GAWS2JR		★					2	.500	.187	.016	.203	.071
NP-DNGA431-GAWS2JL		★					2	.500	.187	.016	.203	.071
NP-DNGA432-GAWS2JR		●					2	.500	.187	.031	.203	.067
NP-DNGA432-GAWS2JL		●					2	.500	.187	.031	.203	.067
NP-DNGA441-GAWS2JR		★					2	.500	.250	.016	.203	.071
NP-DNGA441-GAWS2JL		★					2	.500	.250	.016	.203	.071
NP-DNGA442-GAWS2JR		★					2	.500	.250	.031	.203	.067
NP-DNGA442-GAWS2JL		●					2	.500	.250	.031	.203	.067
NP-DNGA431-GSWS2JR	★						2	.500	.187	.016	.203	.071
NP-DNGA431-GSWS2JL	★						2	.500	.187	.016	.203	.071
NP-DNGA432-GSWS2JR	★						2	.500	.187	.031	.203	.067
NP-DNGA432-GSWS2JL	★						2	.500	.187	.031	.203	.067
NP-DNGA441-GSWS2JR	★						2	.500	.250	.016	.203	.071
NP-DNGA441-GSWS2JL	★						2	.500	.250	.016	.203	.071
NP-DNGA442-GSWS2JR	★						2	.500	.250	.031	.203	.067
NP-DNGA442-GSWS2JL	★						2	.500	.250	.031	.203	.067
BF-DNGM432-TAWS2		●					2	.500	.187	.031	.203	.094
BF-DNGM433-TAWS2		●					2	.500	.187	.047	.203	.102
BF-DNGM431-TS2	★						2	.500	.187	.016	.203	.083
BF-DNGM432-TS2	★						2	.500	.187	.031	.203	.079
BF-DNGM433-TS2	●						2	.500	.187	.047	.203	.071
BF-DNGM432-TSWS2	★						2	.500	.187	.031	.203	.094
BF-DNGM433-TSWS2	★						2	.500	.187	.047	.203	.102
BM-DNGM431-TA2		●					2	.500	.187	.016	.203	.083
BM-DNGM432-TA2		★					2	.500	.187	.031	.203	.079
BM-DNGM433-TA2		●					2	.500	.187	.047	.203	.071
BR-DNGM431-TA2		★					2	.500	.187	.016	.203	.083
BR-DNGM432-TA2		★					2	.500	.187	.031	.203	.079
BR-DNGM433-TA2		★					2	.500	.187	.047	.203	.071
BR-DNGM441-TA2		★					2	.500	.250	.016	.203	.083
BR-DNGM442-TA2		★					2	.500	.250	.031	.203	.079
BR-DNGM443-TA2		★					2	.500	.250	.047	.203	.071

● : USA Stock ★ : Stocked in Japan
(1 insert in one case)

Negative Inserts (With Hole)
G Class
SNGA

NEW PETIT CUT
NP_◌◌2

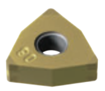
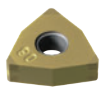

2 corner



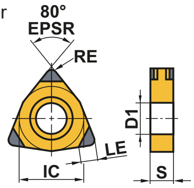
(inch)

Order Number	Coated CBN							Cutting Edges	IC	S	RE	D1	LE
	BC8210	BC8220											
NP-SNGA432-GA2		★						2	.500	.187	.031	.203	.087
NP-SNGA433-GA2		★						2	.500	.187	.047	.203	.098

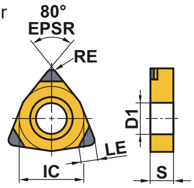
Negative Inserts (With Hole)
G Class
WNGA

NEW PETIT CUT	NEW PETIT CUT	NEW PETIT CUT
NP_◌◌6	NP_◌◌3	NP_◌◌WS3
		 (With Wiper)

6 corner



3 corner



(inch)

Order Number	Coated CBN							Cutting Edges	IC	S	RE	D1	LE
	BC8210	BC8220											
NP-WNGA432-GS6	★							6	.500	.187	.031	.203	.079
NP-WNGA432-FS6	★							6	.500	.187	.031	.203	.079
NP-WNGA432-TS6	★							6	.500	.187	.031	.203	.079
NP-WNGA432-GA3		●						3	.500	.187	.031	.203	.079
NP-WNGA432-GS3	●							3	.500	.187	.031	.203	.079
NP-WNGA432-FS3	★							3	.500	.187	.031	.203	.079
NP-WNGA432-TA3		★						3	.500	.187	.031	.203	.079
NP-WNGA432-TS3	★							3	.500	.187	.031	.203	.079
NP-WNGA432-GSWS3	★							3	.500	.187	.031	.203	.079

CBN Grade for Turning Hardened Steel

BC8200 Series NEW

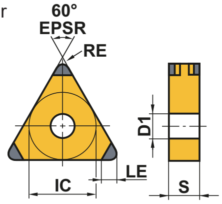
Negative Inserts (With Hole)

G Class

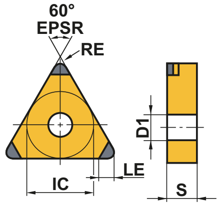
TNGA

NEW PETIT CUT	NEW PETIT CUT
NP_◌◌6	**NP_◌◌3**
	

6 corner



3 corner



(inch)

Order Number	Coated CBN						Cutting Edges	IC	S	RE	D1	LE
	BC8210	BC8220										
NP-TNGA331-GA6		★					6	.375	.187	.016	.150	.063
NP-TNGA332-GA6		★					6	.375	.187	.031	.150	.067
NP-TNGA333-GA6		★					6	.375	.187	.047	.150	.075
NP-TNGA331-GS6	●						6	.375	.187	.016	.150	.063
NP-TNGA332-GS6	★						6	.375	.187	.031	.150	.067
NP-TNGA333-GS6	★						6	.375	.187	.047	.150	.075
NP-TNGA331-GH6		★					6	.375	.187	.016	.150	.063
NP-TNGA332-GH6		★					6	.375	.187	.031	.150	.067
NP-TNGA333-GH6		★					6	.375	.187	.047	.150	.075
NP-TNGA331-FS6	★						6	.375	.187	.016	.150	.063
NP-TNGA332-FS6	★						6	.375	.187	.031	.150	.067
NP-TNGA333-FS6	★						6	.375	.187	.047	.150	.075
NP-TNGA331-VA6		★					6	.375	.187	.016	.150	.063
NP-TNGA332-VA6		★					6	.375	.187	.031	.150	.067
NP-TNGA333-VA6		★					6	.375	.187	.047	.150	.075
NP-TNGA331-TA6		★					6	.375	.187	.016	.150	.063
NP-TNGA332-TA6		★					6	.375	.187	.031	.150	.067
NP-TNGA333-TA6		★					6	.375	.187	.047	.150	.075
NP-TNGA331-TS6	★						6	.375	.187	.016	.150	.063
NP-TNGA332-TS6	★						6	.375	.187	.031	.150	.067
NP-TNGA333-TS6	★						6	.375	.187	.047	.150	.075
NP-TNGA332-TH6		★					6	.375	.187	.031	.150	.067
NP-TNGA333-TH6		★					6	.375	.187	.047	.150	.075
NP-TNGA330.5-GA3		★					3	.375	.187	.008	.150	.059
NP-TNGA331-GA3		●					3	.375	.187	.016	.150	.063
NP-TNGA332-GA3		●					3	.375	.187	.031	.150	.067
NP-TNGA333-GA3		●					3	.375	.187	.047	.150	.075
NP-TNGA330.5-GS3	★						3	.375	.187	.008	.150	.059
NP-TNGA331-GS3	★						3	.375	.187	.016	.150	.063
NP-TNGA332-GS3	★						3	.375	.187	.031	.150	.067
NP-TNGA333-GS3	★						3	.375	.187	.047	.150	.075
NP-TNGA331-GH3		●					3	.375	.187	.016	.150	.063
NP-TNGA332-GH3		★					3	.375	.187	.031	.150	.067
NP-TNGA333-GH3		★					3	.375	.187	.047	.150	.075

● : USA Stock ★ : Stocked in Japan
(1 insert in one case)

(inch)

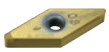
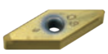
Order Number	Coated CBN							Cutting Edges	IC	S	RE	D1	LE
	BC8210	BC8220											
NP-TNGA330.5-FS3	★							3	.375	.187	.008	.150	.059
NP-TNGA331-FS3	★							3	.375	.187	.016	.150	.063
NP-TNGA332-FS3	★							3	.375	.187	.031	.150	.067
NP-TNGA333-FS3	★							3	.375	.187	.047	.150	.075
NP-TNGA331-VA3		●						3	.375	.187	.016	.150	.063
NP-TNGA332-VA3		●						3	.375	.187	.031	.150	.067
NP-TNGA333-VA3		●						3	.375	.187	.047	.150	.075
NP-TNGA331-TA3		★						3	.375	.187	.016	.150	.063
NP-TNGA332-TA3		★						3	.375	.187	.031	.150	.067
NP-TNGA333-TA3		★						3	.375	.187	.047	.150	.075
NP-TNGA331-TS3	★							3	.375	.187	.016	.150	.063
NP-TNGA332-TS3	★							3	.375	.187	.031	.150	.067
NP-TNGA333-TS3	★							3	.375	.187	.047	.150	.075
NP-TNGA332-TH3		★						3	.375	.187	.031	.150	.067
NP-TNGA333-TH3		★						3	.375	.187	.047	.150	.075

BC8200 Series NEW

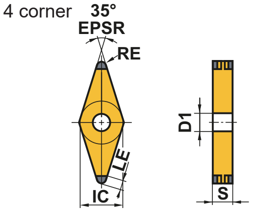
Negative Inserts (With Hole)

G Class

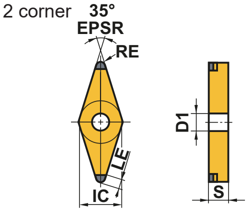
VNGA

NEW PETIT CUT	NEW PETIT CUT
NP_◌◌4	NP_◌◌2
	

4 corner



2 corner



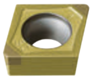
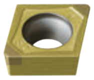
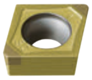
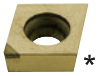
(inch)

Order Number	Coated CBN						Cutting Edges	IC	S	RE	D1	LE
	BC8210	BC8220										
NP-VNGA331-GA4		★					4	.375	.187	.016	.150	.098
NP-VNGA332-GA4		★					4	.375	.187	.031	.150	.079
NP-VNGA333-GA4		★					4	.375	.187	.047	.150	.059
NP-VNGA331-GS4	★						4	.375	.187	.016	.150	.098
NP-VNGA332-GS4	★						4	.375	.187	.031	.150	.079
NP-VNGA333-GS4	★						4	.375	.187	.047	.150	.059
NP-VNGA331-GH4		★					4	.375	.187	.016	.150	.098
NP-VNGA332-GH4		★					4	.375	.187	.031	.150	.079
NP-VNGA331-FS4	★						4	.375	.187	.016	.150	.098
NP-VNGA332-FS4	★						4	.375	.187	.031	.150	.079
NP-VNGA331-VA4		★					4	.375	.187	.016	.150	.098
NP-VNGA332-VA4		★					4	.375	.187	.031	.150	.079
NP-VNGA333-VA4		★					4	.375	.187	.047	.150	.059
NP-VNGA331-TA4		★					4	.375	.187	.016	.150	.098
NP-VNGA332-TA4		★					4	.375	.187	.031	.150	.079
NP-VNGA331-TS4	★						4	.375	.187	.016	.150	.098
NP-VNGA332-TS4	★						4	.375	.187	.031	.150	.079
NP-VNGA331-TH4		★					4	.375	.187	.016	.150	.098
NP-VNGA332-TH4		★					4	.375	.187	.031	.150	.079
NP-VNGA330.5-GA2		●					2	.375	.187	.008	.150	.098
NP-VNGA331-GA2		●					2	.375	.187	.016	.150	.098
NP-VNGA332-GA2		●					2	.375	.187	.031	.150	.079
NP-VNGA333-GA2		●					2	.375	.187	.047	.150	.059
NP-VNGA330.5-GS2	●						2	.375	.187	.008	.150	.098
NP-VNGA331-GS2	●						2	.375	.187	.016	.150	.098
NP-VNGA332-GS2	●						2	.375	.187	.031	.150	.079
NP-VNGA333-GS2	★						2	.375	.187	.047	.150	.059
NP-VNGA331-GH2		★					2	.375	.187	.016	.150	.098
NP-VNGA332-GH2		★					2	.375	.187	.031	.150	.079
NP-VNGA330.5-FS2	★						2	.375	.187	.008	.150	.098
NP-VNGA331-FS2	●						2	.375	.187	.016	.150	.098
NP-VNGA332-FS2	●						2	.375	.187	.031	.150	.079
NP-VNGA331-VA2		●					2	.375	.187	.016	.150	.098
NP-VNGA332-VA2		★					2	.375	.187	.031	.150	.079
NP-VNGA333-VA2		★					2	.375	.187	.047	.150	.059
NP-VNGA331-TA2		★					2	.375	.187	.016	.150	.098
NP-VNGA332-TA2		★					2	.375	.187	.031	.150	.079
NP-VNGA331-TS2	★						2	.375	.187	.016	.150	.098
NP-VNGA332-TS2	★						2	.375	.187	.031	.150	.079
NP-VNGA331-TH2		★					2	.375	.187	.016	.150	.098
NP-VNGA332-TH2		★					2	.375	.187	.031	.150	.079

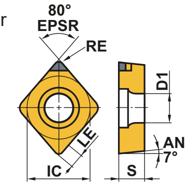
● : USA Stock ★ : Stocked in Japan
(1 insert in one case)

Positive Inserts (With Hole)

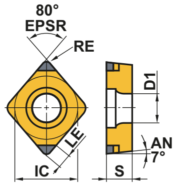
G Class
CCGW 7°, CCGT 7°, CPGB 11°

NEW PETIT CUT	NEW PETIT CUT	NEW PETIT CUT	NEW PETIT CUT
NP_◯◯2	NP_◯◯W◯2	BF_, BM_	NP
			 *
	(With Wiper)	(With Breaker)	(Non-ISO)

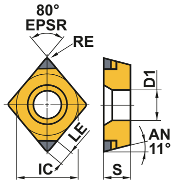
1 corner



2 corner



2 corner



(inch)

Order Number	Coated CBN						Cutting Edges	IC	S	RE	D1	LE
	BC8210	BC8220										
NP-CCGW21.50.5-GA2		●					2	.250	.094	.008	.110	.067
NP-CCGW21.51-GA2		●					2	.250	.094	.016	.110	.071
NP-CCGW21.52-GA2		●					2	.250	.094	.031	.110	.079
NP-CCGW32.50.5-GA2		●					2	.375	.156	.008	.173	.067
NP-CCGW32.51-GA2		●					2	.375	.156	.016	.173	.071
NP-CCGW32.52-GA2		●					2	.375	.156	.031	.173	.079
NP-CCGW21.50.5-GS2	●						2	.250	.094	.008	.110	.067
NP-CCGW21.51-GS2	●						2	.250	.094	.016	.110	.071
NP-CCGW21.52-GS2	●						2	.250	.094	.031	.110	.079
NP-CCGW32.50.5-GS2	●						2	.375	.156	.008	.173	.067
NP-CCGW32.51-GS2	●						2	.375	.156	.016	.173	.071
NP-CCGW32.52-GS2	●						2	.375	.156	.031	.173	.079
NP-CCGW21.50.5-FS2	●						2	.250	.094	.008	.110	.067
NP-CCGW21.51-FS2	●						2	.250	.094	.016	.110	.071
NP-CCGW21.52-FS2	★						2	.250	.094	.031	.110	.079
NP-CCGW32.50.5-FS2	●						2	.375	.156	.008	.173	.067
NP-CCGW32.51-FS2	●						2	.375	.156	.016	.173	.071
NP-CCGW32.52-FS2	●						2	.375	.156	.031	.173	.079
NP-CCGW32.51-VA2		●					2	.375	.156	.016	.173	.071
NP-CCGW32.52-VA2		●					2	.375	.156	.031	.173	.079
NP-CCGW32.51-TA2		★					2	.375	.156	.016	.173	.071
NP-CCGW32.52-TA2		★					2	.375	.156	.031	.173	.079
NP-CCGW32.51-FSWS2	★						2	.375	.156	.016	.173	.071
NP-CCGW32.52-FSWS2	★						2	.375	.156	.031	.173	.079
NP-CCGW32.51-GAWS2		●					2	.375	.156	.016	.173	.071
NP-CCGW32.52-GAWS2		●					2	.375	.156	.031	.173	.079
NP-CCGW32.51-GSWS2	●						2	.375	.156	.016	.173	.071
NP-CCGW32.52-GSWS2	★						2	.375	.156	.031	.173	.079
BF-CCGT32.51-TS2	★						2	.375	.156	.016	.173	.071
BF-CCGT32.52-TS2	●						2	.375	.156	.031	.173	.079
BM-CCGT32.51-TA2		★					2	.375	.156	.016	.173	.071
BM-CCGT32.52-TA2		★					2	.375	.156	.031	.173	.079
NP-CCGW03S102FS	●						1	.141*	.055	.008	.079	.043
NP-CCGW03S104FS	●						1	.141*	.055	.016	.079	.039
NP-CCGW04T002FS	●						1	.172*	.070	.008	.094	.059
NP-CCGW04T004FS	●						1	.172*	.070	.016	.094	.055

* Diameter of inscribed circle is non-ISO standard. (For SCLC type)

CBN Grade for Turning Hardened Steel

BC8200 Series

NEW

(inch)

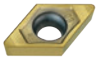
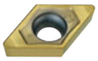
Order Number	Coated CBN							Cutting Edges	IC	S	RE	D1	LE
	BC8210	BC8220											
NP-CPGB2.51.51-GA2		★						2	.313	.094	.016	.138	.071
NP-CPGB2.51.52-GA2		★						2	.313	.094	.031	.138	.079
NP-CPGB2.51.53-GA2		★						2	.313	.094	.047	.138	.087
NP-CPGB320.5-GA2		★						2	.375	.125	.008	.177	.067
NP-CPGB321-GA2		★						2	.375	.125	.016	.177	.071
NP-CPGB322-GA2		★						2	.375	.125	.031	.177	.079
NP-CPGB323-GA2		●						2	.375	.125	.047	.177	.087
NP-CPGB2.51.51-GS2	●							2	.313	.094	.016	.138	.071
NP-CPGB2.51.52-GS2	★							2	.313	.094	.031	.138	.079
NP-CPGB320.5-GS2	★							2	.375	.125	.008	.177	.067
NP-CPGB321-GS2	★							2	.375	.125	.016	.177	.071
NP-CPGB322-GS2	★							2	.375	.125	.031	.177	.079
NP-CPGB321-VA2		★						2	.375	.125	.016	.177	.071
NP-CPGB322-VA2		★						2	.375	.125	.031	.177	.079
NP-CPGB323-VA2		★						2	.375	.125	.047	.177	.087
NP-CPGB321-TA2		★						2	.375	.125	.016	.177	.071
NP-CPGB322-TA2		★						2	.375	.125	.031	.177	.079
NP-CPGB323-TA2		★						2	.375	.125	.047	.177	.087

● : USA Stock ★ : Stocked in Japan
(1 insert in one case)

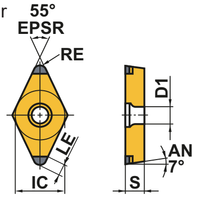
Positive Inserts (With Hole)

G Class

DCGW 7°, DCGT 7°

NEW PETIT CUT	NEW PETIT CUT
NP_◌◌2	**BF_, BM_**
	 (With Breaker)

2 corner



(inch)

Order Number	Coated CBN							Cutting Edges	IC	S	RE	D1	LE
	BC8210	BC8220											
NP-DCGW21.50.5-GA2		★						2	.250	.094	.008	.110	.087
NP-DCGW21.51-GA2		★						2	.250	.094	.016	.110	.083
NP-DCGW21.52-GA2		★						2	.250	.094	.031	.110	.079
NP-DCGW32.50.5-GA2		★						2	.375	.156	.008	.173	.087
NP-DCGW32.51-GA2		●						2	.375	.156	.016	.173	.083
NP-DCGW32.52-GA2		●						2	.375	.156	.031	.173	.079
NP-DCGW21.50.5-GS2	★							2	.250	.094	.008	.110	.087
NP-DCGW21.51-GS2	●							2	.250	.094	.016	.110	.083
NP-DCGW21.52-GS2	★							2	.250	.094	.031	.110	.079
NP-DCGW32.50.5-GS2	★							2	.375	.156	.008	.173	.087
NP-DCGW32.51-GS2	★							2	.375	.156	.016	.173	.083
NP-DCGW32.52-GS2	●							2	.375	.156	.031	.173	.079
NP-DCGW21.50.5-FS2	★							2	.250	.094	.008	.110	.087
NP-DCGW21.51-FS2	●							2	.250	.094	.016	.110	.083
NP-DCGW21.52-FS2	★							2	.250	.094	.031	.110	.079
NP-DCGW32.50.5-FS2	★							2	.375	.156	.008	.173	.087
NP-DCGW32.51-FS2	●							2	.375	.156	.016	.173	.083
NP-DCGW32.52-FS2	●							2	.375	.156	.031	.173	.079
NP-DCGW32.51-VA2		★						2	.375	.156	.016	.173	.083
NP-DCGW32.52-VA2		●						2	.375	.156	.031	.173	.079
NP-DCGW32.51-TA2		★						2	.375	.156	.016	.173	.083
NP-DCGW32.52-TA2		★						2	.375	.156	.031	.173	.079
BF-DCGT32.51-TS2	★							2	.375	.156	.016	.173	.083
BF-DCGT32.52-TS2	★							2	.375	.156	.031	.173	.079
BM-DCGT32.51-TA2		●						2	.375	.156	.016	.173	.083
BM-DCGT32.52-TA2		●						2	.375	.156	.031	.173	.079

BC8200 Series NEW

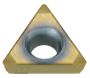
Positive Inserts (With Hole)

G Class

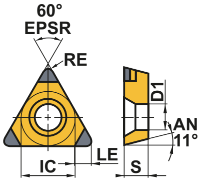
TPGB 11°

NEW PETIT CUT

NP_◌◌3



3 corner



(inch)

Order Number	Coated CBN						Cutting Edges	IC	S	RE	D1	LE
	BC8210	BC8220										
NP-TPGB1.81.51-GA3		★					3	.219	.094	.016	.114	.063
NP-TPGB1.81.52-GA3		★					3	.219	.094	.031	.114	.067
NP-TPGB220.5-GA3		★					3	.250	.125	.008	.134	.059
NP-TPGB221-GA3		●					3	.250	.125	.016	.134	.063
NP-TPGB222-GA3		●					3	.250	.125	.031	.134	.067
NP-TPGB321-GA3		●					3	.375	.125	.016	.173	.063
NP-TPGB322-GA3		★					3	.375	.125	.031	.173	.067
NP-TPGB1.51.51-GS3	★						3	.187	.094	.016	.094	.063
NP-TPGB1.51.52-GS3	★						3	.187	.094	.031	.094	.067
NP-TPGB1.81.51-GS3	●						3	.219	.094	.016	.114	.063
NP-TPGB1.81.52-GS3	★						3	.219	.094	.031	.114	.067
NP-TPGB220.5-GS3	●						3	.250	.125	.008	.134	.059
NP-TPGB221-GS3	★						3	.250	.125	.016	.134	.063
NP-TPGB222-GS3	★						3	.250	.125	.031	.134	.067
NP-TPGB321-GS3	●						3	.375	.125	.016	.173	.063
NP-TPGB322-GS3	★						3	.375	.125	.031	.173	.067
NP-TPGB220.5-FS3	★						3	.250	.125	.008	.134	.059
NP-TPGB221-FS3	★						3	.250	.125	.016	.134	.063
NP-TPGB222-FS3	★						3	.250	.125	.031	.134	.067
NP-TPGB221-VA3		★					3	.250	.125	.016	.134	.063
NP-TPGB222-VA3		●					3	.250	.125	.031	.134	.067
NP-TPGB221-TA3		★					3	.250	.125	.016	.134	.063
NP-TPGB222-TA3		●					3	.250	.125	.031	.134	.067

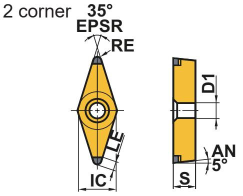
● : USA Stock ★ : Stocked in Japan
(1 insert in one case)

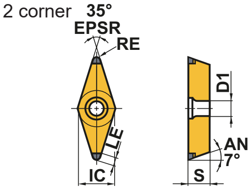
Positive Inserts (With Hole)

G Class

VBGW 5°, VCGW 7°

NEW PETIT CUT
NP_○○2





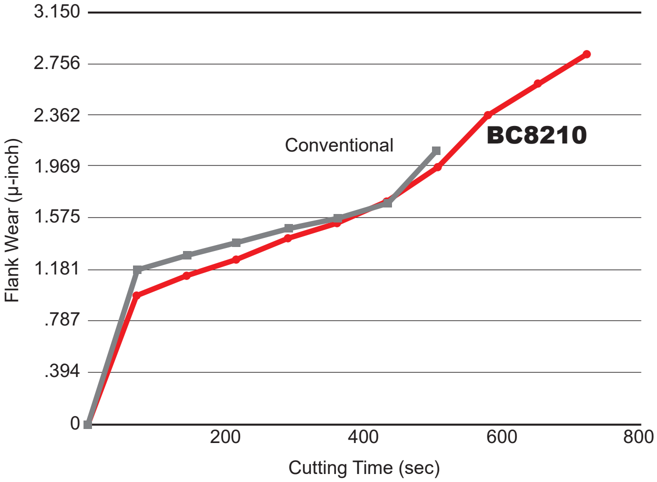
(inch)

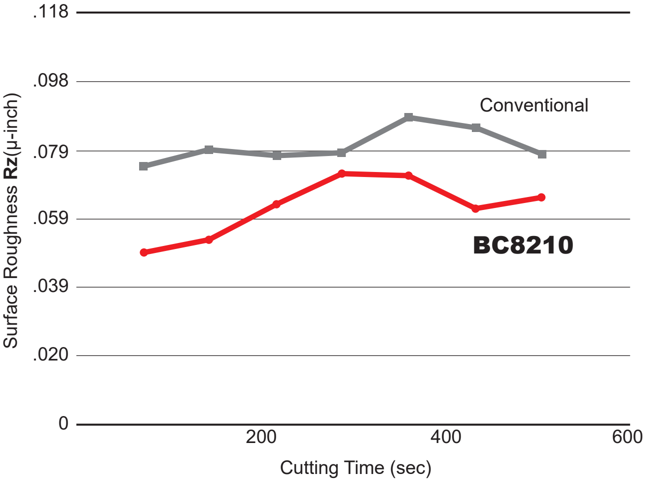
Order Number	Coated CBN							Cutting Edges	IC	S	RE	D1	LE
	BC8210	BC8220											
NP-VBGW220.5-GA2		★						2	.250	.125	.008	.112	.098
NP-VBGW221-GA2		●						2	.250	.125	.016	.112	.098
NP-VBGW222-GA2		●						2	.250	.125	.031	.112	.079
NP-VBGW330.5-GA2		★						2	.375	.187	.008	.174	.098
NP-VBGW331-GA2		●						2	.375	.187	.016	.174	.098
NP-VBGW332-GA2		★						2	.375	.187	.031	.174	.079
NP-VBGW220.5-GS2	●							2	.250	.125	.008	.112	.098
NP-VBGW221-GS2	★							2	.250	.125	.016	.112	.098
NP-VBGW222-GS2	★							2	.250	.125	.031	.112	.079
NP-VBGW330.5-GS2	●							2	.375	.187	.008	.174	.098
NP-VBGW331-GS2	●							2	.375	.187	.016	.174	.098
NP-VBGW332-GS2	●							2	.375	.187	.031	.174	.079
NP-VBGW220.5-FS2	★							2	.250	.125	.008	.112	.098
NP-VBGW221-FS2	●							2	.250	.125	.016	.112	.098
NP-VBGW222-FS2	★							2	.250	.125	.031	.112	.079
NP-VBGW330.5-FS2	●							2	.375	.187	.008	.174	.098
NP-VBGW331-VA2		★						2	.375	.187	.016	.174	.098
NP-VBGW332-VA2		★						2	.375	.187	.031	.174	.079
NP-VBGW331-TA2		★						2	.375	.187	.016	.174	.098
NP-VBGW332-TA2		★						2	.375	.187	.031	.174	.079
NP-VCGW331-GA2		●						2	.375	.187	.016	.173	.098
NP-VCGW332-GA2		★						2	.375	.187	.031	.173	.079
NP-VCGW331-GS2	●							2	.375	.187	.016	.173	.098
NP-VCGW332-GS2	●							2	.375	.187	.031	.173	.079
NP-VCGW331-VA2		★						2	.375	.187	.016	.173	.098
NP-VCGW332-VA2		★						2	.375	.187	.031	.173	.079
NP-VCGW331-TA2		★						2	.375	.187	.016	.173	.098
NP-VCGW332-TA2		★						2	.375	.187	.031	.173	.079

BC8210 For Continuous and Light Interrupted Cutting

Machining 5120(60 HRC):Comparison of Continuous Cutting

BC8210 reduces flank wear and maintains a good surface finish.

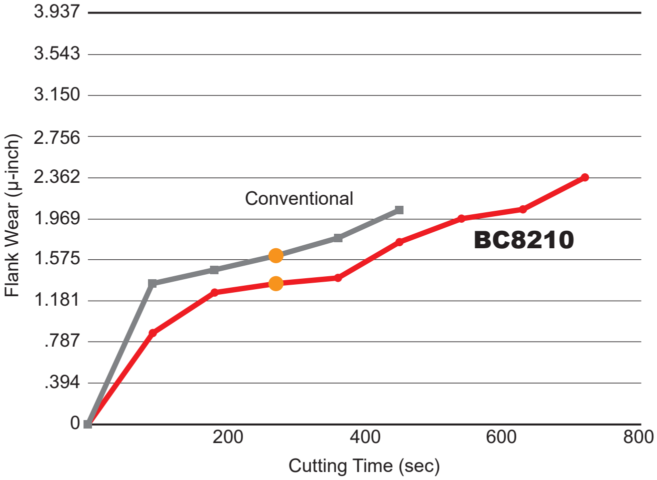




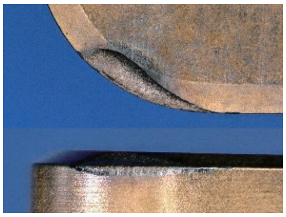
<Cutting Conditions>
Workpiece Material : AISI 5120 (60 HRC)
Inserts : NP-CNGA432-GS2
Cutting Speed : vc=655 SFM
Feed per Rev. : f=.004 IPR
Depth of Cut : ap=.008 inch
Cutting Mode : Dry Cutting

Machining 5120(60 HRC):Comparison of Light Interrupted Cutting

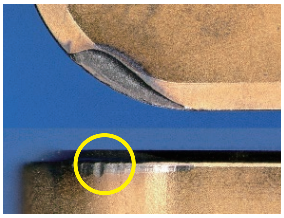
BC8210 provides excellent chipping resistance.



After machining 360 seconds



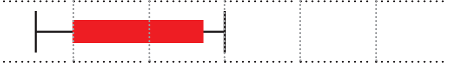
BC8210



Conventional Product is Chipping

<Cutting Conditions>
Workpiece Material : AISI 5120 (60 HRC)
Inserts : NP-CNGA432-GS2
Cutting Speed : vc=525 SFM
Feed per Rev. : f=.004 IPR
Depth of Cut : ap=.008 inch
Cutting Mode : Dry Cutting

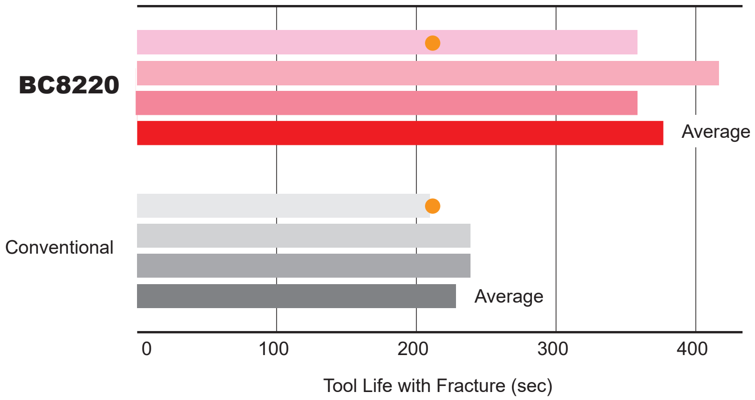
Recommended Cutting Conditions

Grade	Workpiece Material	Machining Methods	Cutting Speed vc (SFM) 330 490 655 820 985	Feed per Rev. f (IPR)	Depth pf Cut ap (inch)	Cutting Mode
BC8210	Hardened Steels	Continuous Cutting		≤.008	≤.014	Dry, Wet
		Light Interrupted Cutting		≤.008	≤.014	Dry, Wet

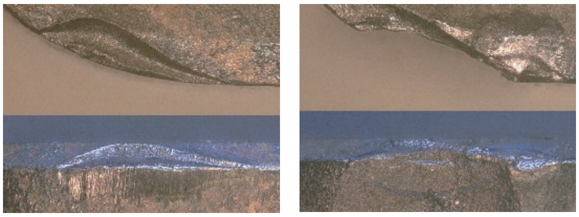
BC8220 General Applications

Machining 5120(60HRC): Comparison of Fracture Resistance During Medium Interrupted Cutting

Stable cutting is achieved with excellent fracture resistance in medium interrupted cutting.



After machining 210 seconds



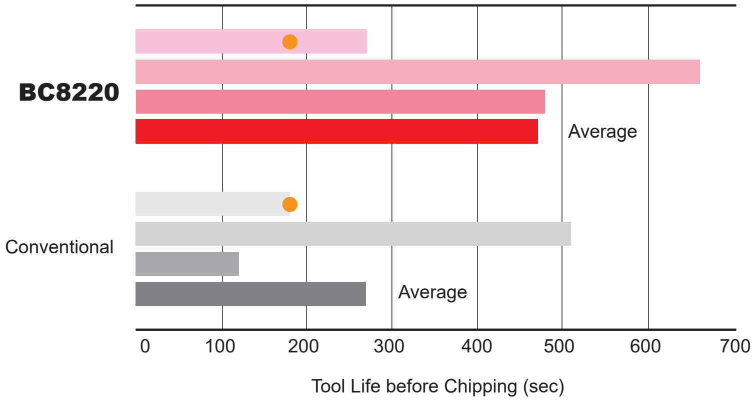
BC8220

Conventional

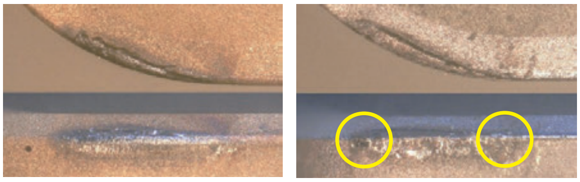
<Cutting Conditions>
Workpiece Material : AISI 5120 (60 HRC)
Inserts : NP-CNGA432-VA2
Cutting Speed : vc=820 SFM
Feed per Rev. : f=.006 IPR
Depth of Cut : ap=.004 inch
Cutting Mode : Dry Cutting

Machining 5120(60HRC): Comparison of Fracture Resistance During Heavy Interrupted Cutting

Achieves excellent chipping resistance during heavy interrupted cutting.



After machining 180 seconds

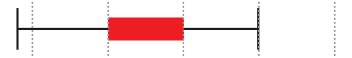
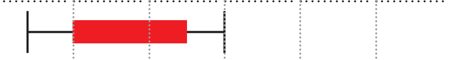


BC8220

Conventional Product is Chipping

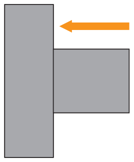
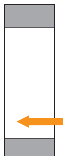
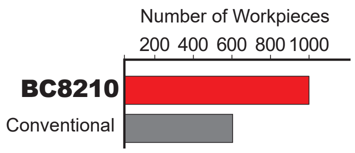
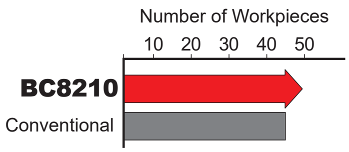
<Cutting Conditions>
Workpiece Material : AISI 5120 (60 HRC)
Inserts : NP-CNGA432-VA2
Cutting Speed : vc=655 SFM
Feed per Rev. : f=.002 IPR
Depth of Cut : ap=.004 inch
Cutting Mode : Wet Cutting

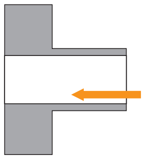
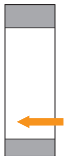
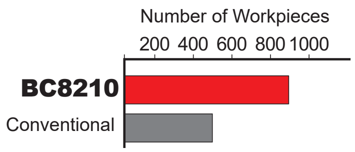
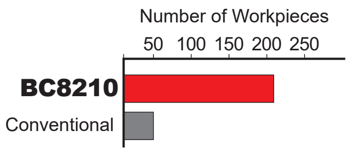
Recommended Cutting Conditions

Grade	Workpiece Material	Machining Methods	Cutting Speed vc (SFM) 330 490 655 820 985	Feed per Rev. f (IPR)	Depth pf Cut ap (inch)	Cutting Mode
BC8220	Hardened Steels	Continuous Cutting		≤.008	≤.020	Dry, Wet
		Light to Medium Interrupted Cutting		≤.008	≤.012	Dry, Wet

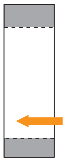
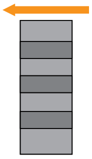
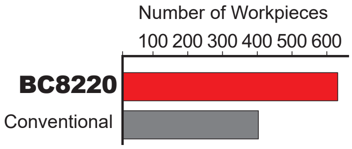
CBN Grade for Turning Hardened Steel

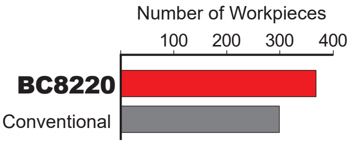
Examples of Usage

Insert		**NP-CNGA433-GSWS2**	**NP-DCGW32.51-GS2**
Workpiece Material		Non-microalloyed Steel 	16MnCr5 
Component		Automobile Parts	Automobile Parts
Application		External Continuous Cutting	Internal Continuous Cutting
Cutting Conditions	Cutting Speed vc (SFM)	850	785
	Feed per Rev. f (IPR)	.008	.003
	Depth of Cut ap (inch)	.006	.008
Cutting Mode		Dry Cutting	Dry Cutting
Results		 In continuous cutting, it was possible to maintain good surface roughness and to achieve a tool life extension of 1.6 X or more compared to conventional products.	 The same tool life as continuous cutting was achieved. Good surface roughness compared to conventional products was maintained.

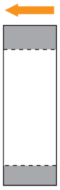
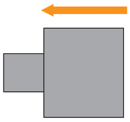
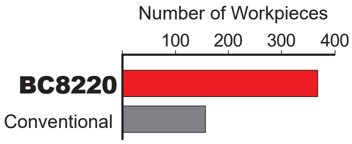
Insert		**NP-CCGW32.52-GS2**	**NP-CCGW32.51-FS2**
Workpiece Material		16MnCr5 	Alloy Steel 
Component		Automobile Parts	Automobile Parts
Application		Internal Continuous Cutting	Internal Continuous Cutting
Cutting Conditions	Cutting Speed vc (SFM)	460	920
	Feed per Rev. f (IPR)	.003	.003
	Depth of Cut ap (inch)	.004	.004
Cutting Mode		Dry Cutting	Dry Cutting
Results		 By significantly suppressing the deterioration of the surface of the insert, tool life was extended 1.8 X longer than that of conventional products in continuous cutting.	 Tool life is 4 X longer than that of conventional products during continuous cutting in high speeds.

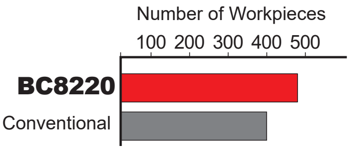
The application examples are from customers workpieces and can therefore differ from the recommended cutting conditions.

<table>
<tr><th colspan="2">Insert</th><th>NP-TNGA333-TA3</th><th>NP-TNGA33 (RE2.0)-TA3</th></tr>
<tr><td colspan="2">Workpiece Material</td><td>16MnCr5
</td><td>16MnCr5
</td></tr>
<tr><td colspan="2">Component</td><td>Automobile Parts</td><td>Automobile Parts</td></tr>
<tr><td colspan="2">Application</td><td>Heavy Interrupted Boring</td><td>Heavy Interrupted Turning</td></tr>
<tr><td rowspan="3">Cutting Conditions</td><td>Cutting Speed vc (SFM)</td><td>395</td><td>425</td></tr>
<tr><td>Feed per Rev. f (IPR)</td><td>.007</td><td>.005</td></tr>
<tr><td>Depth of Cut ap (inch)</td><td>.006-.010</td><td>.010</td></tr>
<tr><td colspan="2">Cutting Mode</td><td>Dry Cutting</td><td>Dry Cutting</td></tr>
<tr><td colspan="2">Results</td><td>

BC8220, which has excellent fracture resistance, has a tool life 1.5 times longer than that of conventional products.</td><td>

BC8220, which has excellent fracture resistance, has a tool life 1.25 times longer than that of conventional products.</td></tr>
</table>

<table>
<tr><th colspan="2">Insert</th><th>NP-CNGA431-TA2</th><th>NP-DNGA334-GA2</th></tr>
<tr><td colspan="2">Workpiece Material</td><td>JIS SCM415
</td><td>AISI 1050 (58HRC)
</td></tr>
<tr><td colspan="2">Component</td><td>Automobile Parts</td><td>Automobile Parts</td></tr>
<tr><td colspan="2">Application</td><td>External Continuous Cutting</td><td>External Continuous Cutting</td></tr>
<tr><td rowspan="3">Cutting Conditions</td><td>Cutting Speed vc (SFM)</td><td>490</td><td>460</td></tr>
<tr><td>Feed per Rev. f (IPR)</td><td>Rough .005 Finish .004</td><td>.006</td></tr>
<tr><td>Depth of Cut ap (inch)</td><td>Rough .004 Finish .002</td><td>.006</td></tr>
<tr><td colspan="2">Cutting Mode</td><td>Dry Cutting</td><td>Dry Cutting</td></tr>
<tr><td colspan="2">Results</td><td>

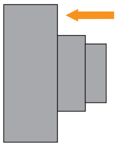
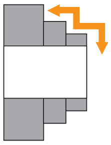
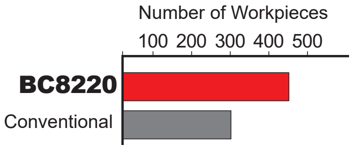
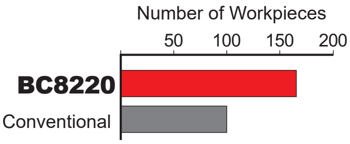
Tool life for continuous cutting is 2.5 times longer than that of conventional products.</td><td>

Tool life for continuous cutting is 1.2 times longer than that of conventional products.</td></tr>
</table>

The application examples are from customers workpieces and can therefore differ from the recommended cutting conditions.

CBN Grade for Turning Hardened Steel

Examples of Usage

Insert		**BR-CNGM432-TA2**	**BR-DNGM432-TA2**
Workpiece Material		Steel (62-64HRC) 	JIS SMnC420 (59-63HRC) 
Component		Gear	Gear
Application		External Continuous Cutting	External Continuous Interrupted Turning
Cutting Conditions	Cutting Speed vc (m/min)	490-560	590
	Feed per Rev. f (mm/rev)	.004-.008	.001→.005
	Depth of Cut ap (mm)	.028	.039-.043
Cutting Mode		Dry Cutting	Dry Cutting
Results		 While conventional products can machine up to 300 pieces, BC8220 can machine up to 450 pieces.	 The BR breaker removed the required material in one pass compared to a conventional product that took 4 passes. This gave the BR breaker a tool life 1.5 times greater than the conventional product.

The application examples are from customers workpieces and can therefore differ from the recommended cutting conditions.

DIAEDGE

TOOL NEWS B234A

Coated CBN Grade for Cast Irons

BC5110

New Products

Excellent Wear Resistance when Turning Grey Cast Irons at Low Cutting Speeds
Provides Fine Surface Finishes on Low Rigidity Workpieces

MITSUBISHI MATERIALS CORPORATION

Coated CBN Grade for Cast Irons

BC5110

BC5110 combines a tough substrate with a high hardness coating to provide excellent chipping and wear resistance.

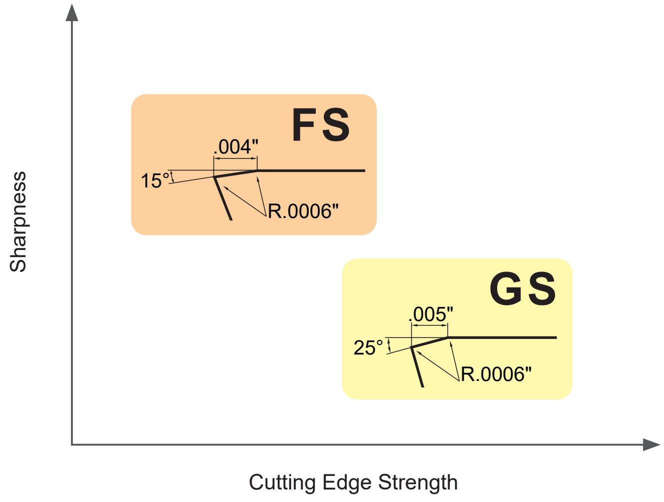
Excellent Chipping Resistance

Compared to conventional grades, the fine grain and high cBN content greatly improves chipping resistance and provides stability and long tool life.

Excellent Wear Resistant Coating

The hard ceramic coating layer provides excellent surface finishes as well as wear and notch resistance during continuous cutting. Additionally, chipping and peeling of the coating layer is suppressed due to the improved bonding strength to the CBN substrate.

Edge Preparation (Honing) Options



FS Honing

FS honing has a sharp edge with a small chamfer angle for good flank wear resistance. Recommended for minimizing burrs and achieving improved surface finish.

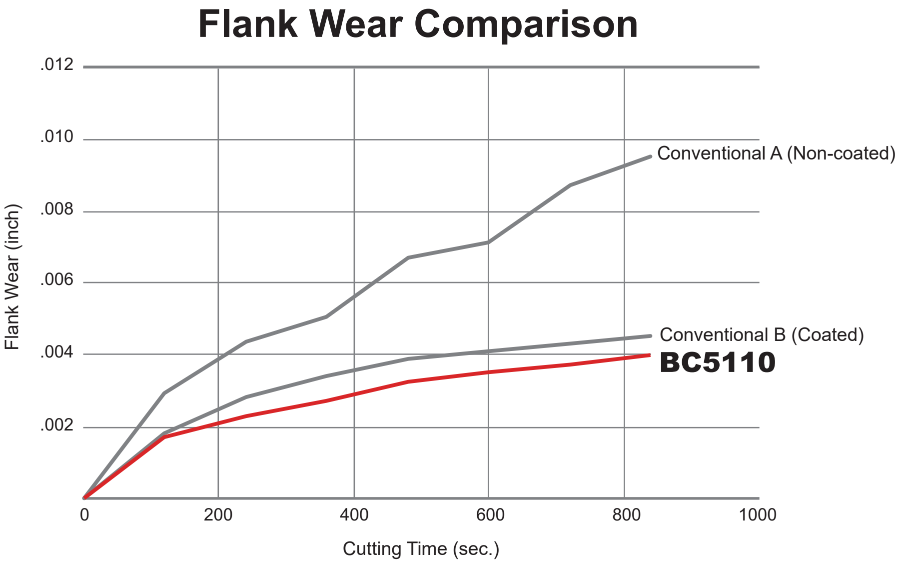
GS Honing

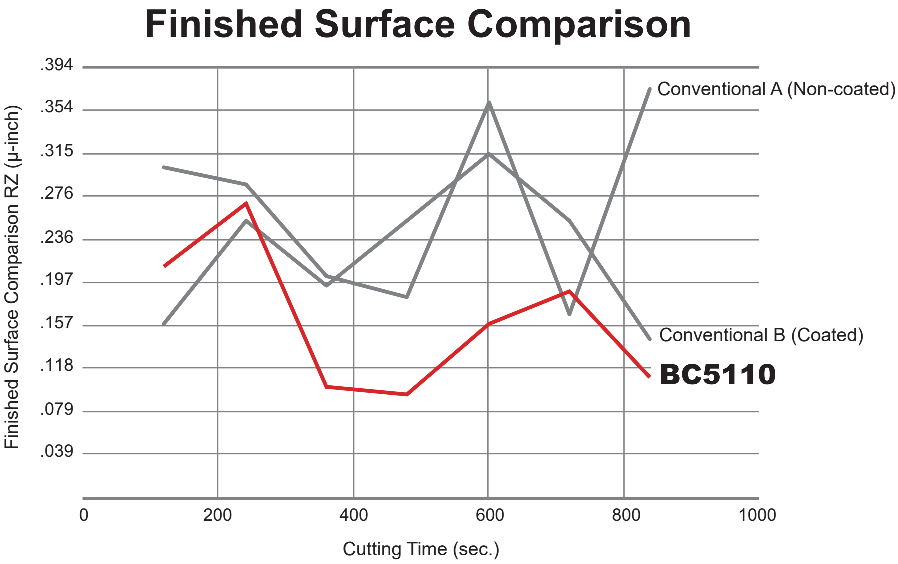
GS honing is preferable for thin or low rigidity workpiece material and for applications that are prone to chip the cutting edge.

Cutting Performance

Machining AISI No 35 B : comparing wear resistance and surface roughness.

The tough substrate and wear resistant coating of BC5110 provides improved flank wear and better surface finishes when compared to conventional uncoated grades.

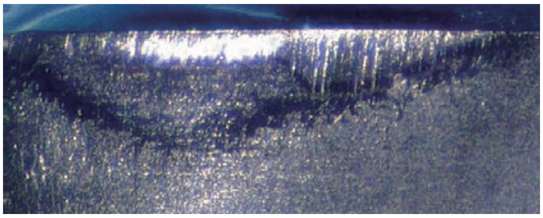




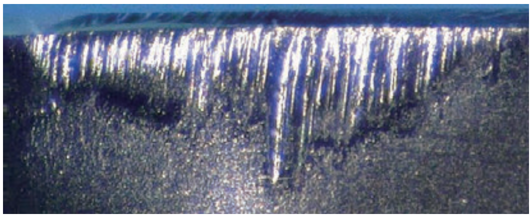
<Cutting Conditions>

Workpiece Material	: AISI No 35 B
Inserts	: CNGA432
Machining Methods	: External Continuous Cutting
Cutting Speed	: vc = 985 SFM
Feed per Rev.	: fr=.004 IPR
Depth of Cut	: ap = .008 inch
Cutting Mode	: Dry Cutting

BC5110 900 sec.

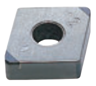
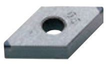


Conventional 900 sec.

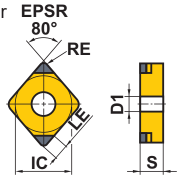


Negative Inserts (With Hole)

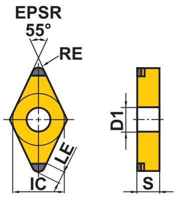
G Class

NEW PETIT CUT	NEW PETIT CUT	NEW PETIT CUT
NP_○○2	**NP_○○2**	**NP_○○2**
		

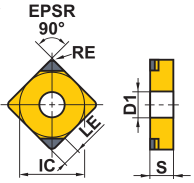
CNGA
2 corner



DNGA
2 corner



SNGA
2 corner



(inch)

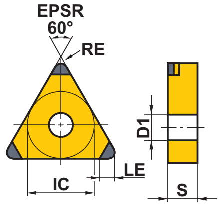
Order Number	Coated CBN	Cutting Edges	IC	S	RE	D1	LE
	BC5110						
NP-CNGA431-FS2	●	2	.500	.187	.016	.203	.073
NP-CNGA432-FS2	●	2	.500	.187	.031	.203	.082
NP-CNGA433-FS2	●	2	.500	.187	.047	.203	.090
NP-CNGA431-GS2	●	2	.500	.187	.016	.203	.073
NP-CNGA432-GS2	●	2	.500	.187	.031	.203	.082
NP-CNGA433-GS2	●	2	.500	.187	.047	.203	.090
NP-DNGA431-FS2	●	2	.500	.187	.016	.203	.083
NP-DNGA432-FS2	●	2	.500	.187	.031	.203	.080
NP-DNGA441-FS2	●	2	.500	.250	.016	.203	.083
NP-DNGA442-FS2	●	2	.500	.250	.031	.203	.080
NP-DNGA431-GS2	●	2	.500	.187	.016	.203	.083
NP-DNGA432-GS2	●	2	.500	.187	.031	.203	.080
NP-DNGA442-GS2	●	2	.500	.250	.031	.203	.080
NP-SNGA432-GS2	●	2	.500	.187	.031	.203	.090

Negative Inserts (With Hole)

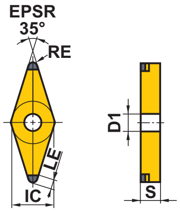
G Class

NEW PETIT CUT	NEW PETIT CUT
NP_○○3	**NP_○○2**
	

TNGA
3 corner



VNGA
2 corner



(inch)

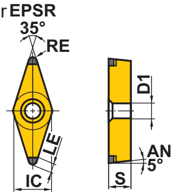
Order Number	Coated CBN	Cutting Edges	IC	S	RE	D1	LE
	BC5110						
NP-TNGA331-FS3	●	3	.375	.187	.016	.150	.063
NP-TNGA332-FS3	●	3	.375	.187	.031	.150	.069
NP-TNGA333-FS3	●	3	.375	.187	.047	.150	.076
NP-TNGA331-GS3	●	3	.375	.187	.016	.150	.063
NP-TNGA332-GS3	●	3	.375	.187	.031	.150	.069
NP-TNGA333-GS3	●	3	.375	.187	.047	.150	.076
NP-VNGA331-FS2	●	2	.375	.187	.016	.150	.099
NP-VNGA332-FS2	●	2	.375	.187	.031	.150	.079
NP-VNGA331-GS2	●	2	.375	.187	.016	.150	.099
NP-VNGA332-GS2	●	2	.375	.187	.031	.150	.079

● : Inventory maintained. (1 insert in one case)

Positive Inserts (With Hole)
G Class

NEW PETIT CUT
NP_○○2

VBGW
2 corner

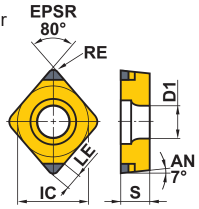


(inch)

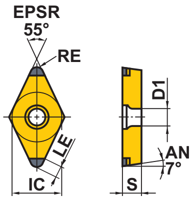
Order Number	Coated CBN	Cutting Edges	IC	S	RE	D1	LE
	BC5110						
NP-VBGW331-GS2	●	2	.375	.187	.016	.173	.099
NP-VBGW332-GS2	●	2	.375	.187	.031	.173	.079

Positive Inserts (With Hole)
G Class

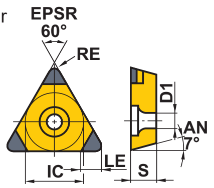
CCGW
2 corner



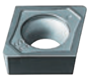
DCGW
2 corner



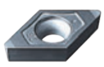
TCGW
3 corner



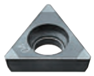
NEW PETIT CUT
NP_○○2



NEW PETIT CUT
NP_○○2



NEW PETIT CUT
NP_○○3



(inch)

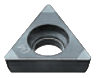
Order Number	Coated CBN	Cutting Edges	IC	S	RE	D1	LE
	BC5110						
NP-CCGW21.50.5-FS2	●	2	.250	.094	.008	.110	.069
NP-CCGW21.51-FS2	●	2	.250	.094	.016	.110	.073
NP-CCGW32.51-FS2	●	2	.375	.156	.016	.173	.073
NP-CCGW32.52-FS2	●	2	.375	.156	.031	.173	.082
NP-CCGW21.50.5-GS2	●	2	.250	.094	.008	.110	.069
NP-CCGW32.51-GS2	●	2	.375	.156	.016	.173	.073
NP-CCGW32.52-GS2	●	2	.375	.156	.031	.173	.082
NP-DCGW21.51-FS2	●	2	.250	.094	.016	.110	.083
NP-DCGW32.52-FS2	●	2	.375	.156	.031	.173	.080
NP-DCGW21.51-GS2	●	2	.250	.094	.016	.110	.083
NP-DCGW32.51-GS2	●	2	.375	.156	.016	.173	.083
NP-DCGW32.52-GS2	●	2	.375	.156	.031	.173	.080
NP-TCGW21.51-FS3	●	3	.250	.094	.016	.110	.063
NP-TCGW21.52-FS3	●	3	.250	.094	.031	.110	.069
NP-TCGW1.81.51-GS3	●	3	.219	.094	.016	.098	.063
NP-TCGW21.52-GS3	●	3	.250	.094	.031	.110	.069

Coated CBN Grade for Cast Irons

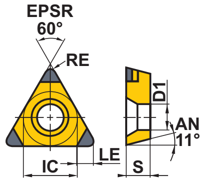
Positive Inserts (With Hole)

G Class

NEW PETIT CUT
NP_○○3



TPGB
3 corner



(inch)

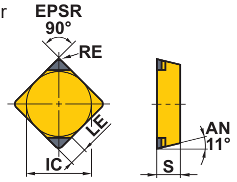
Order Number	Coated CBN	Cutting Edges	IC	S	RE	D1	LE
	BC5110						
NP-TPGB1.81.51-FS3	●	3	.219	.094	.016	.114	.063
NP-TPGB221-FS3	●	3	.250	.125	.016	.134	.063
NP-TPGB222-FS3	●	3	.250	.125	.031	.134	.069
NP-TPGB1.51.51-GS3	●	3	.187	.094	.016	.094	.063
NP-TPGB221-GS3	●	3	.250	.125	.016	.134	.063
NP-TPGB222-GS3	●	3	.250	.125	.031	.134	.069

Positive Inserts (Without Hole)

G Class

NEW PETIT CUT
NP_○○2

SPGN
2 corner

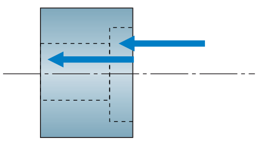
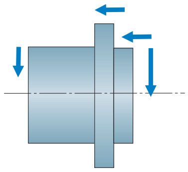
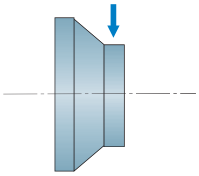
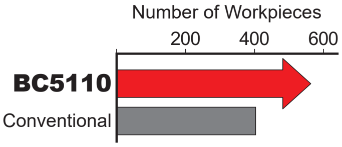
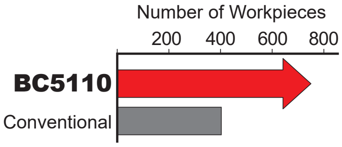
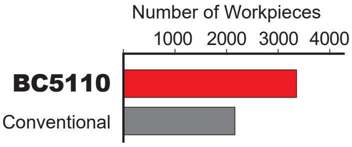


(inch)

Order Number	Coated CBN	Cutting Edges	IC	S	RE	D1	LE
	BC5110						
NP-SPGN433-GS2	●	2	.500	.187	.047	–	.099

● : Inventory maintained. (1 insert in one case)

Application Examples

Insert		NP-DCGW21.51-FS2	NP-VCGW332-FS2	NP-VNGA332-FS2
Workpiece Material		Gray Cast Iron (AISI No 35 B) 	Gray Cast Iron (AISI No 35 B) 	Gray Cast Iron 
Component		Automotive Parts	Automotive Parts	Ring
Cutting Conditions	Cutting Speed **vc** (SFM)	1195	1740	360
	Feed per Rev. **f** (IPR)	.004	.004	.005
	Depth of Cut **ap** (inch)	.004	.004	.024
Cutting Mode		Wet Cutting	Wet Cutting	Dry Cutting
Results		 BC5110 achieved 1.25 X longer tool life with stable dimensional accuracy and improved surface finish when compared to conventional product.	 BC5110 achieved 1.5 X longer tool life with greatly reduced flank wear compared to conventional product.	 BC5110 achieved a 50% increase in tool life plus an improved surface finish.

The application examples are from customers workpieces and can therefore differ from the recommended cutting conditions.

Recommended Cutting Conditions

Workpiece Material		Cutting Speed vc (SFM)						f (IPR)	ap (inch)	Cutting Mode
		330	655	985	1310	1640	1970			
K	Gray Cast Irons AISI No 35 B, No 45 B	🟥	🟥	🟥	🟥	🟥	🟥	≤ .020	≤ .020	Dry, Wet

For your safety
●Don't handle inserts and chips without gloves. ●Please machine within the recommended application range and exchange expired tools with new ones in advance of breakage. ●Please use safety covers and wear safety glasses. ●When using compounded cutting oils, please take fire precautions. ●When using rotating tools, please make a trial run to check run-out, vibration and abnormal sounds etc.

DIA EDGE

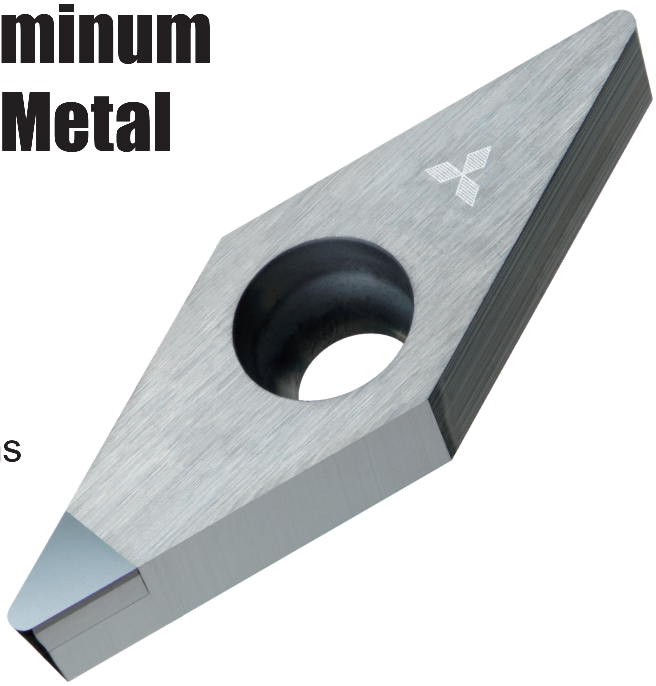
TOOL NEWS B115A-F

PCD Grade for Non-Ferrous Metals Turning

MD220 VCGW Type

New Item Addition

Suitable for Cutting Aluminum Alloys and Non-ferrous Metal Components on Small Automatic Lathes

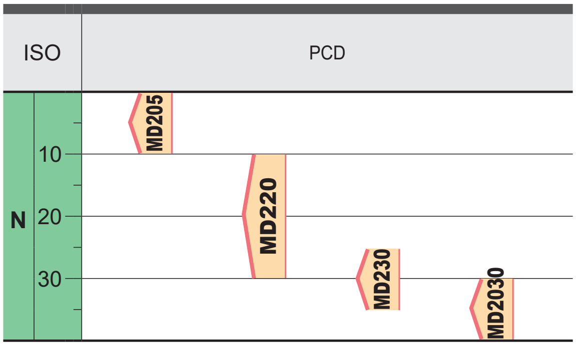


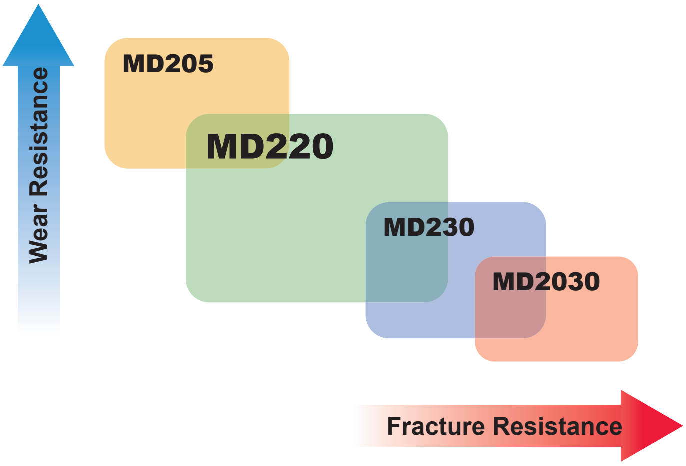
Proficient in various machining applications such as external turning and internal boring, because of the strong, tough edge and the availability to utilize both edge hands.

For General Machining MD220

Sintered medium grain diamond particles. Wear resistance and fracture resistance are superbly balanced. Applicable to general finishing of non-ferrous metals, non-metal cutting, and similar machining.

●**Aluminum Alloy**





Suitable for cutting materials such as nonferrous metals and fiber reinforced plastics (FRP) including aluminum alloys.
It supports ultra high speed finish cutting.

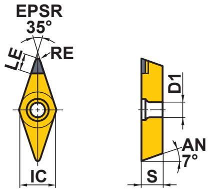
MITSUBISHI MATERIALS CORPORATION

Positive Inserts (With Hole)

G Class

Flat Top

VCGW



(inch)

Order Number	MD220	Cutting Edges	IC	S	RE	D1	LE
VCGW220.2	●	1	.250	.125	.004	.110	.122
VCGW220.5	●	1	.250	.125	.008	.110	.118
VCGW221	●	1	.250	.125	.016	.110	.102

● : USA Stock (1 insert in one case)

Recommended Cutting Conditions

(inch)

Work Material	Cutting Speed **vc** (SFM)	Feed **f** (IPM)	Depth of Cut **ap**
Aluminium Alloy (Si ≤ 12%)	2625 (655—3935)	—.008	—.039
Aluminium Alloy (Si ≥13%)	1970 (655—3280)	—.008	—.039
Copper Alloy	2295 (655—3935)	—.008	—.039
Strengthened Plastic	1970 (330—3280)	—.016	—.039
Glass Fibre Reinforced Plastic	1640 (330—2625)	—.010	—.039
Carbon	1310 (330—1970)	—.012	—.039
Ceramics	165 (100—260)	—.004	—.039
Hard Rubber	1970 (985—2625)	—.006	—.039
Wood Inorganic Board	4265 (985—13120)	—.016	—
Cemented Carbide	50 (15—65)	—.008	—.020

For your safety
●Don't handle inserts and chips without gloves. ●Please machine within the recommended application range and exchange expired tools with new ones in advance of breakage. ●Please use safety covers and wear safety glasses. ●When using compounded cutting oils, please take fire precautions. ●When using rotating tools, please make a trial run to check run-out, vibration and abnormal sounds etc.

DIAEDGE

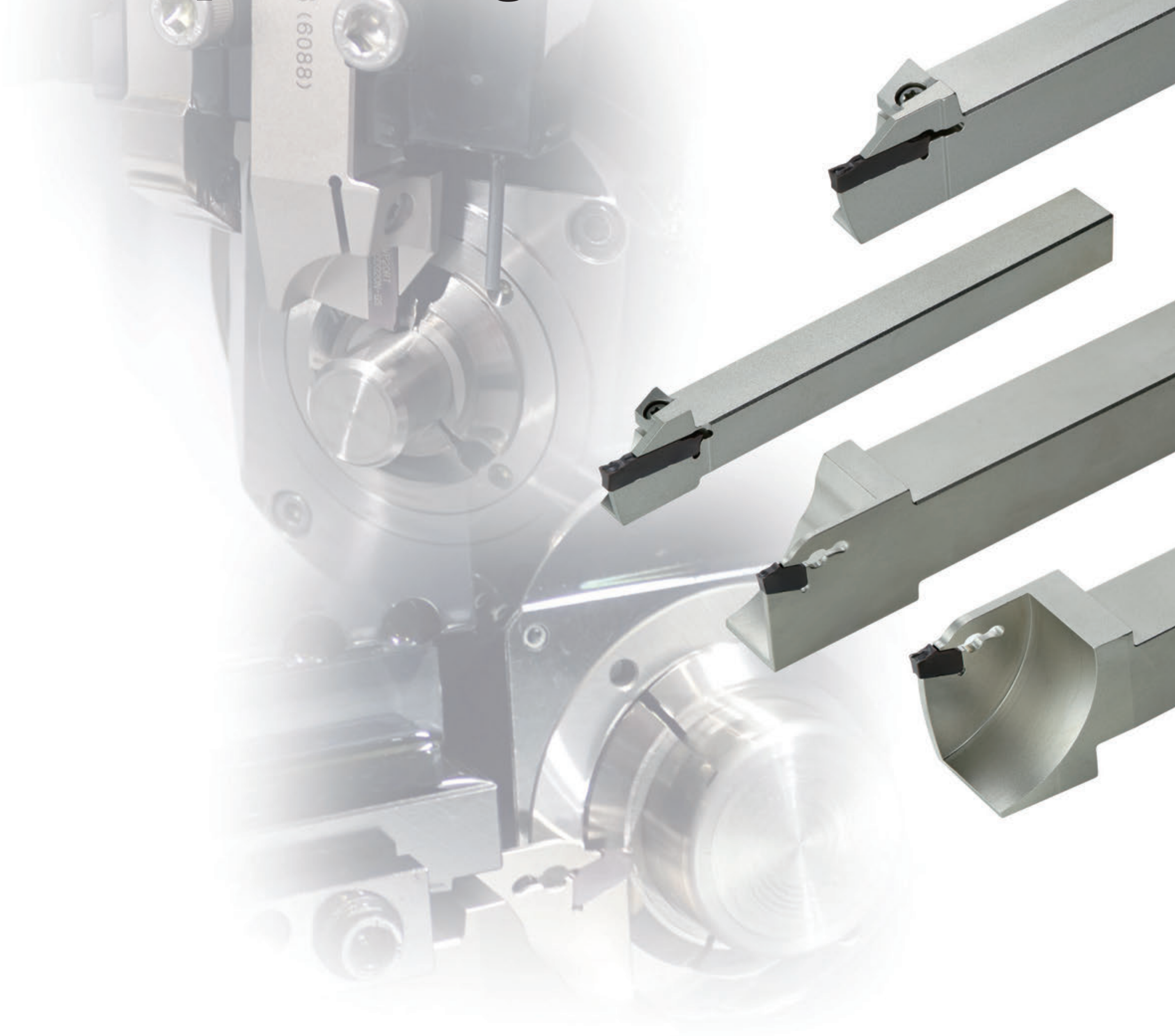
TOOL NEWS B255A-H

GY/GW Series Cutting Off and Grooving System

GY/GW Monoblock Holders for Swiss-Type Automatic Lathes

New Products

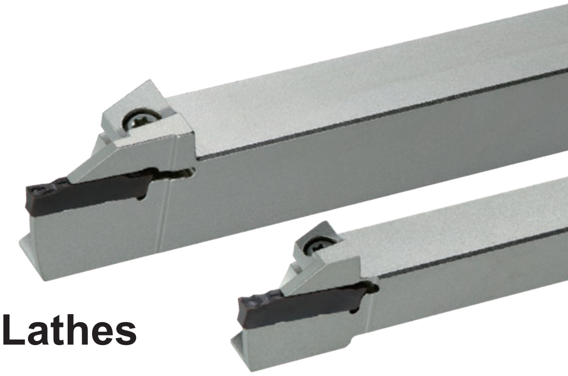
New High Rigidity Geometry ideal for Deep Grooving



MITSUBISHI MATERIALS CORPORATION

Cutting Off and Grooving System

GY Series

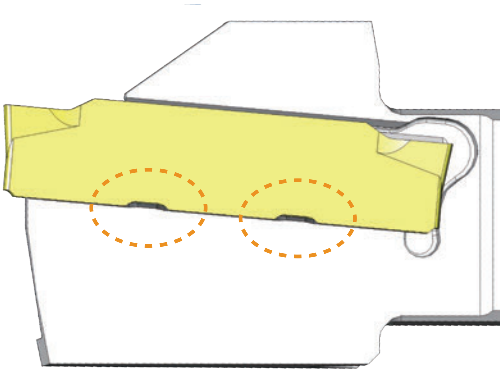


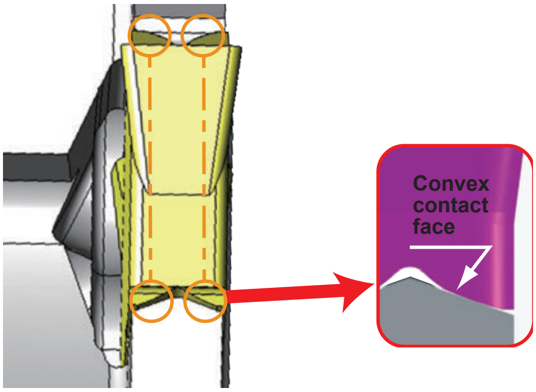
Monoblock Holder for Swiss-type Automatic Lathes

Highly Reliable Insert Clamp

The safety key locks the insert and prevents movement.

The convex geometry ensures high precision clamping.



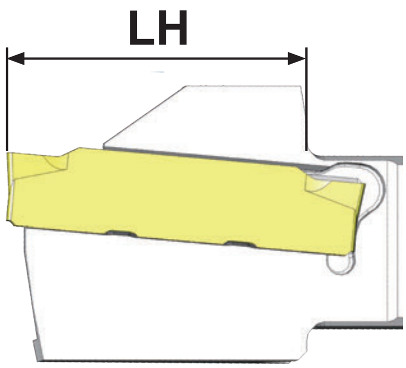


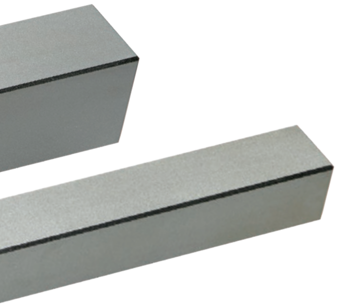
Monoblock Holder for Swiss-type Automatic Lathe

The new geometry with greatly improved rigidity suppresses vibrations and dimensional changes thereby solving problems during cutting off and grooving operations.

Overhang Length Compatible with Swiss-type Automatic Lathes

Head length corresponding to the maximum machining diameter of CNC Swiss-type automatic lathes and turret machines.

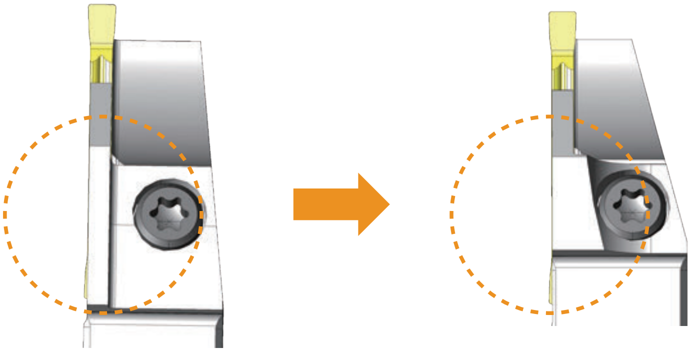




Features of High-Rigidity Holder

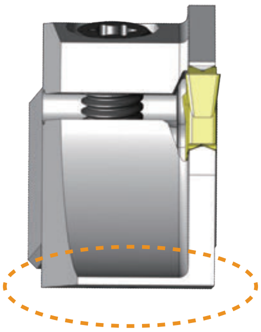
Strong Clamp Bridge

The strong design of the clamp bridge suppresses chatter and vibration.

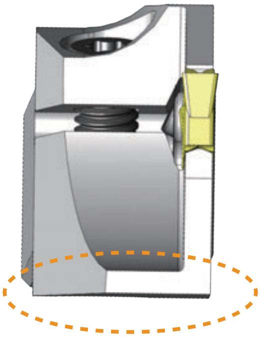


Thicker Tool Base

Tool deflection caused by cutting resistance is greatly reduced.

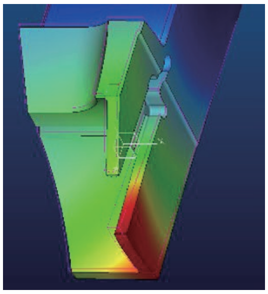


Analysis by Simulation
Deflection Measurement : .0017"



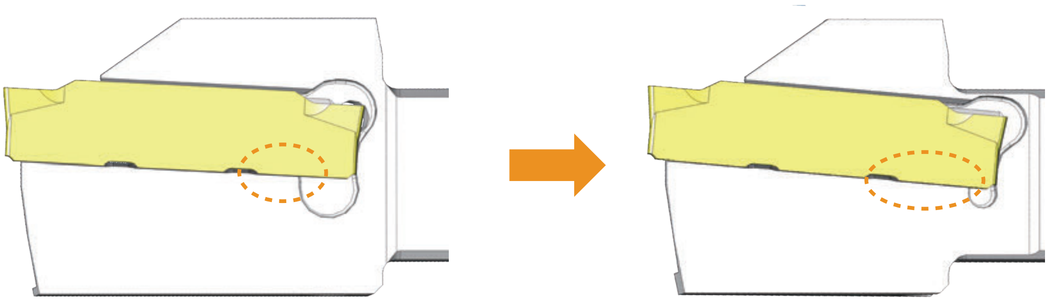
Analysis by Simulation
Deflection Measurement : .0005"

Analysis by Simulation



Strengthening of the Insert Clamp

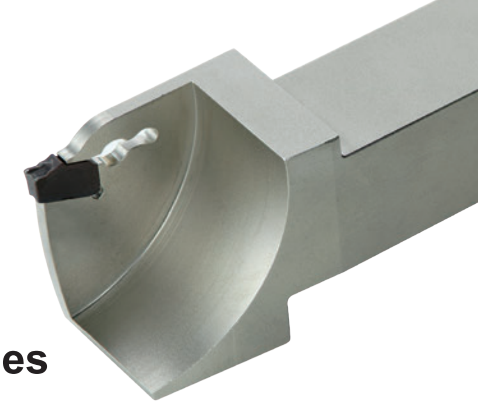
The seating face of the insert becomes wider reducing the deformation of the workpiece material.



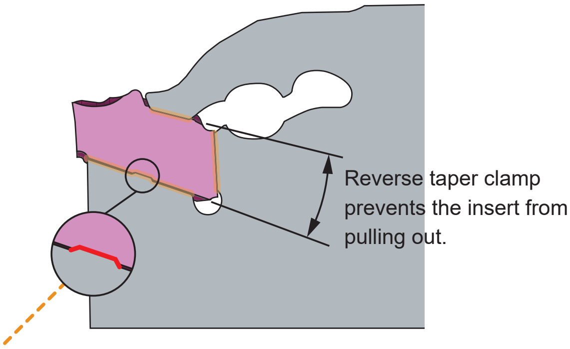
Cutting Off and Grooving System

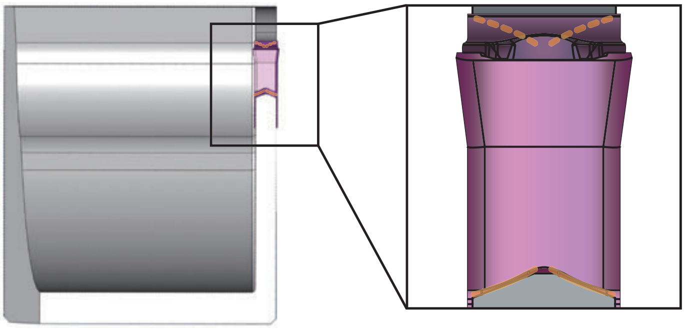
GW Series

Monoblock Holder for Swiss-type Automatic Lathes



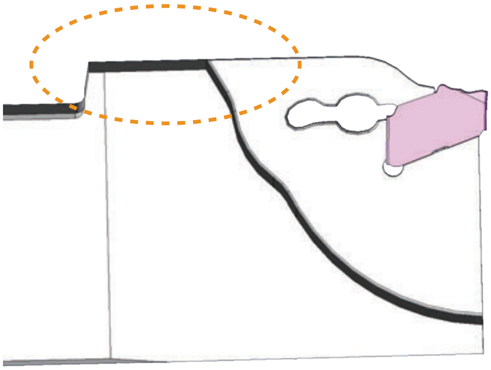
Highly Reliable Insert Clamping

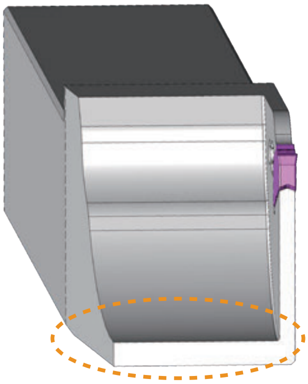




High-Rigidity Holder

Tool deflection caused by cutting resistance and the remaining material pip in the center are greatly reduced.





New Low Resistance and High Lead Angle Insert

New inserts with a lead angle of 8° have been added to the range to reduce burrs and the remaining material pip in the center.

Lead Angle 5°

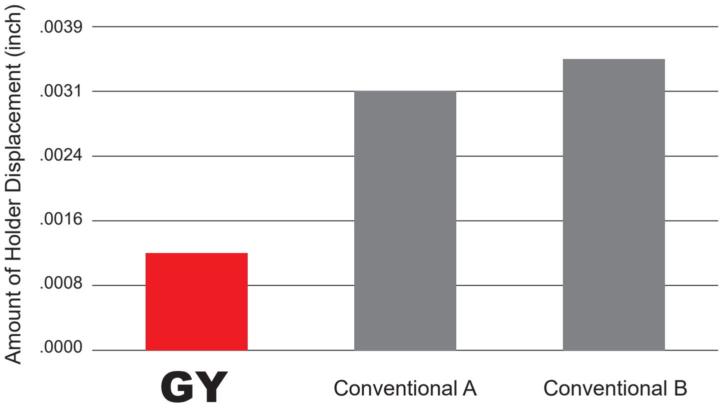
Lead Angle 8°

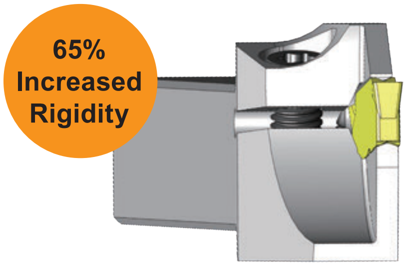
Cutting Performance

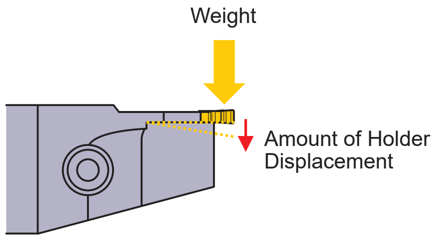
Tool Holder Deflection Comparison

The high rigidity of the tool reduces chatter and vibration thereby improving the component surface finish and also reducing the remaining pip in the center.

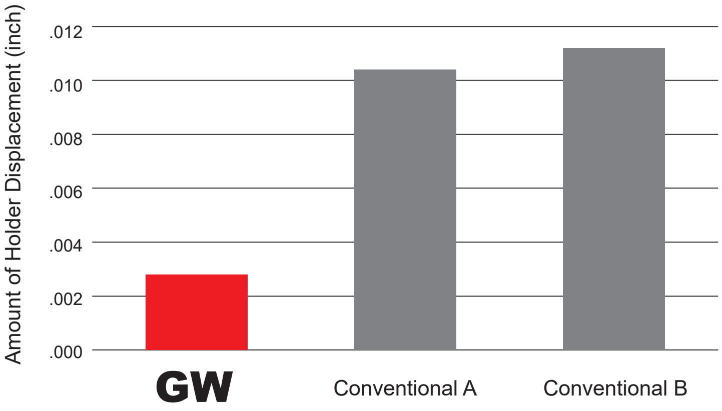
GY Holder

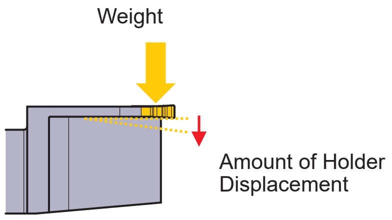






GW Holder





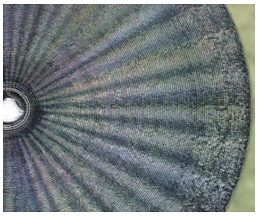
Cutting Performance

Surface Finish Comparison when Cutting Off : AISI 304

The high-rigidity holder suppresses chatter vibration and deflection, improving the finished surface.

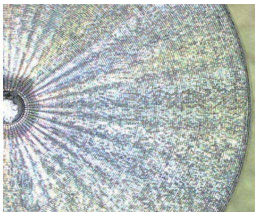
GY Holder

GY



Rz .071 μ-inch

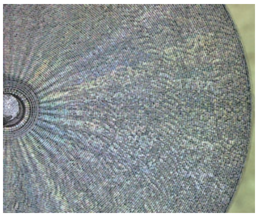
Conventional A



Rz .220 μ-inch

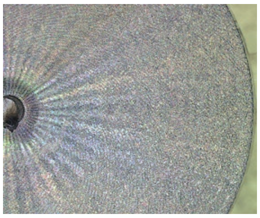
Excellent Surface Finish

Conventional B



Rz .161 μ-inch

Conventional C

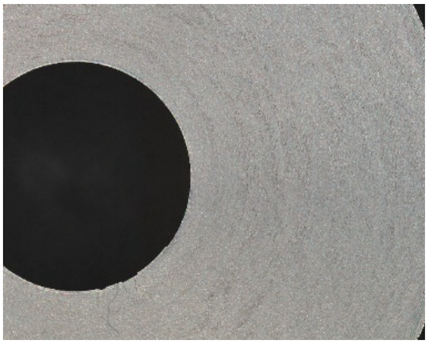


Rz .224 μ-inch

<Cutting Conditions>
Work Material : AISI 304 ø.984 inch
Tool : Cutting Width CW=.079 inch
RE=.008 inch
630 inch x .630 inch
Cutting Speed : vc=395 SFM
Feed per Rev. : f=.0039 IPR
Cutting Mode : Wet Cutting

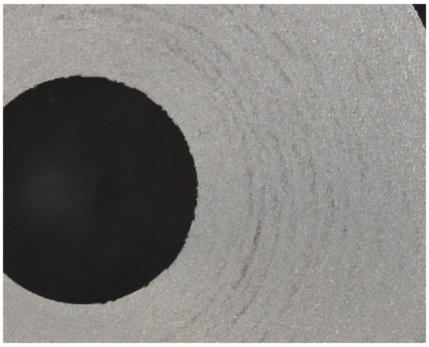
GW Holder

GW Lead Angle 8°



Rz .311 μ-inch

Conventional Lead Angle 6°



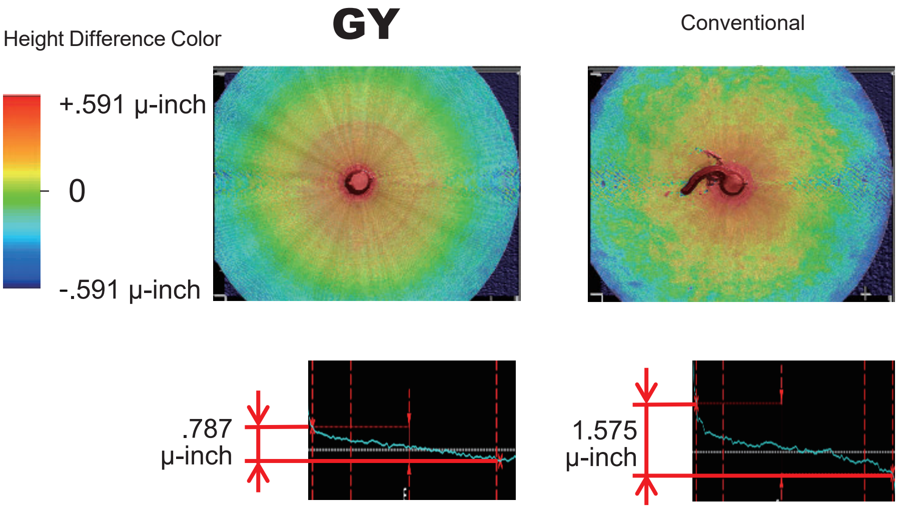
Rz .445 μ-inch

High Lead Angle Effect

<Cutting Conditions>
Work Material : AISI 304 ø1.496 inch
Tool : Cutting Width CW=.079 inch
Cutting Speed : vc=395 SFM
Feed per Rev. : f=.0043 IPR
Cutting Mode : Wet Cutting

Comparison of the Accuracy of Workpiece When Cutting Off : AISI 304

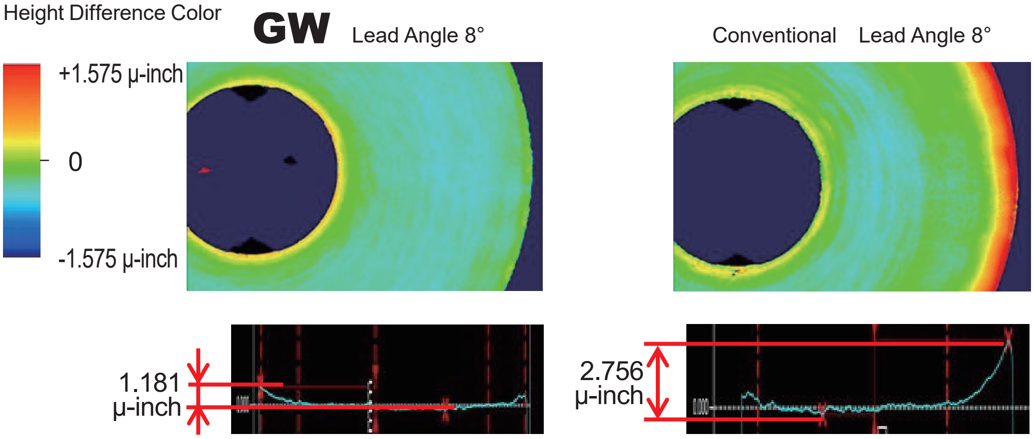
GY Holder



1/2 of Conventional Products

<Cutting Conditions>
Work Material : AISI 304 ø.984 inch
Tool : Cutting Width CW=.079 inch
RE=.008 inch
.630 inch x .630 inch
Cutting Speed : vc=395 SFM
Feed per Rev. : f=.0039 IPR
Cutting Mode : Wet Cutting

GW Holder



High accuracy with same lead angle

<Cutting Conditions>
Work Material : AISI 304 ø1.496 inch
Tool : Cutting Width CW=.079 inch
Cutting Speed : vc=395 SFM
Feed per Rev. : f=.0043 IPR
Cutting Mode : Wet Cutting

GY SERIES (External for Swiss-type Automatic Lathes)

NEW

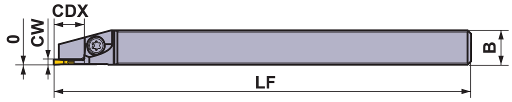


Fig. 1

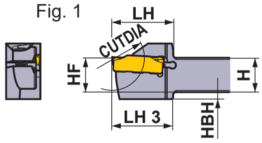


Fig. 2

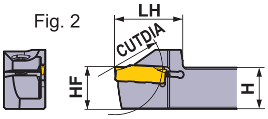
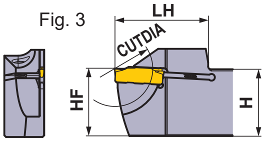


Fig. 3



Right hand tool holder shown.

Spare Parts

Holder Type	Clamp Screw	Wrench
GYSR/L1010JX00	CS350990T	TKY10R
GYSR/L1212JX00	CS350990T	TKY10R
GYSR/L1616JX00	TS4SBL	TKY15R
GYSR/L1915K00	TS4SBL	TKY15R
GYSR/L2012JX00	CS350990T	TKY10R
GYSR/L2020K00	HSC05018	HKY40R
GYSR/L2525K00	HSC05018	HKY40R

(mm)

Seat Size	CW	*4 CDX	CUTDIA	Type	Hand (R/L)	Order Number	Stock	Dimensions (mm) *3							Fig.
								H	B	LF	LH	LH 3	HF	HBH	
C	1.50 .059"	8	16	Mono Block	R	**GYSR1010JX00-C08**	★	10	10	120	17.5	17.5	10	2	1
		8	16		L	**GYSL1010JX00-C08**	★	10	10	120	17.5	17.5	10	2	1
		8	16	Mono Block	R	**GYSR1212JX00-C08**	★	12	12	120	19.5	—	12	—	2
		8	16		L	**GYSL1212JX00-C08**	★	12	12	120	19.5	—	12	—	2
		12	24	Mono Block	R	**GYSR1212JX00-C12**	★	12	12	120	19.5	19.5	12	2	1
		12	24		L	**GYSL1212JX00-C12**	★	12	12	120	19.5	19.5	12	2	1
		13	26	Mono Block	R	**GYSR1616JX00-C13**	★	16	16	120	25	—	16	—	2
		13	26		L	**GYSL1616JX00-C13**	★	16	16	120	25	—	16	—	2
		13	26	Mono Block	R	**GYSR2012JX00-C13**	★	20	12	120	28	—	20	—	3
		13	26		L	**GYSL2012JX00-C13**	★	20	12	120	28	—	20	—	3
D	2.00 2.24 .079" .088"	10	20	Mono Block	R	**GYSR1010JX00-D10**	★	10	10	120	17.5	17.5	10	2	1
		10	20		L	**GYSL1010JX00-D10**	★	10	10	120	17.5	17.5	10	2	1
		12	24	Mono Block	R	**GYSR1212JX00-D12**	●	12	12	120	19.5	19.5	12	2	1
		12	24		L	**GYSL1212JX00-D12**	●	12	12	120	19.5	19.5	12	2	1
		13	26	Mono Block	R	**GYSR1616JX00-D13**	●	16	16	120	25	—	16	—	2
		13	26		L	**GYSL1616JX00-D13**	●	16	16	120	25	—	16	—	2
		16	32	Mono Block	R	**GYSR1616JX00-D16**	●	16	16	120	28	—	16	—	2
		16	32		L	**GYSL1616JX00-D16**	●	16	16	120	28	—	16	—	2
		17	34	Mono Block	R	**GYSR1915K00-D17**	★	19.05	15.875	125	28	—	19.05	—	3
		17	34		L	**GYSL1915K00-D17**	★	19.05	15.875	125	28	—	19.05	—	3
		17	34	Mono Block	R	**GYSR2012JX00-D17**	●	20	12	120	28	—	20	—	3
		17	34		L	**GYSL2012JX00-D17**	★	20	12	120	28	—	20	—	3
		17	34	Mono Block	R	**GYSR2020K00-D17**	★	20	20	125	35	—	20	—	2
		17	34		L	**GYSL2020K00-D17**	★	20	20	125	35	—	20	—	2
		17	34	Mono Block	R	**GYSR2525M00-D17**	★	25	25	150	40	—	25	—	2
		17	34		L	**GYSL2525M00-D17**	★	25	25	150	40	—	25	—	2
E	2.39 2.50 2.74 .094" .098" .108"	10	20	Mono Block	R	**GYSR1010JX00-E10**	●	10	10	120	17.5	17.5	10	2	1
		10	20		L	**GYSL1010JX00-E10**	★	10	10	120	17.5	17.5	10	2	1
		12	24	Mono Block	R	**GYSR1212JX00-E12**	★	12	12	120	19.5	19.5	12	2	1
		12	24		L	**GYSL1212JX00-E12**	●	12	12	120	19.5	19.5	12	2	1
		13	26	Mono Block	R	**GYSR1616JX00-E13**	★	16	16	120	25	—	16	—	2
		13	26		L	**GYSL1616JX00-E13**	★	16	16	120	25	—	16	—	2
		16	32	Mono Block	R	**GYSR1616JX00-E16**	★	16	16	120	28	—	16	—	2
		16	32		L	**GYSL1616JX00-E16**	★	16	16	120	28	—	16	—	2
		17	34	Mono Block	R	**GYSR1915K00-E17**	★	19.05	15.875	125	28	—	19.05	—	3
		17	34		L	**GYSL1915K00-E17**	★	19.05	15.875	125	28	—	19.05	—	3
		17	34	Mono Block	R	**GYSR2012JX00-E17**	★	20	12	120	28	—	20	—	3
		17	34		L	**GYSL2012JX00-E17**	★	20	12	120	28	—	20	—	3
		17	34	Mono Block	R	**GYSR2020K00-E17**	★	20	20	125	35	—	20	—	2
		17	34		L	**GYSL2020K00-E17**	★	20	20	125	35	—	20	—	2
		17	34	Mono Block	R	**GYSR2525M00-E17**	★	25	25	150	40	—	25	—	2
		17	34		L	**GYSL2525M00-E17**	★	25	25	150	40	—	25	—	2

CW = Cutting Width **CDX =** Max. Groove Depth **CUTDIA =** Max. Cut Off Diameter

*1 The maximum groove depth (**CDX**) varies according to the insert used. Please refer to the maximum groove depth (**CDX**) of inserts on pages 150—152.

*2 The maximum cut off diameter (**CUTDIA**) varies according to the insert used. The cut off diameter is double the maximum groove depth (**CDX**) of inserts on pages 150—152.

*3 Dimensions shown are when the standard insert is used. If other insert geometries are used then **LF**, **LH** and **LH 3** values may vary.

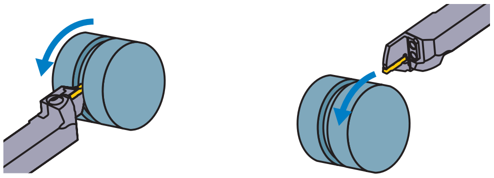
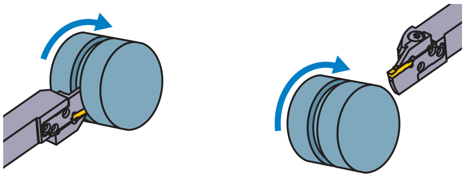
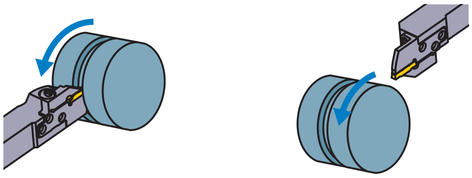
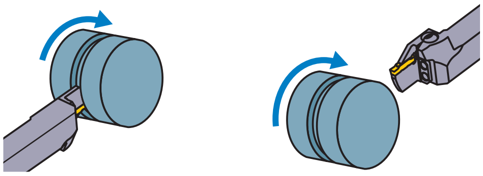
*4 The maximum groove depth (**CDX**) is limited by the workpiece diameter. For details, please refer to page 150—152.

● : USA Stock ★ : Stocked in Japan

(mm)

Seat Size	CW	*4 CDX	CUTDIA	Type	Hand (R/L)	Order Number	Stock	Dimensions (mm) *3 H	B	LF	LH	LH 3	HF	HBH	Fig.
F	3.00 3.18 3.24 .118" .125" .128"	12	24	Mono Block	R	**GYSR1212JX00-F12**	●	12	12	120	19.5	19.5	12	2	1
		12	24		L	**GYSL1212JX00-F12**	★	12	12	120	19.5	19.5	12	2	1
		13	26	Mono Block	R	**GYSR1616JX00-F13**	●	16	16	120	25	—	16	—	2
		13	26		L	**GYSL1616JX00-F13**	★	16	16	120	25	—	16	—	2
		16	32	Mono Block	R	**GYSR1616JX00-F16**	●	16	16	120	28	—	16	—	2
		16	32		L	**GYSL1616JX00-F16**	●	16	16	120	28	—	16	—	2
		17	34	Mono Block	R	**GYSR1915K00-F17**	★	19.05	15.875	125	28	—	19.05	—	3
		17	34		L	**GYSL1915K00-F17**	★	19.05	15.875	125	28	—	19.05	—	3
		17	34	Mono Block	R	**GYSR2012JX00-F17**	★	20	12	120	28	—	20	—	3
		17	34		L	**GYSL2012JX00-F17**	★	20	12	120	28	—	20	—	3

Cutting Mode

	Clockwise	Anticlockwise
R		
L		

Insert Selection

Seat Size	Insert Type
C	**GY◌◌0150C◌◌◌◌−Breaker shown below**
D	**GY◌◌0200/0224D◌◌◌◌−Breaker shown below**
E	**GY◌◌0239/0250/0274E◌◌◌◌−Breaker shown below**
F	**GY◌◌0300/0318/0324F◌◌◌◌−Breaker shown below**

For grooving/cutting off breaker

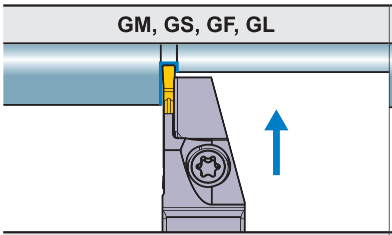
Seat Size	Breaker / CW	GU (For gummy steel)	GS (Low)	GM (Medium)	GL (Aluminium)	05-GM (Cutting off)	GFGS (Hardened steel)
		Neutral	Neutral	Neutral	Neutral	With hand	Neutral
C	.059", 1.50 mm		●	🔴			
D	.079", 2.00 mm	●	●	🔴	●	●	●
E	.094", 2.39 mm	●	●	●			●
	.098", 2.50 mm	●	●	🔴	●	●	●
F	.118", 3.00 mm	●	●	🔴	●	●	●
	.125", 3.18 mm	●	●	●			●

For multifunctional grooving breaker

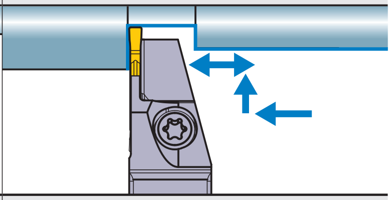
Seat Size	Breaker / CW	MF (Finish)	MS (Low)	MM (Medium)	BM (Copying)
					Ball shape
C	.059", 1.50 mm				
D	.079", 2.00 mm	●	●	●	●
	.088", 2.24 mm	●			
E	.094", 2.39 mm	●			
	.098", 2.50 mm	●	●	●	●
	.108", 2.74 mm	●			
F	.118", 3.00 mm				●
	RE .008", 0.2 mm	●	●	●	
	RE .016", 0.4 mm	●	●	●	
	RE .031", 0.8 mm			●	
	.125", 3.18 mm				●
	RE .008", 0.2 mm	●			
	RE .016", 0.4 mm	●			
	.128", 3.24 mm	●			

🔴 : Standard insert with dimensions

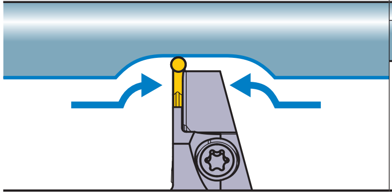
GM, GS, GF, GL



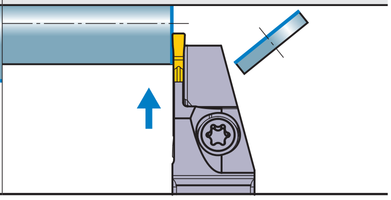
MF, MS, MM



BM



GM, GS, GU, GL, 05-GM



NEW

GW SERIES (External for Swiss-type Automatic Lathes)

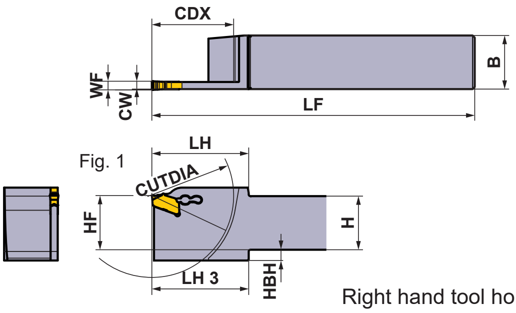


Fig. 1

Right hand tool holder shown.

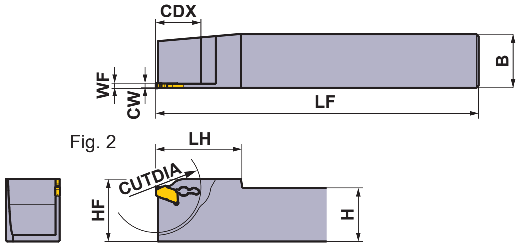


Fig. 2

Right hand tool holder shown.

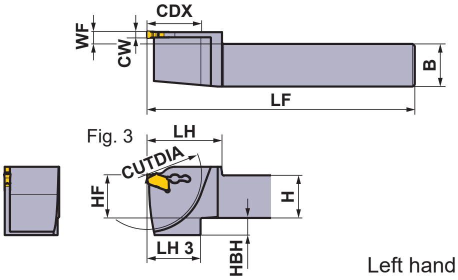
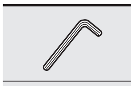


Fig. 3

Left hand tool holder shown.

Spare Parts



Wrench
GWY39L

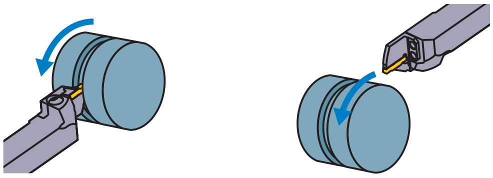
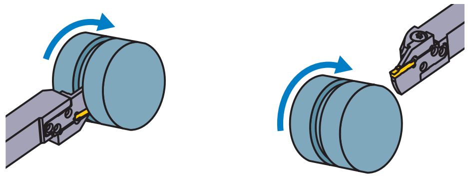
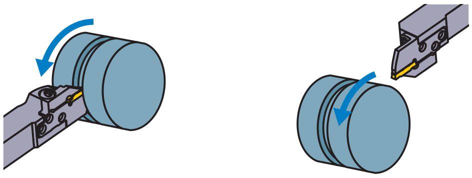
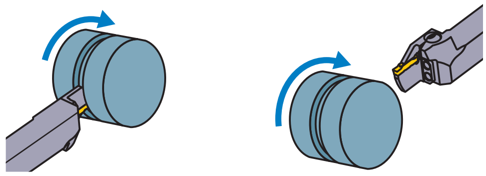
(mm)

Seat Size	CW	CDX	CUTDIA	Type	Hand (R/L)	Order Number	Stock	Dimensions (mm)								Fig.
								H	B	LF	LH	LH 3	HF	WF	HBH	
D	2.00 .079"	19	38	Mono Block	R	GWSR1616JX00-D38	★	16	16	120	30	30	16	0.3	6	1
		19	38		L	GWSL1616JX00-D38	★	16	16	120	30	30	16	0.3	6	1
		19	38	Mono Block	R	GWSR1915K00-D38	★	19.05	15.875	125	35	35	19.05	0.3	3	1
		19	38		L	GWSL1915K00-D38	★	19.05	15.875	125	35	35	19.05	0.3	3	1
		21	42	Mono Block	R	GWSR2020K00-D42	★	20	20	125	35	25	20	0.3	4	1
		21	42		L	GWSL2020K00-D42	★	20	20	125	35	25	20	0.3	4	1
		21	42	Mono Block	R	GWSR2012K00-D42	★	20	12	125	35	25	20	0.3	4	1
		21	42		L	GWSL2012K00-D42	★	20	12	125	35	25	20	0.3	4	1
		21	42	Mono Block	R	GWSR2525M00-D42	★	25	25	150	40	—	25	0.3	—	2
		21	42		L	GWSL2525M00-D42	★	25	25	150	40	—	25	0.3	—	2
E	2.39 .094"	19	38	Mono Block	R	GWSR1915K00-E38	★	19.05	15.875	125	35	35	19.05	0.2	3	1
		19	38		L	GWSL1915K00-E38	★	19.05	15.875	125	35	35	19.05	0.2	3	1
		21	42	Mono Block	R	GWSR2020K00-E42	★	20	20	125	35	25	20	0.2	4	1
		21	42		L	GWSL2020K00-E42	★	20	20	125	35	25	20	0.2	4	1
		21	42	Mono Block	L	GWSL2020K00-E42-M	★	20	20	125	35	25	20	5.7	8	3
		21	42	Mono Block	R	GWSR2012K00-E42	★	20	12	125	35	25	20	0.2	4	1
		21	42		L	GWSL2012K00-E42	★	20	12	125	35	25	20	0.2	4	1
		21	42	Mono Block	R	GWSR2525M00-E42	★	25	25	150	40	—	25	0.2	—	2
		21	42		L	GWSL2525M00-E42	★	25	25	150	40	—	25	0.2	—	2
F	3.00 .118"	19	38	Mono Block	R	GWSR1915K00-F38	●	19.05	15.875	125	35	35	19.05	0.3	3	1
		19	38		L	GWSL1915K00-F38	●	19.05	15.875	125	35	35	19.05	0.3	3	1
		21	42	Mono Block	R	GWSR2012K00-F42	●	20	12	125	35	25	20	0.3	4	1
		21	42		L	GWSL2012K00-F42	●	20	12	125	35	25	20	0.3	4	1
		21	42	Mono Block	R	GWSR2020K00-F42	●	20	20	125	35	25	20	0.3	4	1
		21	42		L	GWSL2020K00-F42	●	20	20	125	35	25	20	0.3	4	1
		21	42	Mono Block	L	GWSL2020K00-F42-M	●	20	20	125	35	25	20	5.8	8	3
		25.5	51	Mono Block	R	GWSR2020K00-F51	●	20	20	125	35	25	20	0.3	8	1
		25.5	51		L	GWSL2020K00-F51	●	20	20	125	35	25	20	0.3	8	1
		25.5	51	Mono Block	L	GWSL2020K00-F51-M	●	20	20	125	35	25	20	5.8	8	3
		25.5	51	Mono Block	R	GWSR2525M00-F51	●	25	25	150	40	40	25	0.3	3	1
		25.5	51		L	GWSL2525M00-F51	●	25	25	150	40	40	25	0.3	3	1
		32.5	65	Mono Block	R	GWSR2020M00-F65	●	20	20	150	40	33	20	0.3	10	1
		32.5	65		L	GWSL2020M00-F65	●	20	20	150	40	33	20	0.3	10	1
		38	76	Mono Block	R	GWSR2525M00-F76	●	25	25	150	45	45	25	0.3	5	1
		38	76		L	GWSL2525M00-F76	●	25	25	150	45	45	25	0.3	5	1
G	4.00	38	76	Mono Block	R	GWSR2525M00-G76	★	25	25	150	45	45	25	0.4	5	1
		38	76		L	GWSL2525M00-G76	★	25	25	150	45	45	25	0.4	5	1

CW = Cutting Width **CDX =** Max. Groove Depth **CUTDIA =** Max. Cut Off Diameter

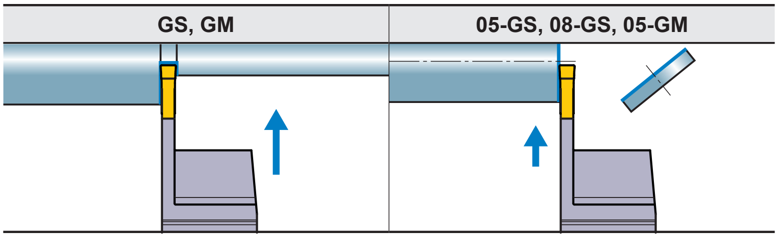
● : USA Stock ★ : Stocked in Japan

Cutting Mode

	Clockwise	Anticlockwise
R		
L		

Insert Selection

Seat Size	Insert Type
D	GW1M0200D
E	GW1M0239E
F	GW1M0300F
G	GW1M0400G



For grooving/cutting off breaker

Seat Size	Breaker / CW	GS (Low)	GM (Medium)	05-GS (Low)	08-GS (Low)	05-GM (Cutting off)
		Neutral	Neutral	With hand	With hand	With hand
D	.079", 2.00 mm	●	🔴	●	●	●
E	.094", 2.39 mm	●	🔴	●	●	●
F	.118", 3.00 mm	●	🔴	●	●	●
G	.157", 4.00 mm	●	🔴			●

🔴 : Standard insert with dimensions

Proper Use of GW Series Right Hand Inserts

First Recommended

Improved Fracture Resistance

Reduction of Burrs and Core Residue

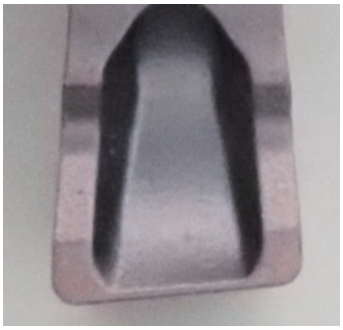
GM Breaker
PSIRR=5°
RE=.008", 0.2 mm

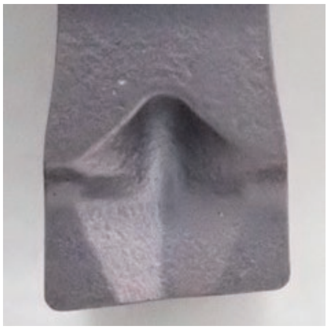
GS Breaker
PSIRR=5°
RE=.008", 0.2 mm

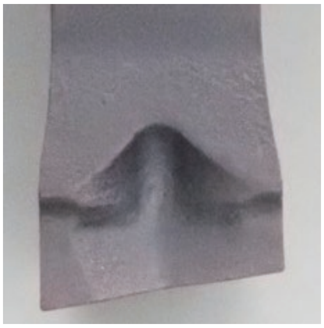
GS Breaker
PSIRR=8°
RE=.001", 0.03 mm

Reduction of Cutting Resistance

Improved Fracture Resistance







Recommended Cutting Speed [For External Grooving / Cutting Off]

	Workpiece Material	Properties	Grade	Cutting Speed **vc** (SFM)
P	Mild Steels	Hardness ≤160HB	VP20RT	330–720
			VP10RT	360–755
			NX2525	295–690
	Carbon Steels Alloy Steels	Hardness 160–280HB	VP20RT	260–590
			VP10RT	295–620
			MY5015	360–820
			NX2525	230–560
		Hardness 280HB≤	VP20RT	195–460
			VP10RT	230–490
			MY5015	295–690
			NX2525	180–440
M	Stainless Steels	Hardness ≤270HB	VP20RT	195–460
			VP10RT	230–490
K	Gray Cast Irons	Tensile Strength ≤300MPa	VP20RT	260–590
			VP10RT	295–620
			MY5015	460–985
	Ductile Cast Irons	Tensile Strength ≤800MPa	VP20RT	195–460
			VP10RT	230–490
			MY5015	295–690
S	Heat Resistant Alloys Titanium Alloys	–	MP9015	130–330
			MP9025	100–295
			VP20RT	100–195
			VP10RT/ RT9010	130–230
H	Hardened Steels	50HRC≤	BC8110/MB8025	260–395

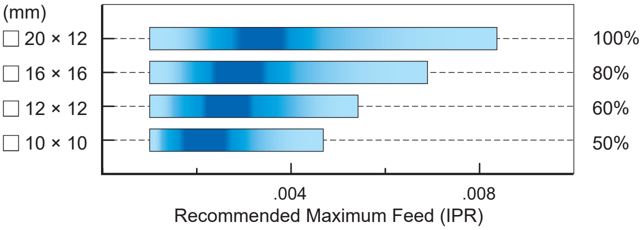
Note 1) For MP9015, MP9025, VP10RT, VP20RT and MY5015, wet cutting is recommended.

	Workpiece Material	Properties	Grade	Cutting Speed **vc** (SFM)
N	Aluminum Alloys	Content Si<5%	RT9010	655–1640
	Aluminum Alloys	Content 5%≤Si≤10%	RT9010	655–1640
	Aluminum Alloys	Content Si>10%	RT9010	330–655

RECOMMENDED CUTTING CONDITIONS [For External Grooving / Cutting Off]

Recommended cutting conditions when combining a GYHR/L2525M00/90-M24R/L modular holder and GYM25R/LA-◌◌◌ modular blade.

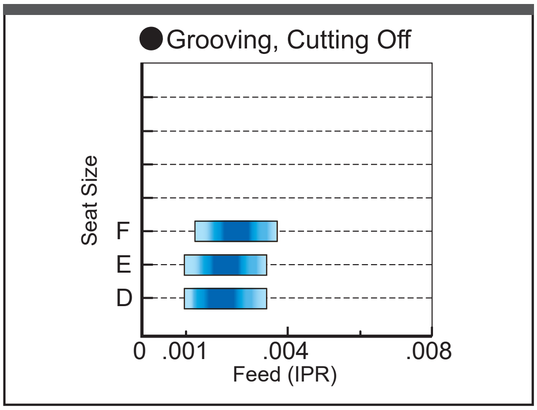
■In the case of mono block type holder for Swiss-type lathes



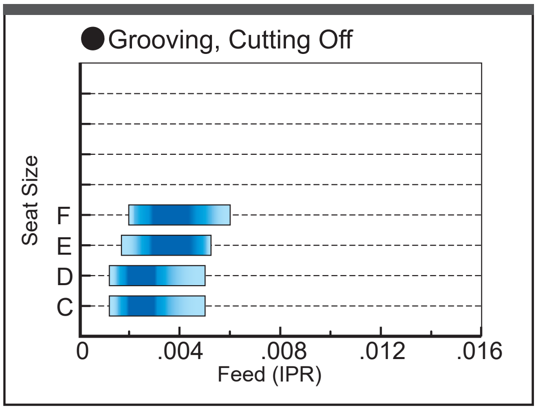
Please refer to the tables above on recommended cutting conditions for external grooving and cutting off.
Apply the percentage ratio shown on each shank size with the values in the table.

■Recommended feed rate and depth of cut

GU BREAKER

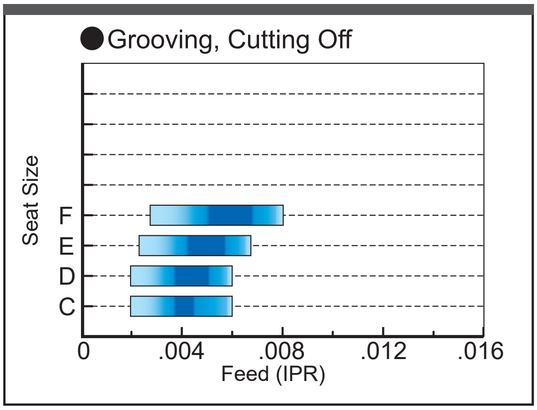

●Grooving, Cutting Off

GS BREAKER

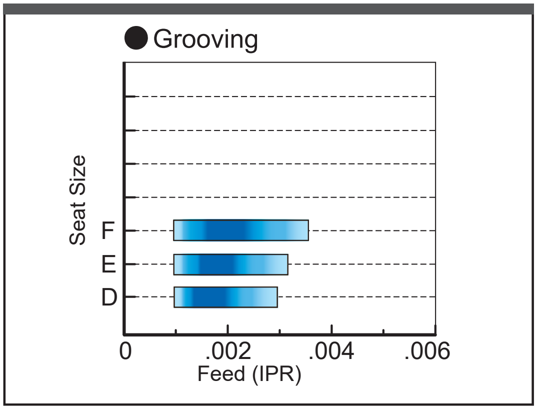

●Grooving, Cutting Off

	Seat Size Insert Width
C	.059", 1.50 mm
D	.079", 2.00 mm .088", 2.24 mm
E	.094", 2.39 mm .098", 2.50 mm .108", 2.74 mm
F	.118", 3.00 mm .125", 3.18 mm .128", 3.24 mm

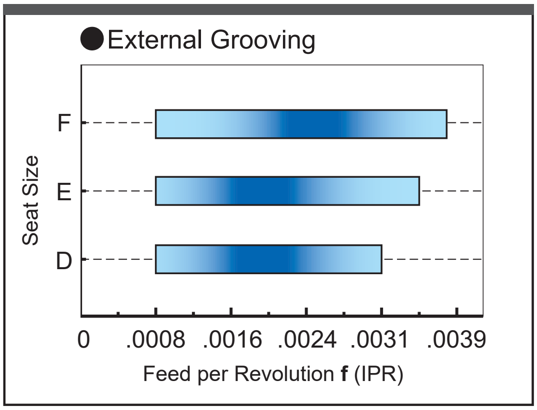
GM BREAKER


●Grooving, Cutting Off

FLAT TOP GFGS (CBN)

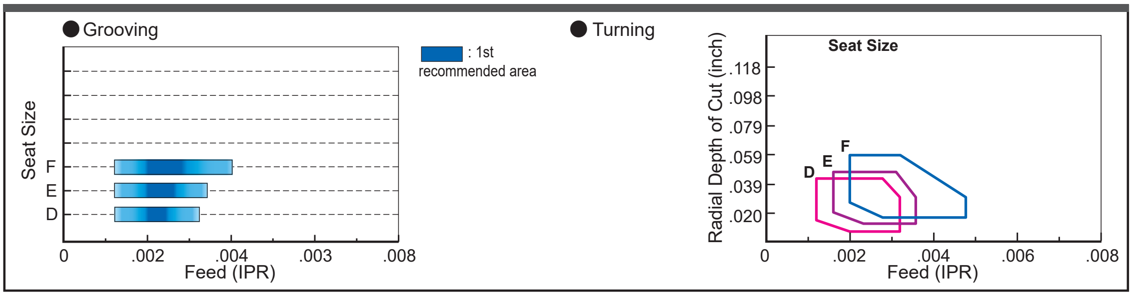

●Grooving

GL BREAKER


●External Grooving

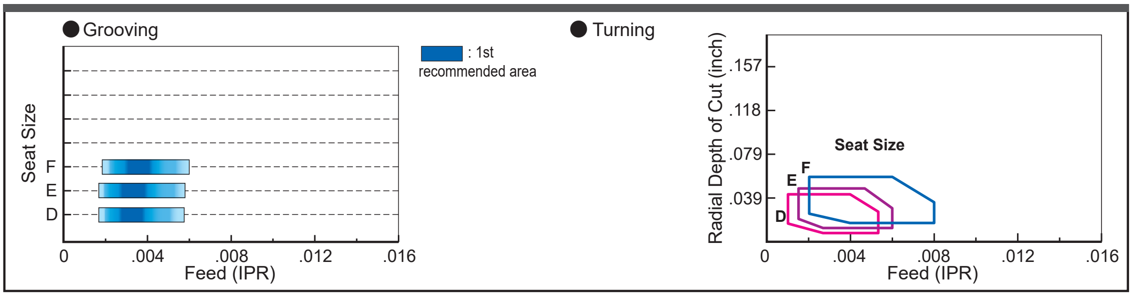
■: 1st recommended area

MF BREAKER

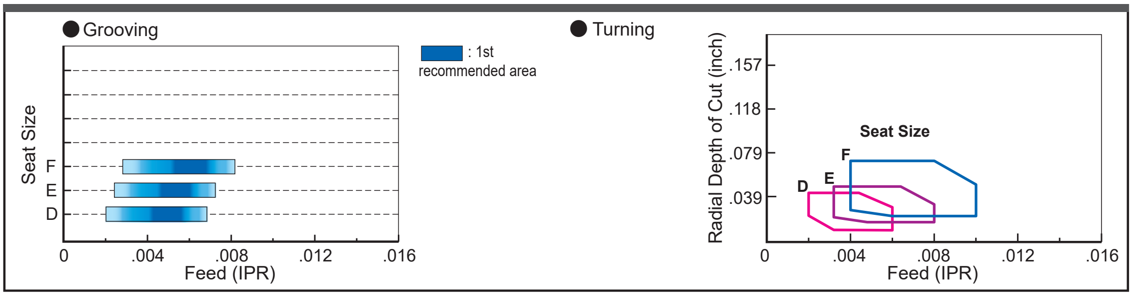


Seat Size	
	Insert Width
C	.059", 1.50 mm
D	.079", 2.00 mm .088", 2.24 mm
E	.094", 2.39 mm .098", 2.50 mm .108", 2.74 mm
F	.118", 3.00 mm .125", 3.18 mm .128", 3.24 mm

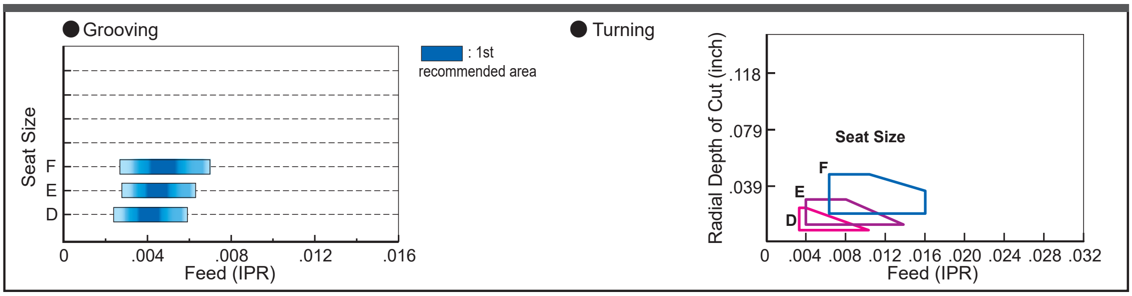
MS BREAKER



MM BREAKER



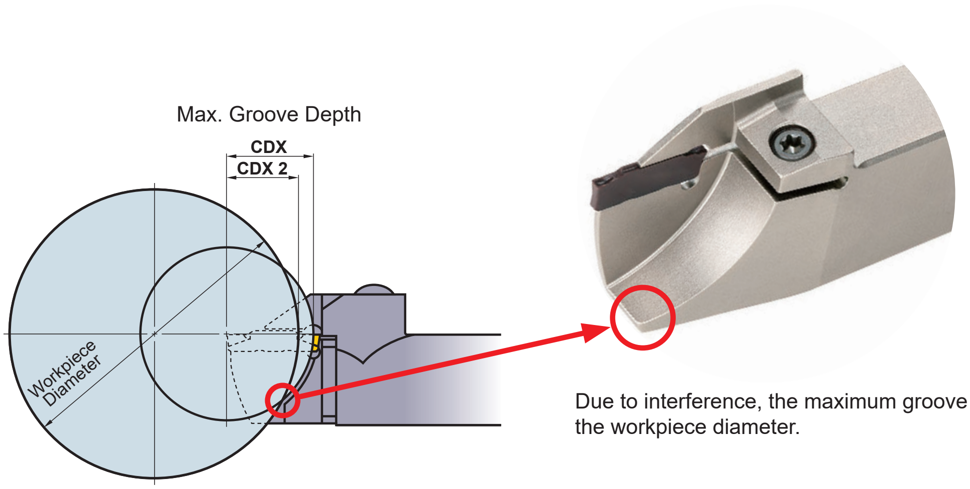
BM BREAKER



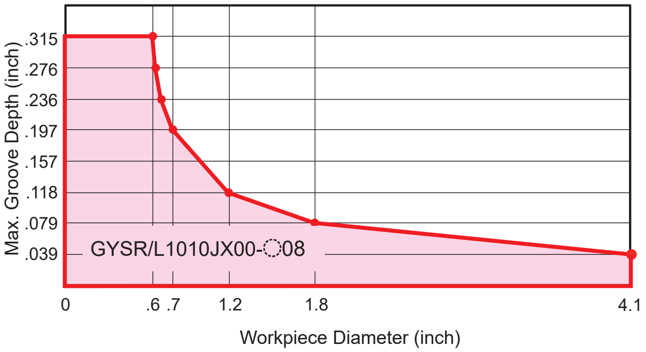
LIMITATION OF THE MAXIMUM GROOVE DEPTH [For External Grooving]

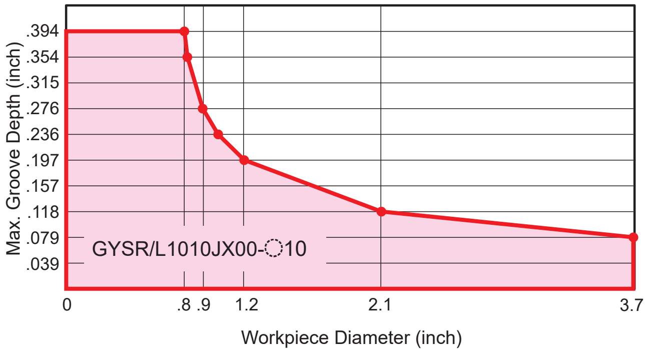
•In The Case of Mono Block Type Holder for Swiss-type Lathes

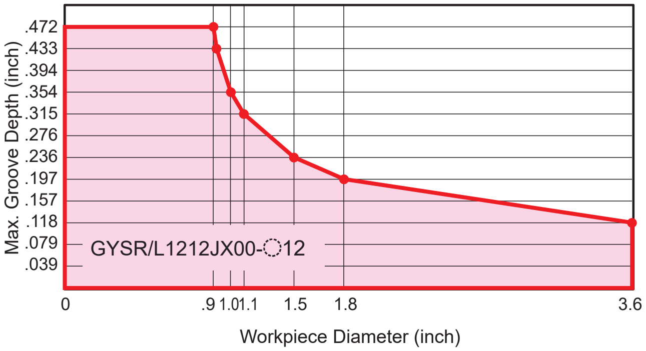
The maximum groove depth is limited by the workpiece diameter.

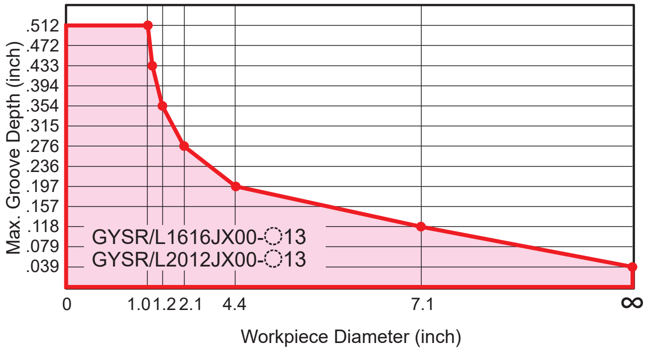


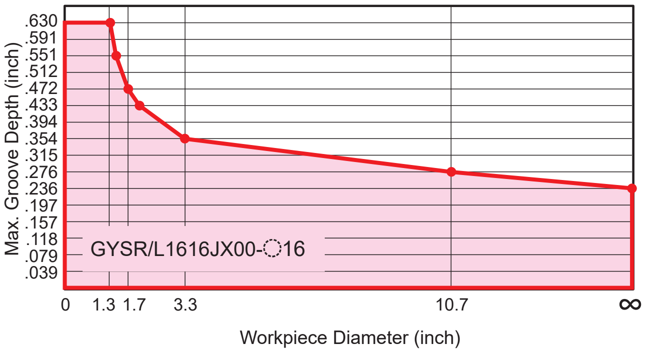
Due to interference, the maximum groove depth is limited by the workpiece diameter.

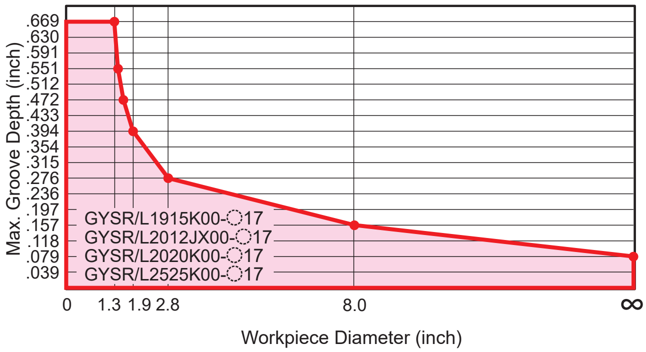












GW Series

Recommended Cutting Conditions

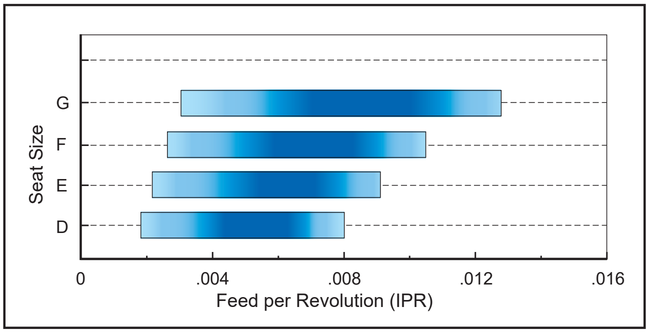
■ Cutting Speed

	Work Material	Properties	Grade	Cutting Speed **vc** (SFM) 165 330 490 655 820 985
P	Mild Steels	Hardness ≤160HB	VP20RT	330 785
			VP10RT	360 820
	Carbon Steels Alloy Steels	Hardness 160—280HB	VP20RT	260 655
			VP10RT	295 690
			VP30RT	195 590
			MY5015	360 820
		Hardness ≥280HB	VP20RT	195 525
			VP10RT	230 560
			VP30RT	130 460
			MY5015	295 690
M	Stainless Steels	Hardness ≤270HB	VP20RT	195 590
			VP10RT	230 620
			VP30RT	130 525
K	Gray Cast Irons	Tensile Strength ≤300MPa	VP20RT	260 655
			VP10RT	295 690
			MY5015	460 985
	Ductile Cast Irons	Tensile Strength ≤800MPa	VP20RT	195 525
			VP10RT	230 560
			MY5015	295 690
S	Heat Resistant Alloys Titanium Alloys	—	VP20RT	100 195
			VP10RT	130 230

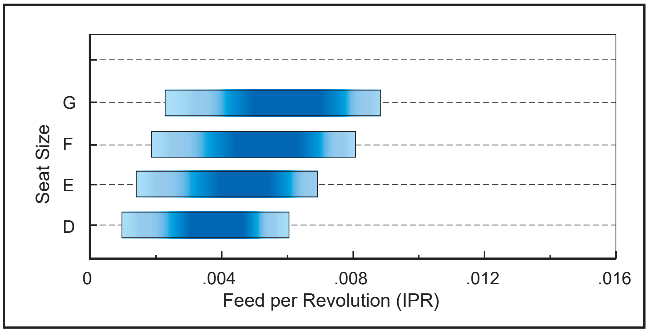
Note 1) VP20RT is the first recommended grade for materials.
Note 2) For VP10RT, VP20RT, VP30RT and MY5015, wet cutting is recommended.

■ Feed per Revolution

GM Breaker



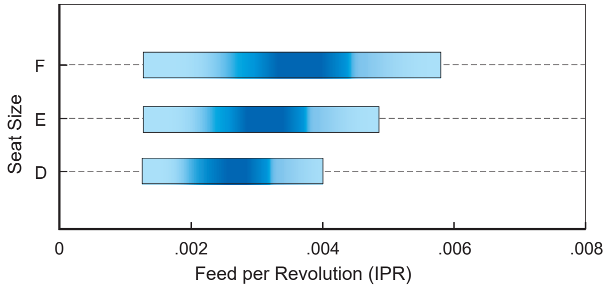
GS Breaker



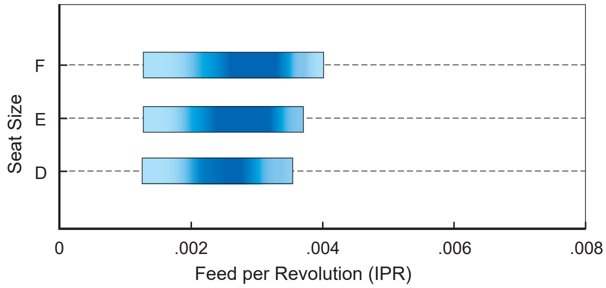
Chip Breaker	**Feed per Revolution** (IPR)			
	Seat Size D	**Seat Size E**	**Seat Size F**	**Seat Size G**
GM Breaker	.0020 — .0079	.0024 — .0091	.0028 — .0102	.0031 — .0126
GS Breaker	.0012 — .0059	.0016 — .0067	.0020 — .0079	.0024 — .0087

Cutting Off   Feed per Revolution

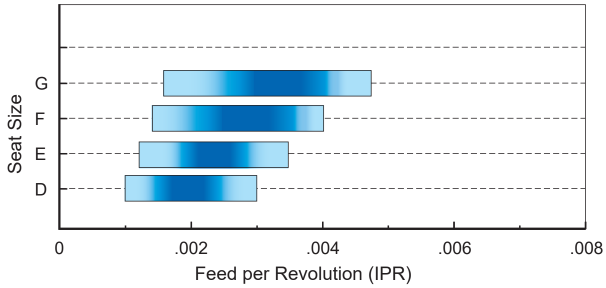
R05-GS Breaker



R08-GS Breaker



R/L05-GM Breaker

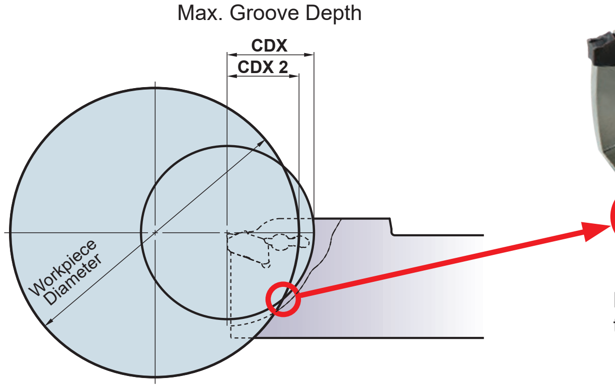


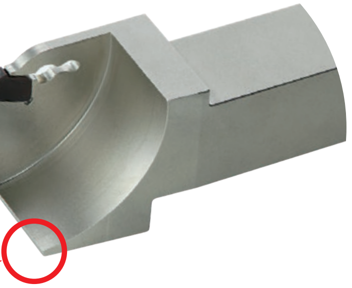
Chip Breaker	PSIPR	Hand	**Feed per Revolution** (IPR)			
			Seat Size D	Seat Size E	Seat Size F	Seat Size G
R05-GS	5°	R	.0012 – .0039	.0012 – .0047	.0012 – .0055	–
R08-GS	8°	R	.0012 – .0031	.0012 – .0035	.0012 – .0055	–
R05-GM	5°	R/L	.0020 – .0059	.0024 – .0067	.0028 – .0079	.0031 – .0091

LIMITATION OF THE MAXIMUM GROOVE DEPTH [For External Grooving]

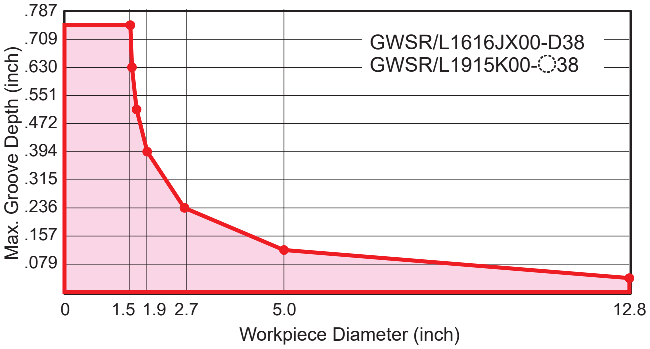
•In The Case of Mono Block Type Holder for Swiss-type Lathes

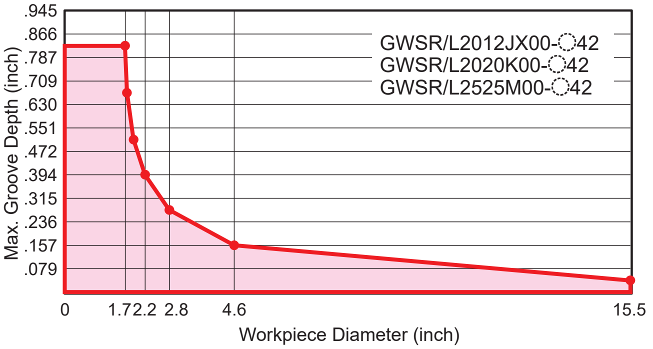
The maximum groove depth is limited by the workpiece diameter.

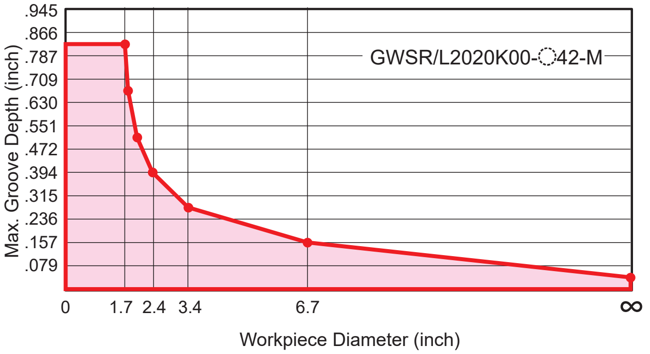


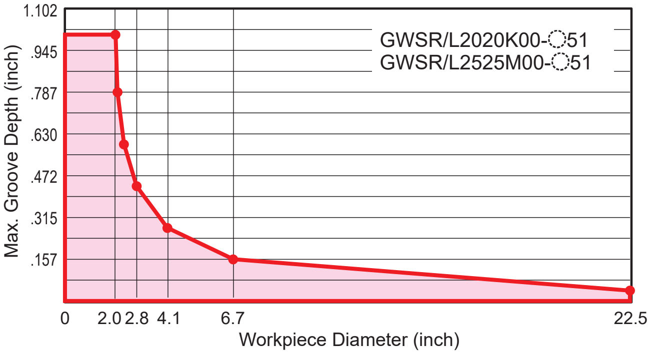


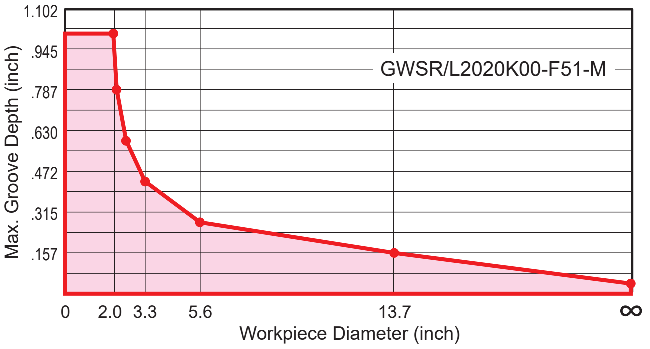
Due to interference, the maximum groove depth is limited by the workpiece diameter.

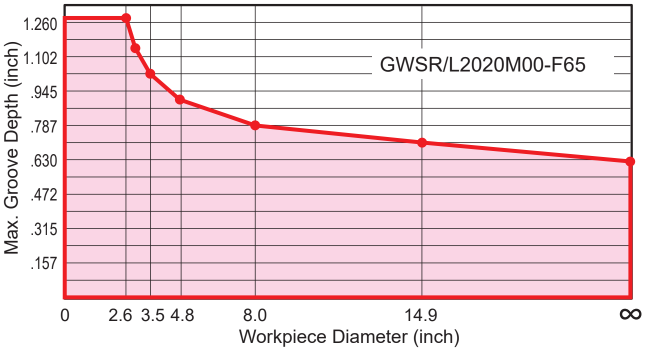


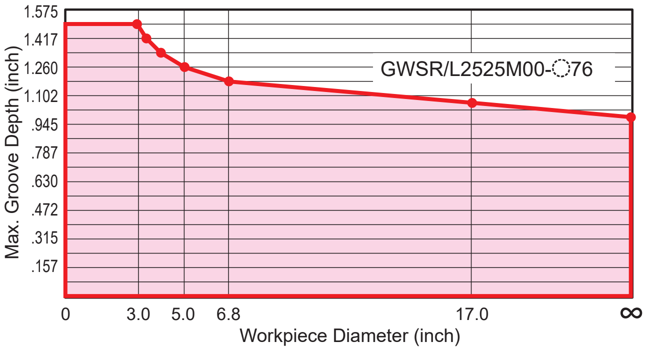












DIAEDGE

TOOL NEWS

2021.4 Update
B255A-G

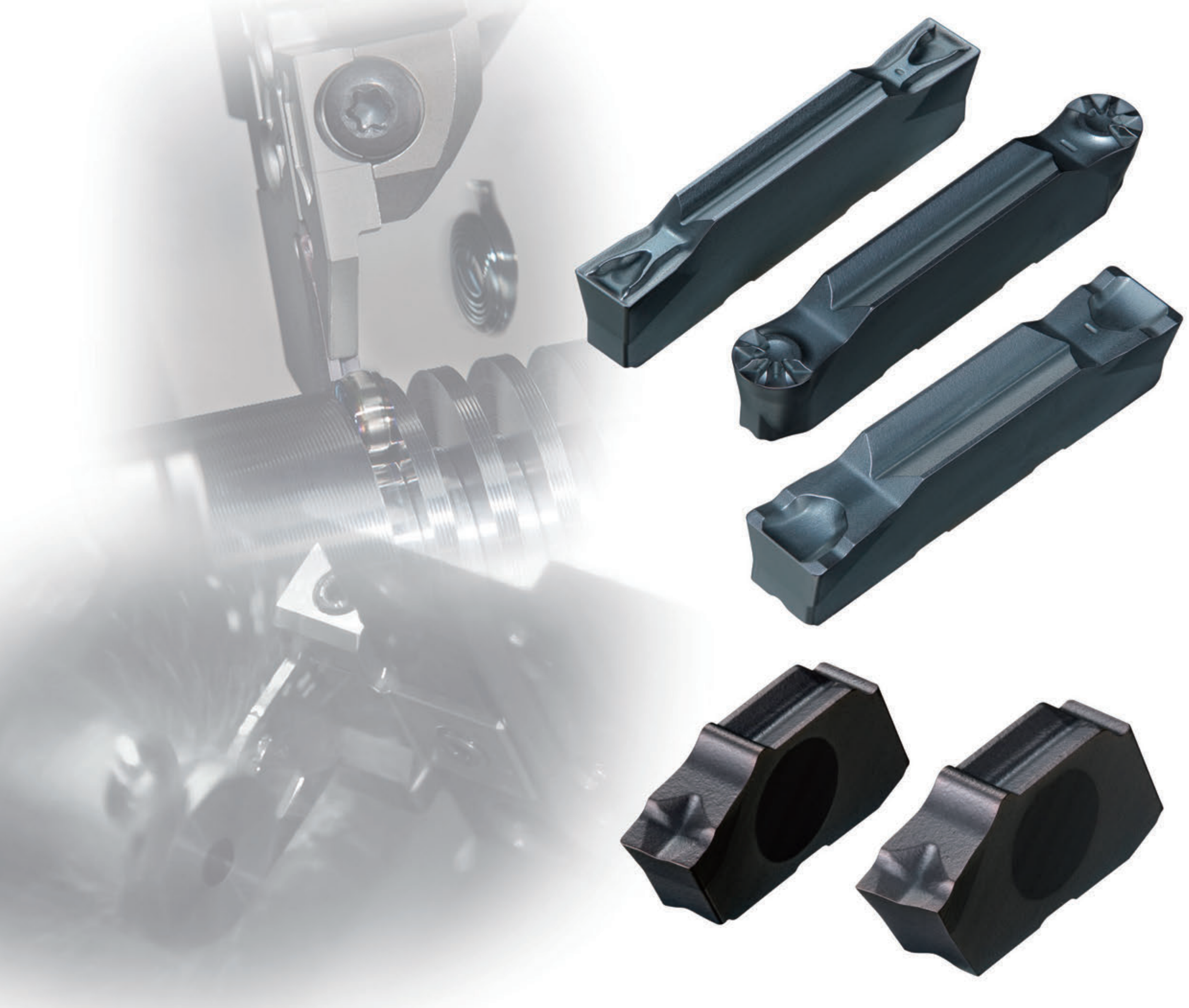
Cutting Off & Grooving System **GY/GW Series**

GY/GW Inserts

Series Expansion

Grooving Revolution

Durable and Easy to Use Grooving and Cutting Off Tools



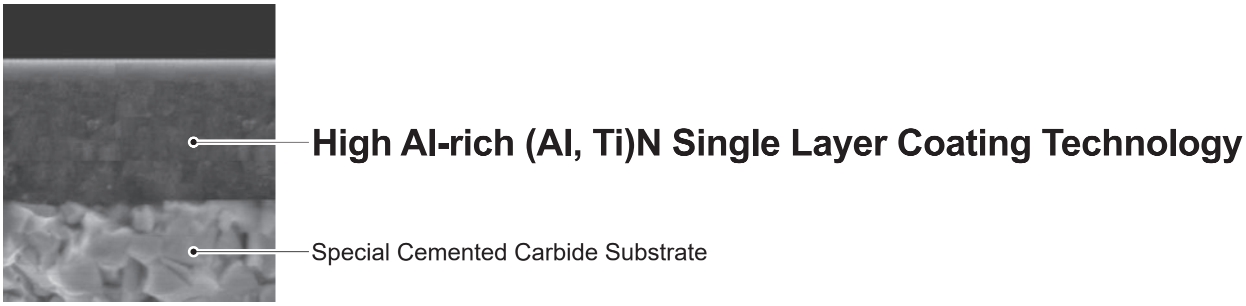
MITSUBISHI MATERIALS CORPORATION

Turning Inserts for Difficult-to-cut Materials

PVD Coated Grade NEW

MP9015/MP9025

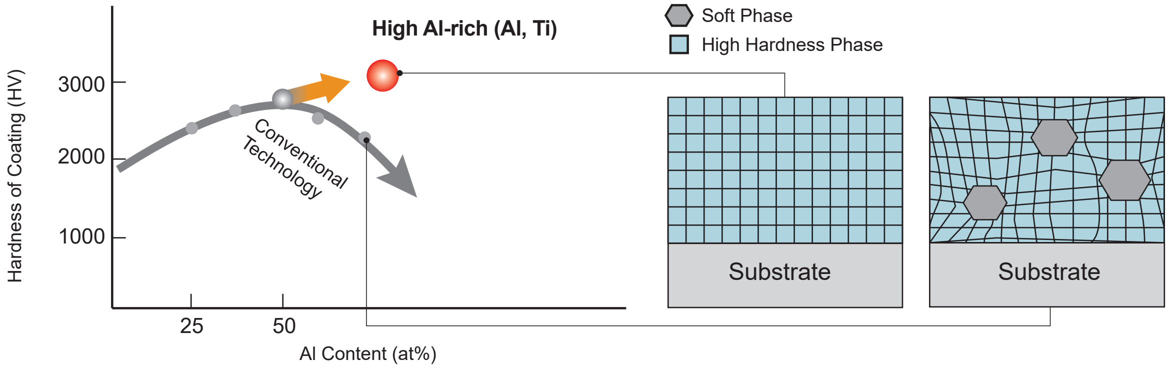
Excellent Wear Resistance when Machining Heat Resistant Super Alloys



MP9015/MP9025

High Al and Conventional Coating Comparison

The high Al-rich (Al, Ti)N single layer coating provides stabilization of the high hardness phase and succeeds in dramatically improving wear, crater and welding resistance.

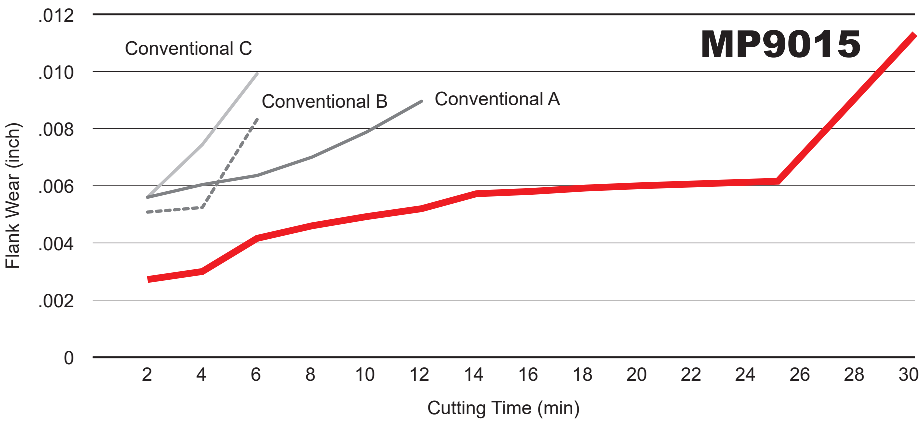


ISO Grade	Grade	Concept	Application
S10	**MP9015**	High hardness grade focusing on wear resistance.	Heat Resistant Alloys
S30	**MP9025**	First recommended grade focusing on fracture resistance.	Heat Resistant Alloys

Cutting Performance

Cross Feed Machining of Inconel 718 - Comparison of Wear Resistance

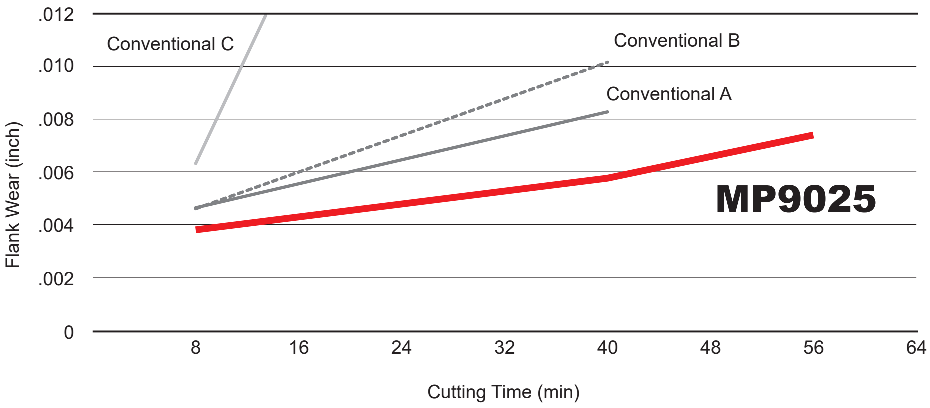
MP9015 exhibits 1.5 times more wear resistance than conventional products.



<Cutting Conditions>
Workpice Material : Inconel 718
Tool : GY2M0300F150N-BM
Cutting Speed : vc=165 SFM
Feed per Rev. : f=.002 IPR
Depth of Cut : ap=.039 inch
Cutting Mode : Wet Cutting

Groove Machining of Inconel 718 - Comparison of Wear Resistance

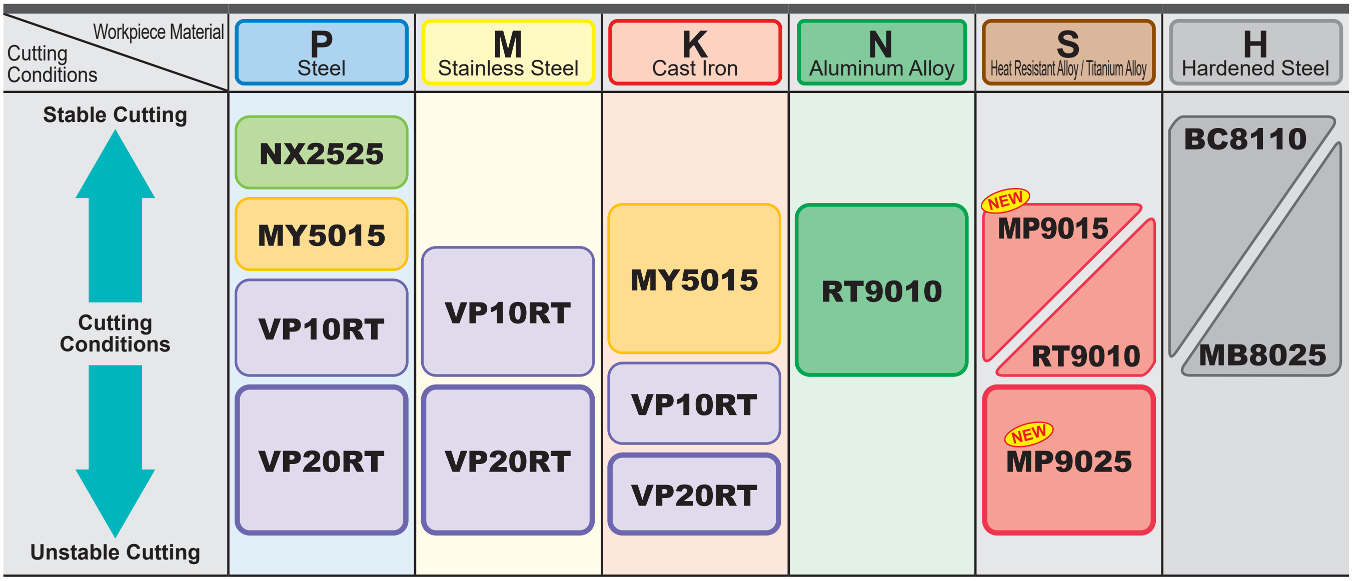
MP9025 has excellent wear resistance.



<Cutting Conditions>
Workpice Material : Inconel 718
Tool : GY2M0300F030N-GM
Cutting Speed : vc=165 SFM
Feed per Rev. : f=.002 IPR
Flute Depth : .039 inch
Cutting Mode : Wet Cutting

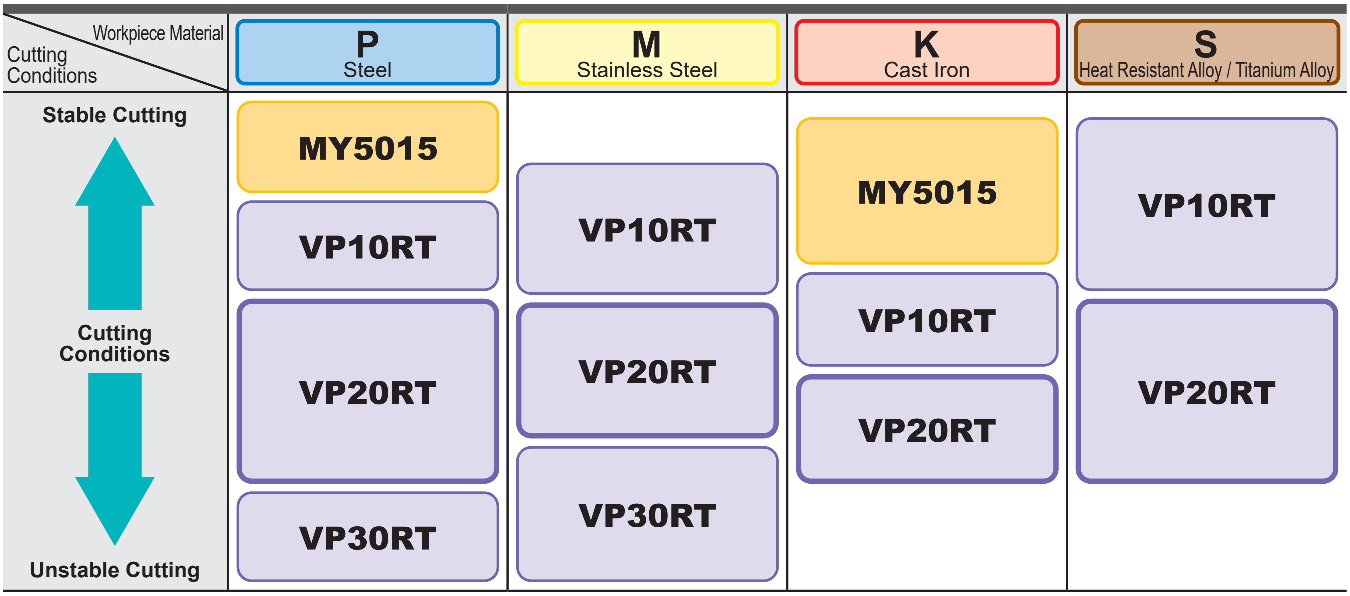
Insert Grades

GY Series



Workpiece Material / Cutting Conditions	**P** Steel	**M** Stainless Steel	**K** Cast Iron	**N** Aluminum Alloy	**S** Heat Resistant Alloy / Titanium Alloy	**H** Hardened Steel
Stable Cutting Cutting Conditions Unstable Cutting	**NX2525** **MY5015** **VP10RT** **VP20RT**	**VP10RT** **VP20RT**	**MY5015** **VP10RT** **VP20RT**	**RT9010**	NEW **MP9015** / **RT9010** NEW **MP9025**	**BC8110** / **MB8025**

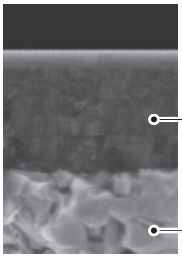
GW Series



Workpiece Material / Cutting Conditions	**P** Steel	**M** Stainless Steel	**K** Cast Iron	**S** Heat Resistant Alloy / Titanium Alloy
Stable Cutting Cutting Conditions Unstable Cutting	**MY5015** **VP10RT** **VP20RT** **VP30RT**	**VP10RT** **VP20RT** **VP30RT**	**MY5015** **VP10RT** **VP20RT**	**VP10RT** **VP20RT**

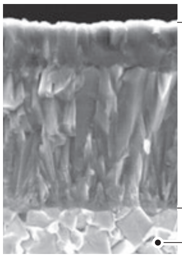
GY/GW Series Insert Grades

MP9000 Series NEW



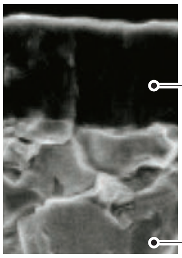
The high Al-rich (Al, Ti)N single layer coating provides stabilization of the high hardness phase and succeeds in dramatically improving wear, crater and welding resistance.

MY5015



MY5015 is a CVD coated grade with excellent wear resistance even at high temperatures. It provides longer tool life when machining cast and ductile cast irons. Also suitable for high speed continuous cutting of steels.

VP20RT



PVD coated grade suitable for a wide range of applications. The combination of a special tough cemented carbide substrate with MIRACLE coating provides an excellent balance of wear and fracture resistance.

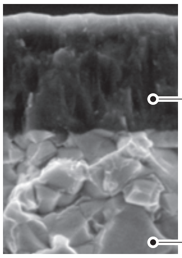
RT9010

RT9010 is a non-coated cemented carbide grade. Suitable for processing non-ferrous metals.

NX2525

NX2525 is a cermet grade for finish machining of steels and for good surface finishes at lower cutting speeds.

VP10RT



PVD coated grade with a cemented carbide substrate harder than VP20RT. For use on difficult-to-cut materials and for extending tool life.

BC8110

BC8110 is a coated grade for continuous cutting, which provides longer life when machining hardened steels.

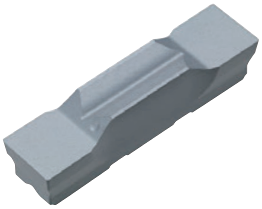
MB8025

MB8025 is a sintered CBN grade for hardened steels.

Blank Inserts

Blank inserts for custom grinding.

1 Edge Type



2 Edge Type

＊ Insert blank is not suitable for machining without grinding.

RT9010/RT9020 for insert blank

RT9020 is the first recommendation for blank inserts due to the tougher carbide substrate's suitability over a wider range of applications.
RT9010 is a harder substrate and is ideal for long tool life on stable applications.
A coating layer is recommended for machining steels, stainless and cast irons.

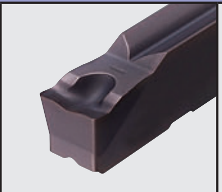
GY Series

A Wide Selection of Inserts

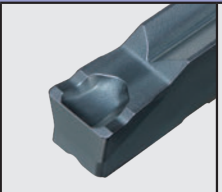
Chip Breaker System

Grooving

GUBreaker
(For Gummy Steels)



GSBreaker
(Low Feeds)



GMBreaker
(Medium Feeds)

GFGS
(For Hardened Steels)

For Multifunctional Grooving | **Copying/For Recessing**

MFBreaker
(G Class)

MSBreaker
(Low Feeds)

MMBreaker
(Medium Feeds)

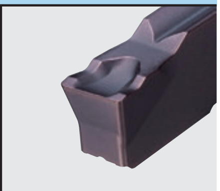
BMBreaker

Cutting Off

GUBreaker
(For Gummy Steels)

GSBreaker
(Low Feeds)

GMBreaker
(Medium Feeds)



R/L05-GM Breaker
(Medium Feeds)

GL Breaker for Aluminum Alloys

G Class Breaker

Improved chip control by narrowing the breaker width.

High Rake Angle

Achieves low cutting resistance.

Sharp Edge

Improved welding resistance for aluminum alloys.

MF Breaker

Efficient chip breaking when cross-feed machining.

Chips are controlled when finish machining.

GW Series

Chip breaker system offering excellent chip disposal properties.

Low Feeds

Neutral

Right Hand 5°

Right Hand 8°

GS Breaker

Medium Feeds

Neutral

Right Hand / Left Hand 5°

GM Breaker

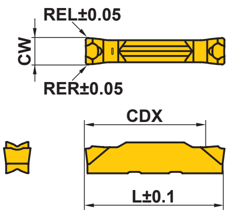
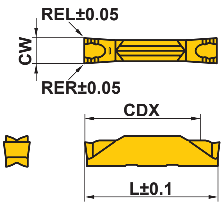
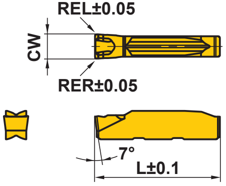
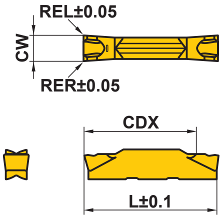
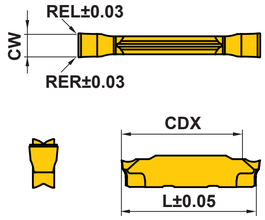
GY Series L Dimension Tolerance Conversion Table

Cutting Width **CW**	*1Dimensions **L** (inch)	*2Dimensional tolerance (inch) versus standard dimension (L) of each breaker							
		GU	**GS/GM**	**MS/MM**	**R/L-GM**	Flat Top	**MF**	**BM**	**GL**
.059", 1.50 mm	.579		0						
.079", 2.00 mm	.815	0	0	0	.004	0	.014	.008	.014
.088", 2.24 mm	*3 (.815)						.014		
.094", 2.39 mm	.815	0	0			0	.014		
.098", 2.50 mm	.815	0	0	0	.005	0	.014	.008	.014
.108", 2.74 mm	*3 (.815)						.014		
.118", 3.00 mm	.815	0	0	0	.006	0	.014	.008	.014
.125", 3.18 mm	.815	0	0			0	.014	.008	
.128", 3.24 mm	*3 (.815)						.014		
.157", 4.00 mm	1.010	0	0	0	.008	0	.012	.006	
.167", 4.24 mm	*3 (1.010)						.012		
.187", 4.75 mm	1.010	0	0			0	.012	.006	
.197", 5.00 mm	1.010	0	0	0	.012	0	.012	.006	
.206", 5.24 mm	*3 (1.010)						.012		
.236", 6.00 mm	1.010	0	0	0		0	.012	.010	
.248", 6.31 mm	*3 (1.010)						.012		
.250", 6.35 mm	1.010	0	0				.012	.010	
.315", 8.00 mm	1.201		0	0				.012	

*1 This value is used at the described holder dimension.
*2 ▨ when there is no applicable breaker.
*3 The standard dimensions shown here use an approximate insert width.

GY Series Inserts

(inch)

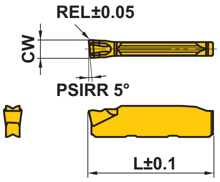
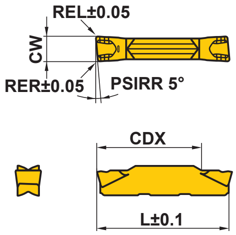
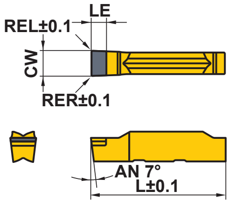
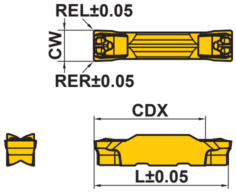
Applications	Geometry	Order Number	Stock										Seat Size	CW			RER/L	CDX	*2 L
			Coated					Cermet		Carbide		CBN		Cutting Width		Tolerance			
			MP9015	MP9025	VP10RT	VP20RT	MY5015	NX2525		RT9010	RT9020	MB8025		inch	(mm)				
For Grooving / Cutting Off	**GU Breaker** (For gummy steel) 	GY2M0200D020N-GU			●	●		●					D	.079	(2.00)	±.0012	.008	.776	.815
		GY2M0239E020N-GU			●	●		●					E	.094	(2.39)	±.0012	.008	.780	.815
		GY2M0250E020N-GU			●	●		●					E	.098	(2.50)	±.0012	.008	.768	.815
		GY2M0300F030N-GU			●	●		●					F	.118	(3.00)	±.0012	.012	.760	.815
		GY2M0318F030N-GU			●	●		●					F	.125	(3.18)	±.0012	.012	.760	.815
		GY2M0400G030N-GU			●	●		●					G	.157	(4.00)	±.0016	.012	.953	1.010
		GY2M0475H040N-GU			●	●		●					H	.187	(4.75)	±.0016	.016	.953	1.010
		GY2M0500H040N-GU			●	●		●					H	.197	(5.00)	±.0016	.016	.953	1.010
		GY2M0600J040N-GU			●	●		●					J	.236	(6.00)	±.0016	.016	.953	1.010
		GY2M0635J040N-GU			●	●		●					J	.250	(6.35)	±.0016	.016	.953	1.010
	GS Breaker (Low feeds) 	GY2M0150C010N-GS			●	●		●					C	.059	(1.50)	±.0012	.004	.528	.579
		GY2M0200D020N-GS			●	●		●					D	.079	(2.00)	±.0012	.008	.736	.815
		GY2M0239E020N-GS			●	●		●					E	.094	(2.39)	±.0012	.008	.728	.815
		GY2M0250E020N-GS			●	●		●					E	.098	(2.50)	±.0012	.008	.728	.815
		GY2M0300F020N-GS			●	●		●					F	.118	(3.00)	±.0012	.008	.728	.815
		GY2M0318F020N-GS			●	●		●					F	.125	(3.18)	±.0012	.008	.728	.815
		GY2M0400G020N-GS			●	●		●					G	.157	(4.00)	±.0016	.008	.941	1.010
		GY2M0475H030N-GS			●	●		●					H	.187	(4.75)	±.0016	.012	.941	1.010
		GY2M0500H030N-GS			●	●		●					H	.197	(5.00)	±.0016	.012	.945	1.010
		GY2M0600J030N-GS			●	●		●					J	.236	(6.00)	±.0016	.012	.949	1.010
		GY2M0635J030N-GS			●	●		●					J	.250	(6.35)	±.0016	.012	.949	1.010
		GY2M0800K030N-GS			●	●							K	.315	(8.00)	±.0016	.012	1.146	1.201
	GM Breaker (Medium feeds) 	GY1M0200D020N-GM	●	●	●	●	●						D	.079	(2.00)	±.0012	.008	—	.815
		GY1M0250E020N-GM	●	●	●	●	●						E	.098	(2.50)	±.0012	.008	—	.815
		GY1M0300F030N-GM	●	●	●	●	●						F	.118	(3.00)	±.0012	.012	—	.815
		GY1M0400G030N-GM	●	●	●	●	●						G	.157	(4.00)	±.0016	.012	—	1.010
		GY1M0500H040N-GM	●	●	●	●	●						H	.197	(5.00)	±.0016	.016	—	1.010
	GM Breaker (Medium feeds) 	GY2M0150C020N-GM	●	●	●	●		●					C	.059	(1.50)	±.0012	.008	.547	.579
		GY2M0200D020N-GM	●	●	●	●	●	●					D	.079	(2.00)	±.0012	.008	.764	.815
		GY2M0239E020N-GM	●	●	●	●	●	●					E	.094	(2.39)	±.0012	.008	.764	.815
		GY2M0250E020N-GM	●	●	●	●	●	●					E	.098	(2.50)	±.0012	.008	.764	.815
		GY2M0300F030N-GM	●	●	●	●	●	●					F	.118	(3.00)	±.0012	.012	.764	.815
		GY2M0318F030N-GM	●	●	●	●	●	●					F	.125	(3.18)	±.0012	.012	.764	.815
		GY2M0400G030N-GM	●	●	●	●	●	●					G	.157	(4.00)	±.0016	.012	.961	1.010
		GY2M0475H040N-GM	●	●	●	●	●	●					H	.187	(4.75)	±.0016	.016	.957	1.010
		GY2M0500H040N-GM	●	●	●	●	●	●					H	.197	(5.00)	±.0016	.016	.957	1.010
		GY2M0600J040N-GM	●	●	●	●	●	●					J	.236	(6.00)	±.0016	.016	.957	1.010
		GY2M0635J040N-GM	●	●	●	●	●	●					J	.250	(6.35)	±.0016	.016	.957	1.010
		GY2M0800K050N-GM	●	●	●	●	●						K	.315	(8.00)	±.0016	.020	1.154	1.201
For Grooving / Cutting Off	**GL Breaker** (For Aluminum Alloys) 	GY2G0200D005N-GL								●			D	.079	(2.00)	±.0008	.002	.768	.829
		GY2G0250E005N-GL								●			E	.098	(2.50)	±.0008	.002	.752	.829
		GY2G0300F005N-GL								●			F	.118	(3.00)	±.0008	.002	.744	.829

*2 The dimension depends on the breaker. Refer to the page 149 “L dimension tolerance conversion table”.

● = NEW

● : USA Stock
(10 inserts in one case) (CBN inserts are with 1 piece in one case.)

(inch)

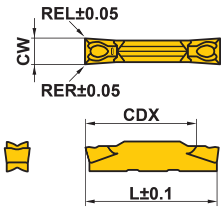
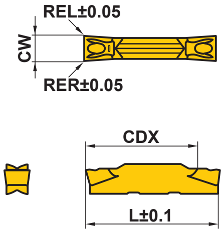
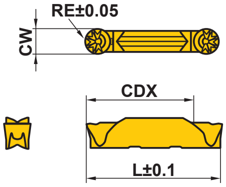
Applications	Geometry	Order Number	Stock											Seat Size	CW			RER/L	CDX	*2 L	LE
			Coated					Cermet		Carbide		CBN			Cutting Width		Tolerance				
			MP9015	MP9025	VP10RT	VP20RT	MY5015	NX2525		RT9010	RT9020	BC8110	MB8025		inch	(mm)					
For Cutting off	**R/L05-GM Breaker**  Right hand insert shown.	GY1M0200D020R05-GM			●	●								D	.079	(2.00)	±.0012	.008	–	.819	–
		GY1M0200D020L05-GM			●	●								D	.079	(2.00)	±.0012	.008	–	.819	–
		GY1M0300F030R05-GM			●	●								F	.118	(3.00)	±.0012	.012	–	.821	–
		GY1M0300F030L05-GM			●	●								F	.118	(3.00)	±.0012	.012	–	.821	–
For Cutting Off	**R/L05-GM Breaker**  Right hand insert shown.	GY2M0200D020R05-GM			●	●								D	.079	(2.00)	±.0012	.008	.768	.819	–
		GY2M0200D020L05-GM			●	●								D	.079	(2.00)	±.0012	.008	.768	.819	–
		GY2M0250E020R05-GM			●	●								E	.098	(2.50)	±.0012	.008	.768	.820	–
		GY2M0250E020L05-GM			●	●								E	.098	(2.50)	±.0012	.008	.768	.820	–
		GY2M0300F030R05-GM			●	●								F	.118	(3.00)	±.0012	.012	.768	.821	–
		GY2M0300F030L05-GM			●	●								F	.118	(3.00)	±.0012	.012	.768	.821	–
		GY2M0400G030R05-GM			●	●								G	.157	(4.00)	±.0016	.012	.965	1.018	–
		GY2M0400G030L05-GM			●	●								G	.157	(4.00)	±.0016	.012	.965	1.018	–
		GY2M0500H040R05-GM			●	●								H	.197	(5.00)	±.0016	.016	.965	1.022	–
		GY2M0500H040L05-GM			●	●								H	.197	(5.00)	±.0016	.016	.965	1.022	–
For Grooving	**Flat Top** (For hardened steel)  	GY1G0200D020N-GFGS										●	●	D	.079	(2.00)	±.0012	.008	–	.815	.106
		GY1G0239E020N-GFGS										●	●	E	.094	(2.39)	±.0012	.008	–	.815	.106
		GY1G0250E020N-GFGS										●	●	E	.098	(2.50)	±.0012	.008	–	.815	.106
		GY1G0300F020N-GFGS										●	●	F	.118	(3.00)	±.0012	.008	–	.815	.106
		GY1G0318F020N-GFGS										●	●	F	.125	(3.18)	±.0012	.008	–	.815	.106
		GY1G0400G020N-GFGS										●	●	G	.157	(4.00)	±.0012	.008	–	1.010	.106
		GY1G0475H020N-GFGS										●	●	H	.187	(4.75)	±.0012	.008	–	1.010	.106
		GY1G0500H020N-GFGS										●	●	H	.197	(5.00)	±.0012	.008	–	1.010	.106
		GY1G0600J020N-GFGS										●		J	.236	(6.00)	±.0012	.008	–	1.010	.106
For Multifunctional Grooving	**MF Breaker** (Finishing)  	GY2G0200D020N-MF			●	●		●		●				D	.079	(2.00)	±.0008	.008	.768	.829	–
		*1 GY2G0224D015N-MF			●	●		●		●				D	.088	(2.24)	±.0008	.006	.780	.829	–
		GY2G0239E020N-MF			●	●		●		●				E	.094	(2.39)	±.0008	.008	.756	.829	–
		GY2G0250E020N-MF			●	●		●		●				E	.098	(2.50)	±.0008	.008	.764	.829	–
		*1 GY2G0274E020N-MF			●	●		●		●				E	.108	(2.74)	±.0008	.008	.776	.829	–
		GY2G0300F020N-MF			●	●		●		●				F	.118	(3.00)	±.0008	.008	.768	.829	–
		GY2G0300F040N-MF			●	●		●		●				F	.118	(3.00)	±.0008	.016	.760	.829	–
		GY2G0318F020N-MF			●	●		●		●				F	.125	(3.18)	±.0008	.008	.768	.829	–
		GY2G0318F040N-MF			●	●		●		●				F	.125	(3.18)	±.0008	.016	.760	.829	–
		*1 GY2G0324F020N-MF			●	●		●		●				F	.128	(3.24)	±.0008	.008	.768	.829	–
		GY2G0400G020N-MF			●	●		●		●				G	.157	(4.00)	±.0008	.008	.980	1.022	–
		GY2G0400G040N-MF			●	●		●		●				G	.157	(4.00)	±.0008	.016	.972	1.022	–
		GY2G0400G080N-MF			●	●		●		●				G	.157	(4.00)	±.0008	.031	.957	1.022	–
		*1 GY2G0424G020N-MF			●	●		●		●				G	.167	(4.24)	±.0008	.008	.980	1.022	–
		GY2G0475H020N-MF			●	●		●		●				H	.187	(4.75)	±.0008	.008	.961	1.022	–
		GY2G0475H040N-MF			●	●		●		●				H	.187	(4.75)	±.0008	.016	.953	1.022	–
		GY2G0475H080N-MF			●	●		●		●				H	.187	(4.75)	±.0008	.031	.937	1.022	–
		GY2G0500H020N-MF			●	●		●		●				H	.197	(5.00)	±.0008	.008	.961	1.022	–
		GY2G0500H040N-MF			●	●		●		●				H	.197	(5.00)	±.0008	.016	.953	1.022	–
		GY2G0500H080N-MF			●	●		●		●				H	.197	(5.00)	±.0008	.031	.937	1.022	–
		*1 GY2G0524H020N-MF			●	●		●		●				H	.206	(5.24)	±.0008	.008	.961	1.022	–
		GY2G0600J020N-MF			●	●		●		●				J	.236	(6.00)	±.0008	.008	.961	1.022	–
		GY2G0600J040N-MF			●	●		●		●				J	.236	(6.00)	±.0008	.016	.953	1.022	–
		GY2G0600J080N-MF			●	●		●		●				J	.236	(6.00)	±.0008	.031	.937	1.022	–
		*1 GY2G0631J020N-MF			●	●		●		●				J	.248	(6.31)	±.0008	.008	.961	1.022	–
		GY2G0635J020N-MF			●	●		●		●				J	.250	(6.35)	±.0008	.008	.961	1.022	–
		GY2G0635J040N-MF			●	●		●		●				J	.250	(6.35)	±.0008	.016	.953	1.022	–
		GY2G0635J080N-MF			●	●		●		●				J	.250	(6.35)	±.0008	.031	.937	1.022	–

*1 Circlip corresponding width of cut

● = NEW

GY Series Inserts

(inch)

Applications	Geometry	Order Number	Stock										Seat Size	CW			RE RER/L	CDX	*2 L
			Coated					Cermet		Carbide		CBN		Cutting Width		Tolerance			
			MP9015	MP9025	VP10RT	VP20RT	MY5015	NX2525		RT9010	RT9020	MB8025		inch	(mm)				
For Multifunctional Grooving	**MS Breaker** (Low feeds)  	GY2M0200D020N-MS			●	●	●	●					D	.079	(2.00)	±.0012	.008	.752	.815
		GY2M0250E020N-MS			●	●	●	●					E	.098	(2.50)	±.0012	.008	.752	.815
		GY2M0300F020N-MS			●	●	●	●					F	.118	(3.00)	±.0012	.008	.756	.815
		GY2M0300F040N-MS			●	●	●	●					F	.118	(3.00)	±.0012	.016	.744	.815
		GY2M0400G020N-MS			●	●	●	●					G	.157	(4.00)	±.0016	.008	.953	1.010
		GY2M0400G040N-MS			●	●	●	●					G	.157	(4.00)	±.0016	.016	.941	1.010
		GY2M0500H040N-MS			●	●	●	●					H	.197	(5.00)	±.0016	.016	.941	1.010
		GY2M0500H080N-MS			●	●	●	●					H	.197	(5.00)	±.0016	.031	.925	1.010
		GY2M0600J040N-MS			●	●	●	●					J	.236	(6.00)	±.0016	.116	.941	1.010
		GY2M0600J080N-MS			●	●	●	●					J	.236	(6.00)	±.0016	.031	.925	1.010
		GY2M0800K080N-MS			●	●	●						K	.315	(8.00)	±.0016	.031	1.122	1.201
	MM Breaker (Medium feeds)  	GY2M0200D020N-MM	●	●	●	●	●	●					D	.079	(2.00)	±.0012	.008	.752	.815
		GY2M0250E020N-MM	●	●	●	●	●	●					E	.098	(2.50)	±.0012	.008	.752	.815
		GY2M0300F020N-MM	●	●	●	●	●	●					F	.118	(3.00)	±.0012	.008	.752	.815
		GY2M0300F040N-MM	●	●	●	●	●	●					F	.118	(3.00)	±.0012	.016	.744	.815
		GY2M0300F080N-MM	●	●	●	●	●	●					F	.118	(3.00)	±.0012	.031	.728	.815
		GY2M0400G020N-MM	●	●	●	●	●	●					G	.157	(4.00)	±.0016	.008	.949	1.010
		GY2M0400G040N-MM	●	●	●	●	●	●					G	.157	(4.00)	±.0016	.016	.941	1.010
		GY2M0400G080N-MM	●	●	●	●	●	●					G	.157	(4.00)	±.0016	.031	.925	1.010
		GY2M0500H040N-MM	●	●	●	●	●	●					H	.197	(5.00)	±.0016	.016	.941	1.010
		GY2M0500H080N-MM	●	●	●	●	●	●					H	.197	(5.00)	±.0016	.031	.925	1.010
		GY2M0600J040N-MM	●	●	●	●	●	●					J	.236	(6.00)	±.0016	.016	.941	1.010
		GY2M0600J080N-MM	●	●	●	●	●	●					J	.236	(6.00)	±.0016	.031	.925	1.010
		GY2M0800K080N-MM	●	●	●	●	●						K	.315	(8.00)	±.0016	.031	1.122	1.201
		GY2M0800K120N-MM	●	●	●	●	●						K	.315	(8.00)	±.0016	.047	1.106	1.201
For Copying / For Recessing	**BM Breaker**  	GY2M0200D100N-BM	●	●	●	●	●	●					D	.079	(2.00)	±.0012	.039	.768	.815
		GY2M0250E125N-BM	●	●	●	●	●	●					E	.098	(2.50)	±.0012	.049	.760	.815
		GY2M0300F150N-BM	●	●	●	●	●	●					F	.118	(3.00)	±.0012	.059	.748	.823
		GY2M0318F159N-BM	●	●	●	●	●	●					F	.125	(3.18)	±.0012	.063	.744	.823
		GY2M0400G200N-BM	●	●	●	●	●	●					G	.157	(4.00)	±.0016	.079	.921	1.016
		GY2M0475H238N-BM	●	●	●	●	●	●					H	.187	(4.75)	±.0016	.094	.902	1.016
		GY2M0500H250N-BM	●	●	●	●	●	●					H	.197	(5.00)	±.0016	.098	.898	1.016
		GY2M0600J300N-BM	●	●	●	●	●	●					J	.236	(6.00)	±.0016	.118	.886	1.020
		GY2M0635J318N-BM	●	●	●	●	●	●					J	.250	(6.35)	±.0016	.125	.878	1.020
		GY2M0800K400N-BM	●	●	●	●	●						K	.315	(8.00)	±.0016	.157	1.043	1.213

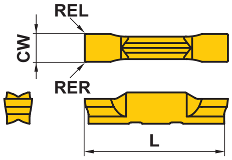
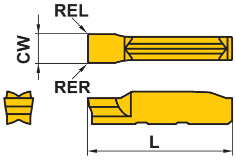
*2 The dimension depends on the breaker. Refer to the page 149 “L dimension tolerance conversion table”.

● = NEW

● : USA Stock ★ : Stocked in Japan
(10 inserts in one case) (CBN inserts are available in 1 piece in one case.)

Blank Inserts

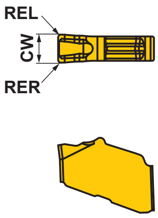
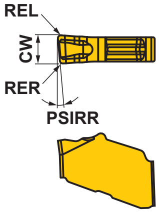
(inch)

Applications	Geometry	Order Number	Stock				Seat Size	CW			RER/L	L
			Cermet		Carbide			Grooving Width		Tolerance		
			NX2525		RT9010	RT9020		inch	(mm)			
*1 Blank	**2 Edge Type** 	**GY2B0220D020N**	★		★	★	**D**	.087	(2.20)	± .0039	.008	.829
		GY2B0250D020N	★		★	★	**D**	.100	(2.55)	± .0039	.008	.838
		GY2B0270E020N	★		★	★	**E**	.106	(2.70)	± .0039	.008	.829
		GY2B0300E020N	★		★	★	**E**	.120	(3.05)	± .0039	.008	.838
		GY2B0340F020N	★		★	★	**F**	.134	(3.40)	± .0039	.008	.829
		GY2B0360F020N	★		★	★	**F**	.144	(3.65)	± .0039	.008	.838
		GY2B0420G020N	★		★	★	**G**	.165	(4.20)	± .0039	.008	1.024
		GY2B0460G020N	★		★	★	**G**	.183	(4.65)	± .0039	.008	1.031
		GY2B0520H020N	★		★	★	**H**	.205	(5.20)	± .0039	.008	1.024
		GY2B0560H020N	★		★	★	**H**	.222	(5.65)	± .0039	.008	1.031
		GY2B0655J020N	★		★	★	**J**	.258	(6.55)	± .0039	.008	1.025
		GY2B0680J020N	★		★	★	**J**	.270	(6.85)	± .0039	.008	1.031
		GY2B0880K020N			★	★	**K**	.348	(8.85)	± .0039	.008	1.216
	1 Edge Type 	**GY1B0220D020N**	★		★	★	**D**	.087	(2.20)	± .0039	.008	.830
		GY1B0270E020N	★		★	★	**E**	.106	(2.70)	± .0039	.008	.831
		GY1B0340F020N	★		★	★	**F**	.134	(3.40)	± .0039	.008	.827
		GY1B0420G020N	★		★	★	**G**	.165	(4.20)	± .0039	.008	1.018
		GY1B0520H020N	★		★	★	**H**	.205	(5.20)	± .0039	.008	1.020
		GY1B0655J020N	★		★	★	**J**	.258	(6.55)	± .0039	.008	1.020

***1 Insert blank is not suitable for machining without grinding.**

GW Series Inserts

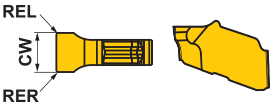
(inch)

Application	Order Number	Stock				CW			RER REL	PSIRR PSIRL	Geometry
		Coating				Cutting Width		Tolerance			
		MY5015	VP10RT	VP20RT	VP30RT	inch	(mm)				
Grooving, Cutting Off	**GW1M0200D020N-GS**		●	●	●	.079	(2.00)	±.0012	.008	–	
Grooving, Cutting Off	NEW **GW1M0239E020N-GS**		●	●	●	.094	(2.39)	±.0012	.008	–	
Grooving, Cutting Off	**GW1M0300F020N-GS**		●	●	●	.118	(3.00)	±.0012	.008	–	
Grooving, Cutting Off	**GW1M0400G020N-GS**		●	●	●	.157	(4.00)	±.0016	.008	–	
Grooving, Cutting Off	**GW1M0500H030N-GS**		●	●	●	.197	(5.00)	±.0016	.012	–	
Grooving, Cutting Off	**GW1M0200D020N-GM**	●	●	●	●	.079	(2.00)	±.0012	.008	–	
Grooving, Cutting Off	NEW **GW1M0239E020N-GM**	●	●	●	●	.094	(2.39)	±.0012	.008	–	
Grooving, Cutting Off	**GW1M0300F030N-GM**	●	●	●	●	.118	(3.00)	±.0012	.012	–	
Grooving, Cutting Off	**GW1M0400G030N-GM**	●	●	●	●	.157	(4.00)	±.0016	.012	–	
Grooving, Cutting Off	**GW1M0500H040N-GM**	●	●	●	●	.197	(5.00)	.0016	.016	–	
Cutting off, Low Feed	NEW **GW1M0200D020R05-GS**		●	●	●	.079	(2.00)	±.0012	.008	5	 Right hand insert shown.
Cutting off, Low Feed	NEW **GW1M0239E020R05-GS**		●	●	●	.094	(2.39)	±.0012	.008	5	
Cutting off, Low Feed	NEW **GW1M0300F020R05-GS**		●	●	●	.118	(3.00)	±.0012	.008	5	
Cutting off Low Feed, Lead Angle 8°	NEW **GW1M0200D003R08-GS**		●	●	●	.079	(2.00)	±.0012	.0012	8	
Cutting off Low Feed, Lead Angle 8°	NEW **GW1M0239E003R08-GS**		●	●	●	.094	(2.39)	±.0012	.0012	8	
Cutting off Low Feed, Lead Angle 8°	NEW **GW1M0300F003R08-GS**		●	●	●	.118	(3.00)	±.0012	.0012	8	
Cutting Off	**GW1M0200D020R05-GM**		●	●	●	.079	(2.00)	±.0012	.008	5	
Cutting Off	**GW1M0200D020L05-GM**		●	●	●	.079	(2.00)	±.0012	.008	5	
Cutting Off	NEW **GW1M0239E020R05-GM**		●	●	●	.094	(2.39)	±.0012	.008	5	
Cutting Off	NEW **GW1M0239E020L05-GM**		●	●	●	.094	(2.39)	±.0012	.008	5	
Cutting Off	**GW1M0300F030R05-GM**		●	●	●	.118	(3.00)	±.0012	.012	5	
Cutting Off	**GW1M0300F030L05-GM**		●	●	●	.118	(3.00)	±.0012	.012	5	
Cutting Off	**GW1M0400G030R05-GM**		●	●	●	.157	(4.00)	±.0016	.012	5	
Cutting Off	**GW1M0400G030L05-GM**		●	●	●	.157	(4.00)	±.0016	.012	5	
Cutting Off	**GW1M0500H040R05-GM**		●	●	●	.197	(5.00)	±.0016	.016	5	
Cutting Off	**GW1M0500H040L05-GM**		●	●	●	.197	(5.00)	±.0016	.016	5	

● = NEW

Blank Inserts

(inch)

Geometry	Order Number	Carbide		Seat Size	CW			RER	REL
		RT9010	RT9020		Grooving Width		Tolerance		
					inch	(mm)			
1 Edge Type 	**GW1B0320D020N**	★	★	**D**	.128	(3.24)	±0.10	.008	.008
	GW1B0440F020N	★	★	**F**	.175	(4.44)	±0.10	.008	.008
	GW1B0540G020N	★	★	**G**	.214	(5.44)	±0.10	.008	.008
	GW1B0640H020N	★	★	**H**	.254	(6.44)	±0.10	.008	.008

★ Insert blank is not suitable for machining without grinding.

● : USA Stock ★ : Stocked in Japan
(10 inserts in one case)

Cutting Conditions ➤ P25

Proper Use of GW Series Right Hand Inserts

First Recommended

Improved Fracture Resistance

Reduction of Burrs and Core Residue

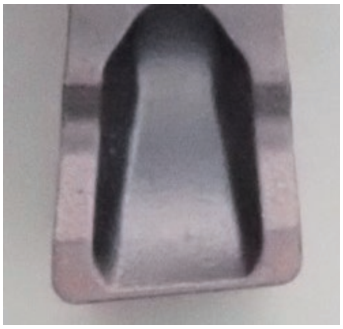
GM Breaker
PSIRR=5°
RE=.0079

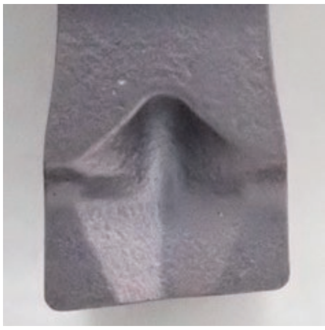
GS Breaker
PSIRR=5°
RE=.0079

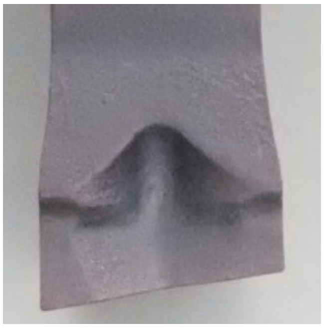
GS Breaker
PSIRR=8°
RE=.0012

Reduction of Cutting Resistance

Improved Fracture Resistance







Recommended Cutting Speed [For External Grooving / Cutting Off]

	Workpiece Material	Properties	Grade	Cutting Speed vc (SFM) 165 330 490 655 820 985
P	Mild Steels	Hardness ≤160HB	**VP20RT**	330 720
			VP10RT	360 755
			NX2525	295 690
	Carbon Steels Alloy Steels	Hardness 160–280HB	**VP20RT**	260 590
			VP10RT	295 620
			MY5015	360 820
			NX2525	230 560
		Hardness 280HB≤	**VP20RT**	195 460
			VP10RT	230 490
			MY5015	295 690
			NX2525	180 440
M	Stainless Steels	Hardness ≤270HB	**VP20RT**	195 460
			VP10RT	230 490
K	Gray Cast Irons	Tensile Strength ≤300MPa	**VP20RT**	260 590
			VP10RT	295 620
			MY5015	460 985
	Ductile Cast Irons	Tensile Strength ≤800MPa	**VP20RT**	195 460
			VP10RT	230 490
			MY5015	295 690
S	Heat Resistant Alloys Titanium Alloys	–	**MP9015**	130 330
			MP9025	100 295
			VP20RT	100 195
			VP10RT/ RT9010	130 230
H	Hardened Steels	50HRC≤	**BC8110/MB8025**	260 395

Note 1) For MP9015, MP9025, VP10RT, VP20RT and MY5015, wet cutting is recommended.

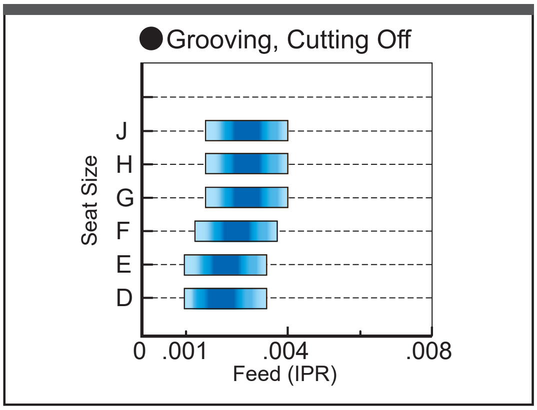
	Workpiece Material	Properties	Grade	Cutting Speed vc (SFM) 165 330 655 985 1310 1640
N	Aluminum Alloys	Content Si<5%	**RT9010**	655 1640
	Aluminum Alloys	Content 5%≤Si≤10%	**RT9010**	655 1640
	Aluminum Alloys	Content Si>10%	**RT9010**	330 655

Recommended Cutting Conditions [For External Grooving / Cutting Off]

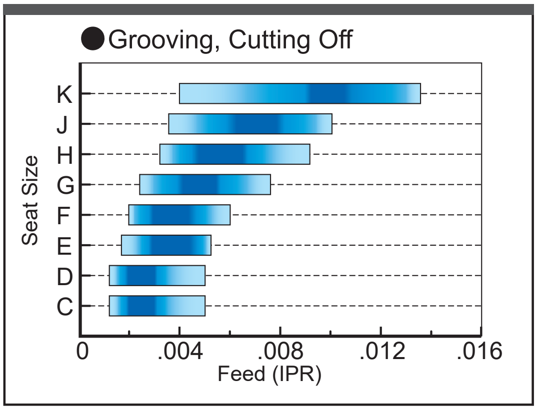
Recommended cutting conditions when combining a GYHR/L2525M00/90-M25R/L modular holder and GYM25R/LA-◌◌◌ modular blade.

■ Recommended feed rate and depth of cut

GU Breaker

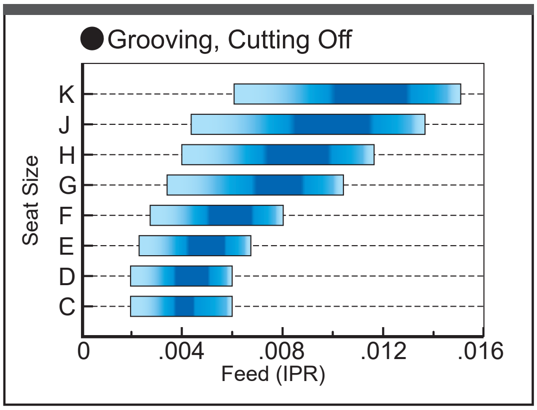


GS Breaker

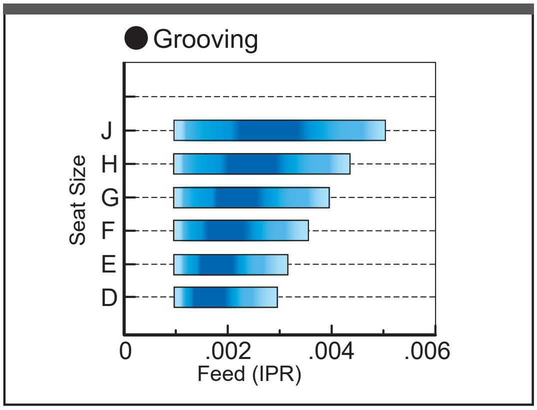


Seat Size	Insert Width
C	.059", 1.50 mm
D	.079", 2.00 mm .088", 2.24 mm
E	.094", 2.39 mm .098", 2.50 mm .108", 2.74 mm
F	.118", 3.00 mm .125", 3.18 mm .128", 3.24 mm
G	.157", 4.00 mm .167", 4.24 mm
H	.187", 4.75 mm .197", 5.00 mm .206", 5.24 mm
J	.236", 6.00 mm .248", 6.31 mm .250", 6.35 mm
K	.315", 8.00 mm

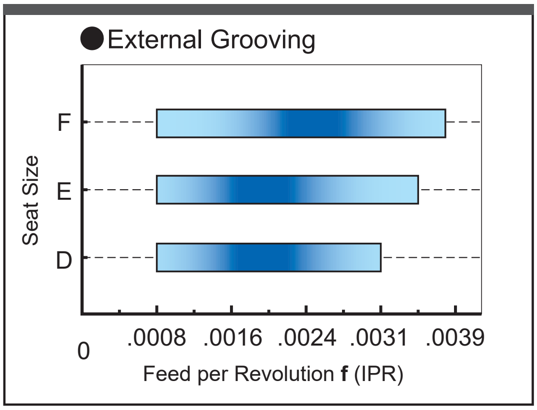
GM Breaker



Flat Top GFGS (CBN)



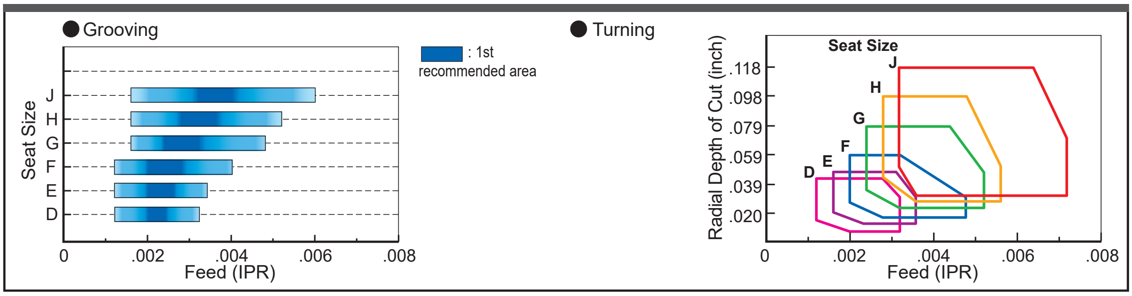
GL Breaker



▇ : 1st recommended area

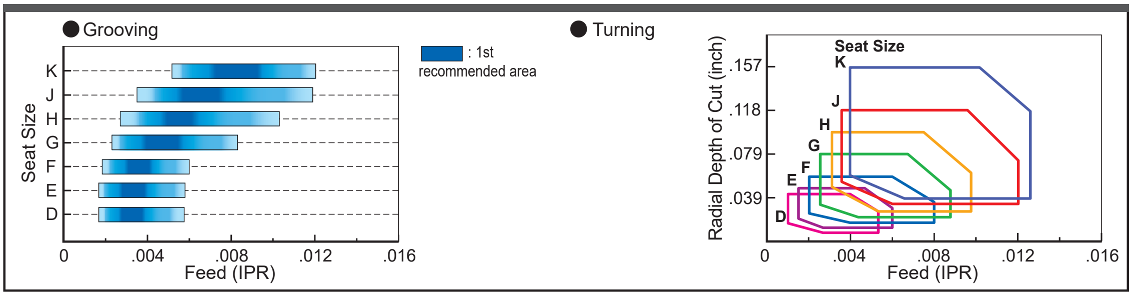
Cutting Off & Grooving System

MF Breaker

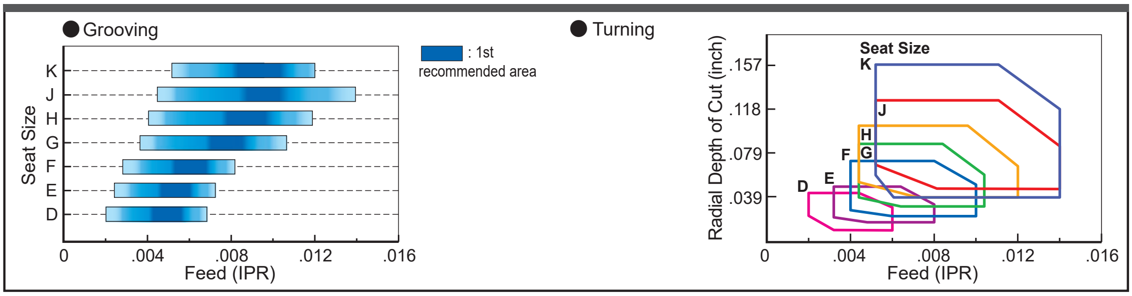


Seat Size	Insert Width
C	.059", 1.50 mm
D	.079", 2.00 mm .088", 2.24 mm
E	.094", 2.39 mm .098", 2.50 mm .108", 2.74 mm
F	.118", 3.00 mm .125", 3.18 mm .128", 3.24 mm
G	.157", 4.00 mm .167", 4.24 mm
H	.187", 4.75 mm .197", 5.00 mm .206", 5.24 mm
J	.236", 6.00 mm .248", 6.31 mm .250", 6.35 mm
K	.315", 8.00 mm

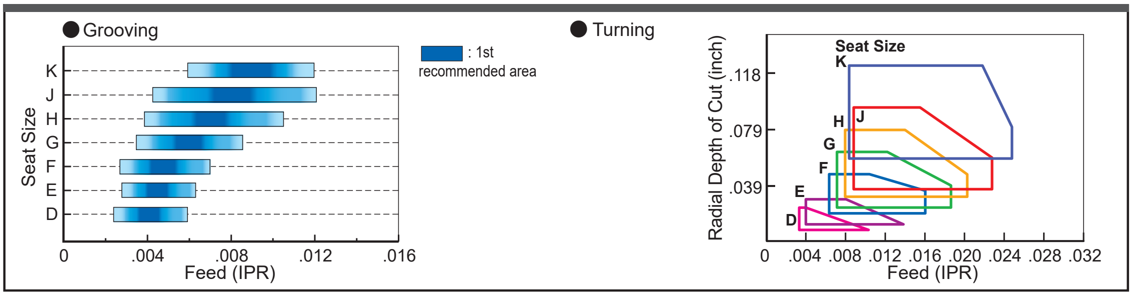
MS Breaker



MM Breaker

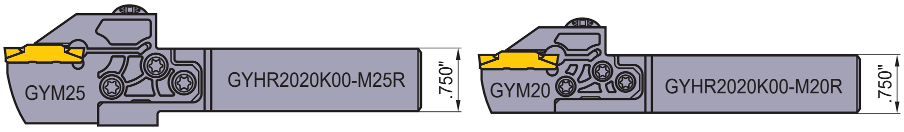


BM Breaker



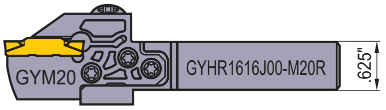
Note 1) Lower the recommended cutting speed given in the table by 20% and 40% respectively when combining the following modular holders and modular blades.

● Decrease the feed rate by 20%.



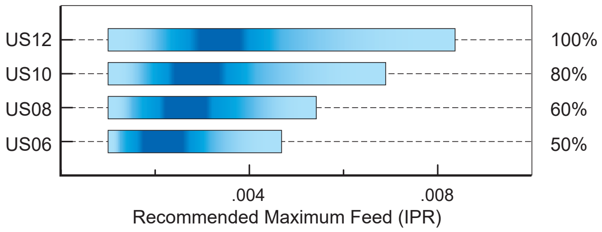
(.750" x .750" Square holder)

● Decrease the feed rate by 40%.



(.625" x .625" Square holder)

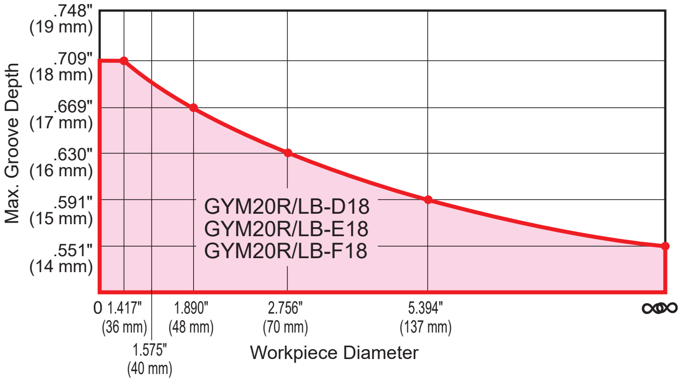
■In the case of mono block type holder for Swiss-type lathes

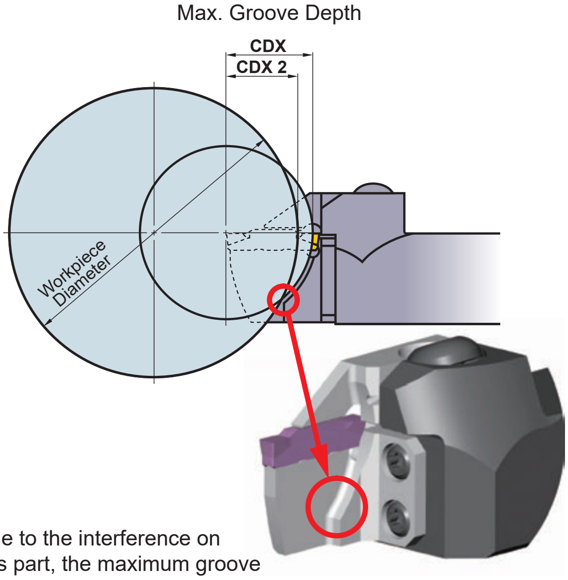


Please refer to the tables above on recommended cutting conditions for external grooving and cutting off.
Apply the percentage ratio shown on each shank size with the values in the table.

Limitation of The Maximum Groove Depth [For External Grooving]

- **When using the modular blade GYM◌◌R/LA-◌◌◌**
  The maximum groove depth is not limited by the workpiece diameter.
- **When using the modular blade GYM◌◌R/LB-◌◌◌**
  The maximum groove depth is limited by the workpiece diameter.



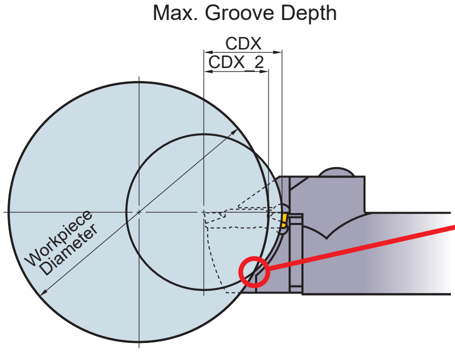


Due to the interference on this part, the maximum groove depth is limited by the workpiece diameter.

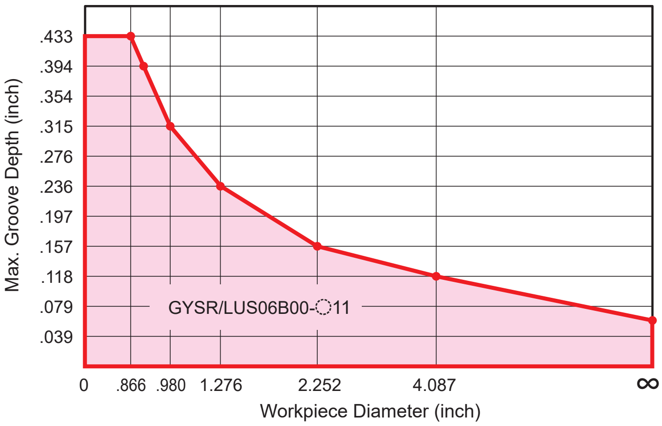
LIMITATION OF THE MAXIMUM GROOVE DEPTH [For External Grooving]

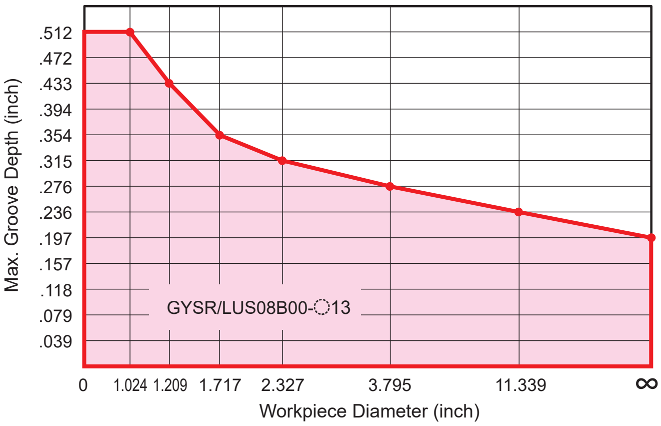
●For Swiss-type lathes mono block holder

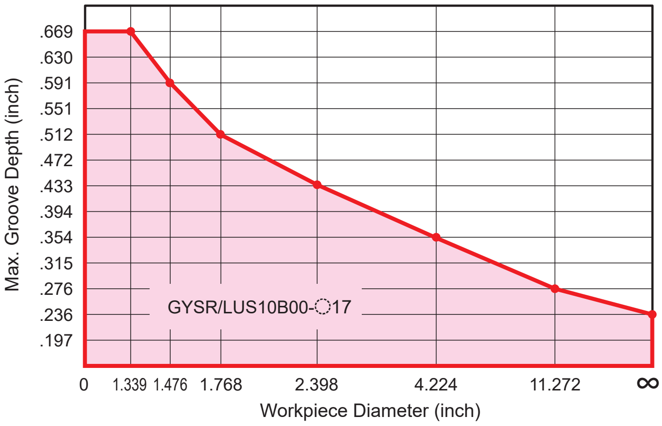
The maximum groove depth is limited by the workpiece diameter.

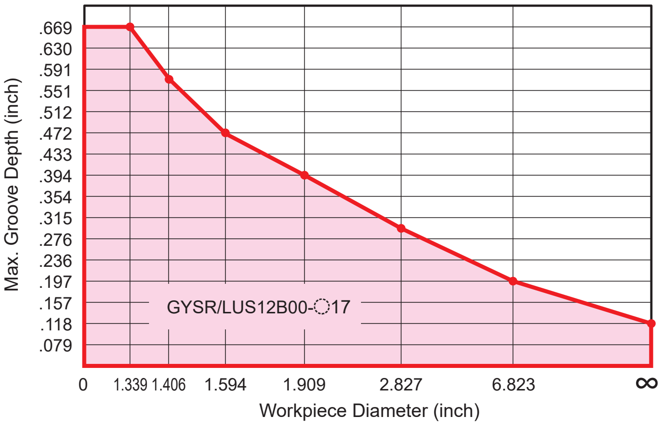


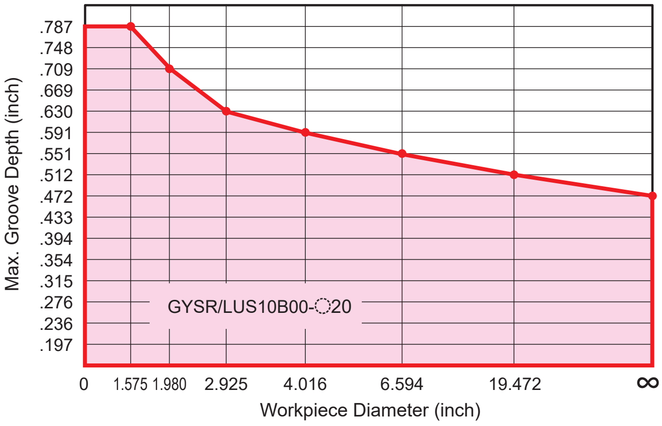
Due to the interference on this part, the maximum groove depth is limited by the workpiece diameter.

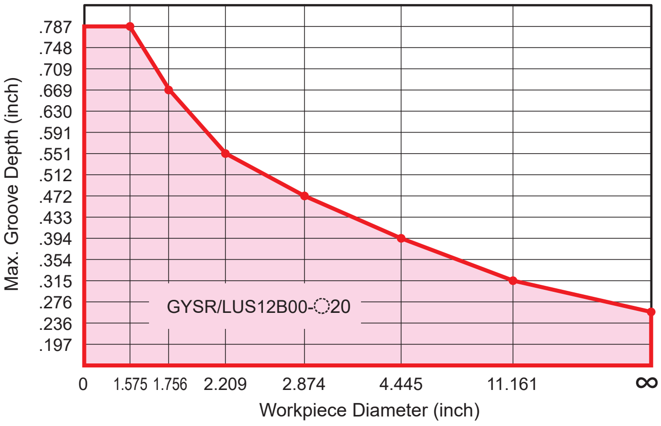










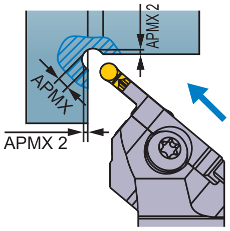


Recommended Cutting Speed [For External Recessing]

	Workpiece Material	Properties	Grade	Cutting Speed vc (SFM) 165 330 490 655 820
P	Mild Steels	Hardness ≦180HB	VP20RT	260 – 590
			VP10RT	295 – 620
	Carbon Steels Alloy Steels	Hardness 180−280HB	VP20RT	195 – 460
			VP10RT	230 – 490
			MY5015	295 – 690
			NX2525	180 – 440
	Carbon Steels Alloy Steels	Hardness 280−350HB	VP20RT	165 – 360
			VP10RT	195 – 395
			MY5015	260 – 525
			NX2525	150 – 345
M	Stainless Steels	Hardness ≦350HB	VP20RT	165 – 360
			VP10RT	195 – 395
K	Gray Cast Irons	Tensile Strength ≦350MPa	VP20RT	195 – 460
			VP10RT	230 – 490
			MY5015	295 – 690
	Ductile Cast Irons	Tensile Strength ≦800MPa	VP20RT	165 – 360
			VP10RT	195 – 395
			MY5015	260 – 525
S	Heat Resistant Alloys Titanium Alloys	−	MP9015	130 – 330
			MP9025	100 – 295
			VP20RT	100 – 195
			VP10RT	130 – 230

Note 1) For MP9015, MP9025, VP10RT, VP20RT and MY5015, wet cutting is recommended.

Distance from Work Surface Recess Depth

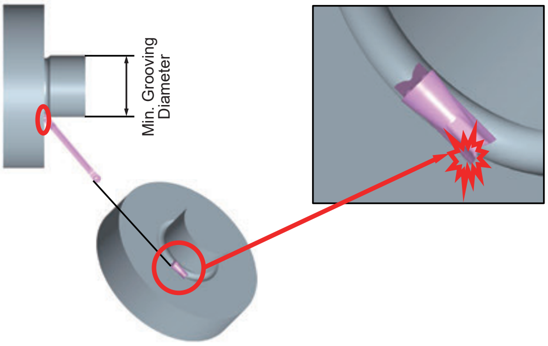


Grooving Width **CW**	Recessing Depth **APMX**	Distance workpiece to the recess depth **APMX2**
.079", 2.00 mm	.059", 1.50 mm	.025", 0.646 mm
.098", 2.50 mm	.069", 1.75 mm	.028", 0.720 mm
.118", 3.00 mm	.079", 2.00 mm	.031", 0.793 mm
.125", 3.18 mm	.082", 2.09 mm	.032", 0.819 mm
.157", 4.00 mm	.098", 2.50 mm	.037", 0.939 mm
.187", 4.75 mm	.113", 2.88 mm	.041", 1.049 mm
.197", 5.00 mm	.118", 3.00 mm	.043", 1.086 mm
.236", 6.00 mm	.138", 3.50 mm	.049", 1.232 mm
.250", 6.35 mm	.145", 3.68 mm	.051", 1.283 mm

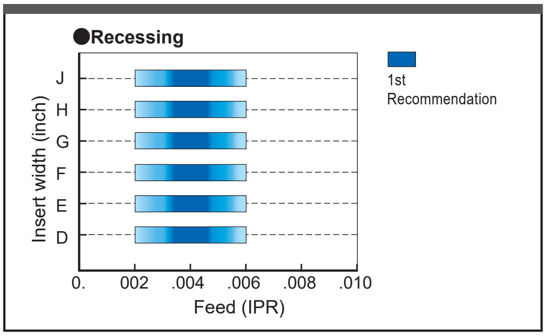
BM Breaker

Minimum grooving diameter

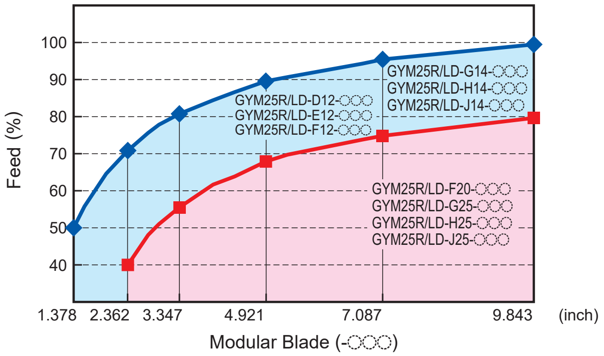
Ensure the tool is suitable for the diameter being machined. Refer to the Min. Grooving Diameter as shown in the table to avoid a collision with the workpiece material shown below.



■Recommended feed rate and depth of cut



Relationship Between The Modular Blade and Feed Per Rotation [For Face Grooving]



Note 1) Adjust the feed per rotation in the cutting conditions to the percentage shown in the table above.

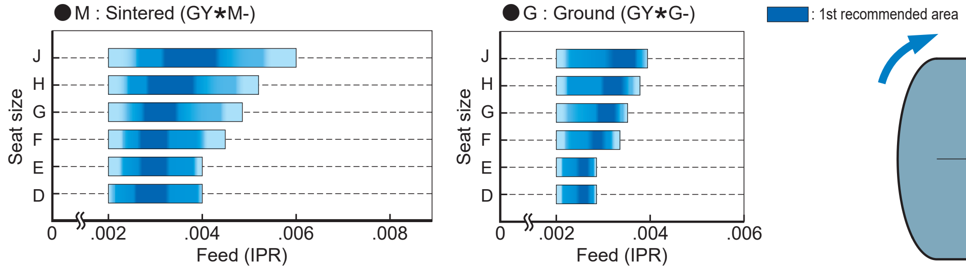
Recommended Cutting Speed [For Face Grooving]

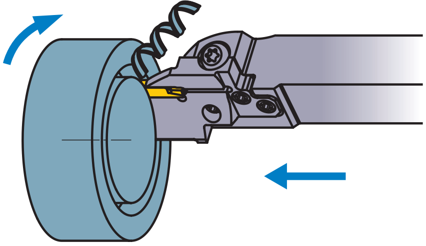
	Workpiece Material	Properties	Grade	Cutting Speed (SFM) 165 330 490 655 820 985
P	Mild Steels	Hardness ≤160HB	VP20RT	260 590
			VP10RT	295 620
			NX2525	230 560
	Carbon Steels Alloy Steels	Hardness 160—280HB	VP20RT	195 460
			VP10RT	230 490
			MY5015	295 690
			NX2525	180 440
		Hardness 280HB≤	VP20RT	165 360
			VP10RT	195 395
			MY5015	260 525
			NX2525	150 345
M	Stainless Steels	Hardness ≤270HB	VP20RT	165 360
			VP10RT	195 395
K	Gray Cast Irons	Tensile Strength ≤300MPa	VP20RT	195 460
			VP10RT	230 490
			MY5015	295 690
	Ductile Cast Irons	Tensile Strength ≤800MPa	VP20RT	165 360
			VP10RT	195 395
			MY5015	260 525
S	Heat Resistant Alloys Titanium Alloys	–	MP9015	130 330
			MP9025	100 295
			VP20RT	100 195
			VP10RT	130 230
			RT9010	130 230
H	Hardened Steels	Hardness 50HRC≤	BC8110	195 330
			MB8025	195 330

Note 1) For MP9015, MP9025, VP10RT, VP20RT and MY5015, wet cutting is recommended.

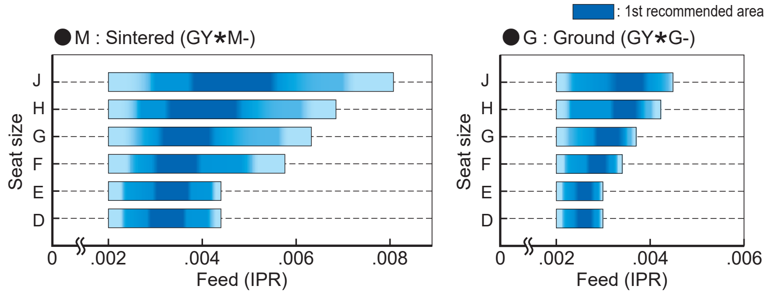
Recommended Cutting Conditions [For Face Grooving]

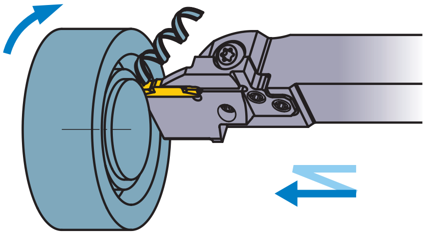
Grooving





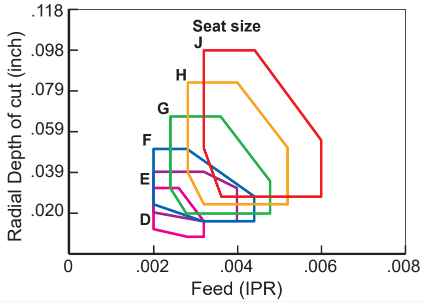
Plunging



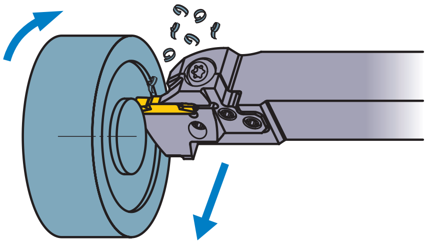


∗ After the 1st plunge, the width of cut should be set narrower than insert with CW.

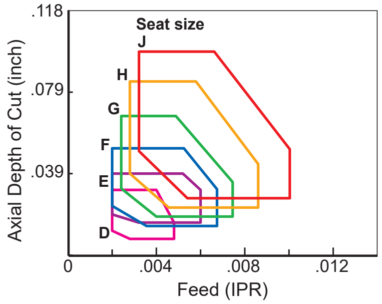
Traverse Machining (MF Breaker)

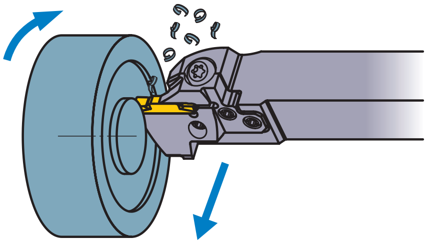


Seat Size	Insert Width	Seat Size	Insert Width
D	.079", 2.00 mm .088", 2.24 mm	G	.157", 4.00 mm .167", 4.24 mm
E	.094", 2.39 mm .098", 2.50 mm .108",2.74 mm	H	.187", 4.75 mm .197", 5.00 mm .206", 5.24 mm
F	.118",3.00 mm .125", 3.18 mm .128", 3.24 mm	J	.236", 6.00 mm .248", 6.31 mm .250", 6.35 mm

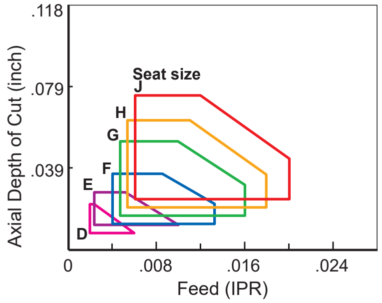


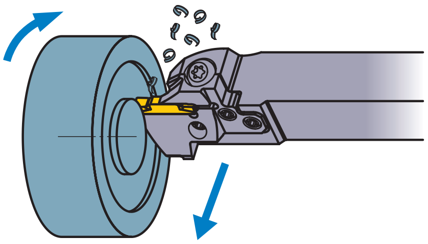
Traverse Machining (MM/MS Breaker)





Traverse Machining (BM Breaker)





Note 1) GL chip breaker is not recommended for face grooving.

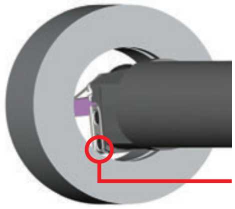
Limitation of The Maximum Groove Depth [For Internal Grooving]

●When using the mono block type

The maximum groove depth is not limited by the cutting diameter.

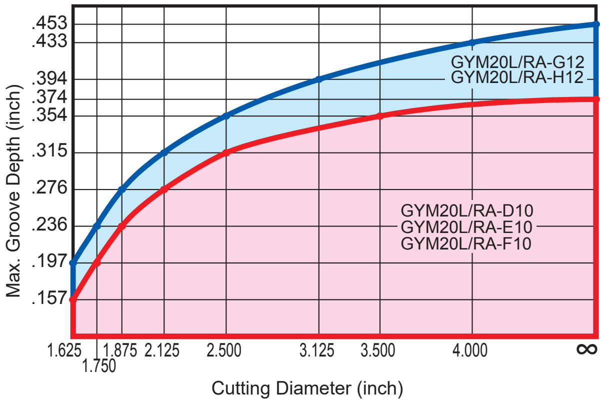
●When using the modular blade type

The maximum groove depth is limited by the cutting diameter.

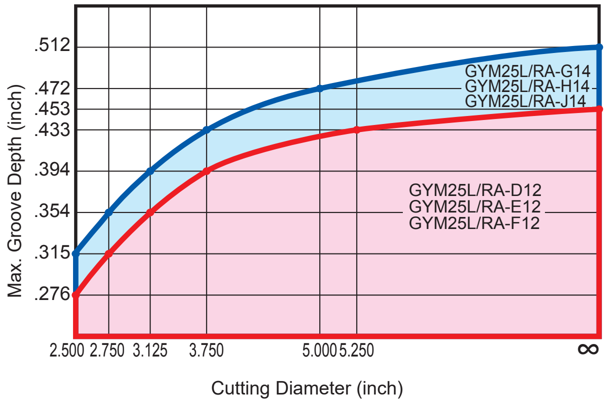


Due to interference of this part, the maximum groove depth is limited by the cutting diameter.

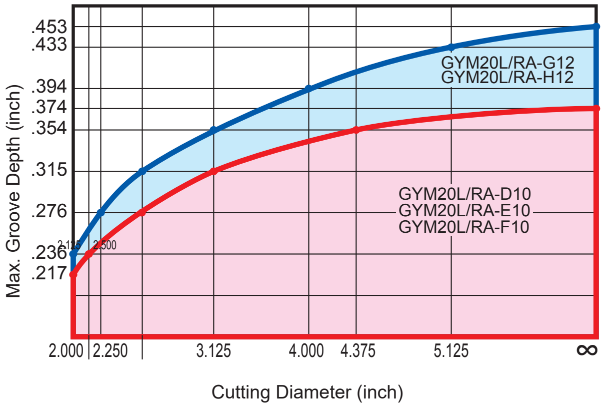
Shank Diameter=1.250 inch (GYM20 Blade)



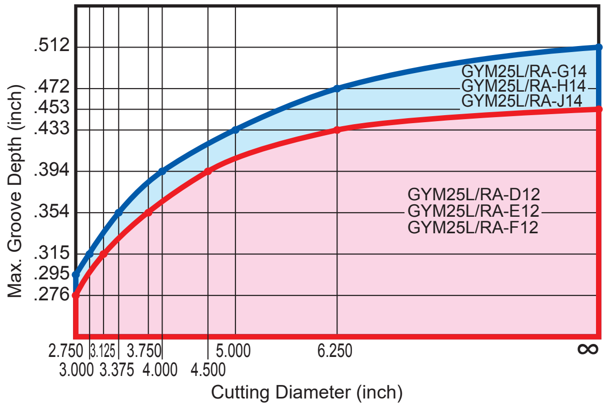
Shank Diameter=1.500 inch (GYM25 Blade)



Shank Diameter=1.500 inch (GYM20 Blade)



Shank Diameter=2.000 inch (GYM25 Blade)



Recommended Cutting Speed [For Internal Grooving]

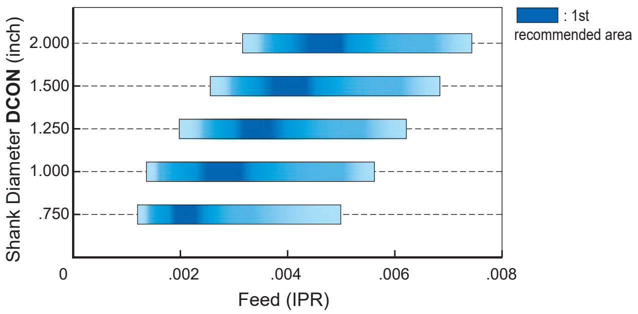
	Workpiece Material	Properties	Grade	Cutting Speed (SFM) 165 330 490 655 820
P	Mild Steels	Hardness ≦160HB	VP20RT	260 590
			VP10RT	295 620
			NX2525	230 560
	Carbon Steels Alloy Steels	Hardness 160–280HB	VP20RT	195 460
			VP10RT	230 490
			MY5015	295 690
			NX2525	180 440
		Hardness 280HB≦	VP20RT	165 360
			VP10RT	195 395
			MY5015	260 525
			NX2525	150 345
M	Stainless Steels	Hardness ≦270HB	VP20RT	165 360
			VP10RT	195 395
K	Gray Cast Irons	Tensile Strength ≦300MPa	VP20RT	195 460
			VP10RT	230 490
			MY5015	295 690
	Ductile Cast Irons	Tensile Strength ≦800MPa	VP20RT	165 360
			VP10RT	195 395
			MY5015	260 525
S	Heat Resistant Alloys Titanium Alloys	–	MP9015	130 330
			MP9025	100 295
			VP20RT	100 195
			VP10RT/RT9010	130 230
H	Hardened Steels	50HRC≦	BC8110/MB8025	195 330

Note 1) For MP9015, MP9025, VP10RT, VP20RT and MY5015, wet cutting is recommended.

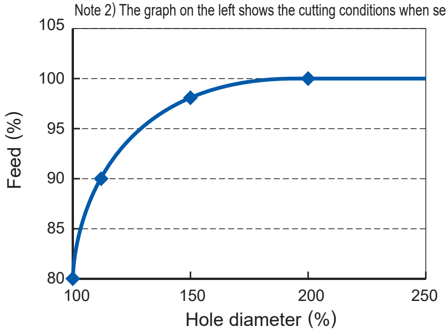
	Workpiece Material	Properties	Grade	Cutting Speed vc (SFM) 165 330 655 985 1310 1640
N	Aluminum Alloys	Content Si<5%	RT9010	490 1310
	Aluminum Alloys	Content 5%≤Si≤10%	RT9010	490 1310
	Aluminum Alloys	Content Si>10%	RT9010	260 525

Recommended Cutting Conditions [For Internal Grooving]

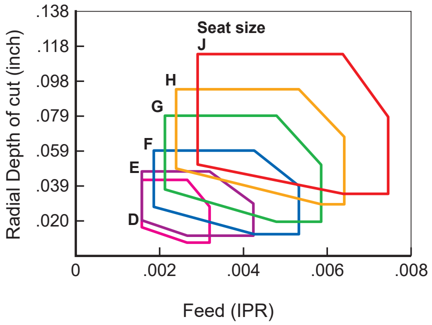
Grooving



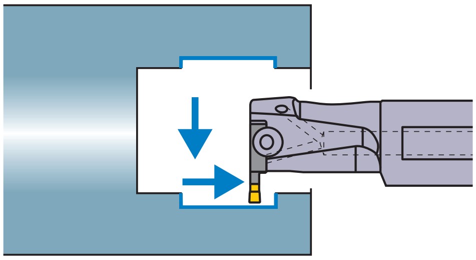
Note 1) The cutting diameter 100% represents the minimum cutting diameter (DMIN).
Note 2) The graph on the left shows the cutting conditions when setting the feed to 100%.



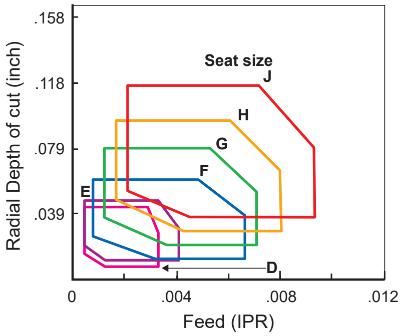
Traverse Machining (MF Breaker)



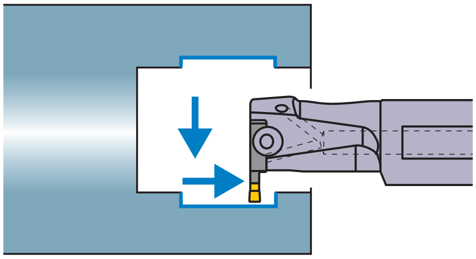
- When traverse machining a blind hole, it is recommended to carry out back turning considering chip disposal.



Traverse Machining (MM/MS Breaker)

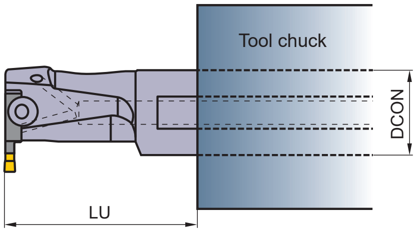


- When traverse machining a blind hole, it is recommended to carry out back turning considering chip disposal.



Note 1) The above cutting conditions are for when using the tool overhang (LU) 1.6-2.0 times larger than the shank diameter (DCON). (L/D=1.6-2.0)
When using L/D larger than 2.0, reduce the cutting conditions.

Seat Size	
	Insert Width
D	.079", 2.00 mm .088", 2.24 mm
E	.094", 2.39 mm .098", 2.50 mm .108", 2.74 mm
F	.118", 3.00 mm .125", 3.18 mm .128", 3.24 mm
G	.157", 4.00 mm .167", 4.24 mm
H	.187", 4.75 mm .197", 5.00 mm .206", 5.24 mm
J	.236", 6.00 mm .248", 6.31 mm .250", 6.35 mm



Memo

GW Series

Recommended Cutting Conditions

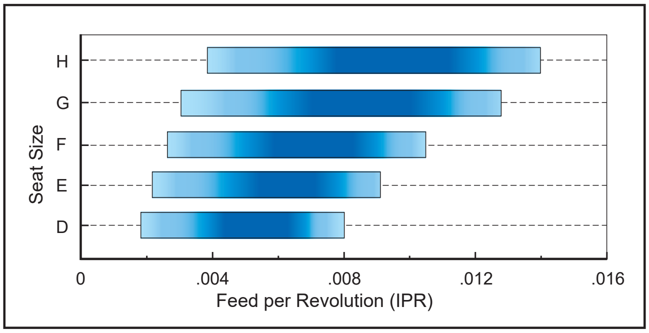
■ Cutting Speed

	Work Material	Properties	Grade	Cutting Speed vc (SFM)
P	Mild Steels	Hardness ≤160HB	VP20RT	330 – 785
			VP10RT	360 – 820
	Carbon Steels Alloy Steels	Hardness 160−280HB	VP20RT	260 – 655
			VP10RT	295 – 690
			VP30RT	195 – 590
			MY5015	360 – 820
		Hardness ≥280HB	VP20RT	195 – 525
			VP10RT	230 – 560
			VP30RT	130 – 460
			MY5015	295 – 690
M	Stainless Steels	Hardness ≤270HB	VP20RT	195 – 590
			VP10RT	230 – 620
			VP30RT	130 – 525
K	Gray Cast Irons	Tensile Strength ≤300MPa	VP20RT	260 – 655
			VP10RT	295 – 690
			MY5015	460 – 985
	Ductile Cast Irons	Tensile Strength ≤800MPa	VP20RT	195 – 525
			VP10RT	230 – 560
			MY5015	295 – 690
S	Heat Resistant Alloys Titanium Alloys	−	VP20RT	100 – 195
			VP10RT	130 – 230

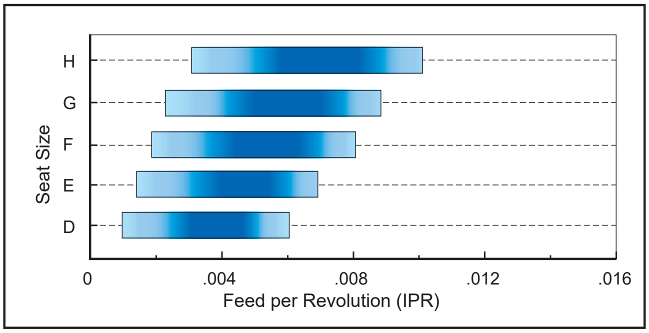
Note 1) VP20RT is the first recommended grade for materials.
Note 2) For VP10RT, VP20RT, VP30RT and MY5015, wet cutting is recommended.

■ Feed per Revolution

GM Breaker



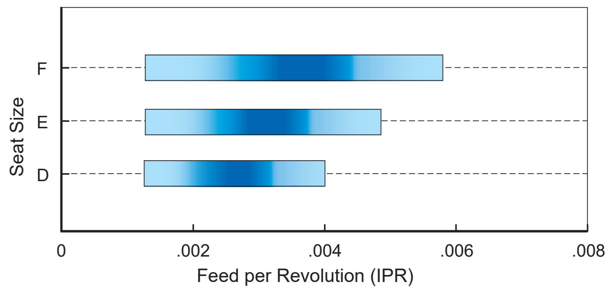
GS Breaker



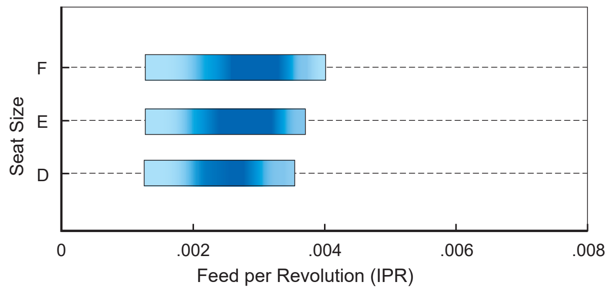
Chip Breaker	Feed per Revolution (IPR)				
	Seat Size D	Seat Size E	Seat Size F	Seat Size G	Seat Size H
GM Breaker	.0020 − .0079	.0024 − .0091	.0028 − .0102	.0031 − .0126	.0039 − .0138
GS Breaker	.0012 − .0059	.0016 − .0067	.0020 − .0079	.0024 − .0087	.0031 − .0098

Cutting Off   Feed per Revolution

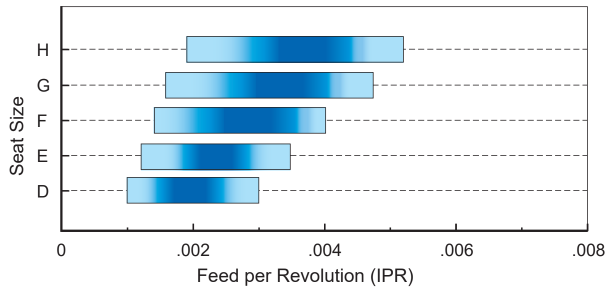
R05-GS Breaker



R08-GS Breaker



R/L05-GM Breaker



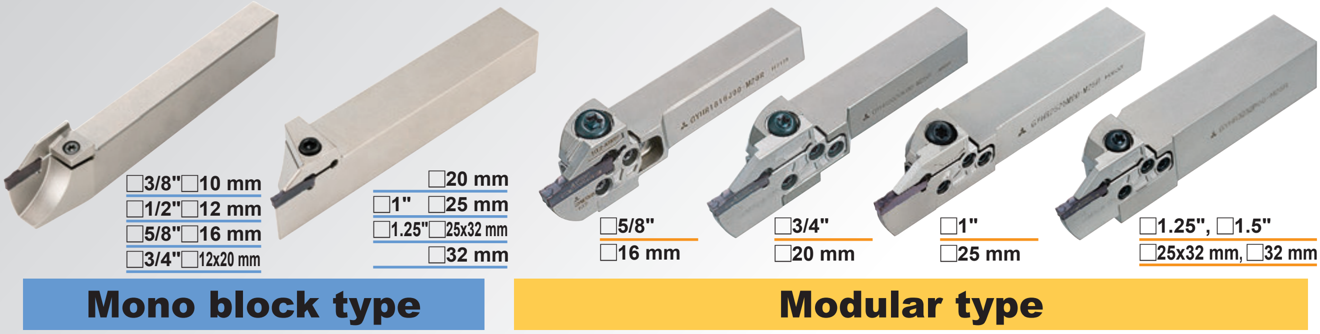
Chip Breaker	PSIPR	Hand	**Feed per Revolution** (IPR)				
			Seat Size D	Seat Size E	Seat Size F	Seat Size G	Seat Size H
R05-GS	5°	R	.0012 – .0039	.0012 – .0047	.0012 – .0055	–	–
R08-GS	8°	R	.0012 – .0031	.0012 – .0035	.0012 – .0055	–	–
R05-GM	5°	R/L	.0020 – .0059	.0024 – .0067	.0028 – .0079	.0031 – .0091	.0039 – .0102

GY Series

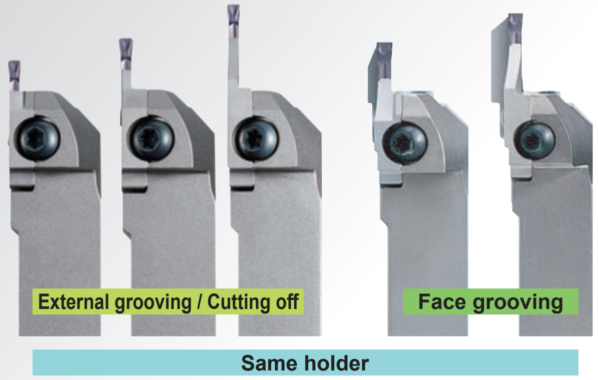
A wide selection of holders and inserts available for diverse grooving and cutting off applications

External • Face holders

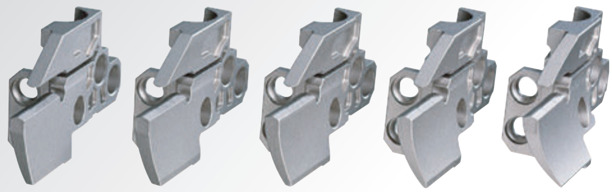
Corresponding blades to a variety of modular holders with different shank sizes



A wide selection of holders and inserts available for diverse grooving and cutting off applications

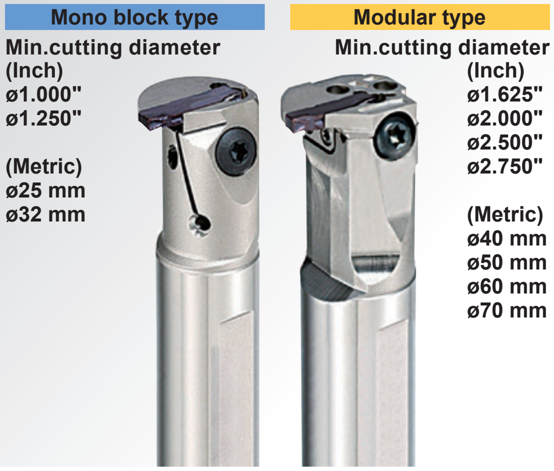


Applicable for various diameters of face grooves by the wide array of modular blades with different grooving diameters



Internal holders

A wide range of holders available from minimum diameter of ø25 mm



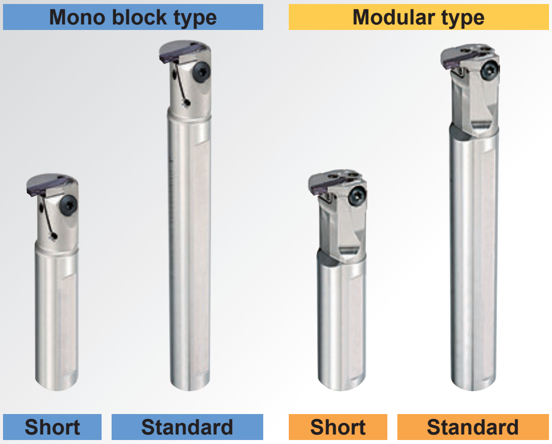
Mono block type
Min.cutting diameter
(Inch)
ø1.000"
ø1.250"

(Metric)
ø25 mm
ø32 mm

Modular type
Min.cutting diameter
(Inch)
ø1.625"
ø2.000"
ø2.500"
ø2.750"

(Metric)
ø40 mm
ø50 mm
ø60 mm
ø70 mm

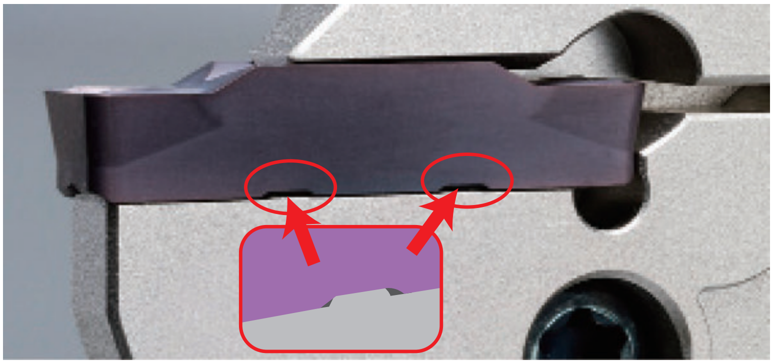
Short shank types are standard stocked



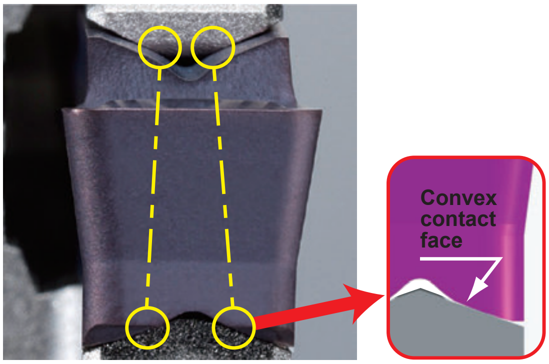
Original insert design leading the way to new grooving and cutting off applications

Highly reliable insert clamping

Safety keys prevent insert movement.



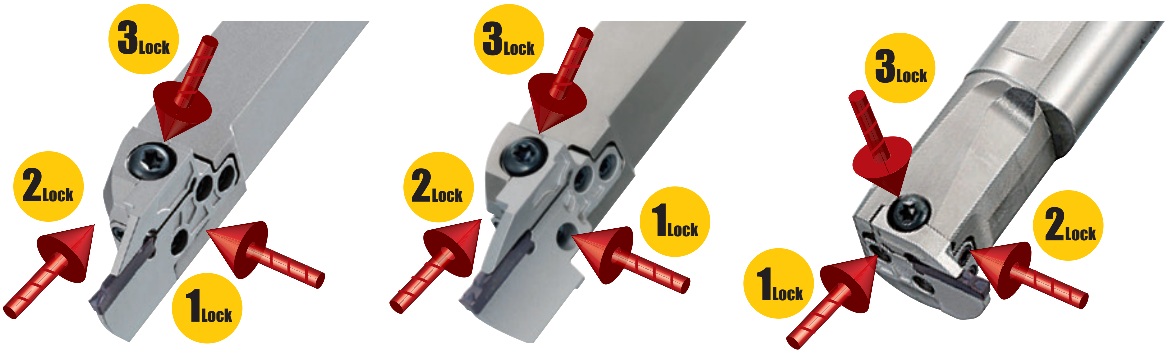
The convex geometry ensures high precision clamping.



New TRI-LOCK System for increased stability and performance!

TRI-LOCK System

The TRI-LOCK system ensures the blade is securely fixed in 3 directions (side, front and top), giving high rigidity for stable grooving and cutting off performance.



A WIDE SELECTION OF INSERTS

- Selection of groove widths

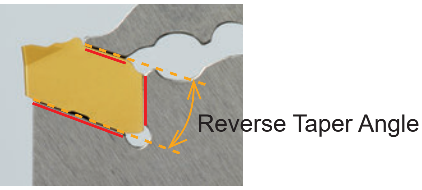
- Different corner radii available

GW Series
Easy to Utilize Configuration that Improves Tool Handling

Clamp

Simple insert clamping method offering high rigidity.

To prevent the insert from being pulled out during machining a reverse taper angle has been designed from the front of the insert. Additionally the design also includes 3 large locating faces between the insert and the blade offering increased cutting edge reliability. The blade itself is made from a special alloy steel to suit this application.

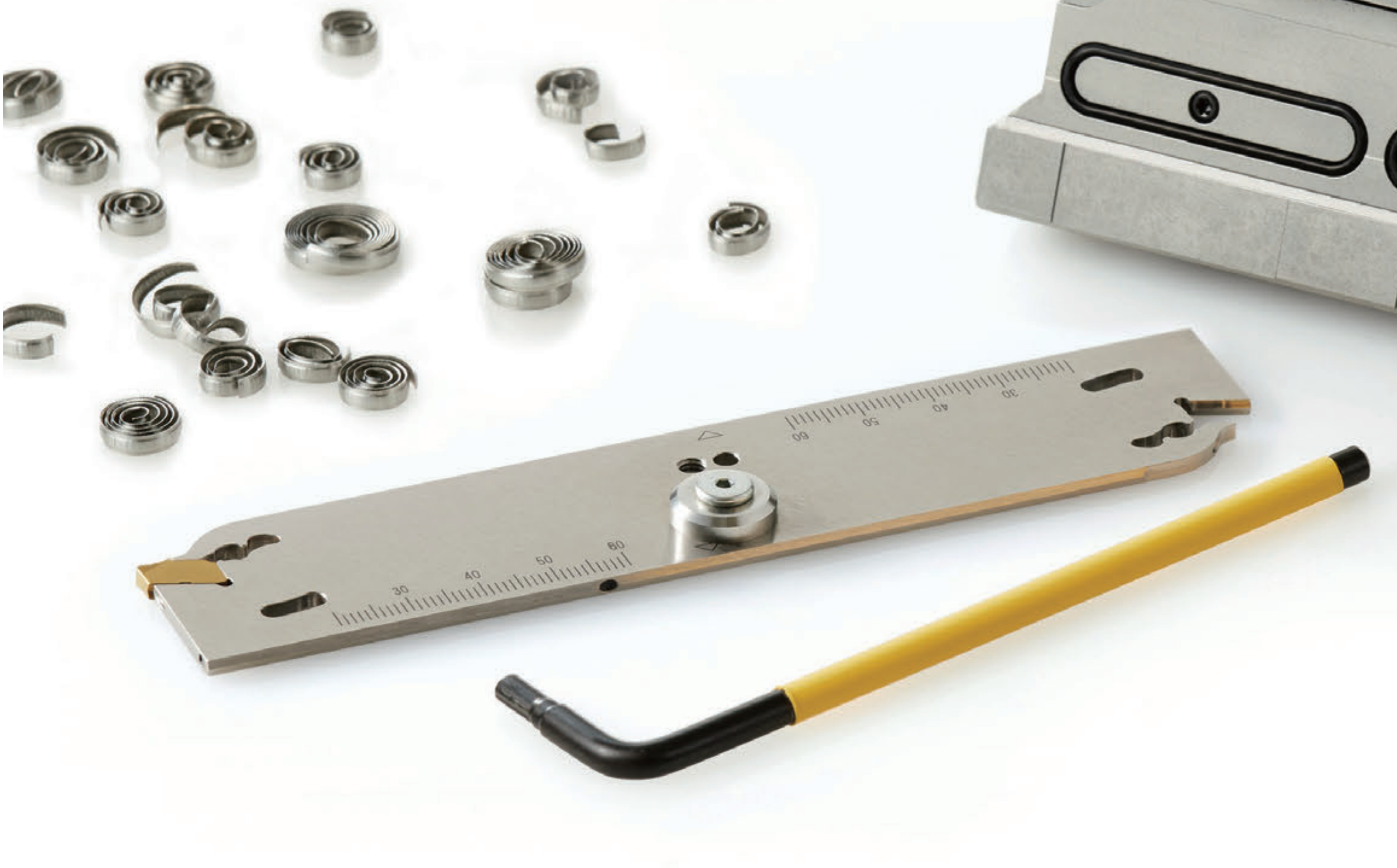


In respect to insert indexing, a unique wrench is supplied to ensure ease when changing the insert.

Voice of Developer

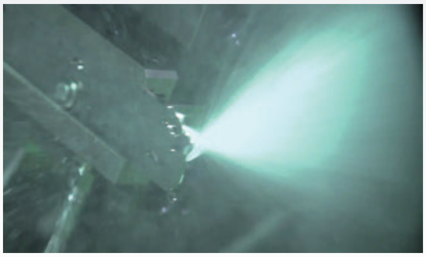
Just how easy is it to set an insert?

With the use of a unique wrench, it is possible to locate and remove the insert with one simple action making it easier for use in the workplace.



Through Coolant Blade

Increased wear resistance due to the use of 2 through coolant ejection holes.



2 through coolant holes supply the coolant to both the rake and flank face, leading to effective cutting edge cooling and increased wear resistance.
Additionally this blade can also be used for both low pressure and high pressure coolant (1000 PSI).

Voice of Developer

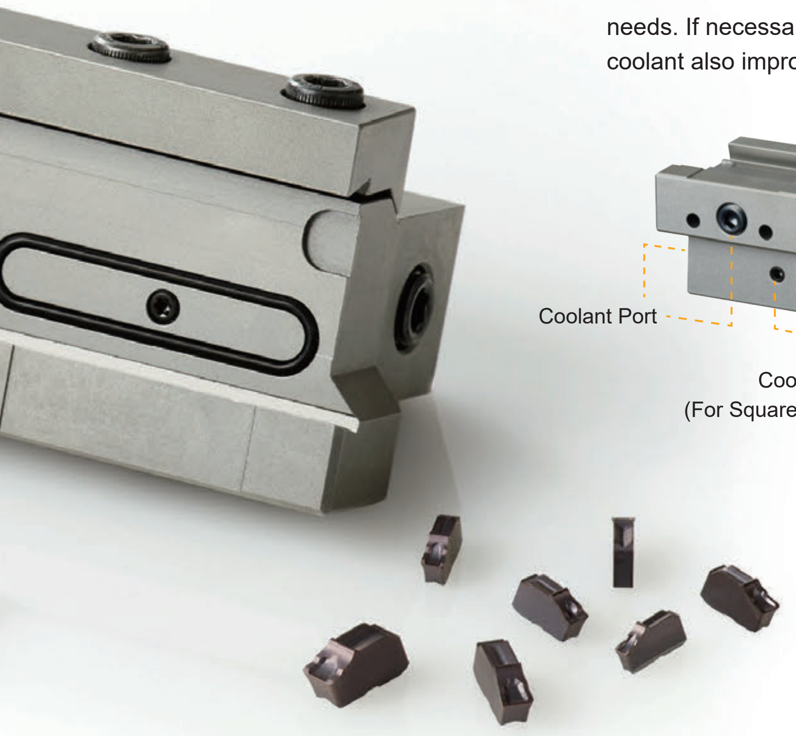
How is it possible to reduce heat generation?

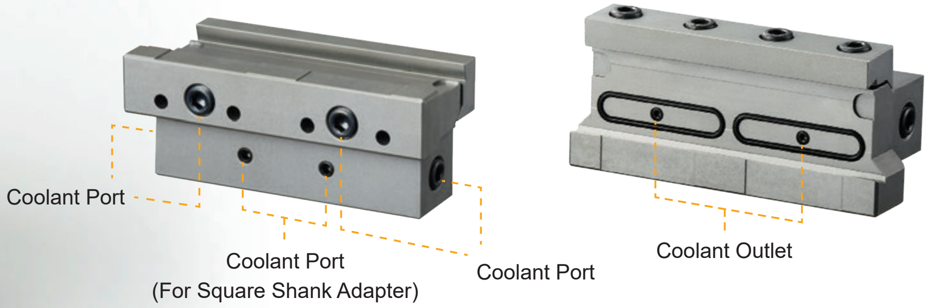
The 2 coolant holes used in the blade are capable of using high coolant pressures of up (1000 PSI). This is achieved by using as large as possible through coolant hole diameter. The ejection holes are located close to the cutting edge to improve the cutting edge cooling effect and increasing wear resistance.

Coolant Ports

Flexible set up possible with the use of 6 coolant ports.

There are 6 coolant ports designed into the tool block. This makes it easier for the end user to set up the tool block and blade to a configuration that suits their needs. If necessary it is also possible to use coolant hose. The ejection type coolant also improves cutting edge cooling and chip evacuation.





Voice of Developer

Possible set up to suit the requirements of the workplace environment.

One of the objectives of this product is to respond to the customers complaints that “the product did not fit and could not be used”. Starting with the coolant outlet that prevents leaks even when oil quantity or overhangs change. Everything from the material and the shape of the O-ring, to the length of the hose has been tailored to the effective use in the workplace.

Cutting Off & Grooving System

C009A 2019-2020

General Catalog

MITSUBISHI MATERIALS C009A

CUTTING TOOLS
2020-2021

TURNING TOOLS
MILLING TOOLS
DRILLING TOOLS

DIA EDGE

B225A TOOL NEWS

GW Series

MITSUBISHI MATERIALS TOOL NEWS B225A

Cutting Off & Grooving System

GW Series

New Product

Long Lasting, Easy to Use
Cutting Off & Grooving System

DIAEDGE

TOOL NEWS

B255A-I

Grooving System

GY Series PSC Holder

New Products

High-rigidity, High-precision Machining

Extensive modularity enables easy exchanges between many different sizes and types of application by simply changing the blade.

MITSUBISHI MATERIALS CORPORATION

Grooving System

GY Series PSC Holder

Modular GY series blades are easily mounted providing a wide range of machining choices.

Coolant Nozzles with Adjustable Angles

Coolant nozzles mounted on the main body can be adjusted to any desired angle (approx. ±10°) to supply cutting fluid to the cutting edges efficiently and accurately.

Over 100 Types of Modular Blades

External, face and recess machining blades can be used for machining a huge range of applications.

Recommended Maximum
Coolant Pressure: 1MPa

Installation size DCONMS
PSC40, PSC50, PSC63

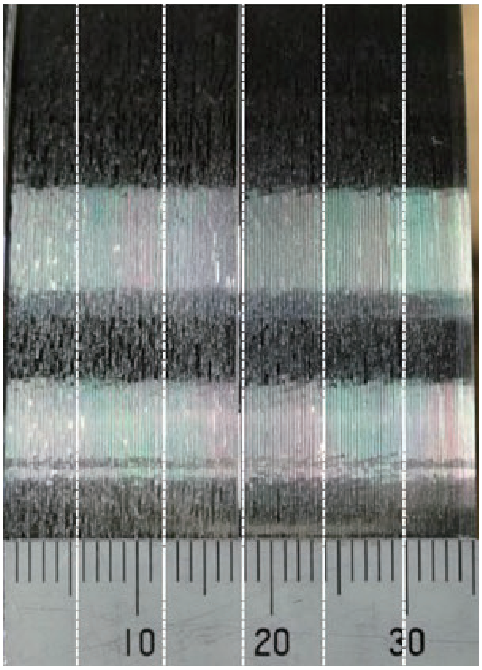
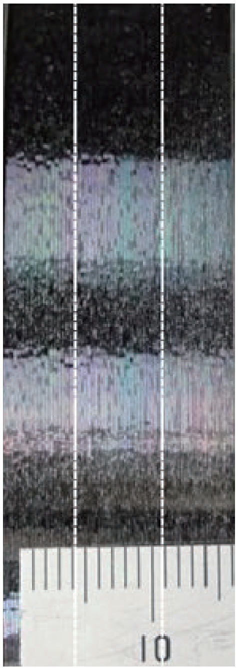
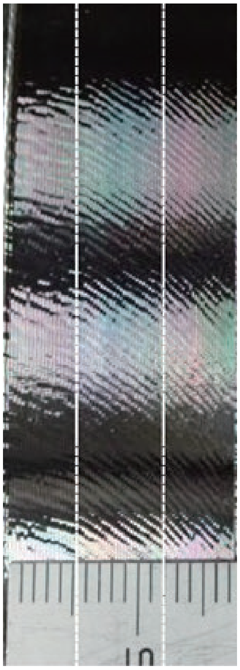
PSC System

The double taper and face contact uses the precision machined polygon geometry to provide high clamping rigidity. In addition it provides accuracy and easy positional repeatability when tool changing.

Cutting Performance

Comparison of Finished Surfaces when Cross-feed Machining 1045 Carbon Steel

The GY series uses modular blades with short overhang exhibiting excellent rigidity, especially during cross-feed machining.

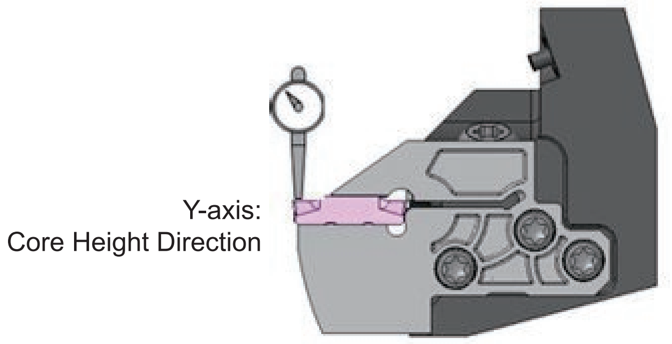
	GY PSC Max.Groove Depth .236 inch						**GY PSC** Max.Groove Depth .472 inch			Conventional Max.Groove Depth .787 inch		
Depth of Cut inch	.039			.059			.039			.039		
Feed IPR	.012	.010	.008	.012	.010	.008	.012	.010	.008	.012	.010	.008
Machined Surface												
Finished Surface Evaluation	OK	OK	OK	OK	OK	OK	OK	OK	OK	NG	NG	NG
Machining Sound	OK	OK	OK	OK	OK	OK	OK	OK	OK	NG	NG	NG

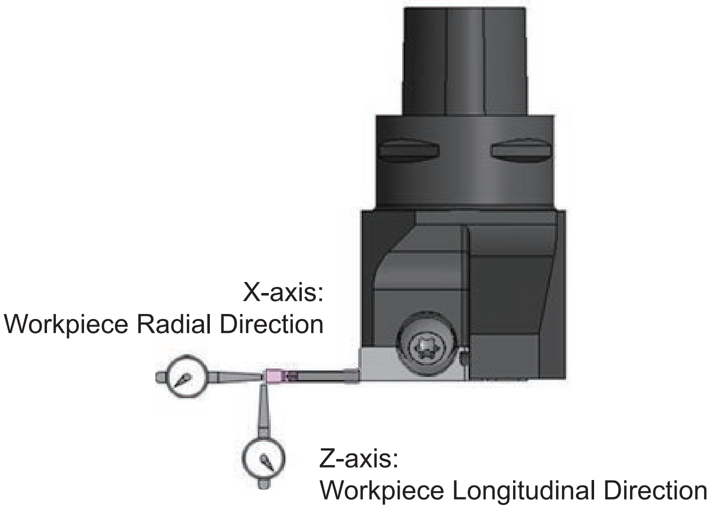
NG - Displays chatter and vibration

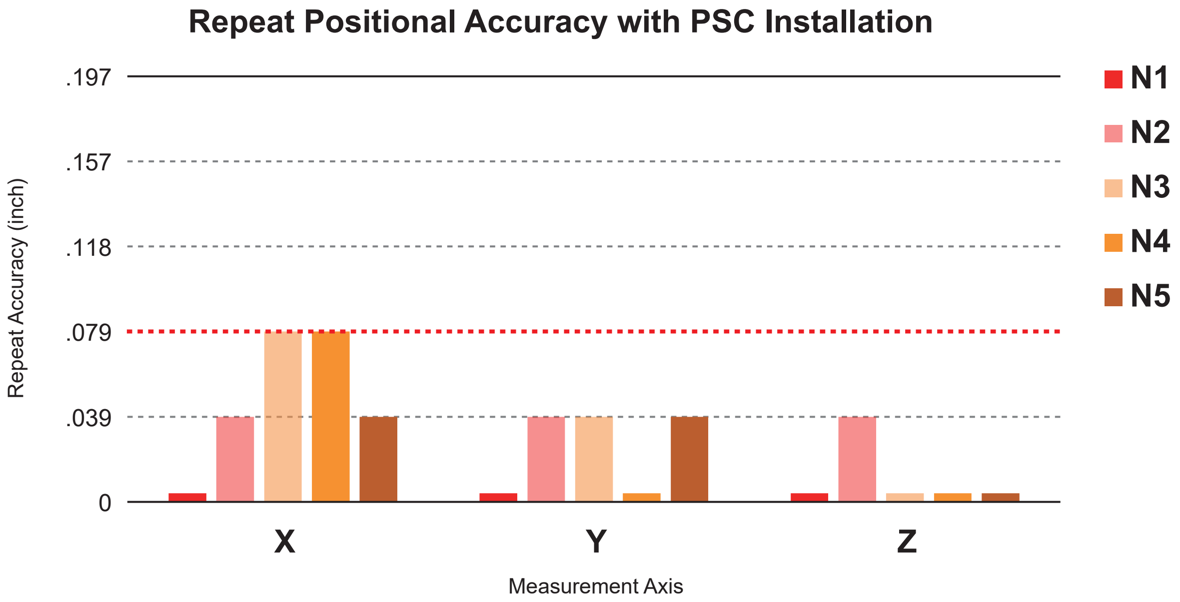
<Cutting Conditions>
Workpiece Material : AISI 1045 ø5.906 inch
Cutting Width : .118 inch
Cutting Speed : vc = 590 SFM
Cutting Mode : Cross-feed Machining
External Coolant 1 Mpa

Repeat Positional Accuracy with PSC Installation

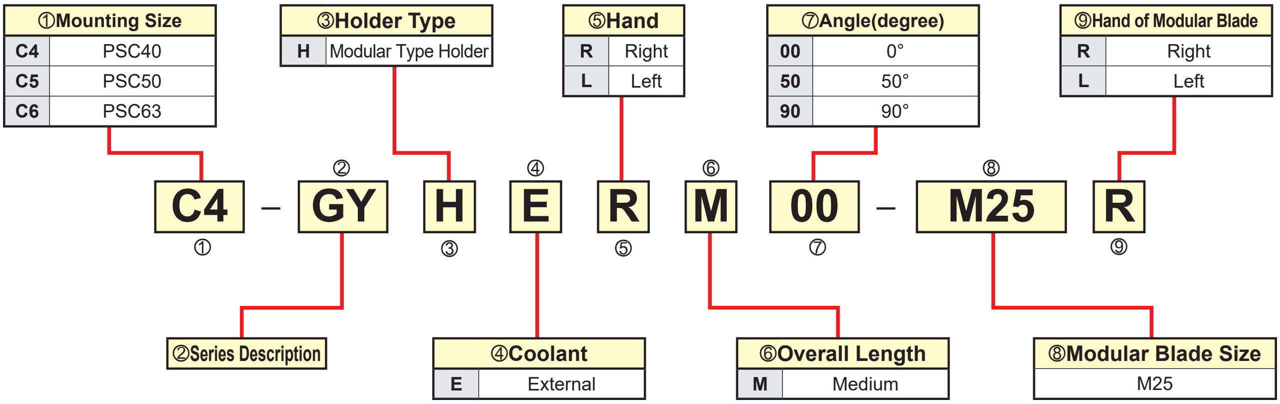
Accuracy of ±.079 μ-inch or less for all 3 axes is achieved when replacing tools.







PSC Holder Order Number



①Mounting Size	
C4	PSC40
C5	PSC50
C6	PSC63

③Holder Type	
H	Modular Type Holder

⑤Hand	
R	Right
L	Left

⑦Angle(degree)	
00	0°
50	50°
90	90°

⑨Hand of Modular Blade	
R	Right
L	Left

④Coolant	
E	External

⑥Overall Length	
M	Medium

⑧Modular Blade Size
M25

GY Series L Dimension Tolerance Conversion Table

The setting dimensions LF and LH shown on the next pages will change depending on the installed insert.
The standard published dimensions assume GM breakers for a cutting edge angle of 00 °90°, and BM breakers for 50°.

Cutting Width CW (mm)	*1 Dimensions L (mm)	*2 Dimensional tolerance (mm) versus standard dimension (L) of each breaker							
		GU	GS/GM	MS/MM	R/L-GM	Flat Top	MF	BM	GL
2.00	20.70	0	0	0	.004	0	.014	.008	.014
2.24	*3 (20.7)						.014		
2.39	20.70	0	0			0	.014		
2.50	20.70	0	0	0	.005	0	.014	.008	.014
2.74	*3 (20.7)						.014		
3.00	20.70	0	0	0	.006	0	.014	.008	.014
3.18	20.70	0	0			0	.014	.008	
3.24	*3 (20.7)						.014		
4.00	25.65	0	0	0	.008	0	.012	.006	
4.24	*3 (25.65)						.012		
4.75	25.65	0	0			0	.012	.006	
5.00	25.65	0	0	0	.012	0	.012	.006	
5.24	*3 (25.65)						.012		
6.00	25.65	0	0	0		0	.012	.010	
6.31	*3 (25.65)						.012		
6.35	25.65	0	0				.012	.010	

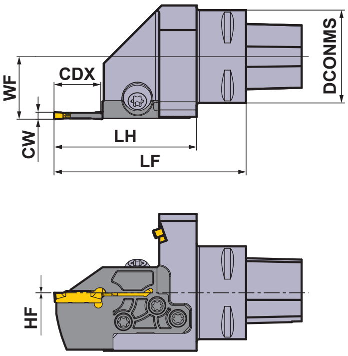
*1 This value is used at the described holder dimension.
*2 ▨ when there is no applicable breaker.
*3 The standard dimensions shown here use an approximate insert width.

GY SERIES (EXTERNAL) NEW

PSC 00° type holder (Metric)

Note 1) Please order the modular blade and modular holder separately.
Note 2) Please set the right hand modular blade at the right hand holder and the left hand modular blade at the left hand holder.

P M K N S H



Right hand tool holder shown.

(mm)

Order Number	Stock	Hand (R/L)	Coolant	Mounting Size	DCONMS	CW
C4-GYHERM00-M25R	●	R	External	PSC40	40	2.0—6.35
C4-GYHELM00-M25L	●	L	External	PSC40	40	2.0—6.35
C5-GYHERM00-M25R	●	R	External	PSC50	50	2.0—6.35
C5-GYHELM00-M25L	●	L	External	PSC50	50	2.0—6.35
C6-GYHERM00-M25R	●	R	External	PSC63	63	2.0—6.35
C6-GYHELM00-M25L	●	L	External	PSC63	63	2.0—6.35

● = NEW

Set Dimensions with Modular Blades

Holder Type	Modular Blade Type	Standard CW	CDX	WF	HF	LF	LH
C4-GYHER/LM00-M25R/L	**GYM25R/L◌-D06**	2.0	6	27.0	0	69	47.6
C4-GYHER/LM00-M25R/L	**GYM25R/L◌-D12**	2.0	12	27.0	0	77	55.6
C4-GYHER/LM00-M25R/L	**GYM25R/L◌-D20**	2.0	20	27.0	0	83	61.6
C4-GYHER/LM00-M25R/L	**GYM25R/L◌-E06**	2.5	6	27.0	0	69	47.6
C4-GYHER/LM00-M25R/L	**GYM25R/L◌-E12**	2.5	12	27.0	0	77	55.6
C4-GYHER/LM00-M25R/L	**GYM25R/L◌-E20**	2.5	20	27.0	0	83	61.6
C4-GYHER/LM00-M25R/L	**GYM25R/L◌-F06**	3.0	6	27.0	0	69	47.6
C4-GYHER/LM00-M25R/L	**GYM25R/L◌-F12**	3.0	12	27.0	0	77	55.6
C4-GYHER/LM00-M25R/L	**GYM25R/L◌-F20**	3.0	20	27.0	0	83	61.6
C4-GYHER/LM00-M25R/L	**GYM25R/L◌-G08**	4.0	8	27.0	0	71	49.6
C4-GYHER/LM00-M25R/L	**GYM25R/L◌-G14**	4.0	14	27.0	0	77	55.6
C4-GYHER/LM00-M25R/L	**GYM25R/L◌-G25**	4.0	25	27.0	0	88	66.6
C4-GYHER/LM00-M25R/L	**GYM25R/L◌-H08**	5.0	8	27.0	0	71	49.6
C4-GYHER/LM00-M25R/L	**GYM25R/L◌-H14**	5.0	14	27.0	0	77	55.6
C4-GYHER/LM00-M25R/L	**GYM25R/L◌-H25**	5.0	25	27.0	0	88	66.6
C4-GYHER/LM00-M25R/L	**GYM25R/L◌-J08**	6.0	8	27.0	0	71	49.6
C4-GYHER/LM00-M25R/L	**GYM25R/L◌-J14**	6.0	14	27.0	0	77	55.6
C4-GYHER/LM00-M25R/L	**GYM25R/L◌-J25**	6.0	25	27.0	0	88	66.6

*Modular blade type: Blades for face machining indicate a code for the minimum face grooving diameter. Example) GYM25RD-D12-040
The “◌” symbol is a position to insert the letter “A” for external diameter machining or “D” for face machining.
To select modular blades, refer to the Modular Blade List (starting from pg.186).

Note 1) The indicated dimensions are values for standard inserts (GM breakers). If other inserts are mounted, LF and LH may differ. Refer to “GYGW Insets” starting on page 156 for recommended conditions.

● : USA Stock

(mm)

Holder Type	Modular Blade Type	Standard CW	CDX	WF	HF	LF	LH
C5-GYHER/LM00-M25R/L	**GYM25R/L◌-D06**	2.0	6	35.0	0	69	47.6
C5-GYHER/LM00-M25R/L	**GYM25R/L◌-D12**	2.0	12	35.0	0	77	55.6
C5-GYHER/LM00-M25R/L	**GYM25R/L◌-D20**	2.0	20	35.0	0	83	61.6
C5-GYHER/LM00-M25R/L	**GYM25R/L◌-E06**	2.5	6	35.0	0	69	47.6
C5-GYHER/LM00-M25R/L	**GYM25R/L◌-E12**	2.5	12	35.0	0	77	55.6
C5-GYHER/LM00-M25R/L	**GYM25R/L◌-E20**	2.5	20	35.0	0	83	61.6
C5-GYHER/LM00-M25R/L	**GYM25R/L◌-F06**	3.0	6	35.0	0	69	47.6
C5-GYHER/LM00-M25R/L	**GYM25R/L◌-F12**	3.0	12	35.0	0	77	55.6
C5-GYHER/LM00-M25R/L	**GYM25R/L◌-F20**	3.0	20	35.0	0	83	61.6
C5-GYHER/LM00-M25R/L	**GYM25R/L◌-G08**	4.0	8	35.0	0	71	49.6
C5-GYHER/LM00-M25R/L	**GYM25R/L◌-G14**	4.0	14	35.0	0	77	55.6
C5-GYHER/LM00-M25R/L	**GYM25R/L◌-G25**	4.0	25	35.0	0	88	66.6
C5-GYHER/LM00-M25R/L	**GYM25R/L◌-H08**	5.0	8	35.0	0	71	49.6
C5-GYHER/LM00-M25R/L	**GYM25R/L◌-H14**	5.0	14	35.0	0	77	55.6
C5-GYHER/LM00-M25R/L	**GYM25R/L◌-H25**	5.0	25	35.0	0	88	66.6
C5-GYHER/LM00-M25R/L	**GYM25R/L◌-J08**	6.0	8	35.0	0	71	49.6
C5-GYHER/LM00-M25R/L	**GYM25R/L◌-J14**	6.0	14	35.0	0	77	55.6
C5-GYHER/LM00-M25R/L	**GYM25R/L◌-J25**	6.0	25	35.0	0	88	66.6
C6-GYHER/LM00-M25R/L	**GYM25R/L◌-D06**	2.0	6	45.0	0	71	47.6
C6-GYHER/LM00-M25R/L	**GYM25R/L◌-D12**	2.0	12	45.0	0	79	55.6
C6-GYHER/LM00-M25R/L	**GYM25R/L◌-D20**	2.0	20	45.0	0	85	61.6
C6-GYHER/LM00-M25R/L	**GYM25R/L◌-E06**	2.5	6	45.0	0	71	47.6
C6-GYHER/LM00-M25R/L	**GYM25R/L◌-E12**	2.5	12	45.0	0	79	55.6
C6-GYHER/LM00-M25R/L	**GYM25R/L◌-E20**	2.5	20	45.0	0	85	61.6
C6-GYHER/LM00-M25R/L	**GYM25R/L◌-F06**	3.0	6	45.0	0	71	47.6
C6-GYHER/LM00-M25R/L	**GYM25R/L◌-F12**	3.0	12	45.0	0	79	55.6
C6-GYHER/LM00-M25R/L	**GYM25R/L◌-F20**	3.0	20	45.0	0	85	61.6
C6-GYHER/LM00-M25R/L	**GYM25R/L◌-G08**	4.0	8	45.0	0	73	49.6
C6-GYHER/LM00-M25R/L	**GYM25R/L◌-G14**	4.0	14	45.0	0	79	55.6
C6-GYHER/LM00-M25R/L	**GYM25R/L◌-G25**	4.0	25	45.0	0	90	66.6
C6-GYHER/LM00-M25R/L	**GYM25R/L◌-H08**	5.0	8	45.0	0	73	49.6
C6-GYHER/LM00-M25R/L	**GYM25R/L◌-H14**	5.0	14	45.0	0	79	55.6
C6-GYHER/LM00-M25R/L	**GYM25R/L◌-H25**	5.0	25	45.0	0	90	66.6
C6-GYHER/LM00-M25R/L	**GYM25R/L◌-J08**	6.0	8	45.0	0	73	49.6
C6-GYHER/LM00-M25R/L	**GYM25R/L◌-J14**	6.0	14	45.0	0	79	55.6
C6-GYHER/LM00-M25R/L	**GYM25R/L◌-J25**	6.0	25	45.0	0	90	66.6

*Modular blade type: Blades for face machining indicate a code for the minimum face grooving diameter. Example) GYM25RD-D12-040
The "◌" symbol is a position to insert the letter "A" for external diameter machining or "D" for face machining.
To select modular blades, refer to the Modular Blade List (starting from pg.186).

Note 1) The indicated dimensions are values for standard inserts (GM breakers). If other inserts are mounted, LF and LH may differ. Refer to "GYGW Insets" starting on page 156 for recommended conditions.

Spare Parts

 *		 *							
Clamp Screw		Blade Screw		Plug		Nozzle		Wrench 1	Wrench 2
Order Number	Pcs.	Order Number	Pcs.	Order Number	Pcs.	Order Number	Pcs.	Order Number	Order Number
GY06013M	1	TS55	5	HSD05004S	1	NZ22042080S	1	TKY25D	TKY30R

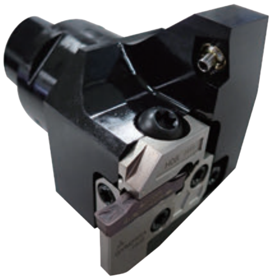
* Clamp Torque (lbf-in) : GY06013M=53, TS55=44
Nozzle Exchange Key : NZKH050S

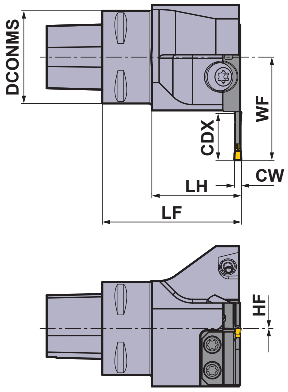
GY SERIES (EXTERNAL) NEW

PSC 90° type holder (Metric)

Note 1) Please order the modular blade and modular holder separately.
Note 2) Please set the left hand modular blade at the right hand holder and the right hand modular blade at the left hand holder.

P M K N S H





Left hand tool holder shown.

(mm)

Order Number	Stock	Hand (R/L)	Coolant	Mounting Size	DCONMS	CW
C4-GYHERM90-M25L	●	R	External	PSC40	40	2.0–6.35
C4-GYHELM90-M25R	●	L	External	PSC40	40	2.0–6.35
C5-GYHERM90-M25L	●	R	External	PSC50	50	2.0–6.35
C5-GYHELM90-M25R	●	L	External	PSC50	50	2.0–6.35
C6-GYHERM90-M25L	●	R	External	PSC63	63	2.0–6.35
C6-GYHELM90-M25R	●	L	External	PSC63	63	2.0–6.35

● = NEW

Set Dimensions with Modular Blades

Holder Type	Modular Blade Type	Standard CW	CDX	WF	HF	LF	LH
C4-GYHER/LM90-M25L/R	**GYM25L/R◌-D06**	2.0	6	30.5	0	60	38.6
C4-GYHER/LM90-M25L/R	**GYM25L/R◌-D12**	2.0	12	38.5	0	60	38.6
C4-GYHER/LM90-M25L/R	**GYM25L/R◌-D20**	2.0	20	44.5	0	60	38.6
C4-GYHER/LM90-M25L/R	**GYM25L/R◌-E06**	2.5	6	30.5	0	60	38.6
C4-GYHER/LM90-M25L/R	**GYM25L/R◌-E12**	2.5	12	38.5	0	60	38.6
C4-GYHER/LM90-M25L/R	**GYM25L/R◌-E20**	2.5	20	44.5	0	60	38.6
C4-GYHER/LM90-M25L/R	**GYM25L/R◌-F06**	3.0	6	30.5	0	60	38.6
C4-GYHER/LM90-M25L/R	**GYM25L/R◌-F12**	3.0	12	38.5	0	60	38.6
C4-GYHER/LM90-M25L/R	**GYM25L/R◌-F20**	3.0	20	44.5	0	60	38.6
C4-GYHER/LM90-M25L/R	**GYM25L/R◌-G08**	4.0	8	32.5	0	60	38.6
C4-GYHER/LM90-M25L/R	**GYM25L/R◌-G14**	4.0	14	38.5	0	60	38.6
C4-GYHER/LM90-M25L/R	**GYM25L/R◌-G25**	4.0	25	49.5	0	60	38.6
C4-GYHER/LM90-M25L/R	**GYM25L/R◌-H08**	5.0	8	32.5	0	60	38.6
C4-GYHER/LM90-M25L/R	**GYM25L/R◌-H14**	5.0	14	38.5	0	60	38.6
C4-GYHER/LM90-M25L/R	**GYM25L/R◌-H25**	5.0	25	49.5	0	60	38.6
C4-GYHER/LM90-M25L/R	**GYM25L/R◌-J08**	6.0	8	32.5	0	60	38.6
C4-GYHER/LM90-M25L/R	**GYM25L/R◌-J14**	6.0	14	38.5	0	60	38.6
C4-GYHER/LM90-M25L/R	**GYM25L/R◌-J25**	6.0	25	49.5	0	60	38.6

*Modular blade type: Blades for face machining indicate a code for the minimum face grooving diameter. Example) GYM25RD-D12-040
The "◌" symbol is a position to insert the letter "A" for external diameter machining or "D" for face machining.
To select modular blades, refer to the Modular Blade List (starting from pg.186).

Note 1) The indicated dimensions are values for standard inserts (GM breakers). If other inserts are mounted, LF and LH may differ. Refer to "GYGW Insets" starting on page 156 for recommended conditions.

● : USA Stock

(mm)

Holder Type	Modular Blade Type	Standard **CW**	**CDX**	**WF**	**HF**	**LF**	**LH**
C5-GYHER/LM90-M25L/R	**GYM25L/R◌-D06**	2.0	6	33.0	0	60	38.6
C5-GYHER/LM90-M25L/R	**GYM25L/R◌-D12**	2.0	12	41.0	0	60	38.6
C5-GYHER/LM90-M25L/R	**GYM25L/R◌-D20**	2.0	20	47.0	0	60	38.6
C5-GYHER/LM90-M25L/R	**GYM25L/R◌-E06**	2.5	6	33.0	0	60	38.6
C5-GYHER/LM90-M25L/R	**GYM25L/R◌-E12**	2.5	12	41.0	0	60	38.6
C5-GYHER/LM90-M25L/R	**GYM25L/R◌-E20**	2.5	20	47.0	0	60	38.6
C5-GYHER/LM90-M25L/R	**GYM25L/R◌-F06**	3.0	6	33.0	0	60	38.6
C5-GYHER/LM90-M25L/R	**GYM25L/R◌-F12**	3.0	12	41.0	0	60	38.6
C5-GYHER/LM90-M25L/R	**GYM25L/R◌-F20**	3.0	20	47.0	0	60	38.6
C5-GYHER/LM90-M25L/R	**GYM25L/R◌-G08**	4.0	8	35.0	0	60	38.6
C5-GYHER/LM90-M25L/R	**GYM25L/R◌-G14**	4.0	14	41.0	0	60	38.6
C5-GYHER/LM90-M25L/R	**GYM25L/R◌-G25**	4.0	25	52.0	0	60	38.6
C5-GYHER/LM90-M25L/R	**GYM25L/R◌-H08**	5.0	8	35.0	0	60	38.6
C5-GYHER/LM90-M25L/R	**GYM25L/R◌-H14**	5.0	14	41.0	0	60	38.6
C5-GYHER/LM90-M25L/R	**GYM25L/R◌-H25**	5.0	25	52.0	0	60	38.6
C5-GYHER/LM90-M25L/R	**GYM25L/R◌-J08**	6.0	8	35.0	0	60	38.6
C5-GYHER/LM90-M25L/R	**GYM25L/R◌-J14**	6.0	14	41.0	0	60	38.6
C5-GYHER/LM90-M25L/R	**GYM25L/R◌-J25**	6.0	25	52.0	0	60	38.6
C6-GYHER/LM90-M25L/R	**GYM25L/R◌-D06**	2.0	6	40.0	0	70	46.6
C6-GYHER/LM90-M25L/R	**GYM25L/R◌-D12**	2.0	12	48.0	0	70	46.6
C6-GYHER/LM90-M25L/R	**GYM25L/R◌-D20**	2.0	20	54.0	0	70	46.6
C6-GYHER/LM90-M25L/R	**GYM25L/R◌-E06**	2.5	6	40.0	0	70	46.6
C6-GYHER/LM90-M25L/R	**GYM25L/R◌-E12**	2.5	12	48.0	0	70	46.6
C6-GYHER/LM90-M25L/R	**GYM25L/R◌-E20**	2.5	20	54.0	0	70	46.6
C6-GYHER/LM90-M25L/R	**GYM25L/R◌-F06**	3.0	6	40.0	0	70	46.6
C6-GYHER/LM90-M25L/R	**GYM25L/R◌-F12**	3.0	12	48.0	0	70	46.6
C6-GYHER/LM90-M25L/R	**GYM25L/R◌-F20**	3.0	20	54.0	0	70	46.6
C6-GYHER/LM90-M25L/R	**GYM25L/R◌-G08**	4.0	8	42.0	0	70	46.6
C6-GYHER/LM90-M25L/R	**GYM25L/R◌-G14**	4.0	14	48.0	0	70	46.6
C6-GYHER/LM90-M25L/R	**GYM25L/R◌-G25**	4.0	25	59.0	0	70	46.6
C6-GYHER/LM90-M25L/R	**GYM25L/R◌-H08**	5.0	8	42.0	0	70	46.6
C6-GYHER/LM90-M25L/R	**GYM25L/R◌-H14**	5.0	14	48.0	0	70	46.6
C6-GYHER/LM90-M25L/R	**GYM25L/R◌-H25**	5.0	25	59.0	0	70	46.6
C6-GYHER/LM90-M25L/R	**GYM25L/R◌-J08**	6.0	8	42.0	0	70	46.6
C6-GYHER/LM90-M25L/R	**GYM25L/R◌-J14**	6.0	14	48.0	0	70	46.6
C6-GYHER/LM90-M25L/R	**GYM25L/R◌-J25**	6.0	25	59.0	0	70	46.6

*Modular blade type: Blades for face machining indicate a code for the minimum face grooving diameter. Example) GYM25RD-D12-040
The "◌" symbol is a position to insert the letter "A" for external diameter machining or "D" for face machining.
To select modular blades, refer to the Modular Blade List (starting from pg.186).

Note 1) The indicated dimensions are values for standard inserts (GM breakers). If other inserts are mounted, LF and LH may differ. Refer to "GYGW Insets" starting on page 156 for recommended conditions.

Spare Parts

 *		 *							
Clamp Screw		Blade Screw		Plug		Nozzle		Wrench 1	Wrench 2
Order Number	Pcs.	Order Number	Pcs.	Order Number	Pcs.	Order Number	Pcs.	Order Number	Order Number
GY06013M	1	TS55	5	HSD05004S	1	NZ22042080S	1	TKY25D	TKY30R

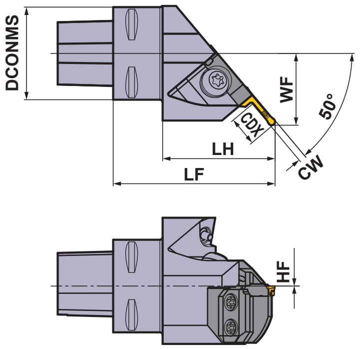
* Clamp Torque (lbf-in) : GY06013M=53, TS55=44
Nozzle Exchange Key : NZKH050S

GY SERIES (FOR RECESSING) NEW

PSC 50° type holder (Metric)

Note 1) Please order the modular blade and modular holder separately.
Note 2) Please set the left hand modular blade at the right hand holder and the right hand modular blade at the left hand holder.

P M K N S H



Left hand tool holder shown.

(mm)

Order Number	Stock	Hand (R/L)	Coolant	Mounting Size	DCONMS	CW
C4-GYHERM50-M25L	●	R	External	PSC40	40	2.0–6.35
C4-GYHELM50-M25R	●	L	External	PSC40	40	2.0–6.35
C5-GYHERM50-M25L	●	R	External	PSC50	50	2.0–6.35
C5-GYHELM50-M25R	●	L	External	PSC50	50	2.0–6.35
C6-GYHERM50-M25L	●	R	External	PSC63	63	2.0–6.35
C6-GYHELM50-M25R	●	L	External	PSC63	63	2.0–6.35

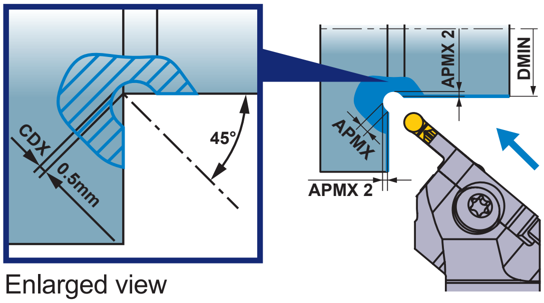
● = NEW

Spare Parts

 *		 *							
Clamp Screw		Blade Screw		Plug		Nozzle		Wrench 1	Wrench 2
Order Number	Pcs.	Order Number	Pcs.	Order Number	Pcs.	Order Number	Pcs.	Order Number	Order Number
GY06013M	1	TS55	4	HSD05004S	1	NZ22042080S	1	TKY25D	TKY30R

* Clamp Torque (lbf-in) : GY06013M=53, TS55=44
Nozzle Exchange Key : NZKH050S

● : USA Stock



Enlarged view

Set Dimensions with Modular Blades

(mm)

Holder Type	Modular Blade Type	Standard CW	CDX	DMIN	APMX	APMX2	WF	HF	LF	LH
C4-GYHER/LM50-M25L/R	**GYM25L/RC-D005**	2.0	0.5	30	1.50	0.646	30.6	0	70.2	48.8
C4-GYHER/LM50-M25L/R	**GYM25L/RC-E005**	2.5	0.5	30	1.75	0.720	30.8	0	70.1	48.7
C4-GYHER/LM50-M25L/R	**GYM25L/RC-F005**	3.0	0.5	30	2.00	0.793	31.0	0	70.0	48.6
C4-GYHER/LM50-M25L/R	**GYM25L/RC-G005**	4.0	0.5	20	2.50	0.939	31.4	0	69.8	48.4
C4-GYHER/LM50-M25L/R	**GYM25L/RC-H005**	5.0	0.5	20	2.88	1.049	31.8	0	69.6	48.2
C4-GYHER/LM50-M25L/R	**GYM25L/RC-J005**	6.0	0.5	20	3.50	1.232	32.4	0	69.4	48.0
C5-GYHER/LM50-M25L/R	**GYM25L/RC-D005**	2.0	0.5	30	1.50	0.646	32.6	0	70.2	48.8
C5-GYHER/LM50-M25L/R	**GYM25L/RC-E005**	2.5	0.5	30	1.75	0.720	32.8	0	70.1	48.7
C5-GYHER/LM50-M25L/R	**GYM25L/RC-F005**	3.0	0.5	30	2.00	0.793	33.0	0	70.0	48.6
C5-GYHER/LM50-M25L/R	**GYM25L/RC-G005**	4.0	0.5	20	2.50	0.939	33.4	0	69.8	48.4
C5-GYHER/LM50-M25L/R	**GYM25L/RC-H005**	5.0	0.5	20	2.88	1.049	33.8	0	69.6	48.2
C5-GYHER/LM50-M25L/R	**GYM25L/RC-J005**	6.0	0.5	20	3.50	1.232	34.4	0	69.4	48.0
C6-GYHER/LM50-M25L/R	**GYM25L/RC-D005**	2.0	0.5	30	1.50	0.646	39.6	0	70.2	46.8
C6-GYHER/LM50-M25L/R	**GYM25L/RC-E005**	2.5	0.5	30	1.75	0.720	39.8	0	70.1	46.7
C6-GYHER/LM50-M25L/R	**GYM25L/RC-F005**	3.0	0.5	30	2.00	0.793	40.0	0	70.0	46.6
C6-GYHER/LM50-M25L/R	**GYM25L/RC-G005**	4.0	0.5	20	2.50	0.939	40.4	0	69.8	46.4
C6-GYHER/LM50-M25L/R	**GYM25L/RC-H005**	5.0	0.5	20	2.88	1.049	40.8	0	69.6	46.2
C6-GYHER/LM50-M25L/R	**GYM25L/RC-J005**	6.0	0.5	20	3.50	1.232	41.4	0	69.4	46.0

DMIN = Min. Cut Diameter

*Modular blade type: Blades for face machining indicate a code for the minimum face grooving diameter. Example) GYM25RD-D12-040
The "◌" symbol is a position to insert the letter "A" for external diameter machining or "D" for face machining.
To select modular blades, refer to the Modular Blade List (starting from pg.186).

Note 1) The indicated dimensions are values for standard inserts (GM breakers). If other inserts are mounted, LF and LH may differ. Refer to "GYGW Insets" starting on page 156 for recommended conditions.

Modular Blade Order Number

■MODULAR BLADE

●EXTERNAL/FOR RECESSING

①	②	③	④		⑤	⑥
GY	**M25**	**R**	**A**	–	**F**	**12**

①Series Description

②Modular Blade Size
M20
M25

③Hand	
R	Right
L	Left

④Modular Blade Type	
A	Standard Type
C	External Recessing
D	Face Grooving

⑤Seat Size *1

	Inch	Metric
D	.079" .088"	2.00 mm 2.24 mm
E	.094" .098" .108"	2.39 mm 2.50 mm 2.74 mm
F	.118" .125" .128"	3.00 mm 3.18 mm 3.24 mm
G	.157" .167"	4.00 mm 4.24 mm
H	.187" .197" .206"	4.75 mm 5.00 mm 5.24 mm
J	.236" .248" .250"	6.00 mm 6.31 mm 6.35 mm

⑥Max. Groove Depth *2

	Inch	Metric
005	.197"	0.5 mm
06	.236"	6 mm
⋮	⋮	⋮
25	.984"	25.0 mm

●FACE GROOVING

①	②	③	④		⑤	⑥		⑦
GY	**M25**	**R**	**D**	–	**F**	**12**	–	**050**

⑦Min. Groove Diameter

	Inch	Metric
035	1.378"	35 mm
040	1.575"	40 mm
⋮	⋮	⋮
250	9.843"	250 mm

*1 Select a seat size with the same symbol as that of the insert.
*2 The maximum groove depth is a value when used for external grooving and changes according to the insert used.

Modular Blades Selection Chart

Holder Angle	Cutting Mode	Holder Type	Hand (R/L)	Seat Size	Modular Blade	
					Order Number	Hand (R/L)
00°	External	C◌-GYHERM00-M25R	R	D	GYM25RA-D06	R
				D	GYM25RA-D12	R
				D	GYM25RA-D20	R
				E	GYM25RA-E06	R
				E	GYM25RA-E12	R
				E	GYM25RA-E20	R
				F	GYM25RA-F06	R
				F	GYM25RA-F12	R
				F	GYM25RA-F20	R
				G	GYM25RA-G08	R
				G	GYM25RA-G14	R
				G	GYM25RA-G25	R
				H	GYM25RA-H08	R
				H	GYM25RA-H14	R
				H	GYM25RA-H25	R
				J	GYM25RA-J08	R
				J	GYM25RA-J14	R
				J	GYM25RA-J25	R
		C◌-GYHELM00-M25L	L	D	GYM25LA-D06	L
				D	GYM25LA-D12	L
				D	GYM25LA-D20	L
				E	GYM25LA-E06	L
				E	GYM25LA-E12	L
				E	GYM25LA-E20	L
				F	GYM25LA-F06	L
				F	GYM25LA-F12	L
				F	GYM25LA-F20	L
				G	GYM25LA-G08	L
				G	GYM25LA-G14	L
				G	GYM25LA-G25	L
				H	GYM25LA-H08	L
				H	GYM25LA-H14	L
				H	GYM25LA-H25	L
				J	GYM25LA-J08	L
				J	GYM25LA-J14	L
				J	GYM25LA-J25	L
00°	Face Grooving	C◌-GYHERM00-M25R	R	D	GYM25RD-D12-040	R
				D	GYM25RD-D12-050	R
				D	GYM25RD-D12-060	R
				D	GYM25RD-D12-075	R
				D	GYM25RD-D12-100	R
				D	GYM25RD-D12-135	R
				D	GYM25RD-D12-180	R
				E	GYM25RD-E12-040	R
				E	GYM25RD-E12-050	R
				E	GYM25RD-E12-060	R
				E	GYM25RD-E12-075	R
				E	GYM25RD-E12-100	R
				E	GYM25RD-E12-135	R
				E	GYM25RD-E12-180	R
				F	GYM25RD-F12-035	R
				F	GYM25RD-F12-040	R
				F	GYM25RD-F12-050	R
				F	GYM25RD-F12-060	R
				F	GYM25RD-F12-075	R
				F	GYM25RD-F12-100	R
				F	GYM25RD-F12-135	R
				F	GYM25RD-F12-180	R
				F	GYM25RD-F12-225	R
				F	GYM25RD-F20-060	R
				F	GYM25RD-F20-075	R
				F	GYM25RD-F20-100	R
				F	GYM25RD-F20-135	R
				F	GYM25RD-F20-180	R
				F	GYM25RD-F20-225	R
				G	GYM25RD-G14-040	R
				G	GYM25RD-G14-050	R
				G	GYM25RD-G14-060	R

Holder Angle	Cutting Mode	Holder Type	Hand (R/L)	Seat Size	Modular Blade	
					Order Number	Hand (R/L)
00°	Face Grooving	C◌-GYHERM00-M25R	R	G	GYM25RD-G14-085	R
				G	GYM25RD-G14-125	R
				G	GYM25RD-G14-180	R
				G	GYM25RD-G14-250	R
				G	GYM25RD-G25-060	R
				G	GYM25RD-G25-085	R
				G	GYM25RD-G25-125	R
				G	GYM25RD-G25-180	R
				G	GYM25RD-G25-250	R
				H	GYM25RD-H14-050	R
				H	GYM25RD-H14-060	R
				H	GYM25RD-H14-085	R
				H	GYM25RD-H14-125	R
				H	GYM25RD-H14-180	R
				H	GYM25RD-H14-250	R
				H	GYM25RD-H25-060	R
				H	GYM25RD-H25-085	R
				H	GYM25RD-H25-125	R
				H	GYM25RD-H25-180	R
				H	GYM25RD-H25-250	R
				J	GYM25RD-J14-050	R
				J	GYM25RD-J14-070	R
				J	GYM25RD-J14-110	R
				J	GYM25RD-J14-170	R
				J	GYM25RD-J14-250	R
				J	GYM25RD-J25-070	R
				J	GYM25RD-J25-110	R
				J	GYM25RD-J25-170	R
				J	GYM25RD-J25-250	R
		C◌-GYHELM00-M25L	L	D	GYM25LD-D12-040	L
				D	GYM25LD-D12-050	L
				D	GYM25LD-D12-060	L
				D	GYM25LD-D12-075	L
				D	GYM25LD-D12-100	L
				D	GYM25LD-D12-135	L
				D	GYM25LD-D12-180	L
				E	GYM25LD-E12-040	L
				E	GYM25LD-E12-050	L
				E	GYM25LD-E12-060	L
				E	GYM25LD-E12-075	L
				E	GYM25LD-E12-100	L
				E	GYM25LD-E12-135	L
				E	GYM25LD-E12-180	L
				F	GYM25LD-F12-035	L
				F	GYM25LD-F12-040	L
				F	GYM25LD-F12-050	L
				F	GYM25LD-F12-060	L
				F	GYM25LD-F12-075	L
				F	GYM25LD-F12-100	L
				F	GYM25LD-F12-135	L
				F	GYM25LD-F12-180	L
				F	GYM25LD-F12-225	L
				F	GYM25LD-F20-060	L
				F	GYM25LD-F20-075	L
				F	GYM25LD-F20-100	L
				F	GYM25LD-F20-135	L
				F	GYM25LD-F20-180	L
				F	GYM25LD-F20-225	L
				G	GYM25LD-G14-040	L
				G	GYM25LD-G14-050	L
				G	GYM25LD-G14-060	L
				G	GYM25LD-G14-085	L
				G	GYM25LD-G14-125	L
				G	GYM25LD-G14-180	L
				G	GYM25LD-G14-250	L
				G	GYM25LD-G25-060	L
				G	GYM25LD-G25-085	L
				G	GYM25LD-G25-125	L

Modular Blades Selection Chart

Holder Angle	Cutting Mode	Holder Type	Hand (R/L)	Seat Size	Modular Blade	
					Order Number	Hand (R/L)
00°	Face Grooving	C◌-GYHELM00-M25L	L	G	GYM25LD-G25-180	L
				G	GYM25LD-G25-250	L
				H	GYM25LD-H14-050	L
				H	GYM25LD-H14-060	L
				H	GYM25LD-H14-085	L
				H	GYM25LD-H14-125	L
				H	GYM25LD-H14-180	L
				H	GYM25LD-H14-250	L
				H	GYM25LD-H25-060	L
				H	GYM25LD-H25-085	L
				H	GYM25LD-H25-125	L
				H	GYM25LD-H25-180	L
				H	GYM25LD-H25-250	L
				J	GYM25LD-J14-050	L
				J	GYM25LD-J14-070	L
				J	GYM25LD-J14-110	L
				J	GYM25LD-J14-170	L
				J	GYM25LD-J14-250	L
				J	GYM25LD-J25-070	L
				J	GYM25LD-J25-110	L
				J	GYM25LD-J25-170	L
				J	GYM25LD-J25-250	L
90°	External	C◌-GYHERM90-M25L	R	D	GYM25LA-D06	L
				D	GYM25LA-D12	L
				D	GYM25LA-D20	L
				E	GYM25LA-E06	L
				E	GYM25LA-E12	L
				E	GYM25LA-E20	L
				F	GYM25LA-F06	L
				F	GYM25LA-F12	L
				F	GYM25LA-F20	L
				G	GYM25LA-G08	L
				G	GYM25LA-G14	L
				G	GYM25LA-G25	L
				H	GYM25LA-H08	L
				H	GYM25LA-H14	L
				H	GYM25LA-H25	L
				J	GYM25LA-J08	L
				J	GYM25LA-J14	L
				J	GYM25LA-J25	L
		C◌-GYHELM90-M25R	L	D	GYM25RA-D06	R
				D	GYM25RA-D12	R
				D	GYM25RA-D20	R
				E	GYM25RA-E06	R
				E	GYM25RA-E12	R
				E	GYM25RA-E20	R
				F	GYM25RA-F06	R
				F	GYM25RA-F12	R
				F	GYM25RA-F20	R
				G	GYM25RA-G08	R
				G	GYM25RA-G14	R
				G	GYM25RA-G25	R
				H	GYM25RA-H08	R
				H	GYM25RA-H14	R
				H	GYM25RA-H25	R
				J	GYM25RA-J08	R
				J	GYM25RA-J14	R
				J	GYM25RA-J25	R
90°	Face Grooving	C◌-GYHERM90-M25L	R	D	GYM25LD-D12-040	L
				D	GYM25LD-D12-050	L
				D	GYM25LD-D12-060	L
				D	GYM25LD-D12-075	L
				D	GYM25LD-D12-100	L
				D	GYM25LD-D12-135	L
				D	GYM25LD-D12-180	L
				E	GYM25LD-E12-040	L
				E	GYM25LD-E12-050	L
				E	GYM25LD-E12-060	L
90°	Face Grooving	C◌-GYHERM90-M25L	R	E	GYM25LD-E12-075	L
				E	GYM25LD-E12-100	L
				E	GYM25LD-E12-135	L
				E	GYM25LD-E12-180	L
				F	GYM25LD-F12-035	L
				F	GYM25LD-F12-040	L
				F	GYM25LD-F12-050	L
				F	GYM25LD-F12-060	L
				F	GYM25LD-F12-075	L
				F	GYM25LD-F12-100	L
				F	GYM25LD-F12-135	L
				F	GYM25LD-F12-180	L
				F	GYM25LD-F12-225	L
				F	GYM25LD-F20-060	L
				F	GYM25LD-F20-075	L
				F	GYM25LD-F20-100	L
				F	GYM25LD-F20-135	L
				F	GYM25LD-F20-180	L
				F	GYM25LD-F20-225	L
				G	GYM25LD-G14-040	L
				G	GYM25LD-G14-050	L
				G	GYM25LD-G14-060	L
				G	GYM25LD-G14-085	L
				G	GYM25LD-G14-125	L
				G	GYM25LD-G14-180	L
				G	GYM25LD-G14-250	L
				G	GYM25LD-G25-060	L
				G	GYM25LD-G25-085	L
				G	GYM25LD-G25-125	L
				G	GYM25LD-G25-180	L
				G	GYM25LD-G25-250	L
				H	GYM25LD-H14-050	L
				H	GYM25LD-H14-060	L
				H	GYM25LD-H14-085	L
				H	GYM25LD-H14-125	L
				H	GYM25LD-H14-180	L
				H	GYM25LD-H14-250	L
				H	GYM25LD-H25-060	L
				H	GYM25LD-H25-085	L
				H	GYM25LD-H25-125	L
				H	GYM25LD-H25-180	L
				H	GYM25LD-H25-250	L
				J	GYM25LD-J14-050	L
				J	GYM25LD-J14-070	L
				J	GYM25LD-J14-110	L
				J	GYM25LD-J14-170	L
				J	GYM25LD-J14-250	L
				J	GYM25LD-J25-070	L
				J	GYM25LD-J25-110	L
				J	GYM25LD-J25-170	L
				J	GYM25LD-J25-250	L
		C◌-GYHELM90-M25R	L	D	GYM25RD-D12-040	R
				D	GYM25RD-D12-050	R
				D	GYM25RD-D12-060	R
				D	GYM25RD-D12-075	R
				D	GYM25RD-D12-100	R
				D	GYM25RD-D12-135	R
				D	GYM25RD-D12-180	R
				E	GYM25RD-E12-040	R
				E	GYM25RD-E12-050	R
				E	GYM25RD-E12-060	R
				E	GYM25RD-E12-075	R
				E	GYM25RD-E12-100	R
				E	GYM25RD-E12-135	R
				E	GYM25RD-E12-180	R
				F	GYM25RD-F12-035	R
				F	GYM25RD-F12-040	R
				F	GYM25RD-F12-050	R

Holder Angle	Cutting Mode	Holder Type	Hand (R/L)	Seat Size	Modular Blade	
					Order Number	Hand (R/L)
90°	Face Grooving	C◌-GYHELM90-M25R	L	F	GYM25RD-F12-060	R
				F	GYM25RD-F12-075	R
				F	GYM25RD-F12-100	R
				F	GYM25RD-F12-135	R
				F	GYM25RD-F12-180	R
				F	GYM25RD-F12-225	R
				F	GYM25RD-F20-060	R
				F	GYM25RD-F20-075	R
				F	GYM25RD-F20-100	R
				F	GYM25RD-F20-135	R
				F	GYM25RD-F20-180	R
				F	GYM25RD-F20-225	R
				G	GYM25RD-G14-040	R
				G	GYM25RD-G14-050	R
				G	GYM25RD-G14-060	R
				G	GYM25RD-G14-085	R
				G	GYM25RD-G14-125	R
				G	GYM25RD-G14-180	R
				G	GYM25RD-G14-250	R
				G	GYM25RD-G25-060	R
				G	GYM25RD-G25-085	R
				G	GYM25RD-G25-125	R
				G	GYM25RD-G25-180	R
				G	GYM25RD-G25-250	R
				H	GYM25RD-H14-050	R
				H	GYM25RD-H14-060	R
				H	GYM25RD-H14-085	R
				H	GYM25RD-H14-125	R
				H	GYM25RD-H14-180	R
				H	GYM25RD-H14-250	R
				H	GYM25RD-H25-060	R
				H	GYM25RD-H25-085	R
				H	GYM25RD-H25-125	R
				H	GYM25RD-H25-180	R
				H	GYM25RD-H25-250	R
				J	GYM25RD-J14-050	R
				J	GYM25RD-J14-070	R
				J	GYM25RD-J14-110	R
				J	GYM25RD-J14-170	R
				J	GYM25RD-J14-250	R
				J	GYM25RD-J25-070	R
				J	GYM25RD-J25-110	R
				J	GYM25RD-J25-170	R
				J	GYM25RD-J25-250	R

Holder Angle	Cutting Mode	Holder Type	Hand (R/L)	Seat Size	Modular Blade	
					Order Number	Hand (R/L)
50°	For Recessing	C◌-GYHERM50-M25L	R	D	GYM25LC-D005	L
				E	GYM25LC-E005	L
				F	GYM25LC-F005	L
				G	GYM25LC-G005	L
				H	GYM25LC-H005	L
				J	GYM25LC-J005	L
		C◌-GYHELM50-M25R	L	D	GYM25RC-D005	R
				E	GYM25RC-E005	R
				F	GYM25RC-F005	R
				G	GYM25RC-G005	R
				H	GYM25RC-H005	R
				J	GYM25RC-J005	R

Cutting Off & Grooving System

Please use the catalogues below for insert selection and recommended cutting conditions.

C009A 2019-2020

General Catalog

MITSUBISHI MATERIALS C009A

CUTTING TOOLS
2020-2021

TURNING TOOLS
MILLING TOOLS
DRILLING TOOLS

DIAEDGE

B255A-G TOOL NEWS

GY/GW Series Inserts

DIAEDGE TOOL NEWS 2021.4 Update B255A-G

Cutting Off & Grooving System GY/GW Series

GY/GW Inserts

Series Expansion

Grooving Revolution

Durable and Easy to Use Grooving and Cutting Off Tools

MITSUBISHI MATERIALS CORPORATION

PG.143

DIAEDGE

TOOL NEWS

B205A-F

For Swiss-Type Automatic Lathes MS plus End Mill Series

MP2ES/3ES/4EC

New Product

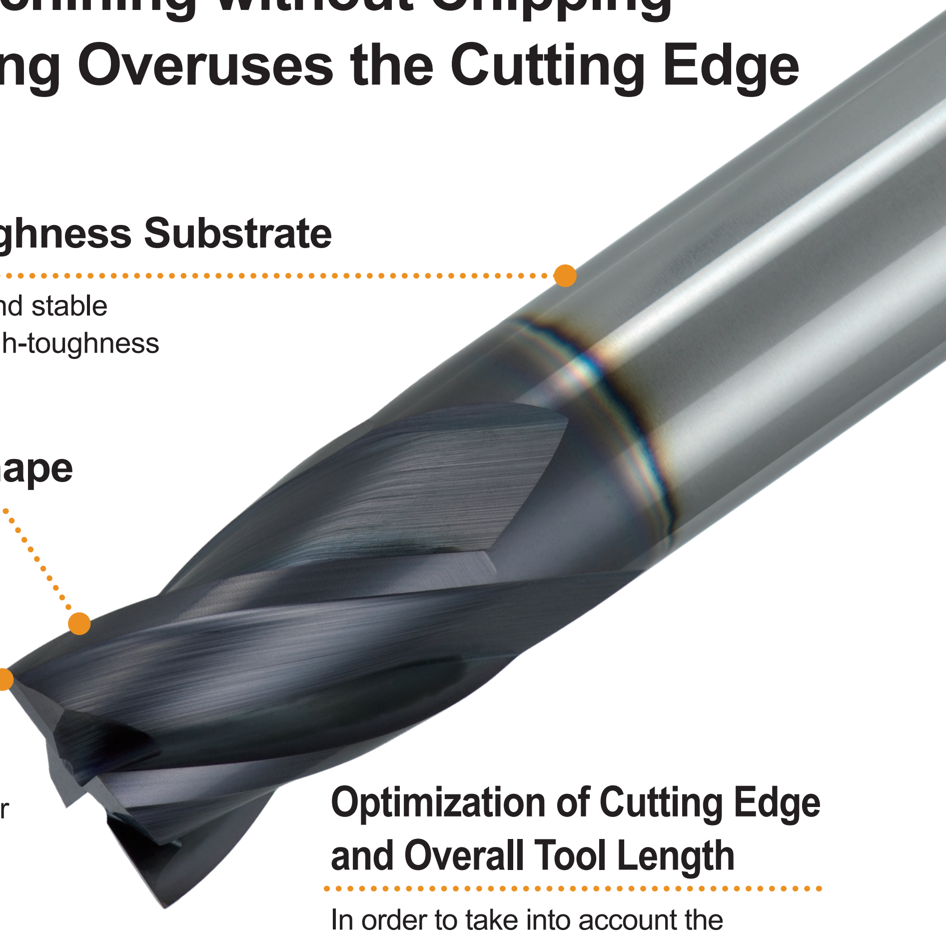
Fracture Resistance & Burr Reduction to Combat Problems Commonly Encountered with Small Swiss-Type Automatic Lathes

MITSUBISHI MATERIALS CORPORATION

For Swiss-Type Automatic Lathes
MS plus End Mill Series

MP2ES/3ES/4EC

Achieves Stable Machining without Chipping Even when Machining Overuses the Cutting Edge



Adoption of New High-Toughness Substrate

Fracture resistance is greatly improved and stable machining is accomplished by using a high-toughness carbide substrate.

Optimized Cutting Edge Shape

The optimized rake angle suppresses burrs.

Improved Cutting Edge Machining

To improve the fracture resistance of the cutting edge, a small gash land is used for Ø6mm or greater.

Optimization of Cutting Edge and Overall Tool Length

In order to take into account the protrusion of the small Swiss-type Automatic Lathes, the cutting edge and overall tool length have been optimized.

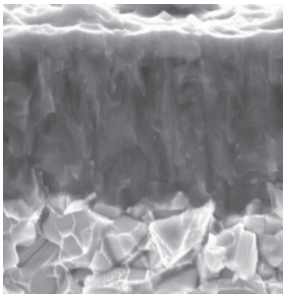
(Al, Ti, Cr)N Multilayer Coating (MS plus)

Suitable coating for a broad range of workpiece materials such as carbon steels and stainless steels.

Our original coating technology incorporates a multilayer of (Al, Ti)N and (Al, Cr)N.
It allows machining of a wide range of workpiece materials.

Properties of MS plus coating

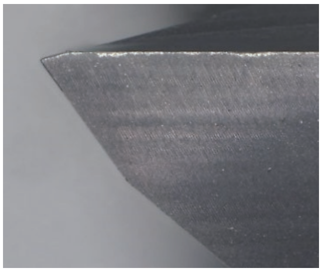
	(Al,Ti,Cr)N multilayer	(Al,Ti)N	(Al,Cr)N
Hardness (HV)	**3200**	2800	3100
Oxidation Temperature (F°)	**2.012**	1.472	2.012
Adhesion (N)	**100**	80	80



Cutting Performance

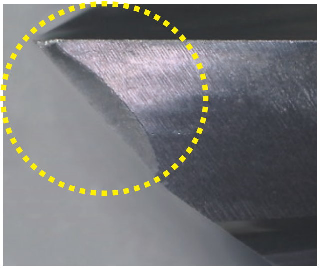
Machining 304 - Comparison of Fracture Resistance

The round, stainless steel bar is machined using a D-cut. The adoption of the high toughness cemented carbide and gash land provides highly improved fracture resistance.



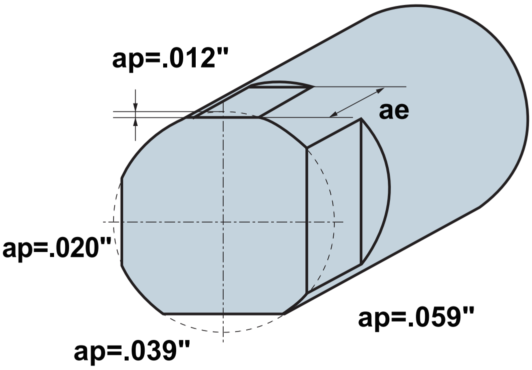
MP3ES

After machining of 2 pieces



Conventional

After machining 1 piece
Fracture of the tip of the tool.

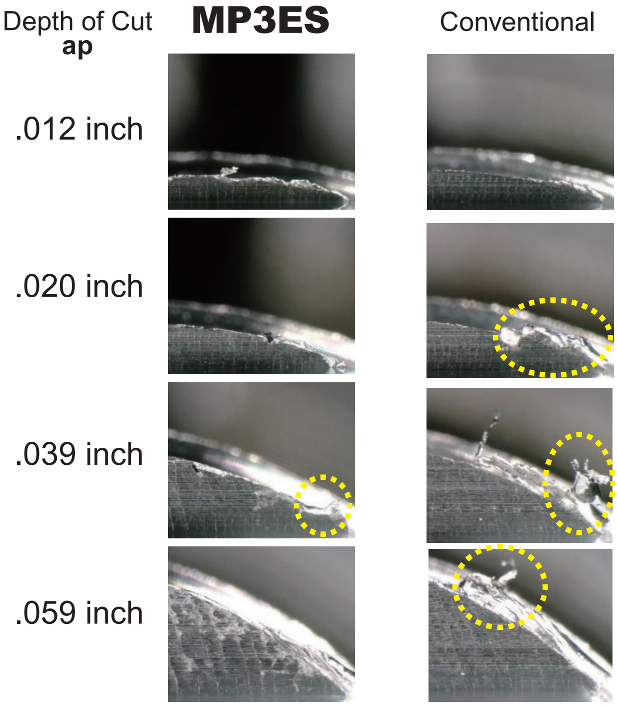


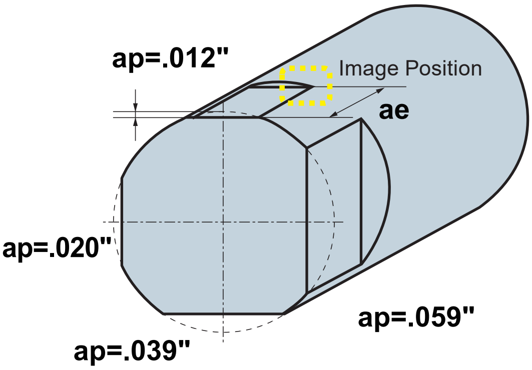
<Cutting Conditions>

Workpiece Material	: AISI 304
Tool	: MP3ESD0800S08
Cutting Speed	: vc = 165 SFM
Feed Rate	: f = 5.9 IPM
Feed per Tooth	: fr = .0010 inch
Depth of Cut	: ap = .012-.059 inch ae = .236
Cutting Mode	: Wet Cutting (Oil)
Machine	: Small Automatic Lathe
Tool Post	: Gang Type Tool Post

Machined 304 - Comparison of Burr Generation

The optimized cutting edge shape suppresses the occurrence of burrs.





<Cutting Conditions>

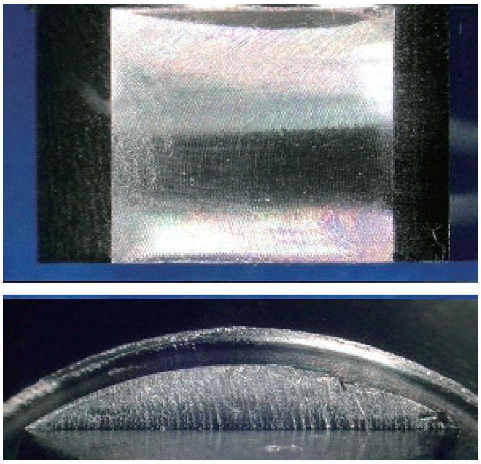
Workpiece Material	: AISI 304
Tool	: MP3ESD0800S08
Cutting Speed	: vc = 165 SFM
Feed Rate	: f = 5.9 IPM
Feed per Tooth	: fr = .0010 inch
Depth of Cut	: ap = .012-.059 inch ae = .236
Cutting Mode	: Wet Cutting (Oil)
Machine	: Small Automatic Lathe
Tool Post	: Gang Type Tool Post

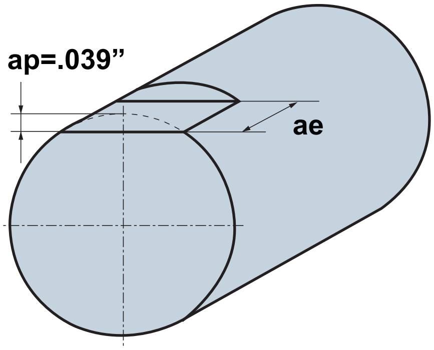
Cutting Performance

Machined 304 - Comparison of Surface Finishes

The surface finish is greatly improved due to the improved chatter resistance.

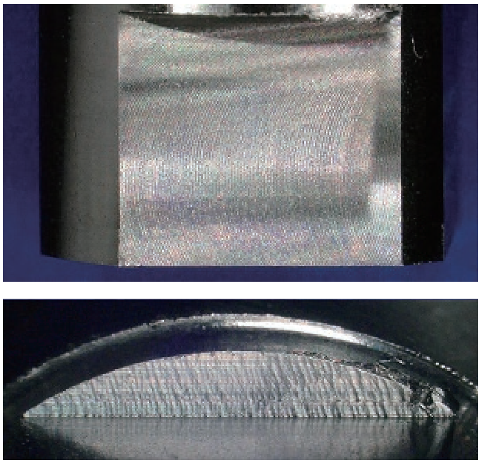
MP3ES
Ra .008 μ-inch



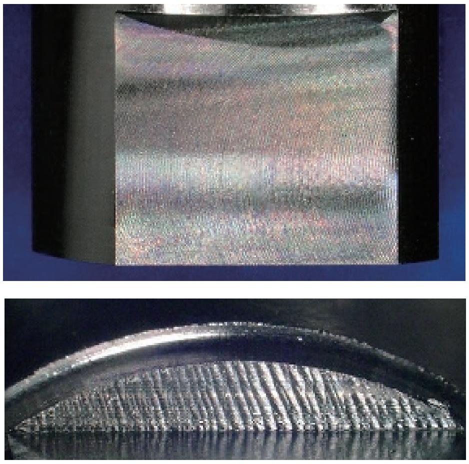


<Cutting Conditions>
Workpiece Material : JIS SUS304
Tool : MP3ESD0800S08
Cutting Speed : vc = 165 SFM
Feed Rate : f = 5.9 IPM
Feed per Tooth : fr = .0010 inch
Depth of Cut : ap = .039 inch
ae = .236
Cutting Mode : Wet Cutting (Oil)
Machine : Small Automatic Lathe
Tool Post : Gang Type Tool Post

Conventional A
Ra .024 μ-inch

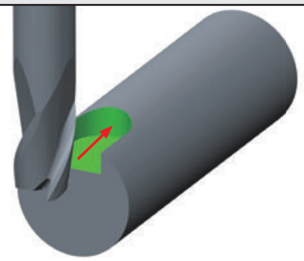
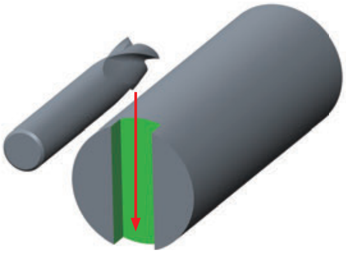
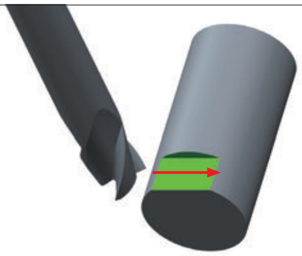
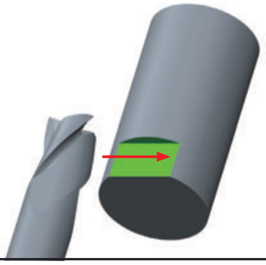


Conventional B
Ra .030 μ-inch



Selection of End Mill for Swiss-Type Lathe

① The number of Flutes must be selected according to the type of machining.

Cuttig Mode	Type	MP2ES	MP3ES	MP4EC
	Flutes	2 Flute	3 Flute	4 Flute
Slotting of External		◎	○	×
Slotting of Facing		◎	○	×
Face Milling		△	◎	○
Shoulder Milling		△	○	◎

② Selecting Tools Other Than Small Swiss-Type Automatic Lathe End Mills

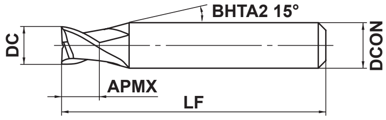
End Mills with an overall tool length of LF=50 mm or less can be used even with small Swiss-type automatic lathe end mills.
Select the necessary tools according to the workpiece material and machining method (such as every 0.1 or radius).

MP2ES NEW

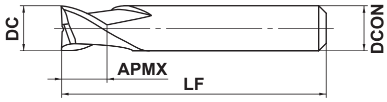
End mill, 2 flute, For Swiss-type lathe

UWC MS+ 30° DC<6 DC≥6

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy	Copper Alloy	Aluminum Alloy
◎	◎	○		○	○	○	



Type1



Type2

	3≤DC≤10				
	- 0.010 - 0.030				
h6	4≤DCON≤6	7≤DCON≤10			
	0 - 0.008	0 - 0.009			

- 2 flute end mill.

(mm)

Order Number	DC	APMX	LF	DCON	* No.F	Stock	Type
MP2ESD0300S04	3	4.5	50	4	2	●	1
MP2ESD0400S04	4	6	50	4	2	●	2
MP2ESD0500S06	5	7.5	50	6	2	●	1
MP2ESD0600S06	6	9	50	6	2	★	2
MP2ESD0700S07	7	10.5	50	7	2	★	2
MP2ESD0800S08	8	12	50	8	2	★	2
MP2ESD1000S10	10	15	50	10	2	●	2

* Number of Flutes

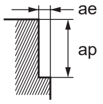
DC = Dia.
APMX = Length of Cut
LF = Overall Length
DCON = Shank Dia.

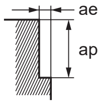
● : USA Stock ★ : Stocked in Japan

Recommended Cutting Conditions

■Side Milling

(inch)

Workpiece Material		Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20				Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21				Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V			
Dia. **DC**		Revolution (min^{-1})	Feed rate (IPM)	Depth of Cut **ap**	Width of Cut **ae**	Revolution (min^{-1})	Feed rate (IPM)	Depth of Cut **ap**	Width of Cut **ae**	Revolution (min^{-1})	Feed rate (IPM)	Depth of Cut **ap**	Width of Cut **ae**
(mm)	(inch)												
3	**.118**	10000	23.6	.118	.024	7000	15.7	.118	.024	6000	11.8	.118	.024
4	**.157**	7500	23.6	.157	.024	5200	15.7	.157	.024	4500	11.8	.157	.024
5	**.197**	6000	23.6	.197	.024	4200	15.7	.197	.024	3600	11.8	.197	.024
6	**.236**	5000	23.6	.236	.024	3500	15.7	.236	.024	3000	11.8	.236	.024
7	**.276**	4500	22.0	.276	.024	3200	14.2	.276	.024	2700	11.0	.276	.024
8	**.315**	4000	20.5	.315	.024	2800	13.8	.315	.024	2400	10.2	.315	.024
10	**.394**	3200	17.7	.394	.024	2200	11.8	.394	.024	1900	9.1	.394	.024
Depth of Cut													

Workpiece Material		Hardened steel (45−55HRC) AISI H13				Copper, Copper Alloy			
Dia. **DC**		Revolution (min^{-1})	Feed rate (IPM)	Depth of Cut **ap**	Width of Cut **ae**	Revolution (min^{-1})	Feed rate (IPM)	Depth of Cut **ap**	Width of Cut **ae**
(mm)	(inch)								
3	**.118**	5000	4.7	.118	.008	13000	30.7	.118	.024
4	**.157**	4000	4.7	.157	.008	9500	29.9	.157	.024
5	**.197**	3200	4.7	.197	.008	7600	29.9	.197	.024
6	**.236**	2700	4.7	.236	.008	6400	30.3	.236	.024
7	**.276**	2300	4.3	.276	.008	5500	26.8	.276	.024
8	**.315**	2000	4.3	.315	.008	4800	24.4	.315	.024
10	**.394**	1600	3.9	.394	.008	3800	20.9	.394	.024
Depth of Cut									

Note 1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is effective.
Note 2) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 3) When drilling, please set the feed rate at 1/3 or below the values above.
Note 4) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

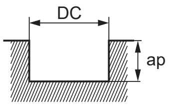
MP2ES

End mill, 2 flute, For Swiss-type lathe

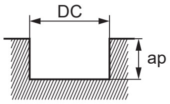
Recommended Cutting Conditions

Slotting

(inch)

Workpiece Material		Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20			Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21			Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		
Dia. **DC**		Revolution (min^{-1})	Feed rate (IPM)	Depth of Cut **ap**	Revolution (min^{-1})	Feed rate (IPM)	Depth of Cut **ap**	Revolution (min^{-1})	Feed rate (IPM)	Depth of Cut **ap**
(mm)	(inch)									
3	**.118**	10000	23.6	.024	7000	15.7	.024	6000	11.8	.024
4	**.157**	7500	23.6	.024	5200	15.7	.024	4500	11.8	.024
5	**.197**	6000	23.6	.024	4200	15.7	.024	3600	11.8	.024
6	**.236**	5000	23.6	.024	3500	15.7	.024	3000	11.8	.024
7	**.276**	4500	22.0	.024	3200	14.2	.024	2700	11.0	.024
8	**.315**	4000	20.5	.024	2800	13.8	.024	2400	10.2	.024
10	**.394**	3200	17.7	.024	2200	11.8	.024	1900	9.1	.024
Depth of Cut		 DC ap								

DC:Dia.

Workpiece Material		Hardened steel (45−55HRC) AISI H13			Copper, Copper Alloy		
Dia. **DC**		Revolution (min^{-1})	Feed rate (IPM)	Depth of Cut **ap**	Revolution (min^{-1})	Feed rate (IPM)	Depth of Cut **ap**
(mm)	(inch)						
3	**.118**	5000	4.7	.008	13000	30.7	.024
4	**.157**	4000	4.7	.008	9500	29.9	.024
5	**.197**	3200	4.7	.008	7600	29.9	.024
6	**.236**	2700	4.7	.008	6400	30.3	.024
7	**.276**	2300	4.3	.008	5500	26.8	.024
8	**.315**	2000	4.3	.008	4800	24.4	.024
10	**.394**	1600	3.9	.008	3800	20.9	.024
Depth of Cut		 DC ap					

DC:Dia.

Note 1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is effective.
Note 2) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 3) When drilling, please set the feed rate at 1/3 or below the values above.
Note 4) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

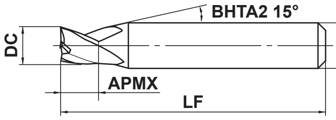
MP3ES **NEW**

End mill, 3 flute, For Swiss-type lathe

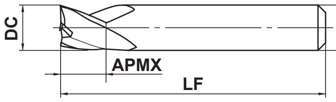
30°

DC<6

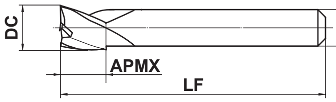
Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Heat Resistant Alloy	Copper Alloy	Aluminum Alloy
◎	◎	○		○	○	○	



Type1



Type2



Type3

3≤DC≤12				
- 0.010 - 0.030				
4≤DCON≤6	7≤DCON≤10	DCON=12		
0 - 0.008	- 0 - 0.009	0 - 0.011		

- 3 flute end mill.

(mm)

Order Number	DC	APMX	LF	DCON	* No.F	Stock	Type
MP3ESD0300S04	3	4.5	50	4	3	●	1
MP3ESD0400S04	4	6	50	4	3	★	2
MP3ESD0500S06	5	7.5	50	6	3	●	1
MP3ESD0600S06	6	9	50	6	3	★	2
MP3ESD0700S07	7	10.5	50	7	3	●	2
MP3ESD0800S08	8	12	50	8	3	★	2
MP3ESD0900S10	9	13.5	50	10	3	★	1
MP3ESD1000S10	10	15	50	10	3	●	2
MP3ESD1200S10	12	15	50	10	3	●	3
MP3ESD1200S12	12	15	50	12	3	★	2

* Number of Flutes

DC = Dia.
APMX = Length of Cut
LF = Overall Length
DCON = Shank Dia.

● : USA Stock ★ : Stocked in Japan

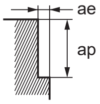
MP3ES

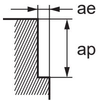
End mill, 3 flute, For Swiss-type lathe

Recommended Cutting Conditions

■Side Milling

(inch)

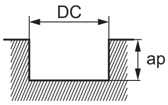
Workpiece Material		Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20				Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21				Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V			
Dia. **DC**		Revolution	Feed rate	Depth of Cut	Width of Cut	Revolution	Feed rate	Depth of Cut	Width of Cut	Revolution	Feed rate	Depth of Cut	Width of Cut
(mm)	(inch)	(min^{-1})	(IPM)	**ap**	**ae**	(min^{-1})	(IPM)	**ap**	**ae**	(min^{-1})	(IPM)	**ap**	**ae**
3	**.118**	10000	28.3	.118	.024	7000	18.9	.118	.024	6000	14.2	.118	.024
4	**.157**	7500	28.3	.157	.024	5200	18.9	.157	.024	4500	14.2	.157	.024
5	**.197**	6000	28.3	.197	.024	4200	18.9	.197	.024	3600	14.2	.197	.024
6	**.236**	5000	28.3	.236	.024	3500	18.9	.236	.024	3000	14.2	.236	.024
7	**.276**	4500	26.4	.276	.024	3200	17.3	.276	.024	2700	13.4	.276	.024
8	**.315**	4000	24.4	.315	.024	2800	16.5	.315	.024	2400	12.2	.315	.024
9	**.354**	3500	22.8	.354	.024	2500	15.0	.354	.024	2100	11.4	.354	.024
10	**.394**	3200	21.3	.394	.024	2200	14.2	.394	.024	1900	11.0	.394	.024
12	**.472**	2700	19.3	.472	.024	1900	12.6	.472	.024	1600	9.8	.472	.024
Depth of Cut													

Workpiece Material		Hardened steel (45−55HRC) AISI H13				Copper, Copper Alloy			
Dia. **DC**		Revolution	Feed rate	Depth of Cut	Width of Cut	Revolution	Feed rate	Depth of Cut	Width of Cut
(mm)	(inch)	(min^{-1})	(IPM)	**ap**	**ae**	(min^{-1})	(IPM)	**ap**	**ae**
3	**.118**	5000	5.5	.118	.008	13000	37.0	.118	.024
4	**.157**	4000	5.5	.157	.008	9500	35.8	.157	.024
5	**.197**	3200	5.5	.197	.008	7600	35.8	.197	.024
6	**.236**	2700	5.5	.236	.008	6400	36.2	.236	.024
7	**.276**	2300	5.1	.276	.008	5500	32.3	.276	.024
8	**.315**	2000	5.1	.315	.008	4800	29.1	.315	.024
9	**.354**	1800	5.1	.354	.008	4200	27.6	.354	.024
10	**.394**	1600	4.7	.394	.008	3800	25.2	.394	.024
12	**.472**	1300	4.7	.472	.008	3200	22.8	.472	.024
Depth of Cut									

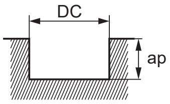
Note 1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is effective.
Note 2) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 3) When drilling, please set the feed rate at 1/3 or below the values above.
Note 4) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

■Slotting

(inch)

Workpiece Material		Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20			Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21			Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		
Dia. **DC**		Revolution (min^{-1})	Feed rate (IPM)	Depth of Cut **ap**	Revolution (min^{-1})	Feed rate (IPM)	Depth of Cut **ap**	Revolution (min^{-1})	Feed rate (IPM)	Depth of Cut **ap**
(mm)	(inch)									
3	**.118**	10000	28.3	.024	7000	18.9	.024	6000	14.2	.024
4	**.157**	7500	28.3	.024	5200	18.9	.024	4500	14.2	.024
5	**.197**	6000	28.3	.024	4200	18.9	.024	3600	14.2	.024
6	**.236**	5000	28.3	.024	3500	18.9	.024	3000	14.2	.024
7	**.276**	4500	26.4	.024	3200	17.3	.024	2700	13.4	.024
8	**.315**	4000	24.4	.024	2800	16.5	.024	2400	12.2	.024
9	**.354**	3500	22.8	.024	2500	15.0	.024	2100	11.4	.024
10	**.394**	3200	21.3	.024	2200	14.2	.024	1900	11.0	.024
12	**.472**	2700	19.3	.024	1900	12.6	.024	1600	9.8	.024
Depth of Cut										

DC:Dia.

Workpiece Material		Hardened steel (45−55HRC) AISI H13			Copper, Copper Alloy		
Dia. **DC**		Revolution (min^{-1})	Feed rate (IPM)	Depth of Cut **ap**	Revolution (min^{-1})	Feed rate (IPM)	Depth of Cut **ap**
(mm)	(inch)						
3	**.118**	5000	5.5	.008	13000	37.0	.024
4	**.157**	4000	5.5	.008	9500	35.8	.024
5	**.197**	3200	5.5	.008	7600	35.8	.024
6	**.236**	2700	5.5	.008	6400	36.2	.024
7	**.276**	2300	5.1	.008	5500	32.3	.024
8	**.315**	2000	5.1	.008	4800	29.1	.024
9	**.354**	1800	5.1	.008	4200	27.6	.024
10	**.394**	1600	4.7	.008	3800	25.2	.024
12	**.472**	1300	4.7	.008	3200	22.8	.024
Depth of Cut							

DC:Dia.

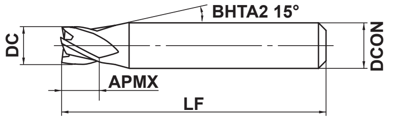
Note 1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is effective.
Note 2) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 3) When drilling, please set the feed rate at 1/3 or below the values above.
Note 4) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

MP4EC NEW

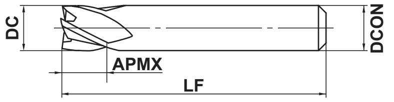
End mill, 4 flute, For Swiss-type lathe

UWC MS+ 30° DC<6

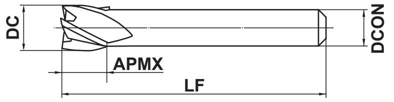
Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy	Copper Alloy	Aluminum Alloy
◎	◎	○		○	○	○	



Type1



Type2



Type3

3≤DC≤12	DC=14			
- 0.010 - 0.030	- 0.010 - 0.040			

h6				
4≤DCON≤6	7≤DCON≤10	DCON=12		
0 - 0.008	0 - 0.009	0 - 0.011		

- 4 flute end mill.

(mm)

Order Number	DC	APMX	LF	DCON	* No.F	Stock	Type
MP4ECD0300S04	3	4.5	50	4	4	●	1
MP4ECD0350S04	3.5	5	50	4	4	★	1
MP4ECD0400S04	4	6	50	4	4	●	2
MP4ECD0500S06	5	7.5	50	6	4	●	1
MP4ECD0600S06	6	9	50	6	4	●	2
MP4ECD0700S07	7	10.5	50	7	4	★	2
MP4ECD0800S07	8	12	50	7	4	★	3
MP4ECD0800S08	8	12	50	8	4	●	2
MP4ECD0900S10	9	13.5	50	10	4	●	1
MP4ECD1000S07	10	15	50	7	4	★	3
MP4ECD1000S10	10	15	50	10	4	●	2
MP4ECD1200S10	12	15	50	10	4	●	3
MP4ECD1200S12	12	15	50	12	4	★	2
MP4ECD1400S10	14	15	50	10	4	●	3

* Number of Flutes

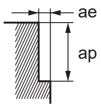
DC = Dia.
APMX = Length of Cut
LF = Overall Length
DCON = Shank Dia.

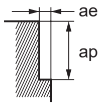
● : USA Stock ★ : Stocked in Japan

Recommended Cutting Conditions

Side Milling

(inch)

Workpiece Material		Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20				Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21				Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V			
Dia. **DC**		Revolution (min^{-1})	Feed rate (IPM)	Depth of Cut **ap**	Width of Cut **ae**	Revolution (min^{-1})	Feed rate (IPM)	Depth of Cut **ap**	Width of Cut **ae**	Revolution (min^{-1})	Feed rate (IPM)	Depth of Cut **ap**	Width of Cut **ae**
(mm)	(inch)												
3	**.118**	10000	35.4	.118	.024	7000	23.6	.118	.024	6000	17.7	.118	.024
3.5	**.138**	8500	35.4	.138	.024	6000	23.6	.138	.024	5100	17.7	.138	.024
4	**.157**	7500	35.4	.157	.024	5200	23.6	.157	.024	4500	17.7	.157	.024
5	**.197**	6000	35.4	.197	.024	4200	23.6	.197	.024	3600	17.7	.197	.024
6	**.236**	5000	35.4	.236	.024	3500	23.6	.236	.024	3000	17.7	.236	.024
7	**.276**	4500	33.1	.276	.024	3200	21.3	.276	.024	2700	16.5	.276	.024
8	**.315**	4000	30.7	.315	.024	2800	20.5	.315	.024	2400	15.4	.315	.024
9	**.354**	3500	28.3	.354	.024	2500	18.9	.354	.024	2100	14.2	.354	.024
10	**.394**	3200	26.8	.394	.024	2200	17.7	.394	.024	1900	13.4	.394	.024
12	**.472**	2700	24.4	.472	.024	1900	16.1	.472	.024	1600	12.2	.472	.024
14	**.551**	2300	21.7	.551	.024	1600	13.8	.551	.024	1400	11.0	.551	.024
Depth of cut													

Workpiece Material		Hardened steel (45−55HRC) AISI H13				Copper, Copper Alloy			
Dia. **DC**		Revolution (min^{-1})	Feed rate (IPM)	Depth of Cut **ap**	Width of Cut **ae**	Revolution (min^{-1})	Feed rate (IPM)	Depth of Cut **ap**	Width of Cut **ae**
(mm)	(inch)								
3	**.118**	5000	7.1	.118	.008	13000	47.2	.118	.024
3.5	**.138**	4500	7.1	.138	.008	11000	47.2	.138	.024
4	**.157**	4000	7.1	.157	.008	9500	43.3	.157	.024
5	**.197**	3200	7.1	.197	.008	7600	43.3	.197	.024
6	**.236**	2700	7.1	.236	.008	6400	43.3	.236	.024
7	**.276**	2300	6.3	.276	.008	5500	39.4	.276	.024
8	**.315**	2000	6.3	.315	.008	4800	37.0	.315	.024
9	**.354**	1800	5.9	.354	.008	4200	33.9	.354	.024
10	**.394**	1600	5.5	.394	.008	3800	31.9	.394	.024
12	**.472**	1300	4.7	.472	.008	3200	28.7	.472	.024
14	**.551**	1200	4.7	.551	.008	2700	25.6	.551	.024
Depth of cut									

Note 1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is effective.
Note 2) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 3) When drilling, please set the feed rate at 1/3 or below the values above.
Note 4) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

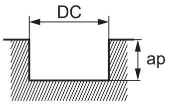
MP4EC

End mill, 4 flute, For Swiss-type lathes

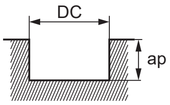
Recommended Cutting Conditions

Slotting

(inch)

Workpiece Material		Carbon steel, Cast iron, Alloy steel (−30HRC) AISI 1050, AISI No 35 B, AISI P20			Alloy steel, Tool steel, Pre-hardened steel AISI H13, AISI W1-10, AISI P21			Austenitic stainless steel, Titanium alloy AISI 304, AISI 306, Ti-6Al-4V		
Dia. **DC**		Revolution (min^{-1})	Feed rate (IPM)	Depth of Cut **ap**	Revolution (min^{-1})	Feed rate (IPM)	Depth of Cut **ap**	Revolution (min^{-1})	Feed rate (IPM)	Depth of Cut **ap**
(mm)	(inch)									
3	**.118**	10000	35.4	.024	7000	23.6	.024	6000	17.7	.024
3.5	**.138**	8500	35.4	.024	6000	23.6	.024	5100	17.7	.024
4	**.157**	7500	35.4	.024	5200	23.6	.024	4500	17.7	.024
5	**.197**	6000	35.4	.024	4200	23.6	.024	3600	17.7	.024
6	**.236**	5000	35.4	.024	3500	23.6	.024	3000	17.7	.024
7	**.276**	4500	33.1	.024	3200	21.3	.024	2700	16.5	.024
8	**.315**	4000	30.7	.024	2800	20.5	.024	2400	15.4	.024
9	**.354**	3500	28.3	.024	2500	18.9	.024	2100	14.2	.024
10	**.394**	3200	26.8	.024	2200	17.7	.024	1900	13.4	.024
12	**.472**	2700	24.4	.024	1900	16.1	.024	1600	12.2	.024
14	**.551**	2300	21.7	.024	1600	13.8	.024	1400	11.0	.024
Depth of Cut										

DC:Dia.

Workpiece Material		Hardened steel (45−55HRC) AISI H13			Copper, Copper Alloy		
Dia. **DC**		Revolution (min^{-1})	Feed rate (IPM)	Depth of Cut **ap**	Revolution (min^{-1})	Feed rate (IPM)	Depth of Cut **ap**
(mm)	(inch)						
3	**.118**	5000	7.1	.008	13000	47.2	.024
3.5	**.138**	4500	7.1	.008	11000	47.2	.024
4	**.157**	4000	7.1	.008	9500	43.3	.024
5	**.197**	3200	7.1	.008	7600	43.3	.024
6	**.236**	2700	7.1	.008	6400	43.3	.024
7	**.276**	2300	6.3	.008	5500	39.4	.024
8	**.315**	2000	6.3	.008	4800	37.0	.024
9	**.354**	1800	5.9	.008	4200	33.9	.024
10	**.394**	1600	5.5	.008	3800	31.9	.024
12	**.472**	1300	4.7	.008	3200	28.7	.024
14	**.551**	1200	4.7	.008	2700	25.6	.024
Depth of Cut							

DC:Dia.

Note 1) When cutting austenitic stainless steels, the use of water-soluble cutting fluid is effective.
Note 2) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 3) When drilling, please set the feed rate at 1/3 or below the values above.
Note 4) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

For Swiss-Type Automatic Lathes SMART MIRACLE End Mill Series

VQ4MRB-FB

New Product

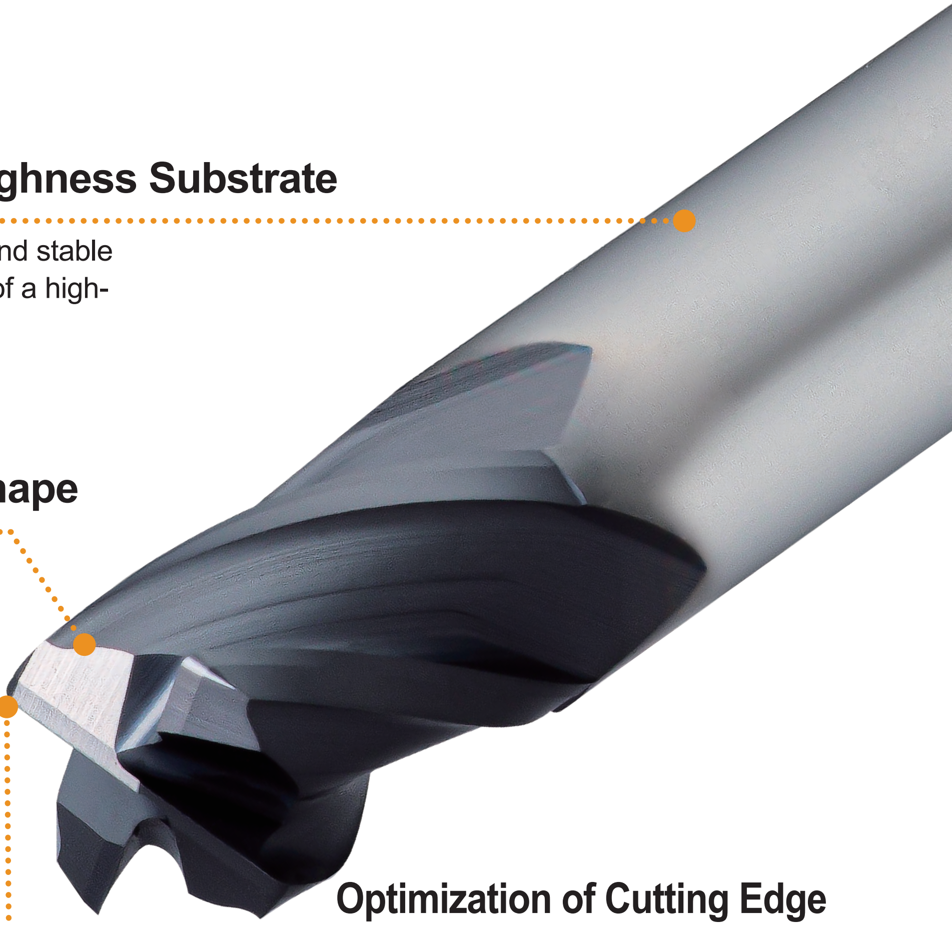
Fracture Resistance & Burr Reduction to Combat Problems Commonly Encountered with Small Swiss-Type Automatic Lathes

MITSUBISHI MATERIALS CORPORATION

For Swiss-Type Automatic Lathes
SMART MIRACLE End Mill Series

VQ4MRB-FB

Achieves Stable Machining without Chipping Even when Machining Overuses the Cutting Edge



Adoption of New High-Toughness Substrate

Fracture resistance is greatly improved and stable machining is accomplished through use of a high-toughness carbide substrate.

Optimized Cutting Edge Shape

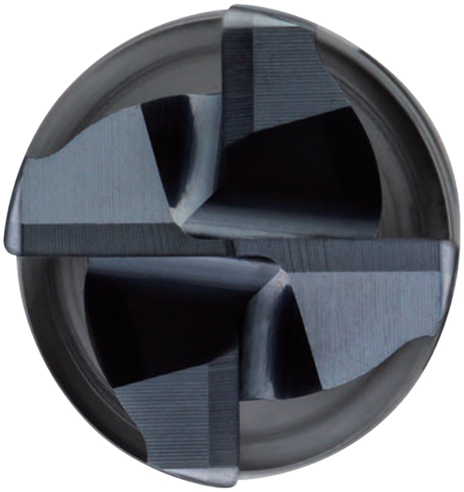
The optimized rake angle suppresses burrs.

Corner Radius Type

Corner radius type with high fracture resistance.

Optimization of Cutting Edge and Overall Tool Length

Overall tool length and cutting edge have been optimized to account for restricted space available in small Swiss-type automatic lathes.



Optimal Seamless Shape

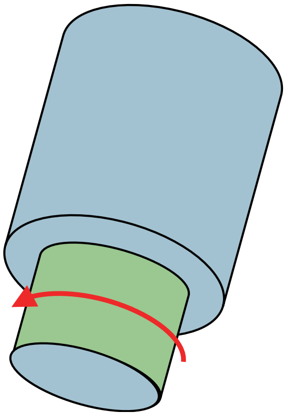
Suppresses chipping

Flat Bottom Shape

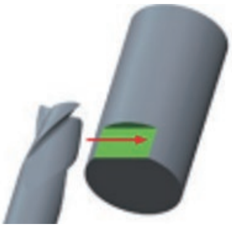
A turn milling machine tool for Swiss-type automatic lathes for machining lobe surfaces without creating concave or convex surfaces when using bottom of the end mill.

Applications of VQ4MRB-FB

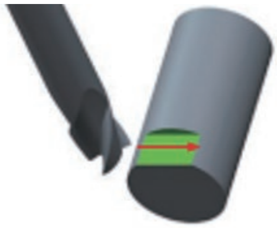
Lobe Milling



Shoulder Milling



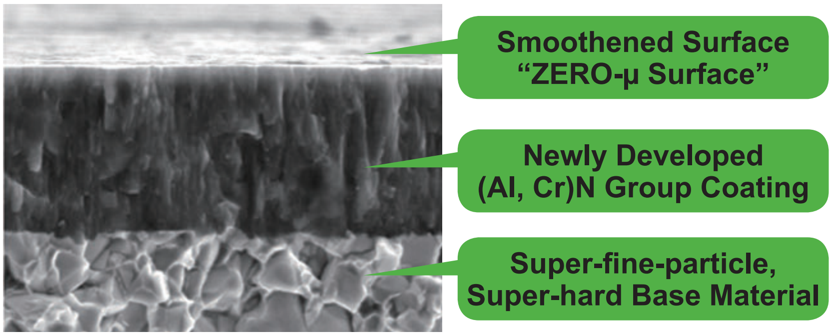
Face Milling

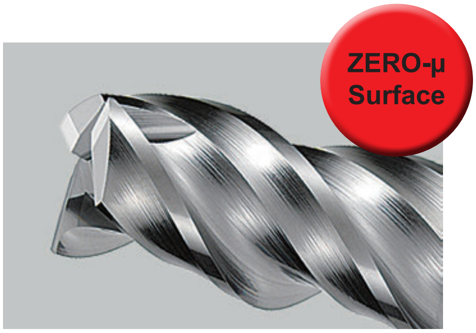


SMART MIRACLE

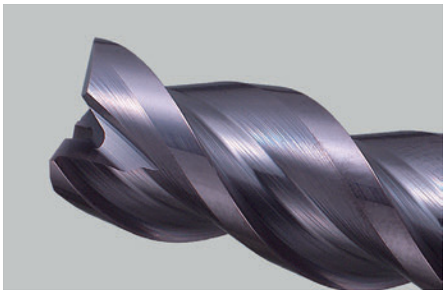
SMART MIRACLE Coating

SMART MIRACLE end mills have been treated with a newly developed (Al, Cr)N group coating which delivers substantially better wear resistance. The surface of the coating has been given a smoothening treatment resulting in better machined surfaces, reduced cutting resistance and improved chip discharge. This is the next generation of coated end mills that delivers long tool life when machining stainless steels and other difficult-to-cut materials.





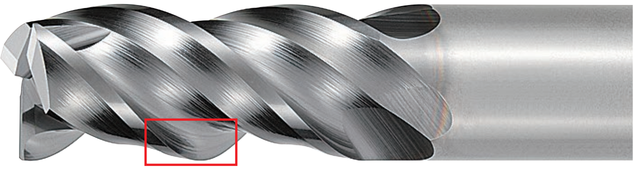
SMART MIRACLE Coating

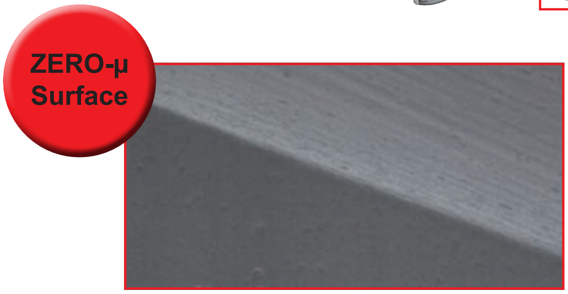


Conventional Coating

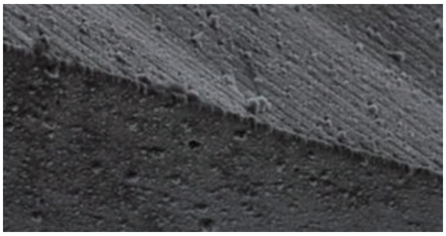
ZERO-μ Surface

With the unique ZERO-μ Surface, the cutting edge retains its sharpness. While previous technologies often resulted in diminished sharpness, the ZERO-μ Surface achieves both smoothness and sharpness, as well as longer tool life.





SMART MIRACLE Coating

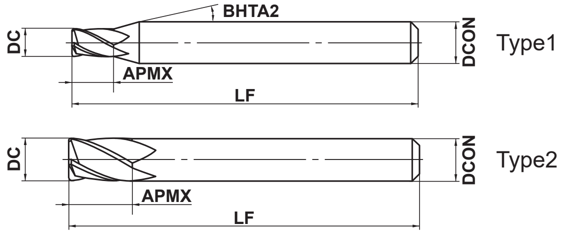


Conventional Coating

VQ4MRB-FB NEW

Corner radius end mill, Medium cutting length, 4 flute, For Swiss-type lathe

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy	Copper Alloy	Aluminum Alloy
◎	◎			◎	◎	○	



DC				
0 - 0.020				
DCON=6	8≤DCON≤10			
0 - 0.008	0 - 0.009			

- A corner radius end mill with high fracture resistance.
- A turn milling machine tool for Swiss-type automatic lathes for machining lobe surfaces.

(mm)

Order Number	**DC**	**RE**	**APMX**	**LF**	**DCON**	* No.F	**Stock**	Type
VQ4MRBD0400R030-FB	4	0.3	6	50	6	4	●	1
VQ4MRBD0600R030-FB	6	0.3	9	50	6	4	●	2
VQ4MRBD0800R030-FB	8	0.3	12	60	8	4	●	2
VQ4MRBD1000R050-FB	10	0.5	15	70	10	4	●	2

Note 1) SMART MIRACLE Coating is not conductive because of its nature. Therefore, an external contact (voltaic type) tool setter cannot be used. An internal contact (non-voltaic) type or laser type tool setter is recommended to measure the length of the tool.

* Number of Flutes

DC = Cutting Dia.
RE = Corner Radius
APMX = Length of Cut
LU = Neck Length
DN = Neck Dia.
LF = Overall Length
DCON = Shank Dia.

● : USA Stock ★ : Stocked in Japan

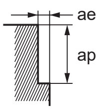
VQ4MRB-FB

Corner radius end mill, Medium cutting length, 4 flute, For Swiss-type lathe

Recommended Cutting Conditions

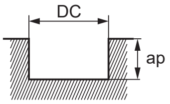
■Side Milling

(inch)

Workpiece Material		Carbon Steels, Cast Irons, Alloy Steels (−30HRC) AISI 1050, AISI No 35 B, AISI P20				Alloy Steels, Tool Steels, Pre-hardened Steels AISI H13, AISI W1-10, AISI P21				Austenitic Stainless Steels, Titanium Alloys AISI 304, AISI 306, Ti-6Al-4V				Copper, Copper Alloys			
Dia. **DC**		Revolution (min^{-1})	Feed rate (IPM)	Depth of Cut **ap**	Depth of Cut **ae**	Revolution (min^{-1})	Feed rate (IPM)	Depth of Cut **ap**	Depth of Cut **ae**	Revolution (min^{-1})	Feed rate (IPM)	Depth of Cut **ap**	Depth of Cut **ae**	Revolution (min^{-1})	Feed rate (IPM)	Depth of Cut **ap**	Depth of Cut **ae**
mm	inch																
4	**.157**	7500	35.4	.157	.024	5200	23.6	.157	.024	4500	17.7	.157	.024	9500	43.3	.157	.024
6	**.236**	5000	35.4	.236	.024	3500	23.6	.236	.024	3000	17.7	.236	.024	6400	43.3	.236	.024
8	**.315**	4000	30.7	.315	.024	2800	20.5	.315	.024	2400	15.4	.315	.024	4800	37.0	.315	.024
10	**.394**	3200	26.8	.394	.024	2200	17.7	.394	.024	1900	13.4	.394	.024	3800	31.9	.394	.024
Depth of Cut																	

■Slotting

(inch)

Workpiece Material		Carbon Steels, Cast Irons, Alloy Steels (−30HRC) AISI 1050, AISI No 35 B, AISI P20			Alloy Steels, Tool Steels, Pre-hardened Steels AISI H13, AISI W1-10, AISI P21			Austenitic Stainless Steels, Titanium Alloys AISI 304, AISI 306, Ti-6Al-4V			Copper, Copper Alloys		
Dia. **DC**		Revolution (min^{-1})	Feed rate (IPM)	Depth of Cut **ap**	Revolution (min^{-1})	Feed rate (IPM)	Depth of Cut **ap**	Revolution (min^{-1})	Feed rate (IPM)	Depth of Cut **ap**	Revolution (min^{-1})	Feed rate (IPM)	Depth of Cut **ap**
mm	inch												
4	**.157**	7500	35.4	.024	5200	23.6	.024	4500	17.7	.024	9500	43.3	.024
6	**.236**	5000	35.4	.024	3500	23.6	.024	3000	17.7	.024	6400	43.3	.024
8	**.315**	4000	30.7	.024	2800	20.5	.024	2400	15.4	.024	4800	37.0	.024
10	**.394**	3200	26.8	.024	2200	17.7	.024	1900	13.4	.024	3800	31.9	.024
Depth of Cut													

DC:Dia.

Note 1) SMART MIRACLE coating has very low electrical conductivity; therefore, an external contact type of tool setter (electric transmitted) may not work.
Note 2) When cutting austenitic stainless steels and titanium alloys, the use of water-soluble cutting fluid is effective.
Note 3) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 4) When drilling, please set the feed rate at 1/3 or below the values above.
Note 5) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

DIA EDGE

TOOL NEWS

2022.3 Update

B231A

For Machining of Hardened Steels

ÍMPACT MIRACLE End Mill Series

IMPACT MIRACLE REVOLUTION

Item Expansion

Revolutionary Machining of Hardened Steels

New coating provides outstanding tool life

MITSUBISHI MATERIALS CORPORATION

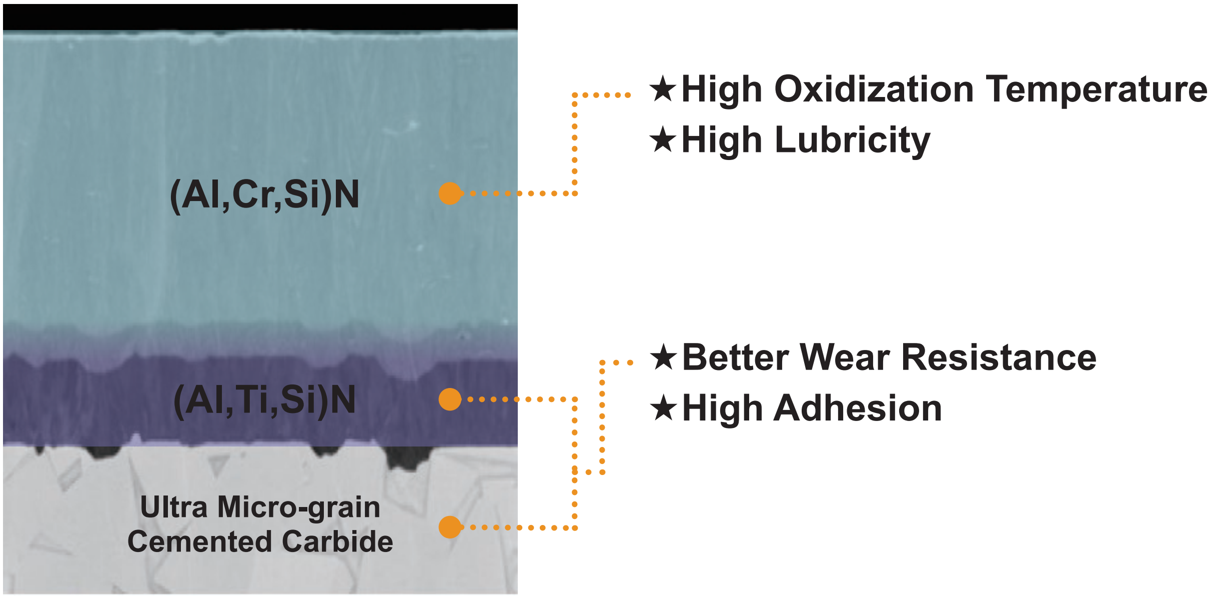
For Machining of Hardened Steels

IMPACT MIRACLE End Mill Series

IMPACT MIRACLE REVOLUTION

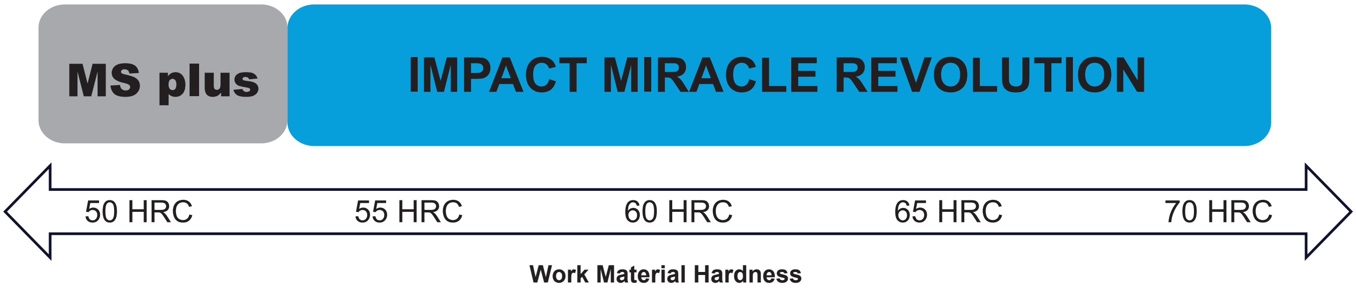
IMPACT MIRACLE REVOLUTION Coating

The combination of the newly developed(Al, Cr, Si)N coating with improved lubricity and a high oxidization temperature, together with the (Al, Ti, Si)N coating layer which provides excellent wear and adhesion to inner coating layer, enables efficient and reliable machining of hardened steels.



Due to manufacturing adjustments, differences in the color of the coating for different diameters may occur. This has no adverse effect on performance.

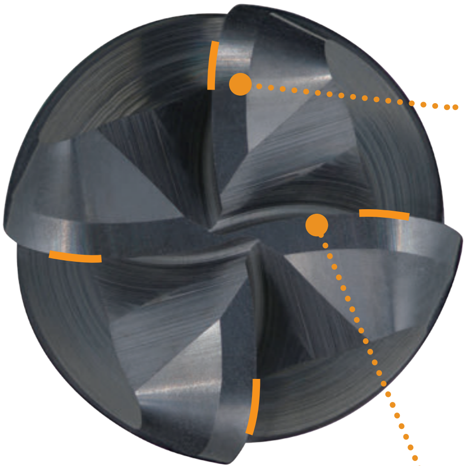
Selection according to Hardness of Work Material



Precision-Corner Radius End Mill, 4 Flute

VFRPSRB NEW

High precision machining is achieved via a seamless shape that suppresses chipping, a strong back taper that reduces chatter and a wiper blade providing improved surface finish.



Equipped with a wiper edge of DC≥1.5mm

Improves the surface finish of the bottom machined face.

Optimal Seamless Shape of DC≥1.5mm

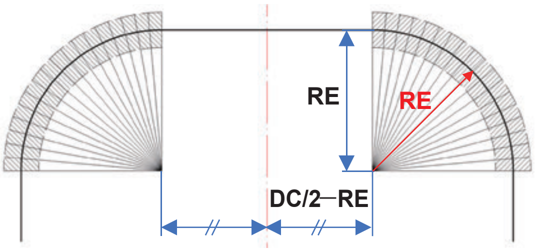
Suppresses chipping.

Strong Back Taper of 1.5≤DC≤5mm

Reduces chatter and vibration when machining vertical walls.

High-Precision Corner Radius Accuracy

The corner radius of VFRPSRB is measured as follows, based on the absolute centre of the corner radius.



DC : Cutting Dia.
RE : Corner Radius

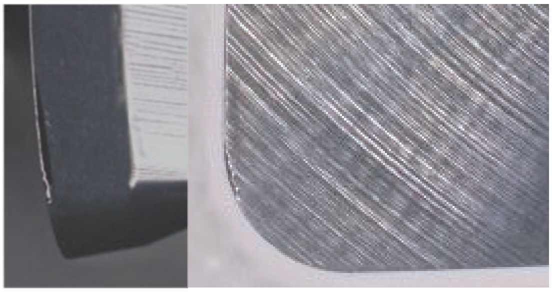
VFRPSRB 0.5≤DC≤6 mm : ±0.005
8≤DC≤12 mm : ±0.007

Conventional Precision Radius ±0.01

Completely Seamless Curved R Edge, DC≥1.5mm

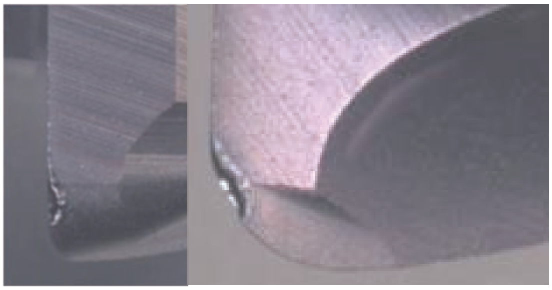
A stable machined surface is achieved by a seamless blend between the radius and flank geometry.

VFRPSRB



Due to the seamless geometry, chipping is suppressed and wear progression is stabilized.

Conventional

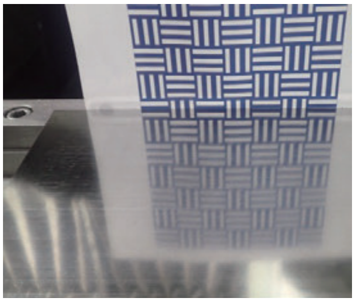


Chipping occurs because the load is concentrated on the joint between the flank and corner edge geometry.

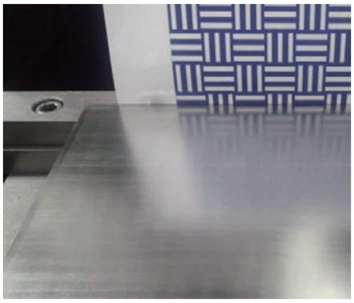
Equipped with a Wiper Edge, DC≥1.5mm

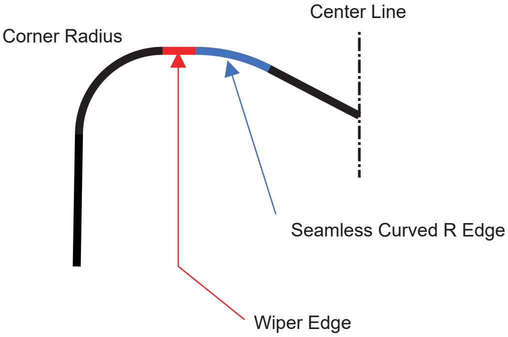
A glossy surface finish is possible via the inclusion of a wiper edge.

VFRPSRB



Conventional

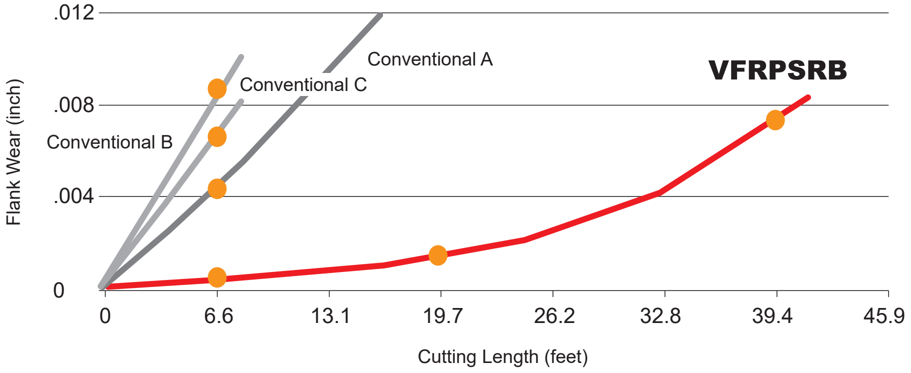


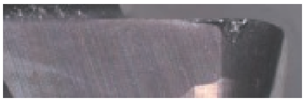


Cutting Performance

Wear Resistance Comparison - High Speed Tool Steel (68HRC)

Excellent wear resistance when machining high-hardness steel.



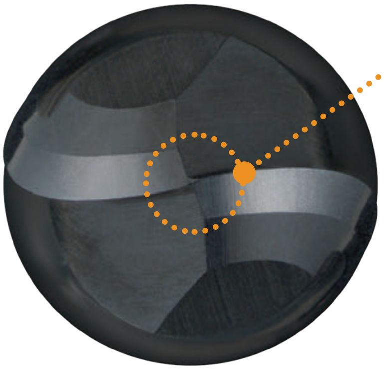
	After Machining 6.6 feet	After Machining 19.7 feet	After Machining 39.4 feet
VFRPSRB			
Conventional A			
Conventional B			
Conventional C			

<Cutting Conditions>
Workpiece Material : Powder High Speed Tool Steel (68HRC)
Tool : VFRPSRBD0600R050N180
Revolution : $n=5500\,min^{-1}$
Table Feed : f=26.0 IPM
Feed per Tooth : .0012 IPT
Depth of Cut : ap=.004 inch
ae=.004 inch
Overhang Length : .709 inch
Cutting Mode : Air blow
Machine : Vertical MC (BT30)

Ball nose, 2 Flute, Long neck

VFR2XLB NEW

Precise machining of vertical walls is possible thanks to a strong back taper combined with seamless ball nose cutting edge geometry.



Ball Nose Optimization

Ideal center flute geometry for finish machining.

Rake Angle Optimization

Optimal geometry combines a sharp edge with fracture resistance enabling excellent surface finishes.

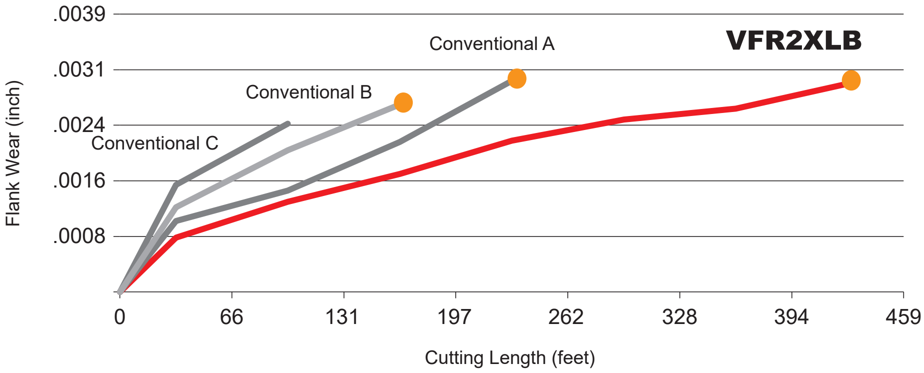
Strong Back Taper

Reduces chatter and vibration when machining vertical walls.

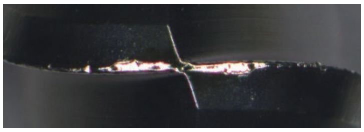
Cutting Performance

Wear Resistance Comparison - ASP23 (62HRC)

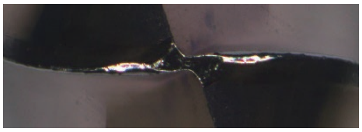
Greatly improved wear resistance for high-precision machining.



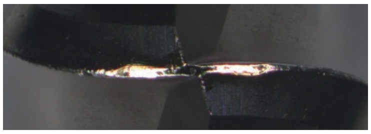
<Cutting Conditions>
Workpiece Material : ASP23 (62HRC)
Tool : VFR2XLBR0100N120
Revolution : $n=16000\,\text{min}^{-1}$
Table Feed : f=63.0 IPM
Feed per Tooth : .002 IPT
Depth of Cut : ap=.002 inch×10
ae=.004 inchx10
Overhang Length : .709 inch
Cutting Mode : Air blow
Machine : Vertical MC (HSK-E32)



VFR2XLB



Conventional A

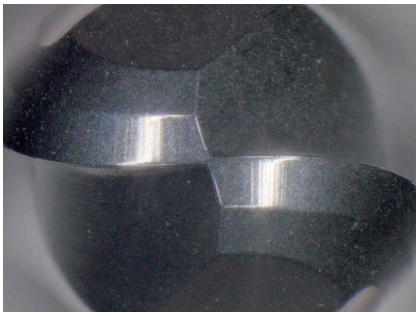


Conventional B

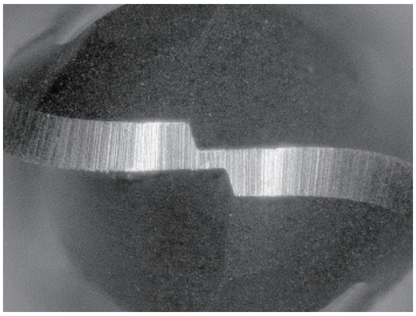
Cutting Edge Geometry for Finishing

Sharp but strong cutting edge enables good surface finishes.

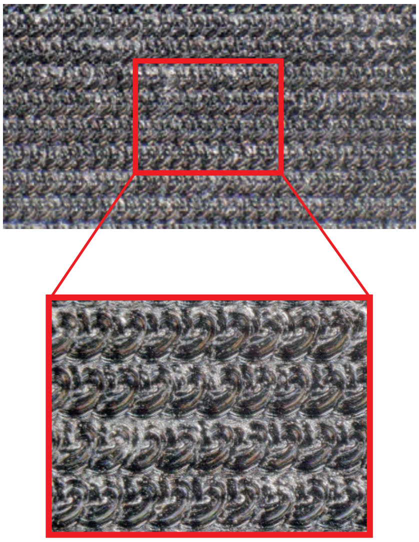
VFR2XLB



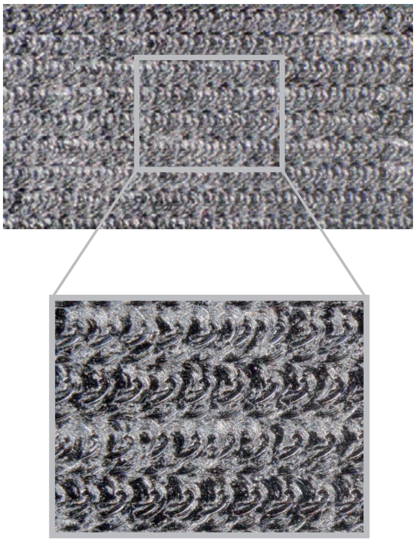
Conventional



Comparison of Surface Finishes

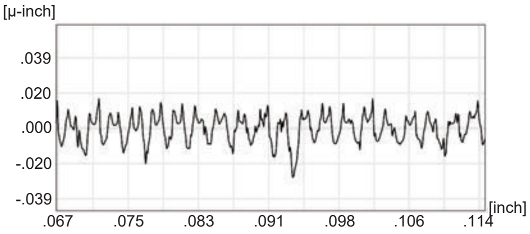


Sharp edges leave a uniform finish.

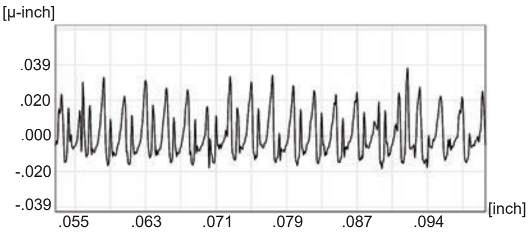


A dull edge leaves an undefined finish.

Comparison of Surface Roughness (Feed Side)



Ra=0.174μm, Rz=1.12μm



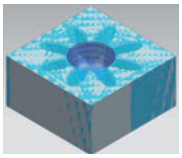
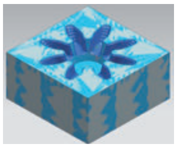
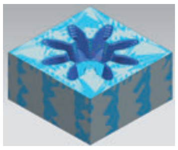
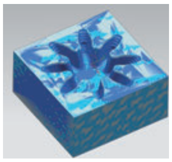
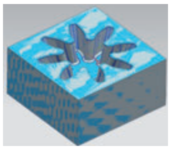
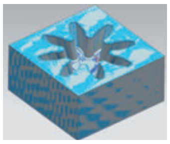
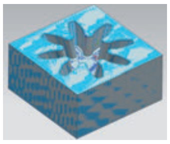
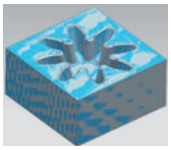
Ra=0.240μm, Rz=2.01μm

Application Example

Machining of a Bevel Gear Mold

Ideal for precision machining of high-hardness, cold forging molds of 65HRC or higher.

(inch)

No.	Process	Tool Used	vc (SFM)	n (min^{-1})	vf (IPM)	ap	ae	Next Process Finishing Allowance	3D Model Post Machining
1	Rough Machining (Central Helical)	**VFR2SBR0400**	260	3,200	5.1	.118	.024	.004	
2	Rough Pocket Milling①	**VFR2SBR0200**	260	6,300	9.8	.035	.012	.008	
3	Rough Pocket Milling②	**VFR2XLBR0150N100**	195	6,300	7.5	.035	.006	.008	
4	Semi-finish Machining	**VFR2XLBR0100N100**	260	12,700	9.8	.008	.004	.004	
5	Deep Wall Finish Machining	**VFR2XLBR0100N100**	260	12,700	9.8	.004	.0012	0	
6	Bottom Face Finish Machining	**VFRPSRBD0300R050N100**	130	4,500	10.6	.004	.004	0	
7	Upper Surface Milling	**VFRPSRBD0600R050N180**	130	2,100	19.7	.0008	.020	0	
8	Chamfering	**VC2CD0600**	165	2,700	4.3	.020	.008	0	

<Cutting Conditions>
Workpiece Material : SKH51
1.969"x1.969"x.984"
Machine : Vertical MC (HSK-E32)

Application Example

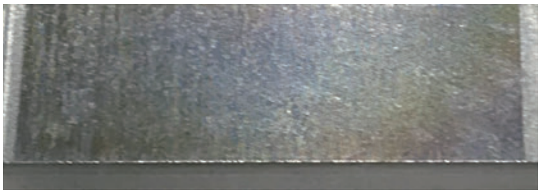
Surface Finish Comparison - Dies Used for Plastic Molding

Ideal surface finishes of dies can be achieved.

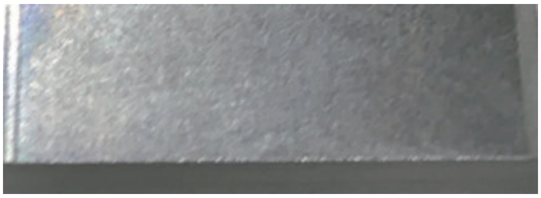
Workpiece Material : Steel die used for Plastic Molding (M340 58HRC)

(inch)

Process	Tools Used	**n** (min^{-1})	**vf** (IPM)	**ap**	**ae**	Coolant
Semi-finish Machining	**VFR2XLBR0050N040**	18000	35.4	.0008	.0008	MQL
	VFR2XLBR0100N060	17500	47.2	.0012	.0039	
Finish Machining	**VFR2XLBR0050N040**	18000	35.4	.0008	.0008	
	VFR2XLBR0100N060	17500	47.2	.0012	.0031	



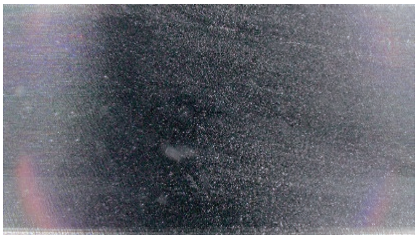
VFR2XLB Has a smooth surface



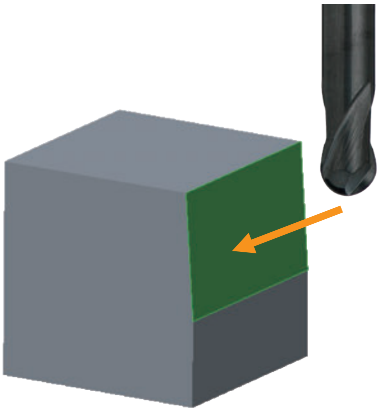
Conventional

Surface Finish Comparison - AISI D2

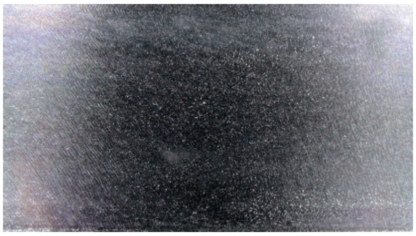
Excellent surface finishes compared to those machined by conventional tools.



VFR2XLB



Cutting Form : 1° Taper Cutting



Conventional: Cloudy surface finish

<Cutting Conditions>

Workpiece Material	: AISI D2 (60HRC)
Tool	: VFR2XLBR0100N100
Revolution	: n=19000 min^{-1}
Table Feed	: f=26.8 IPM
Depth of Cut	: ap=.0008 inch ae=.0008 inch
Overhang Length	: .630 inch
Cutting Mode	: Air blow
Machine	: Vertical MC (HSK-E32)

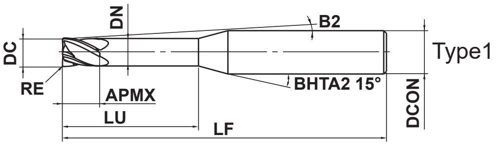
VFRPSRB NEW

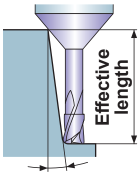
Corner radius, Short cut length, 4 Flute

30°

DC≤1.0 DC≥1.5

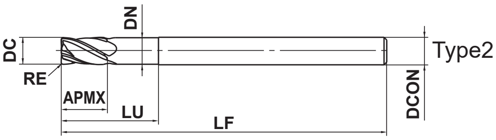
Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminum Alloy
	○	◎	◎				





Effective length for inclined angle

Inclined angle



0.5≤DC≤6	6<DC≤12			
±0.005	±0.007			
0.5≤DC≤6	6<DC≤12			
0 - 0.01	0 - 0.015			
DCON=6	8≤DCON≤10	DCON=12		
0 - 0.005	0 - 0.006	0 - 0.008		

- ● Completely Seamless Curved R Edge. DC≧1.5
- ● The wiper edge and strong back taper achieve high-precision machining. 1.5≦DC≦5

(mm)

Order Number	DC	RE	APMX	LU	DN	B2	LF	DCON	No.F★	Stock	Type	Effective length for inclined angle			
												0.5°	1°	2°	3°
VFRPSRBD0050R005N020	0.5	0.05	0.5	2	0.47	12.6	50	6	4	★	1	2.1	2.2	2.3	2.5
VFRPSRBD0050R010N020	0.5	0.1	0.5	2	0.47	12.7	50	6	4	★	1	2.1	2.2	2.3	2.5
VFRPSRBD0060R005N020	0.6	0.05	0.6	2	0.57	12.5	50	6	4	●	1	2.1	2.2	2.4	2.6
VFRPSRBD0060R010N020	0.6	0.1	0.6	2	0.57	12.5	50	6	4	★	1	2.1	2.2	2.3	2.6
VFRPSRBD0060R010N040	0.6	0.1	0.6	4	0.57	10.8	50	6	4	★	1	4.2	4.4	4.7	5.1
VFRPSRBD0060R020N020	0.6	0.2	0.6	2	0.57	12.6	50	6	4	●	1	2.1	2.2	2.2	2.6
VFRPSRBD0080R005N040	0.8	0.05	0.8	4	0.77	10.7	50	6	4	★	1	4.2	4.4	4.7	5.1
VFRPSRBD0080R010N040	0.8	0.1	0.8	4	0.77	10.7	50	6	4	●	1	4.2	4.4	4.7	5.1
VFRPSRBD0080R020N040	0.8	0.2	0.8	4	0.77	10.8	50	6	4	●	1	4.2	4.4	4.7	5.1
VFRPSRBD0080R030N040	0.8	0.3	0.8	4	0.77	10.8	50	6	4	●	1	4.2	4.4	4.7	5
VFRPSRBD0100R005N040	1	0.05	1	4	0.96	10.4	50	6	4	★	1	4.3	4.5	4.9	5.4
VFRPSRBD0100R010N040	1	0.1	1	4	0.96	10.4	50	6	4	●	1	4.3	4.5	4.9	5.4
VFRPSRBD0100R010N060	1	0.1	1	6	0.96	9.1	50	6	4	●	1	6.4	6.7	7.3	7.9
VFRPSRBD0100R020N040	1	0.2	1	4	0.96	10.5	50	6	4	●	1	4.3	4.5	4.7	5.3
VFRPSRBD0100R020N060	1	0.2	1	6	0.96	9.2	50	6	4	★	1	6.4	6.7	7.3	7.8
VFRPSRBD0100R030N040	1	0.3	1	4	0.96	10.5	50	6	4	★	1	4.3	4.5	4.6	5.3
VFRPSRBD0100R040N040	1	0.4	1	4	0.96	10.6	50	6	4	★	1	4.3	4.5	4.5	5.3
VFRPSRBD0150R010N040	1.5	0.1	1.5	4	1.42	10.2	50	6	4	●	1	4.2	4.4	4.8	5.2
VFRPSRBD0150R010N060	1.5	0.1	1.5	6	1.42	8.8	50	6	4	●	1	6.3	6.6	7.1	7.7
VFRPSRBD0150R010N100	1.5	0.1	1.5	10	1.42	6.9	50	6	4	★	1	10.5	10.9	11.7	12.7
VFRPSRBD0150R020N040	1.5	0.2	1.5	4	1.42	10.2	50	6	4	●	1	4.2	4.4	4.6	5.2
VFRPSRBD0150R020N060	1.5	0.2	1.5	6	1.42	8.8	50	6	4	●	1	6.3	6.6	7.1	7.7
VFRPSRBD0150R020N100	1.5	0.2	1.5	10	1.42	7	50	6	4	●	1	10.5	10.9	11.7	12.6
VFRPSRBD0150R030N040	1.5	0.3	1.5	4	1.42	10.3	50	6	4	★	1	4.2	4.4	4.5	5.2
VFRPSRBD0150R030N060	1.5	0.3	1.5	6	1.42	8.9	50	6	4	●	1	6.3	6.6	7.1	7.6
VFRPSRBD0150R030N100	1.5	0.3	1.5	10	1.42	7	50	6	4	●	1	10.5	10.9	11.7	12.6
VFRPSRBD0150R050N040	1.5	0.5	1.5	4	1.42	10.5	50	6	4	●	1	4.2	4.4	4.3	5.1
VFRPSRBD0150R050N060	1.5	0.5	1.5	6	1.42	9	50	6	4	●	1	6.3	6.6	7.1	7.6

★ Number of Flutes

RE = Corner Radius
DC = Cutting Dia.
APMX = Depth of Cut Max.
LU = Usable Length
DN = Neck Dia.
LF = Functional Length
DCON = Connection Dia.

● : USA Stock ★ : Stocked in Japan

(mm)

Order Number	DC	RE	APMX	LU	DN	B2	LF	DCON	No.F	Stock	Type	Effective length for inclined angle			
												0.5°	1°	2°	3°
VFRPSRBD0150R050N100	1.5	0.5	1.5	10	1.42	7.1	50	6	4	●	1	10.5	10.9	11.7	12.6
VFRPSRBD0200R010N060	2	0.1	2	6	1.9	8.4	50	6	4	●	1	6.3	6.6	7.1	7.6
VFRPSRBD0200R010N100	2	0.1	2	10	1.9	6.5	50	6	4	●	1	10.5	10.9	11.7	12.6
VFRPSRBD0200R010N150	2	0.1	2	15	1.9	5.1	50	6	4	★	1	15.7	16.2	17.4	18.8
VFRPSRBD0200R020N060	2	0.2	2	6	1.9	8.4	50	6	4	●	1	6.3	6.6	7.1	7.6
VFRPSRBD0200R020N100	2	0.2	2	10	1.9	6.5	50	6	4	●	1	10.5	10.9	11.7	12.6
VFRPSRBD0200R020N150	2	0.2	2	15	1.9	5.1	50	6	4	●	1	15.7	16.2	17.4	18.8
VFRPSRBD0200R030N060	2	0.3	2	6	1.9	8.5	50	6	4	★	1	6.3	6.6	7	7.6
VFRPSRBD0200R030N100	2	0.3	2	10	1.9	6.6	50	6	4	●	1	10.5	10.8	11.6	12.6
VFRPSRBD0200R030N150	2	0.3	2	15	1.9	5.1	50	6	4	★	1	15.7	16.2	17.4	18.8
VFRPSRBD0200R030N200	2	0.3	2	20	1.9	4.2	60	6	4	★	1	20.8	21.5	23.1	25
VFRPSRBD0200R050N060	2	0.5	2	6	1.9	8.6	50	6	4	●	1	6.3	6.5	7	7.5
VFRPSRBD0200R050N100	2	0.5	2	10	1.9	6.6	50	6	4	●	1	10.5	10.8	11.6	12.5
VFRPSRBD0200R050N150	2	0.5	2	15	1.9	5.2	50	6	4	●	1	15.6	16.2	17.4	18.7
VFRPSRBD0200R050N200	2	0.5	2	20	1.9	4.2	60	6	4	●	1	20.8	21.5	23.1	24.9
VFRPSRBD0250R030N080	2.5	0.3	2.5	8	2.35	6.9	50	6	4	●	1	8.3	8.6	9.2	10
VFRPSRBD0250R030N150	2.5	0.3	2.5	15	2.35	4.7	50	6	4	●	1	15.6	16.1	17.3	18.7
VFRPSRBD0250R050N080	2.5	0.5	2.5	8	2.35	7	50	6	4	●	1	8.3	8.6	9.2	9.9
VFRPSRBD0250R050N150	2.5	0.5	2.5	15	2.35	4.7	50	6	4	★	1	15.6	16.1	17.3	18.6
VFRPSRBD0250R100N080	2.5	1	2.5	8	2.35	7.3	50	6	4	●	1	8.3	8.6	9.1	9.8
VFRPSRBD0300R010N100	3	0.1	3	10	2.85	5.5	60	6	4	●	1	10.4	10.8	11.6	12.5
VFRPSRBD0300R010N150	3	0.1	3	15	2.85	4.2	60	6	4	★	1	15.6	16.1	17.3	18.7
VFRPSRBD0300R020N100	3	0.2	3	10	2.85	5.5	60	6	4	●	1	10.4	10.8	11.6	12.5
VFRPSRBD0300R020N150	3	0.2	3	15	2.85	4.2	60	6	4	●	1	15.6	16.1	17.3	18.7
VFRPSRBD0300R020N200	3	0.2	3	20	2.85	3.4	60	6	4	●	1	20.7	21.5	23.1	24.9
VFRPSRBD0300R030N100	3	0.3	3	10	2.85	5.6	60	6	4	●	1	10.4	10.8	11.5	12.5
VFRPSRBD0300R030N150	3	0.3	3	15	2.85	4.2	60	6	4	●	1	15.6	16.1	17.3	18.7
VFRPSRBD0300R030N200	3	0.3	3	20	2.85	3.4	60	6	4	●	1	20.7	21.5	23	24.9
VFRPSRBD0300R050N100	3	0.5	3	10	2.85	5.6	60	6	4	●	1	10.4	10.7	11.5	12.4
VFRPSRBD0300R050N150	3	0.5	3	15	2.85	4.2	60	6	4	●	1	15.6	16.1	17.3	18.6
VFRPSRBD0300R050N200	3	0.5	3	20	2.85	3.4	60	6	4	●	1	20.7	21.4	23	24.8
VFRPSRBD0300R100N100	3	1	3	10	2.85	5.8	60	6	4	★	1	10.4	10.7	11.4	12.3
VFRPSRBD0300R100N150	3	1	3	15	2.85	4.3	60	6	4	●	1	15.5	16.1	17.2	18.5
VFRPSRBD0300R100N200	3	1	3	20	2.85	3.5	60	6	4	●	1	20.7	21.4	22.9	24.7
VFRPSRBD0400R010N120	4	0.1	4	12	3.85	3.6	60	6	4	●	1	12.5	12.9	13.9	15
VFRPSRBD0400R010N200	4	0.1	4	20	3.85	2.4	60	6	4	●	1	20.7	21.5	23.1	*
VFRPSRBD0400R020N120	4	0.2	4	12	3.85	3.7	60	6	4	★	1	12.5	12.9	13.9	15
VFRPSRBD0400R020N200	4	0.2	4	20	3.85	2.4	60	6	4	●	1	20.7	21.5	23.1	*
VFRPSRBD0400R030N120	4	0.3	4	12	3.85	3.7	60	6	4	●	1	12.5	12.9	13.8	15
VFRPSRBD0400R030N200	4	0.3	4	20	3.85	2.4	60	6	4	●	1	20.7	21.5	23	*
VFRPSRBD0400R030N300	4	0.3	4	30	3.85	1.7	70	6	4	★	1	31.1	32.2	*	*
VFRPSRBD0400R050N120	4	0.5	4	12	3.85	3.7	60	6	4	●	1	12.5	12.9	13.8	14.9
VFRPSRBD0400R050N200	4	0.5	4	20	3.85	2.5	60	6	4	●	1	20.7	21.4	23	*
VFRPSRBD0400R050N300	4	0.5	4	30	3.85	1.7	70	6	4	●	1	31.1	32.1	*	*
VFRPSRBD0400R100N120	4	1	4	12	3.85	3.8	60	6	4	●	1	12.4	12.8	13.7	14.8
VFRPSRBD0400R100N200	4	1	4	20	3.85	2.5	60	6	4	●	1	20.7	21.4	22.9	*

* Number of Flutes

* No interference

VFRPSRB

Corner radius, Short cut length, 4 Flute

(mm)

Order Number	DC	RE	APMX	LU	DN	B2	LF	DCON	No.F*	Stock	Type	Effective length for inclined angle			
												0.5°	1°	2°	3°
VFRPSRBD0400R100N300	4	1	4	30	3.85	1.7	70	6	4	●	1	31.1	32.1	*	*
VFRPSRBD0500R050N150	5	0.5	5	15	4.85	1.7	60	6	4	★	1	15.6	16.1	*	*
VFRPSRBD0500R100N150	5	1	5	15	4.85	1.8	60	6	4	●	1	15.5	16.1	*	*
VFRPSRBD0600R010N180	6	0.1	9	18	5.85	—	70	6	4	●	2	*	*	*	*
VFRPSRBD0600R020N180	6	0.2	9	18	5.85	—	70	6	4	●	2	*	*	*	*
VFRPSRBD0600R030N180	6	0.3	9	18	5.85	—	70	6	4	●	2	*	*	*	*
VFRPSRBD0600R050N180	6	0.5	9	18	5.85	—	70	6	4	●	2	*	*	*	*
VFRPSRBD0600R100N180	6	1	9	18	5.85	—	70	6	4	●	2	*	*	*	*
VFRPSRBD0600R200N180	6	2	9	18	5.85	—	70	6	4	●	2	*	*	*	*
VFRPSRBD0800R020N240	8	0.2	12	24	7.85	—	90	8	4	●	2	*	*	*	*
VFRPSRBD0800R030N240	8	0.3	12	24	7.85	—	90	8	4	●	2	*	*	*	*
VFRPSRBD0800R050N240	8	0.5	12	24	7.85	—	90	8	4	●	2	*	*	*	*
VFRPSRBD0800R100N240	8	1	12	24	7.85	—	90	8	4	●	2	*	*	*	*
VFRPSRBD0800R200N240	8	2	12	24	7.85	—	90	8	4	★	2	*	*	*	*
VFRPSRBD1000R030N300	10	0.3	15	30	9.7	—	100	10	4	●	2	*	*	*	*
VFRPSRBD1000R050N300	10	0.5	15	30	9.7	—	100	10	4	●	2	*	*	*	*
VFRPSRBD1000R100N300	10	1	15	30	9.7	—	100	10	4	●	2	*	*	*	*
VFRPSRBD1000R200N300	10	2	15	30	9.7	—	100	10	4	●	2	*	*	*	*
VFRPSRBD1000R300N300	10	3	15	30	9.7	—	100	10	4	●	2	*	*	*	*
VFRPSRBD1200R050N360	12	0.5	18	36	11.7	—	110	12	4	★	2	*	*	*	*
VFRPSRBD1200R100N360	12	1	18	36	11.7	—	110	12	4	●	2	*	*	*	*
VFRPSRBD1200R200N360	12	2	18	36	11.7	—	110	12	4	★	2	*	*	*	*
VFRPSRBD1200R300N360	12	3	18	36	11.7	—	110	12	4	●	2	*	*	*	*

* Number of Flutes

* No interference

RE = Corner Radius
DC = Cutting Dia.
APMX = Depth of Cut Max.
LU = Usable Length
DN = Neck Dia.
LF = Functional Length
DCON = Connection Dia.

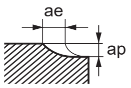
● : USA Stock ★ : Stocked in Japan

Recommended Cutting Conditions

(inch)

Workpiece Material						Hardened Steels (45—55HRC)				Hardened Steels (55—65HRC)				Hardened Steels (65—70HRC)			
Dia. DC		Corner Radius RE		Usable Length LU		Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut ap	Width of Cut ae	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut ap	Width of Cut ae	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut ap	Width of Cut ae
(mm)	(inch)	(mm)	(inch)	(mm)	(inch)												
0.5	**.020**	**0.05**	**.002**	**2**	**.079**	25000	39.4	.0002	.004	19000	29.9	.0002	.003	13000	20.1	.0001	.003
0.5	**.020**	**0.1**	**.004**	**2**	**.079**	25000	39.4	.0003	.004	19000	29.9	.0002	.003	13000	20.1	.0002	.003
0.6	**.024**	**0.05**	**.002**	**2**	**.079**	21000	39.4	.0002	.004	16000	29.9	.0002	.003	11000	20.1	.0001	.003
0.6	**.024**	**0.1**	**.004**	**2**	**.079**	21000	39.4	.0003	.004	16000	29.9	.0002	.003	11000	20.1	.0002	.003
0.6	**.024**	**0.1**	**.004**	**4**	**.157**	18000	35.0	.0002	.004	16000	29.9	.0002	.003	11000	20.1	.0002	.003
0.6	**.024**	**0.2**	**.008**	**2**	**.079**	24000	43.3	.0004	.004	19000	35.0	.0003	.003	16000	29.9	.0002	.003
0.8	**.031**	**0.05**	**.002**	**4**	**.157**	16000	29.9	.0006	.005	12000	22.4	.0004	.004	7900	15.0	.0004	.004
0.8	**.031**	**0.1**	**.004**	**4**	**.157**	16000	29.9	.0008	.005	12000	22.4	.0006	.004	7900	15.0	.0004	.004
0.8	**.031**	**0.2**	**.008**	**4**	**.157**	20000	37.4	.0012	.005	16000	29.9	.0010	.004	12000	22.4	.0008	.004
0.8	**.031**	**0.3**	**.012**	**4**	**.157**	20000	37.4	.0012	.005	16000	29.9	.0010	.004	12000	22.4	.0008	.004
1	**.039**	**0.05**	**.002**	**4**	**.157**	13000	39.4	.0006	.006	9500	29.9	.0004	.005	6400	20.1	.0004	.005
1	**.039**	**0.1**	**.004**	**4**	**.157**	13000	39.4	.0008	.006	9500	29.9	.0006	.005	6400	20.1	.0006	.005
1	**.039**	**0.1**	**.004**	**6**	**.236**	11000	35.0	.0006	.005	6400	20.1	.0004	.004	6400	20.1	.0004	.004
1	**.039**	**0.2**	**.008**	**4**	**.157**	16000	51.2	.0012	.006	9500	29.9	.0010	.005	6400	20.1	.0008	.005
1	**.039**	**0.2**	**.008**	**6**	**.236**	13000	39.4	.0008	.005	6400	20.1	.0008	.004	6400	20.1	.0006	.004
1	**.039**	**0.3**	**.012**	**4**	**.157**	16000	51.2	.0012	.006	9500	29.9	.0010	.005	6400	20.1	.0008	.005
1	**.039**	**0.4**	**.016**	**4**	**.157**	16000	51.2	.0016	.006	9500	29.9	.0012	.005	6400	20.1	.0010	.005
1.5	**.059**	**0.1**	**.004**	**4**	**.157**	14000	66.9	.0010	.009	11000	36.2	.0006	.008	7200	22.4	.0004	.008
1.5	**.059**	**0.1**	**.004**	**6**	**.236**	11000	55.1	.0010	.007	9200	28.7	.0006	.006	5700	18.1	.0004	.006
1.5	**.059**	**0.1**	**.004**	**10**	**.394**	11000	55.1	.0010	.007	9200	28.7	.0006	.006	5700	18.1	.0004	.006
1.5	**.059**	**0.2**	**.008**	**4**	**.157**	14000	66.9	.0020	.009	11000	36.2	.0014	.008	7200	22.4	.0010	.008
1.5	**.059**	**0.2**	**.008**	**6**	**.236**	11000	55.1	.0020	.007	9200	28.7	.0014	.006	5700	18.1	.0010	.006
1.5	**.059**	**0.2**	**.008**	**10**	**.394**	11000	55.1	.0020	.007	9200	28.7	.0014	.006	5700	18.1	.0010	.006
1.5	**.059**	**0.3**	**.012**	**4**	**.157**	16000	74.8	.0030	.009	13000	39.4	.0020	.008	8000	25.2	.0014	.008
1.5	**.059**	**0.3**	**.012**	**6**	**.236**	13000	59.1	.0030	.007	10000	31.9	.0020	.006	6400	20.1	.0014	.006
1.5	**.059**	**0.3**	**.012**	**10**	**.394**	13000	59.1	.0030	.007	10000	31.9	.0020	.006	6400	20.1	.0014	.006
1.5	**.059**	**0.5**	**.020**	**4**	**.157**	16000	74.8	.0031	.009	13000	39.4	.0022	.008	8000	25.2	.0016	.008
1.5	**.059**	**0.5**	**.020**	**6**	**.236**	13000	59.1	.0031	.007	10000	31.9	.0022	.006	6400	20.1	.0016	.006
1.5	**.059**	**0.5**	**.020**	**10**	**.394**	13000	59.1	.0031	.007	10000	31.9	.0022	.006	6400	20.1	.0016	.006
2	**.079**	**0.1**	**.004**	**6**	**.236**	11000	66.9	.0010	.012	8600	39.4	.0008	.011	5400	25.2	.0006	.011
2	**.079**	**0.1**	**.004**	**10**	**.394**	8600	55.1	.0010	.009	6900	32.7	.0008	.009	4300	20.5	.0006	.009
2	**.079**	**0.1**	**.004**	**15**	**.591**	6400	39.4	.0008	.007	5200	24.4	.0006	.007	3200	15.4	.0004	.007
2	**.079**	**0.2**	**.008**	**6**	**.236**	11000	66.9	.0022	.012	8600	39.4	.0014	.011	5400	25.2	.0010	.011
2	**.079**	**0.2**	**.008**	**10**	**.394**	8600	55.1	.0022	.009	6900	32.7	.0014	.009	4300	20.5	.0010	.009
2	**.079**	**0.2**	**.008**	**15**	**.591**	6400	39.4	.0016	.007	5200	24.4	.0010	.007	3200	15.4	.0008	.006
2	**.079**	**0.3**	**.012**	**6**	**.236**	12000	74.8	.0031	.012	6900	43.3	.0022	.011	6000	16.5	.0016	.011
2	**.079**	**0.3**	**.012**	**10**	**.394**	9500	59.1	.0031	.009	7600	36.2	.0022	.009	4800	22.4	.0016	.009
2	**.079**	**0.3**	**.012**	**15**	**.591**	7200	43.3	.0026	.007	5700	27.2	.0018	.007	3600	16.9	.0012	.006
2	**.079**	**0.3**	**.012**	**20**	**.787**	7200	43.3	.0026	.007	5700	27.2	.0018	.007	3600	16.9	.0012	.006
2	**.079**	**0.5**	**.020**	**6**	**.236**	12000	74.8	.0033	.012	9500	43.3	.0024	.011	6000	28.3	.0016	.011
2	**.079**	**0.5**	**.020**	**10**	**.394**	9500	59.1	.0033	.009	7600	36.2	.0024	.009	4800	22.4	.0016	.009
2	**.079**	**0.5**	**.020**	**15**	**.591**	7200	43.3	.0028	.007	5700	27.2	.0018	.007	3600	16.9	.0014	.006
2	**.079**	**0.5**	**.020**	**20**	**.787**	7200	43.3	.0028	.007	5700	27.2	.0018	.007	3600	16.9	.0014	.006
2.5	**.098**	**0.3**	**.012**	**8**	**.315**	9500	74.8	.0031	.015	7600	55.1	.0022	.014	4800	33.9	.0016	.013
2.5	**.098**	**0.3**	**.012**	**15**	**.591**	7600	59.1	.0031	.012	6100	43.3	.0022	.011	3800	27.2	.0016	.011
2.5	**.098**	**0.5**	**.020**	**8**	**.315**	9500	74.8	.0035	.015	7600	55.1	.0024	.014	4800	33.9	.0016	.013
2.5	**.098**	**0.5**	**.020**	**15**	**.591**	7600	59.1	.0035	.012	6100	43.3	.0024	.011	3800	27.2	.0016	.011
2.5	**.098**	**1**	**.039**	**8**	**.315**	9500	74.8	.0059	.013	7600	55.1	.0035	.012	4800	33.9	.0026	.012

Depth of Cut

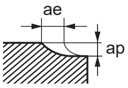


Note 1) The cutting conditions above are a guide only to machining with cutting edges with a corner radius. When machining with peripheral cutting edges, use the minimum feed rate as a guide.
Note 2) If depth of cut is shallow, the revolution and feed rate can be increased.
Note 3) For profile machining such as moulds, machining conditions may differ considerably depending on the workpiece geometry, machining methods and depth of cut, Reduce the feed rate especially when machining the corner sections of workpiece.
Note 4) If the rigidity of the machine or the workpiece installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.

VFRPSRB

Corner radius, Short cut length, 4 Flute

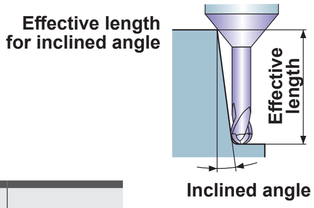
(inch)

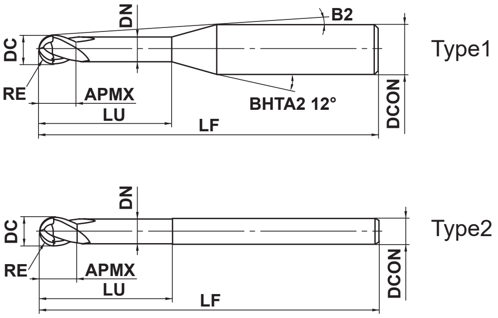
Workpiece Material						Hardened Steels (45−55HRC)				Hardened Steels (55−65HRC)				Hardened Steels (65−70HRC)			
Dia. **DC**		Corner Radius **RE**		Usable Length **LU**		Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut **ap**	Width of Cut **ae**	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut **ap**	Width of Cut **ae**	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut **ap**	Width of Cut **ae**
(mm)	(inch)	(mm)	(inch)	(mm)	(inch)												
3	**.118**	**0.1**	**.004**	**10**	**.394**	8100	74.8	.0010	.024	6500	47.2	.0008	.022	4100	28.7	.0006	.022
3	**.118**	**0.1**	**.004**	**15**	**.591**	6500	63.0	.0010	.019	5200	37.0	.0008	.017	3200	22.8	.0006	.017
3	**.118**	**0.2**	**.008**	**10**	**.394**	8100	74.8	.0022	.024	6500	47.2	.0016	.022	4100	28.7	.0010	.022
3	**.118**	**0.2**	**.008**	**15**	**.591**	6500	63.0	.0022	.019	5200	37.0	.0016	.017	3200	22.8	.0010	.017
3	**.118**	**0.2**	**.008**	**20**	**.787**	6500	63.0	.0022	.019	5200	37.0	.0016	.017	3200	22.8	.0010	.017
3	**.118**	**0.3**	**.012**	**10**	**.394**	9000	86.6	.0033	.024	7200	51.2	.0022	.022	4500	31.9	.0016	.022
3	**.118**	**0.3**	**.012**	**15**	**.591**	7200	66.9	.0033	.019	5800	39.4	.0022	.017	3600	25.6	.0016	.017
3	**.118**	**0.3**	**.012**	**20**	**.787**	7200	66.9	.0033	.019	5800	39.4	.0022	.017	3600	25.6	.0016	.017
3	**.118**	**0.5**	**.020**	**10**	**.394**	9000	86.6	.0035	.024	7200	51.2	.0024	.022	4500	31.9	.0018	.022
3	**.118**	**0.5**	**.020**	**15**	**.591**	7200	66.9	.0035	.019	5800	39.4	.0024	.017	3600	25.6	.0018	.017
3	**.118**	**0.5**	**.020**	**20**	**.787**	7200	66.9	.0035	.019	5800	39.4	.0024	.017	3600	25.6	.0018	.017
3	**.118**	**1**	**.039**	**10**	**.394**	9000	86.6	.0059	.021	7200	51.2	.0039	.020	4500	31.9	.0028	.020
3	**.118**	**1**	**.039**	**15**	**.591**	7200	66.9	.0059	.017	5800	39.4	.0039	.016	3600	25.6	.0028	.016
3	**.118**	**1**	**.039**	**20**	**.787**	7200	78.7	.0059	.017	5800	39.4	.0039	.016	3600	25.6	.0028	.016
4	**.157**	**0.1**	**.004**	**12**	**.472**	6100	66.9	.0098	.031	4900	38.2	.0008	.029	3000	24.0	.0006	.029
4	**.157**	**0.1**	**.004**	**20**	**.787**	4900	55.1	.0098	.024	3900	30.7	.0008	.024	2400	19.3	.0006	.023
4	**.157**	**0.2**	**.008**	**12**	**.472**	6100	66.9	.0022	.031	4900	38.2	.0016	.029	3000	24.0	.0010	.029
4	**.157**	**0.2**	**.008**	**20**	**.787**	4900	55.1	.0022	.024	3900	30.7	.0016	.024	2400	19.3	.0010	.023
4	**.157**	**0.3**	**.012**	**12**	**.472**	6800	74.8	.0033	.031	5400	43.3	.0022	.030	3400	26.8	.0016	.029
4	**.157**	**0.3**	**.012**	**20**	**.787**	5400	59.1	.0033	.024	4300	34.3	.0022	.024	2700	21.3	.0016	.023
4	**.157**	**0.3**	**.012**	**30**	**1.181**	4100	43.3	.0026	.020	3200	25.6	.0018	.018	2000	16.1	.0014	.017
4	**.157**	**0.5**	**.020**	**12**	**.472**	6800	74.8	.0035	.031	5400	43.3	.0024	.030	3400	26.8	.0018	.029
4	**.157**	**0.5**	**.020**	**20**	**.787**	5400	59.1	.0035	.026	4300	34.3	.0024	.024	2700	21.3	.0018	.023
4	**.157**	**0.5**	**.020**	**30**	**1.181**	4100	43.3	.0030	.020	4300	25.6	.0020	.018	2000	16.1	.0014	.017
4	**.157**	**1**	**.039**	**12**	**.472**	6800	74.8	.0059	.028	5400	43.3	.0039	.026	3400	26.8	.0028	.026
4	**.157**	**1**	**.039**	**20**	**.787**	5400	59.1	.0059	.022	4300	34.3	.0039	.021	2700	21.3	.0028	.021
4	**.157**	**1**	**.039**	**30**	**1.181**	4100	43.3	.0039	.016	3200	25.6	.0030	.016	2000	16.1	.0022	.016
5	**.197**	**0.5**	**.020**	**15**	**.591**	6400	70.9	.0039	.051	5100	39.4	.0026	.047	3200	25.2	.0018	.043
5	**.197**	**1**	**.039**	**15**	**.591**	6400	70.9	.0059	.043	5100	39.4	.0039	.039	3200	25.2	.0030	.039
6	**.236**	**0.1**	**.004**	**18**	**.709**	4800	59.1	.0012	.059	3800	36.2	.0008	.055	2400	22.4	.0006	.051
6	**.236**	**0.2**	**.008**	**18**	**.709**	4800	59.1	.0024	.059	3800	36.2	.0016	.055	2400	22.4	.0012	.051
6	**.236**	**0.3**	**.012**	**18**	**.709**	5300	66.9	.0035	.059	4200	39.4	.0024	.055	2700	25.2	.0018	.051
6	**.236**	**0.5**	**.020**	**18**	**.709**	5300	66.9	.0039	.059	4200	39.4	.0026	.055	2700	25.2	.0018	.051
6	**.236**	**1**	**.039**	**18**	**.709**	5300	66.9	.0059	.055	4200	39.4	.0039	.047	2700	25.2	.0030	.047
6	**.236**	**2**	**.079**	**18**	**.709**	5300	66.9	.0118	.051	4200	39.4	.0079	.043	2700	25.2	.0059	.043
8	**.315**	**0.2**	**.008**	**24**	**.945**	3600	43.3	.0024	.079	2900	27.2	.0016	.071	1800	16.9	.0012	.071
8	**.315**	**0.3**	**.012**	**24**	**.945**	4000	51.2	.0035	.079	3200	29.9	.0024	.071	2000	18.9	.0018	.071
8	**.315**	**0.5**	**.020**	**24**	**.945**	4000	51.2	.0037	.079	3200	29.9	.0026	.071	2000	18.9	.0018	.071
8	**.315**	**1**	**.039**	**24**	**.945**	4000	51.2	.0059	.071	3200	29.9	.0039	.067	2000	18.9	.0030	.063
8	**.315**	**2**	**.079**	**24**	**.945**	4000	51.2	.0118	.067	3200	29.9	.0079	.063	2000	18.9	.0059	.059
10	**.394**	**0.3**	**.012**	**30**	**1.181**	3200	39.4	.0035	.098	2500	24.0	.0024	.091	1600	15.0	.0018	.091
10	**.394**	**0.5**	**.020**	**30**	**1.181**	3200	39.4	.0037	.098	2500	24.0	.0026	.091	1600	15.0	.0018	.091
10	**.394**	**1**	**.039**	**30**	**1.181**	3200	39.4	.0059	.091	2500	24.0	.0039	.083	1600	15.0	.0030	.079
10	**.394**	**2**	**.079**	**30**	**1.181**	3200	39.4	.0118	.083	2500	24.0	.0079	.079	1600	15.0	.0059	.075
10	**.394**	**3**	**.118**	**30**	**1.181**	3200	39.4	.0177	.075	2500	24.0	.0118	.067	1600	15.0	.0079	.067
12	**.472**	**0.5**	**.020**	**36**	**1.417**	2700	37.4	.0039	.118	2100	20.1	.0026	.110	1300	12.6	.0020	.106
12	**.472**	**1**	**.039**	**36**	**1.417**	2700	37.4	.0059	.106	2100	20.1	.0039	.098	1300	12.6	.0030	.094
12	**.472**	**2**	**.079**	**36**	**1.417**	2700	37.4	.0118	.102	2100	20.1	.0079	.094	1300	12.6	.0059	.091
12	**.472**	**3**	**.118**	**36**	**1.417**	2700	37.4	.0177	.091	2100	20.1	.0118	.083	1300	12.6	.0079	.079
Depth of Cut																	

VFR2XLB NEW

Ball nose, 2 Flute, Long neck

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminum Alloy
	○	◎	◎				





RE≤3				
±0.005				
4≤DCON≤6				
0 - 0.005				

- Precise machining of vertical walls is possible due to a back taper and a strong, seamless ball nose cutting edge geometry.

(mm)

	Order Number	RE	DC	APMX	LU	DN	B2	LF	DCON	No.F.*	Stock	Type	Effective length for inclined angle			
													0.5°	1°	2°	3°
NEW	VFR2XLBR0010N005	0.1	0.2	0.15	0.5	0.18	11.5°	50	4	2	★	1	0.5	0.5	0.6	0.7
NEW	VFR2XLBR0010N010	0.1	0.2	0.15	1	0.18	10.9°	50	4	2	●	1	1	1.1	1.2	1.3
NEW	VFR2XLBR0015N010	0.15	0.3	0.24	1	0.28	10.9°	50	4	2	●	1	1	1.1	1.2	1.3
NEW	VFR2XLBR0015N015	0.15	0.3	0.24	1.5	0.28	10.4°	50	4	2	●	1	1.6	1.6	1.8	2
NEW	VFR2XLBR0015N020	0.15	0.3	0.24	2	0.28	9.9°	50	4	2	●	1	2.1	2.2	2.4	2.6
NEW	VFR2XLBR0020N010	0.2	0.4	0.3	1	0.37	11°	50	4	2	●	1	1	1.1	1.2	1.3
NEW	VFR2XLBR0020N015	0.2	0.4	0.3	1.5	0.37	10.4°	50	4	2	●	1	1.5	1.6	1.7	1.9
NEW	VFR2XLBR0020N020	0.2	0.4	0.3	2	0.37	9.9°	50	4	2	●	1	2.1	2.2	2.3	2.6
NEW	VFR2XLBR0020N025	0.2	0.4	0.3	2.5	0.37	9.5°	50	4	2	★	1	2.6	2.7	2.9	3.3
NEW	VFR2XLBR0020N030	0.2	0.4	0.3	3	0.37	9.1°	50	4	2	●	1	3.1	3.2	3.5	3.9
NEW	VFR2XLBR0020N040	0.2	0.4	0.3	4	0.37	8.4°	50	4	2	★	1	4.2	4.3	4.7	5.2
NEW	VFR2XLBR0025N015	0.25	0.5	0.37	1.5	0.47	10.4°	50	4	2	●	1	1.5	1.6	1.7	1.9
NEW	VFR2XLBR0025N020	0.25	0.5	0.37	2	0.47	9.9°	50	4	2	●	1	2.1	2.1	2.3	2.6
NEW	VFR2XLBR0025N025	0.25	0.5	0.37	2.5	0.47	9.5°	50	4	2	●	1	2.6	2.7	2.9	3.2
NEW	VFR2XLBR0025N030	0.25	0.5	0.37	3	0.47	9.1°	50	4	2	●	1	3.1	3.2	3.5	3.9
NEW	VFR2XLBR0025N040	0.25	0.5	0.37	4	0.47	8.3°	50	4	2	●	1	4.1	4.3	4.7	5.2
	VFR2XLBR0030N020	0.3	0.6	0.45	2	0.57	9.9°	50	4	2	●	1	2.1	2.2	2.4	2.6
	VFR2XLBR0030N020S06	0.3	0.6	0.45	2	0.57	10.6°	50	6	2	●	1	2.1	2.2	2.4	2.6
	VFR2XLBR0030N030	0.3	0.6	0.45	3	0.57	9°	50	4	2	●	1	3.1	3.3	3.6	4
	VFR2XLBR0030N030S06	0.3	0.6	0.45	3	0.57	9.9°	50	6	2	★	1	3.1	3.3	3.6	4
	VFR2XLBR0030N040	0.3	0.6	0.45	4	0.57	8.2°	50	4	2	★	1	4.2	4.4	4.8	5.3
	VFR2XLBR0030N050	0.3	0.6	0.45	5	0.57	7.6°	50	4	2	★	1	5.2	5.5	6	6.6
	VFR2XLBR0030N060	0.3	0.6	0.45	6	0.57	7.1°	50	4	2	●	1	6.3	6.6	7.2	7.9
	VFR2XLBR0040N030	0.4	0.8	0.6	3	0.77	8.9°	50	4	2	●	1	3.1	3.3	3.6	3.9
	VFR2XLBR0040N040	0.4	0.8	0.6	4	0.77	8.2°	50	4	2	●	1	4.2	4.4	4.8	5.2
	VFR2XLBR0040N060	0.4	0.8	0.6	6	0.77	6.9°	50	4	2	●	1	6.3	6.5	7.2	7.9
	VFR2XLBR0040N080	0.4	0.8	0.6	8	0.77	6°	50	4	2	★	1	8.4	8.7	9.5	10.6
	VFR2XLBR0050N030	0.5	1	0.75	3	0.96	8.7°	50	4	2	●	1	3.2	3.4	3.7	4.1
	VFR2XLBR0050N030S06	0.5	1	0.75	3	0.96	9.8°	50	6	2	●	1	3.2	3.4	3.7	4.1
	VFR2XLBR0050N040	0.5	1	0.75	4	0.96	7.9°	50	4	2	●	1	4.3	4.5	4.9	5.4
	VFR2XLBR0050N040S06	0.5	1	0.75	4	0.96	9.2°	50	6	2	●	1	4.3	4.5	4.9	5.4
	VFR2XLBR0050N060	0.5	1	0.75	6	0.96	6.7°	50	4	2	●	1	6.3	6.5	7.2	7.9

* Number of Flutes

● : USA Stock ★ : Stocked in Japan

For Machining of Hardened Steels

VFR2XLB

Ball nose, 2 Flute, Long neck

(mm)

Order Number	RE	DC	APMX	LU	DN	B2	LF	DCON	No.F*	Stock	Type	Effective length for inclined angle			
												0.5°	1°	2°	3°
VFR2XLBR0050N060S06	0.5	1	0.75	6	0.96	8.2°	50	6	2	●	1	6.3	6.5	7.2	7.9
VFR2XLBR0050N080	0.5	1	0.75	8	0.96	5.8°	50	4	2	●	1	8.5	8.9	9.7	10.7
VFR2XLBR0050N100	0.5	1	0.75	10	0.96	5.1°	50	4	2	●	1	10.6	11.1	12.1	13.4
VFR2XLBR0050N120	0.5	1	0.75	12	0.96	4.6°	50	4	2	●	1	12.7	13.2	14.5	16
VFR2XLBR0075N060	0.75	1.5	1.1	6	1.44	6.3°	50	4	2	●	1	6.3	6.6	7.2	7.9
VFR2XLBR0075N060S06	0.75	1.5	1.1	6	1.44	8°	50	6	2	●	1	6.3	6.6	7.2	7.9
VFR2XLBR0075N080	0.75	1.5	1.1	8	1.44	5.4°	50	4	2	●	1	8.4	8.8	9.6	10.6
VFR2XLBR0075N080S06	0.75	1.5	1.1	8	1.44	7.2°	50	6	2	●	1	8.4	8.8	9.6	10.6
VFR2XLBR0075N100	0.75	1.5	1.1	10	1.44	4.7°	50	4	2	★	1	10.5	11	12	13.2
VFR2XLBR0075N120	0.75	1.5	1.1	12	1.44	4.2°	50	4	2	●	1	12.6	13.1	14.4	15.9
VFR2XLBR0075N140	0.75	1.5	1.1	14	1.44	3.8°	50	4	2	★	1	14.7	15.3	16.8	18.5
VFR2XLBR0075N160	0.75	1.5	1.1	16	1.44	3.4°	60	4	2	★	1	16.8	17.5	19.2	21.2
VFR2XLBR0100N060	1	2	1.5	6	1.94	5.8°	50	4	2	●	1	6.3	6.6	7.1	7.8
VFR2XLBR0100N060S06	1	2	1.5	6	1.94	7.8°	50	6	2	●	1	6.3	6.6	7.1	7.8
VFR2XLBR0100N080	1	2	1.5	8	1.94	4.8°	50	4	2	●	1	8.4	8.8	9.5	10.5
VFR2XLBR0100N080S06	1	2	1.5	8	1.94	6.9°	50	6	2	●	1	8.4	8.8	9.5	10.5
VFR2XLBR0100N100	1	2	1.5	10	1.94	4.2°	50	4	2	★	1	10.5	10.9	11.9	13.1
VFR2XLBR0100N100S06	1	2	1.5	10	1.94	6.2°	50	6	2	●	1	10.5	10.9	11.9	13.1
VFR2XLBR0100N120	1	2	1.5	12	1.94	3.6°	50	4	2	●	1	12.6	13.1	14.3	15.8
VFR2XLBR0100N120S06	1	2	1.5	12	1.94	5.6°	50	6	2	●	1	12.6	13.1	14.3	15.8
VFR2XLBR0100N160	1	2	1.5	16	1.94	2.9°	60	4	2	●	1	16.8	17.5	19.1	*
VFR2XLBR0100N160S06	1	2	1.5	16	1.94	4.7°	60	6	2	★	1	16.8	17.5	19.1	21.1
VFR2XLBR0100N200	1	2	1.5	20	1.94	2.4°	60	4	2	●	1	20.9	21.8	23.9	*
VFR2XLBR0100N200S06	1	2	1.5	20	1.94	4°	60	6	2	★	1	20.9	21.8	23.9	26.4
VFR2XLBR0125N100	1.25	2.5	1.9	10	2.4	3.5°	60	4	2	★	1	10.4	10.8	11.8	12.9
VFR2XLBR0125N150	1.25	2.5	1.9	15	2.4	2.5°	60	4	2	★	1	15.6	16.3	17.8	*
VFR2XLBR0150N100	1.5	3	2.3	10	2.9	5.5°	60	6	2	●	1	10.4	10.8	11.7	12.9
VFR2XLBR0150N120	1.5	3	2.3	12	2.9	4.9°	60	6	2	●	1	12.5	13	14.1	15.5
VFR2XLBR0150N160	1.5	3	2.3	16	2.9	4°	70	6	2	●	1	16.7	17.3	18.9	20.8
VFR2XLBR0150N200	1.5	3	2.3	20	2.9	3.4°	70	6	2	●	1	20.8	21.7	23.7	26.1
VFR2XLBR0150N250	1.5	3	2.3	25	2.9	2.8°	70	6	2	●	1	26.1	27.2	29.7	*
VFR2XLBR0150N300	1.5	3	2.3	30	2.9	2.5°	70	6	2	●	1	31.3	32.6	35.7	*
VFR2XLBR0200N100	2	4	3	10	3.9	4.5°	70	6	2	●	1	10.4	10.8	11.6	12.7
VFR2XLBR0200N120	2	4	3	12	3.9	3.9°	70	6	2	●	1	12.5	12.9	14	15.4
VFR2XLBR0200N160	2	4	3	16	3.9	3.1°	70	6	2	●	1	16.6	17.3	18.8	20.7
VFR2XLBR0200N200	2	4	3	20	3.9	2.6°	70	6	2	●	1	20.8	21.7	23.6	*
VFR2XLBR0200N250	2	4	3	25	3.9	2.1°	70	6	2	●	1	26	27.1	29.6	*
VFR2XLBR0200N300	2	4	3	30	3.9	1.8°	70	6	2	★	1	31.2	32.6	*	*
VFR2XLBR0250N200	2.5	5	3.8	20	4.9	1.5°	70	6	2	●	1	20.8	21.6	*	*
VFR2XLBR0250N250	2.5	5	3.8	25	4.9	1.2°	70	6	2	★	1	26	27.1	*	*
VFR2XLBR0300N180	3	6	6	18	5.85	—	80	6	2	★	2	*	*	*	*
VFR2XLBR0300N300	3	6	6	30	5.85	—	80	6	2	●	2	*	*	*	*

* Number of Flutes

* No interference

RE = Corner Radius
DC = Cutting Dia.
APMX = Depth of Cut Max.
LU = Usable Length
DN = Neck Dia.
LF = Functional Length
DCON = Connection Dia.

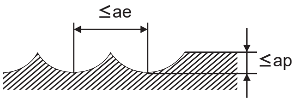
● : USA Stock ★ : Stocked in Japan

Recommended Cutting Conditions

(inch)

Workpiece Material				Hardened Steels (45−55HRC)				Hardened Steels (55−70HRC)			
Corner Radius **RE**		Neck length **LU**		Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut **ap**	Width of Cut **ae**	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut **ap**	Width of Cut **ae**
(mm)	(inch)	(mm)	(inch)								
0.1	**.004**	**0.5**	**.020**	40000	11.8	.00012	.0004	40000	11.8	.00008	.0004
0.1	**.004**	**1**	**.039**	40000	11.8	.00008	.0004	40000	11.8	.00008	.0004
0.15	**.006**	**1**	**.039**	40000	19.7	.00028	.0006	40000	19.7	.00020	.0006
0.15	**.006**	**1.5**	**.059**	40000	19.7	.00020	.0006	40000	19.7	.00012	.0006
0.15	**.006**	**2**	**.079**	40000	19.7	.00012	.0006	40000	19.7	.00008	.0006
0.2	**.008**	**1**	**.039**	40000	55.1	.00059	.0008	40000	55.1	.00039	.0008
0.2	**.008**	**1.5**	**.059**	40000	39.4	.00039	.0008	40000	39.4	.00024	.0008
0.2	**.008**	**2**	**.079**	40000	39.4	.00039	.0008	40000	39.4	.00024	.0008
0.2	**.008**	**2.5**	**.098**	40000	27.6	.00020	.0008	40000	27.6	.00012	.0008
0.2	**.008**	**3**	**.118**	40000	27.6	.00020	.0008	40000	27.6	.00012	.0008
0.2	**.008**	**4**	**.157**	40000	23.6	.00016	.0008	40000	19.7	.00012	.0008
0.25	**.010**	**1.5**	**.059**	40000	78.7	.00079	.0010	40000	78.7	.00059	.0010
0.25	**.010**	**2**	**.079**	40000	78.7	.00079	.0010	40000	78.7	.00059	.0010
0.25	**.010**	**2.5**	**.098**	40000	59.1	.00059	.0010	40000	59.1	.00039	.0010
0.25	**.010**	**3**	**.118**	40000	47.2	.00059	.0010	40000	47.2	.00039	.0010
0.25	**.010**	**4**	**.157**	36000	35.4	.00394	.0010	36000	35.4	.00028	.0010
0.3	**.012**	**2**	**.079**	40000	110.2	.0012	.0012	40000	110.2	.0008	.0012
0.3	**.012**	**3**	**.118**	40000	110.2	.0012	.0012	40000	110.2	.0008	.0012
0.3	**.012**	**4**	**.157**	35000	78.7	.0008	.0012	35000	78.7	.0006	.0012
0.3	**.012**	**5**	**.197**	30000	39.4	.0004	.0012	30000	39.4	.0003	.0012
0.3	**.012**	**6**	**.236**	30000	31.5	.0003	.0012	30000	31.5	.0002	.0012
0.4	**.016**	**3**	**.118**	40000	118.1	.0016	.0016	40000	118.1	.0012	.0016
0.4	**.016**	**4**	**.157**	40000	118.1	.0008	.0016	40000	118.1	.0006	.0016
0.4	**.016**	**6**	**.236**	30000	63.0	.0008	.0016	30000	63.0	.0004	.0016
0.4	**.016**	**8**	**.315**	25000	39.4	.0004	.0016	25000	39.4	.0003	.0016
0.5	**.020**	**3**	**.118**	40000	157.5	.0020	.0020	40000	157.5	.0016	.0020
0.5	**.020**	**4**	**.157**	40000	157.5	.0020	.0020	40000	157.5	.0016	.0020
0.5	**.020**	**6**	**.236**	35000	78.7	.0012	.0020	35000	78.7	.0008	.0020
0.5	**.020**	**8**	**.315**	30000	63.0	.0008	.0020	30000	63.0	.0004	.0020
0.5	**.020**	**10**	**.394**	20000	39.4	.0004	.0020	20000	39.4	.0004	.0020
0.5	**.020**	**12**	**.472**	20000	39.4	.0004	.0020	20000	31.5	.0003	.0020
0.75	**.030**	**6**	**.236**	40000	196.9	.0028	.0030	40000	157.5	.0024	.0030
0.75	**.030**	**8**	**.315**	40000	196.9	.0028	.0030	40000	137.8	.0024	.0030
0.75	**.030**	**10**	**.394**	40000	177.2	.0024	.0030	40000	94.5	.0024	.0030
0.75	**.030**	**12**	**.472**	32000	133.9	.0016	.0030	32000	78.7	.0016	.0030
0.75	**.030**	**14**	**.551**	16000	59.1	.0016	.0030	16000	47.2	.0012	.0030
0.75	**.030**	**16**	**.630**	13000	47.2	.0012	.0030	13000	47.2	.0008	.0030
1	**.039**	**6**	**.236**	40000	236.2	.0039	.0039	40000	133.9	.0039	.0039
1	**.039**	**8**	**.315**	40000	196.9	.0039	.0039	40000	118.1	.0039	.0039
1	**.039**	**10**	**.394**	40000	196.9	.0031	.0039	40000	118.1	.0028	.0039
1	**.039**	**12**	**.472**	40000	196.9	.0031	.0039	40000	102.4	.0020	.0039
1	**.039**	**16**	**.630**	32000	137.8	.0020	.0039	32000	66.9	.0012	.0039
1	**.039**	**20**	**.787**	10000	39.4	.0016	.0039	10000	39.4	.0012	.0039
1.25	**.049**	**10**	**.394**	36000	196.9	.0047	.0098	36000	102.4	.0043	.0098
1.25	**.049**	**15**	**.591**	36000	181.1	.0031	.0098	36000	78.7	.0030	.0098

Depth of Cut



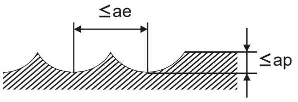
Note 1) When the inclination angle of machined surface is large, or machining with large cutting load such as corner area, reduce the revolution and feed rate.
Note 2) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 3) Cutting conditions may differ considerably due to the tool overhang, depth of cut and machine tool condition. Please use the table above as a reference starting point.

Recommended Cutting Conditions

(inch)

Workpiece Material				Hardened Steels (45−55HRC)				Hardened Steels (55−70HRC)			
Corner Radius **RE**		Neck length **LU**		Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut **ap**	Width of Cut **ae**	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut **ap**	Width of Cut **ae**
(mm)	(inch)	(mm)	(inch)								
1.5	**.059**	**10**	**.394**	32000	200.8	.0059	.0118	32000	86.6	.0059	.0118
1.5	**.059**	**12**	**.472**	32000	200.8	.0051	.0118	32000	86.6	.0051	.0118
1.5	**.059**	**16**	**.630**	32000	177.2	.0039	.0118	32000	70.9	.0039	.0118
1.5	**.059**	**20**	**.787**	27000	149.6	.0039	.0118	27000	63.0	.0024	.0118
1.5	**.059**	**25**	**.984**	21000	106.3	.0031	.0118	21000	47.2	.0024	.0118
1.5	**.059**	**30**	**1.181**	9000	39.4	.0031	.0118	9000	27.6	.0020	.0118
2	**.079**	**10**	**.394**	24000	189.0	.0079	.0157	24000	86.6	.0079	.0157
2	**.079**	**12**	**.472**	24000	189.0	.0079	.0157	24000	86.6	.0079	.0157
2	**.079**	**16**	**.630**	24000	149.6	.0059	.0157	24000	59.1	.0059	.0157
2	**.079**	**20**	**.787**	24000	149.6	.0059	.0157	24000	59.1	.0059	.0157
2	**.079**	**25**	**.984**	24000	149.6	.0059	.0157	24000	43.3	.0039	.0157
2	**.079**	**30**	**1.181**	24000	118.1	.0039	.0157	24000	43.3	.0031	.0157
2.5	**.098**	**20**	**.787**	19000	133.9	.0079	.0197	19000	55.1	.0079	.0197
2.5	**.098**	**25**	**.984**	19000	133.9	.0079	.0197	19000	55.1	.0079	.0197
3	**.118**	**18**	**.709**	16000	137.8	.0098	.0236	16000	39.4	.0079	.0236
3	**.118**	**30**	**1.181**	16000	137.8	.0079	.0236	16000	39.4	.0079	.0236

Depth of Cut



Note 1) When the inclination angle of machined surface is large, or machining with large cutting load such as corner area, reduce the revolution and feed rate.

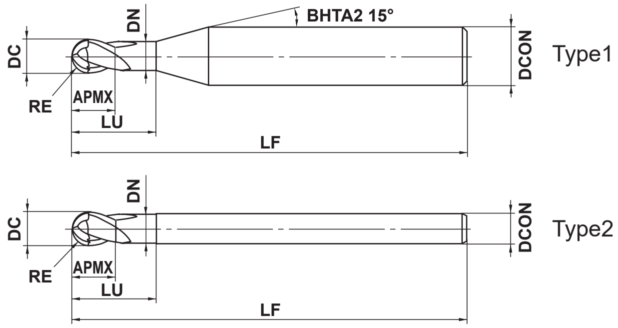
Note 2) If the depth of cut is shallow, the revolution and feed rate can be increased.

Note 3) Cutting conditions may differ considerably due to the tool overhang, depth of cut and machine tool condition. Please use the table above as a reference starting point.

VFR2SSB

Ball nose, Short cut length, 2 flute, Short shank

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminum Alloy
	○	◎	◎				



RE≤6				
±0.005				
4≤DCON≤6	8≤DCON≤10	DCON=12		
0 - 0.005	0 - 0.006	0 - 0.008		

●Opimization of the flute geometry, helix and rake angles have improved the overall edge strength.

(mm)

Order Number	RE	DC	APMX	LU	DN	LF	DCON	* No.F	Stock	Type
VFR2SSBR0050S04	0.5	1	1	2	0.94	40	4	2	●	1
VFR2SSBR0050	0.5	1	1	2	0.94	40	6	2	●	1
VFR2SSBR0075S04	0.75	1.5	1.5	3	1.44	40	4	2	●	1
VFR2SSBR0075	0.75	1.5	1.5	3	1.44	40	6	2	●	1
VFR2SSBR0100	1	2	2	4	1.9	45	6	2	●	1
VFR2SSBR0150	1.5	3	3	6	2.9	45	6	2	●	1
VFR2SSBR0200	2	4	4	8	3.9	45	6	2	●	1
VFR2SSBR0250	2.5	5	5	10	4.9	50	6	2	●	1
VFR2SSBR0300	3	6	6	12	5.85	50	6	2	●	2
VFR2SSBR0400	4	8	8	14	7.85	60	8	2	●	2
VFR2SSBR0500	5	10	10	18	9.7	70	10	2	●	2
VFR2SSBR0600	6	12	12	22	11.7	75	12	2	●	2

* Number of Flutes

RE = Corner Radius
DC = Cutting Dia.
APMX = Depth of Cut Max.
LU = Usable Length
DN = Neck Dia.
LF = Functional Length
DCON = Connection Dia.

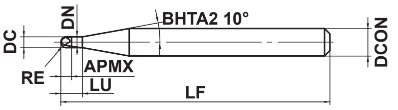
● : USA Stock

VFR2SB

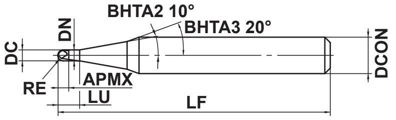
Ball nose, Short cut length, 2 flute

0° RE<0.3
20° RE≥0.3

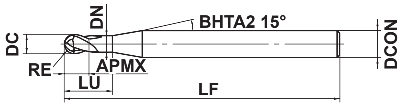
Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminum Alloy
	○	◎	◎				



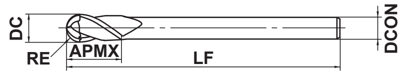
Type1



Type2



Type3



Type4

RE≤6	RE>6			
±0.005	±0.010			
DCON=3	4≤DCON≤6	8≤DCON≤10	DCON=12	DCON=20
0 - 0.004	0 - 0.005	0 - 0.006	0 - 0.008	0 - 0.009

- Optimization of the flute geometry, helix and rake angles have improved the overall edge strength.

(mm)

Order Number	RE	DC	APMX	LU	DN	LF	DCON	* No.F	Stock	Type
VFR2SBR0010	0.1	0.2	0.2	0.4	0.17	45	4	2	●	1
VFR2SBR0010S06	0.1	0.2	0.2	0.4	0.17	50	6	2	●	2
VFR2SBR0015	0.15	0.3	0.3	0.6	0.27	45	4	2	●	1
VFR2SBR0015S06	0.15	0.3	0.3	0.6	0.27	50	6	2	●	2
VFR2SBR0020	0.2	0.4	0.4	0.8	0.36	45	4	2	●	1
VFR2SBR0020S06	0.2	0.4	0.4	0.8	0.36	50	6	2	●	2
VFR2SBR0030	0.3	0.6	0.6	1.2	0.56	45	4	2	●	3
VFR2SBR0030S06	0.3	0.6	0.6	1.2	0.56	50	6	2	●	3
VFR2SBR0040	0.4	0.8	0.8	1.6	0.76	45	4	2	●	3
VFR2SBR0040S06	0.4	0.8	0.8	1.6	0.76	50	6	2	●	3
VFR2SBR0050	0.5	1	1	2	0.94	45	4	2	●	3
VFR2SBR0050S06	0.5	1	1	2	0.94	50	6	2	●	3
VFR2SBR0060	0.6	1.2	1.2	2.4	1.14	45	4	2	●	3
VFR2SBR0060S06	0.6	1.2	1.2	2.4	1.14	50	6	2	●	3
VFR2SBR0070	0.7	1.4	1.4	2.8	1.34	45	4	2	●	3
VFR2SBR0070S06	0.7	1.4	1.4	2.8	1.34	50	6	2	●	3
VFR2SBR0075	0.75	1.5	1.5	3	1.44	45	4	2	●	3
VFR2SBR0075S06	0.75	1.5	1.5	3	1.44	50	6	2	●	3
VFR2SBR0080	0.8	1.6	1.6	3.2	1.54	45	4	2	●	3
VFR2SBR0080S06	0.8	1.6	1.6	3.2	1.54	50	6	2	●	3
VFR2SBR0090	0.9	1.8	1.8	3.6	1.74	45	4	2	●	3
VFR2SBR0090S06	0.9	1.8	1.8	3.6	1.74	50	6	2	●	3
VFR2SBR0100	1	2	2	4	1.9	50	4	2	●	3
VFR2SBR0100S06	1	2	2	4	1.9	60	6	2	●	3
VFR2SBR0125S06	1.25	2.5	2.5	5	2.4	60	6	2	●	3
VFR2SBR0150	1.5	3	3	6	2.9	70	6	2	●	3
VFR2SBR0150S03	1.5	3	3	—	—	60	3	2	●	4
VFR2SBR0200	2	4	4	8	3.9	70	6	2	●	3
VFR2SBR0200S04	2	4	4	—	—	60	4	2	●	4
VFR2SBR0250	2.5	5	5	10	4.9	80	6	2	●	3
VFR2SBR0300	3	6	12	—	—	80	6	2	●	4
VFR2SBR0400	4	8	14	—	—	90	8	2	●	4
VFR2SBR0500	5	10	18	—	—	100	10	2	●	4
VFR2SBR0600	6	12	22	—	—	110	12	2	●	4
VFR2SBR0800	8	16	30	—	—	140	16	2	●	4
VFR2SBR1000	10	20	38	—	—	160	20	2	●	4

* Number of Flutes

RE = Corner Radius
DC = Cutting Dia.
APMX = Depth of Cut Max.
LU = Usable Length
DN = Neck Dia.
LF = Functional Length
DCON = Connection Dia.

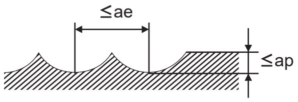
● : USA Stock

Ball nose, Short cut length, 2 flute, Short shank **VFR2SSB**

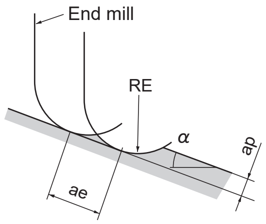
Ball nose, Short cut length, 2 flute **VFR2SB**

Recommended Cutting Conditions

(inch)

Workpiece Material		Hardened steel (45−55HRC) AISI H13						Hardened steel (55−62HRC) AISI D2						Hardened steel (62−70HRC) AISI W1, AISI M2					
Corner Radius **RE**		α≤15°		α>15°		Depth of cut ap	Depth of cut ae	α≤15°		α>15°		Depth of cut ap	Depth of cut ae	α≤15°		α>15°		Depth of cut ap	Depth of cut ae
(mm)	(inch)	Revolution (min^{-1})	Feed rate (IPM)	Revolution (min^{-1})	Feed rate (IPM)			Revolution (min^{-1})	Feed rate (IPM)	Revolution (min^{-1})	Feed rate (IPM)			Revolution (min^{-1})	Feed rate (IPM)	Revolution (min^{-1})	Feed rate (IPM)		
0.1	**.004**	40000	12.6	40000	9.4	.0001	.0008	40000	12.6	40000	6.3	.0001	.0008	40000	12.6	40000	6.3	.0001	.0008
0.15	**.006**	40000	25.2	40000	22.0	.0004	.0012	40000	25.2	40000	15.7	.0003	.0012	40000	25.2	40000	15.7	.0002	.0012
0.2	**.008**	40000	63.0	40000	47.2	.0008	.0016	40000	55.1	40000	39.4	.0006	.0016	40000	47.2	40000	39.4	.0004	.0016
0.3	**.012**	40000	126.0	40000	63.0	.0012	.0024	40000	110.2	40000	47.2	.0010	.0024	40000	78.7	40000	47.2	.0008	.0024
0.4	**.016**	40000	252.0	40000	94.5	.0020	.0031	40000	157.5	40000	63.0	.0016	.0031	40000	110.2	40000	63.0	.0012	.0031
0.5	**.020**	40000	315.0	40000	126.0	.0024	.0039	40000	220.5	40000	94.5	.0020	.0039	40000	141.7	32000	51.2	.0016	.0039
0.75	**.030**	40000	378.0	40000	157.5	.0035	.0059	40000	283.5	32000	98.4	.0030	.0059	32000	177.2	21000	47.2	.0020	.0059
1	**.039**	40000	378.0	39000	185.0	.0043	.0079	40000	315.0	24000	94.5	.0039	.0079	24000	149.6	16000	39.4	.0028	.0079
1.25	**.049**	40000	409.4	32000	177.2	.0047	.0098	37000	318.9	19000	90.6	.0043	.0098	19000	133.9	13000	39.4	.0031	.0098
1.5	**.059**	40000	472.4	27000	169.3	.0051	.0118	32000	303.1	16000	86.6	.0047	.0118	16000	126.0	11000	34.6	.0035	.0118
2	**.079**	32000	428.3	20000	141.7	.0059	.0157	24000	244.1	12000	74.8	.0051	.0157	12000	94.5	8000	31.5	.0039	.0157
2.5	**.098**	25000	354.3	16000	114.2	.0079	.0197	19000	208.7	9600	66.9	.0059	.0197	9600	82.7	6000	23.6	.0039	.0197
3	**.118**	21000	330.7	13000	102.4	.0098	.0236	16000	189.0	8000	63.0	.0079	.0236	8000	66.9	5000	23.6	.0043	.0236
4	**.157**	16000	252.0	10000	78.7	.0118	.0315	12000	141.7	6000	47.2	.0079	.0315	6000	55.1	4000	18.9	.0043	.0315
5	**.197**	13000	204.7	8000	66.9	.0197	.0394	10000	126.0	4800	37.8	.0079	.0394	4800	43.3	3000	16.5	.0047	.0394
6	**.236**	9000	141.7	6000	51.2	.0197	.0472	7000	86.6	3600	28.3	.0118	.0472	3600	33.9	2200	12.2	.0047	.0472
8	**.315**	6000	94.5	4000	39.4	.0197	.0630	5000	63.0	2500	19.7	.0118	.0630	2500	25.6	1500	9.4	.0059	.0630
10	**.394**	4500	70.9	3000	30.7	.0197	.0787	4000	51.2	1800	14.2	.0118	.0787	1800	18.5	1000	6.3	.0059	.0787
Depth of cut																			

Note 1) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately.
Note 2) If the depth of cut is shallow, the revolution and feed rate can be increased.
Please reduce the feed rate when the surface finish is important.
Note 3) α is the inclination angle of the machined surface.



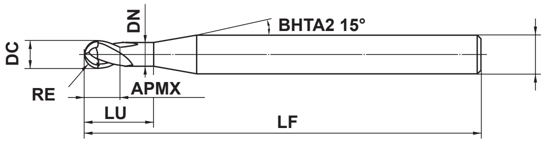
ae:Pick Feed

VFR2SBF

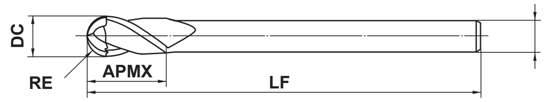
Ball nose, Short cut length, 2 flute, For mirror finishing

30°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminum Alloy
	○	◎	◎				



Type1



Type2

RE≤3				
±0.010				
4≤DCON≤6				
0 - 0.005				

h5

- New ball nose geometry for mirror finishing.

(mm)

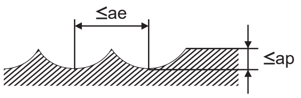
Order Number	RE	DC	APMX	LU	DN	LF	DCON	* No.F	Stock	Type
VFR2SBFR0050	0.5	1	1	2	0.94	45	4	2	●	1
VFR2SBFR0075	0.75	1.5	1.5	3	1.44	45	4	2	●	1
VFR2SBFR0100	1	2	2	4	1.9	60	6	2	●	1
VFR2SBFR0125	1.25	2.5	2.5	5	2.4	60	6	2	●	1
VFR2SBFR0150	1.5	3	3	6	2.9	70	6	2	●	1
VFR2SBFR0200	2	4	4	8	3.9	70	6	2	●	1
VFR2SBFR0250	2.5	5	5	10	4.9	80	6	2	●	1
VFR2SBFR0300	3	6	12	—	—	80	6	2	●	2

* Number of Flutes

RE = Corner Radius
DC = Cutting Dia.
APMX = Depth of Cut Max.
LU = Usable Length
DN = Neck Dia.
LF = Functional Length
DCON = Connection Dia.

Recommended Cutting Conditions

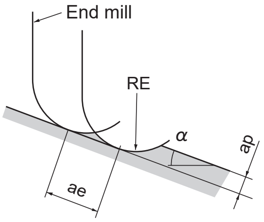
(inch)

Workpiece Material		Carbon Steel, Alloy Steel (180—280HB) Alloy steel (≤350HB), Pre-hardened steel (35— 45HRC) Hardened steel (45— 62HRC) AISI 1045, AISI 4140, SKD, SKT, AISI P21, AISI P20, AISI H13, L6, AISI D2						Hardened steel (62—70HRC) AISI W1, AISI M2					
Corner Radius **RE**		$\alpha \leq 15°$		$\alpha > 15°$		Depth of cut ap	Depth of cut ae	$\alpha \leq 15°$		$\alpha > 15°$		Depth of cut ap	Depth of cut ae
(mm)	(inch)	Revolution (min^{-1})	Feed rate (IPM)	Revolution (min^{-1})	Feed rate (IPM)			Revolution (min^{-1})	Feed rate (IPM)	Revolution (min^{-1})	Feed rate (IPM)		
0.5	**.020**	40000	31.5	40000	31.5	.0003	.0003	40000	22.0	40000	22.0	.0002	.0002
0.75	**.030**	40000	31.5	40000	31.5	.0004	.0004	40000	22.0	40000	22.0	.0003	.0003
1	**.039**	35000	41.3	35000	41.3	.0004	.0004	35000	27.6	35000	27.6	.0004	.0004
1.25	**.049**	35000	41.3	35000	41.3	.0005	.0005	35000	27.6	35000	27.6	.0004	.0004
1.5	**.059**	35000	41.3	35000	41.3	.0006	.0006	35000	27.6	35000	27.6	.0005	.0005
2	**.079**	25000	39.4	25000	39.4	.0007	.0007	25000	29.5	25000	29.5	.0006	.0006
2.5	**.098**	25000	39.4	25000	39.4	.0008	.0008	25000	29.5	25000	29.5	.0006	.0006
3	**.118**	25000	39.4	25000	39.4	.0008	.0008	25000	29.5	25000	29.5	.0006	.0006
Depth of cut													

Note 1) The tools are recommended for use only in finish machining.
Note 2) Air blowing or oil mist is recommended as coolants.
Note 3) Note the following points when using the tools.

- Avoid using equipment abruptly without proper preparation. After sufficiently energizing equipment, ensure that there will be no changes to the depth of cut such as due to elongation of the main axis during machining.
- If the tools are used immediately after rough machining of a surface, large uneven areas (cusp heights) will cause deflection of the tools and waviness of the machined surface. Therefore, it is recommended to add a medium finish machining process which uses the same value of ae as indicated in the table above.

Note 4) α is the inclination angle of the machined surface.

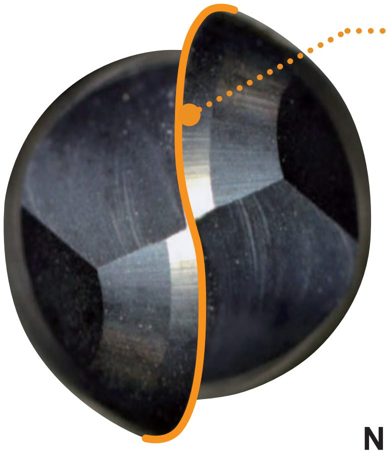


ae:Pick Feed

Revolutionary Machining of Hardened Steels

VFR2SSB/VFR2SB

2 Flute Ball Nose End Mill



Strong S Curve

New Negative Cutting Edge Shape and Slow Helix Angle Cutting Edge

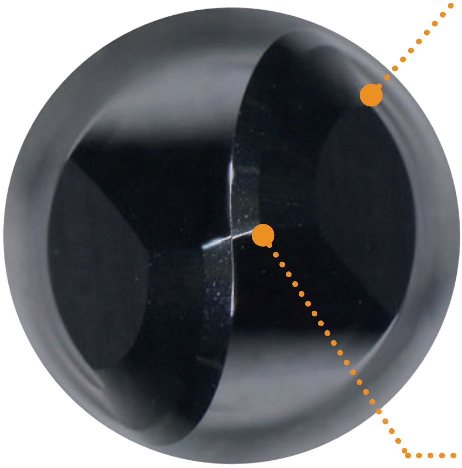
New Cutting Edge : Optimized flute geometry with improved edge strength in all areas of helix and rake angle.
Carbide Substrate : High grade carbide ideal for machining hardened materials.

VFR2SBF

2 Flute Ball Nose End Mill for Mirror Finishes

New ZERO-μ Surface

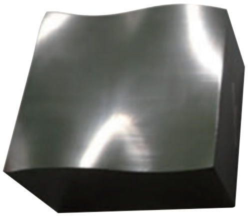
Newly developed surface smoothening technology



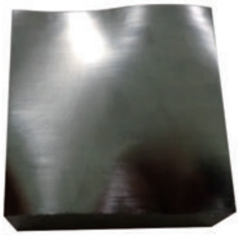
New Ball Nose Geometry for Mirror Finishing

Application Example

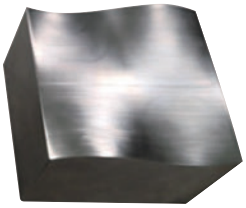
VFR2SB



ASP23
(62 HRC)



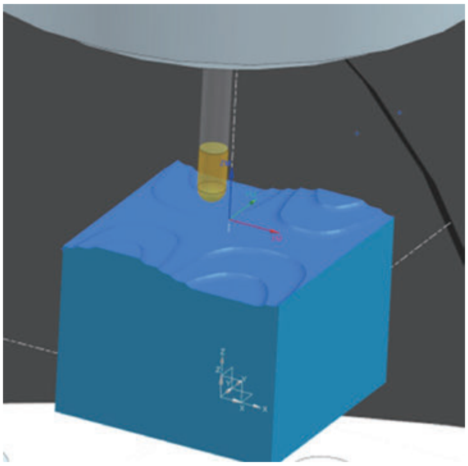
AISI M2
(64 HRC)



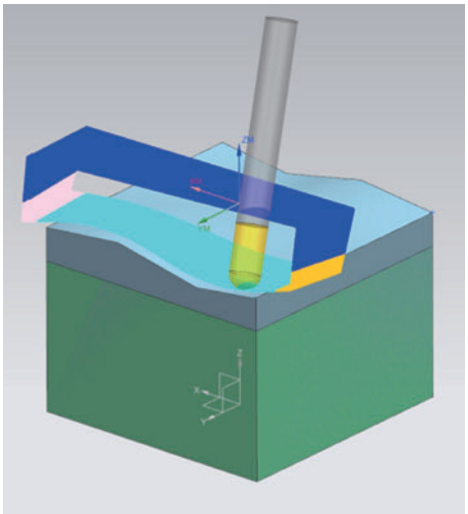
HAP72
(68 HRC)

<Cutting Conditions>
Workpiece : High Speed Steel
1.969"x1.969"x1.969"
Tool : VFR2SBR0300
Cutting Mode : Air Blow
Machine : Vertical MC

Rough Machining Shape



Medium Finish and Finish (Tilt Angle 30°)



Cutting Time : 234 min
Tools Used : 4

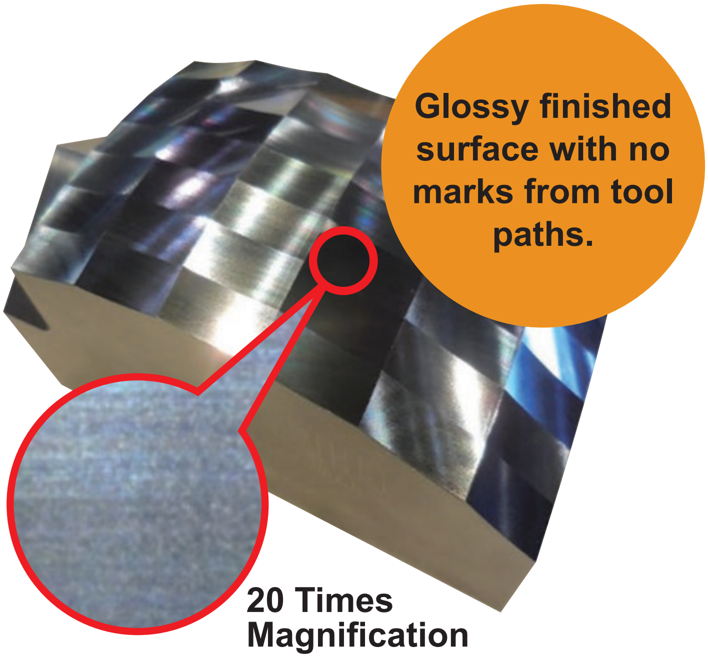
(inch)

Process	RE	n (min^{-1})	vf (IPM)	ap	ae	Finishing Allowance	Cutting Time (h:m:s)	Number of Tools
Rough Machining with Contour Line	**3.0mm, .118"**	12000	63.0	.014	.039	.008	1:01:45	2
Medium Finish Machining with Scan Line	**3.0mm, .118"**	8000	19.7	.012	.004	.002	0:49:15	1
Finish Machining with Scan Line	**3.0mm, .118"**	12000	27.6	.004	.001	—	2:03:19	1

Application Example

VFR2SBF

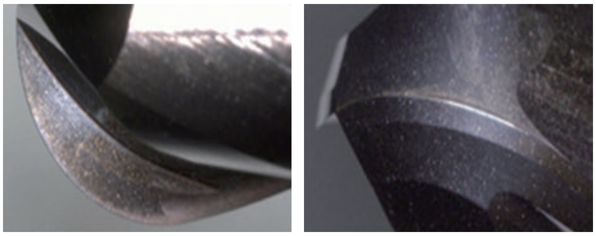
Workpiece : Pre-hardened Steel



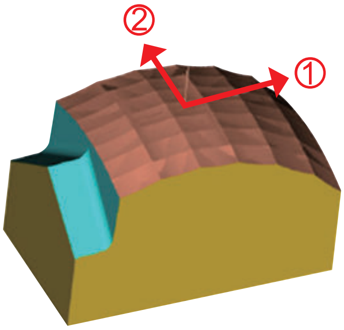
Glossy finished surface with no marks from tool paths.

20 Times Magnification

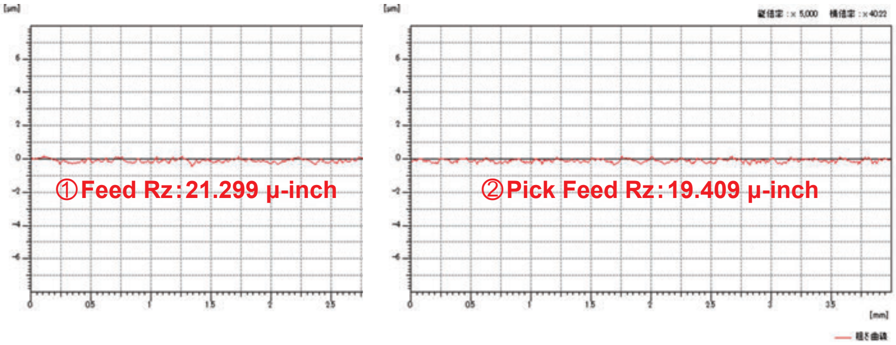
Indexed 5-axis machining can prevent machining at the tips of ball nose end mills.



Excellent tool conditions after 31 hours of finish machining.



A surface roughness of Rz: 31.496 μ-inch or lower can be achieved.



Cutting Conditions

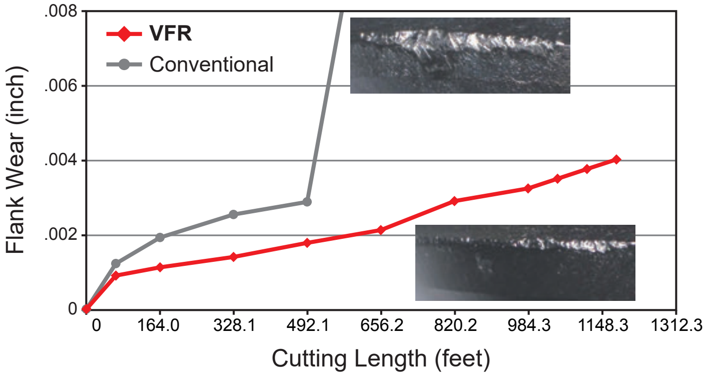
Holder : HSK-A63

(inch)

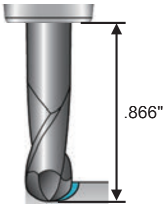
Process	Order Number	Coolant	n (min^{-1})	vc (SFM)	vf (IPM)	fz (IPT)	ap	ae	Finishing Allowance	Cutting Time (h :m)
Rough Machining Side Finish Machining	VQMHVRBD1600R500	Air Blow	3000 2000	490 330	70.9 9.4	.0059 .0012	1.260 —	.039 —	.008 0	0:24
Chamfer and Medium Finish Machining on the Top	MP2SBR0300	Air Blow	13000	805	102.4	.0039	Along the Surface p0.1		.001	0:46
Top Finish Machining	VFR2SBFR0300	MQL	20000	1230	23.6	.0006	Along the Surface p0.015		0	31:10

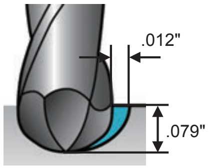
Cutting Performance

AISI H13 (52HRC)

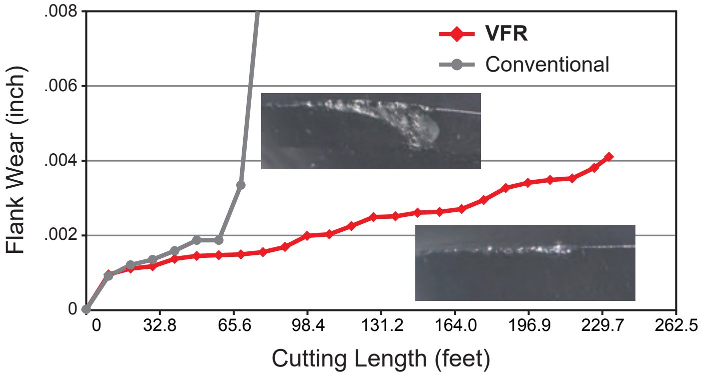


<Cutting Conditions>
Work Material : AISI H13 (52HRC)
Tool : VFR2SBR0300
Revolution : n=17000 min^{-1}
Table Feed : vf=66.9 IPM
Feed per Tooth : fz=.002 IPT
Depth of Cut : ap=.079 inch, ae=.012 inch
Overhang Length : .866 inch
Cutting Mode : Air blow
Machine : Vertical MC (HSK-A63)

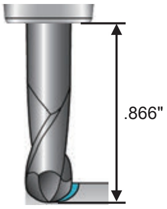


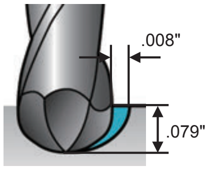


AISI D2 (60HRC)

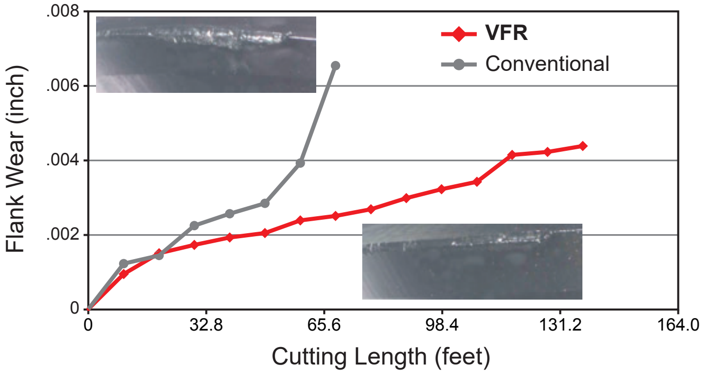


<Cutting Conditions>
Work Material : AISI D2 (60HRC)
Tool : VFR2SBR0300
Revolution : n=5400 min^{-1}
Table Feed : vf=21.3 IPM
Feed per Tooth : fz=.002 IPT
Depth of Cut : ap=.079 inch ae=.008 inch
Overhang Length : .866 inch
Cutting Mode : Air Blow
Machine : Vertical MC (HSK-A63)

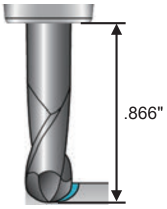


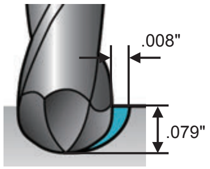


ASP23 (62HRC)

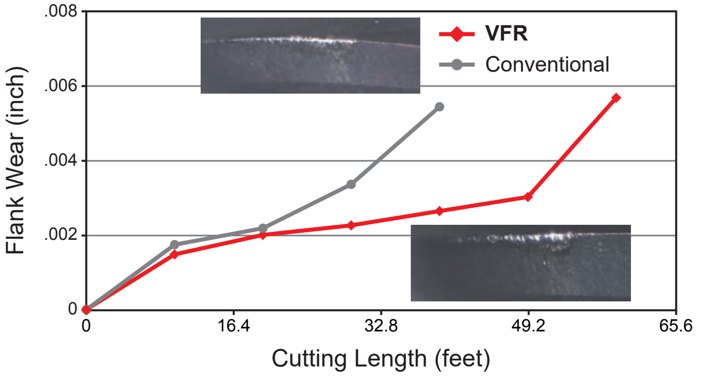


<Cutting Conditions>
Work Material : ASP23 (62HRC)
Tool : VFR2SBR0300
Revolution : n=5400 min^{-1}
Table Feed : vf=21.3 IPM
Feed per Tooth : fz=.002 IPT
Depth of Cut : ap=.079 inch, ae=.008 inch
Overhang Length : .866 inch
Cutting Mode : Air Blow
Machine : Vertical MC (HSK-A63)

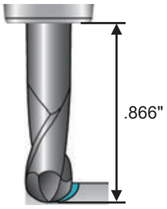


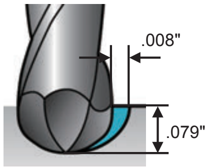


AISI M2 (64HRC)



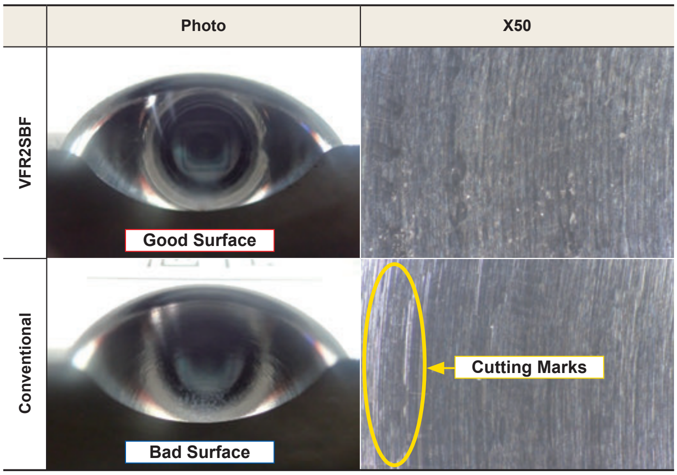
<Cutting Conditions>
Work Material : AISI M2 (64HRC)
Tool : VFR2SBR0300
Revolution : n=5400 min^{-1}
Table Feed : vf=21.3 IPM
Feed per Tooth : fz=.002 IPT
Depth of Cut : ap=.079 inch, ae=.008 inch
Overhang Length : .866 inch
Cutting Mode : Air Blow
Machine : Vertical MC (HSK-A63)



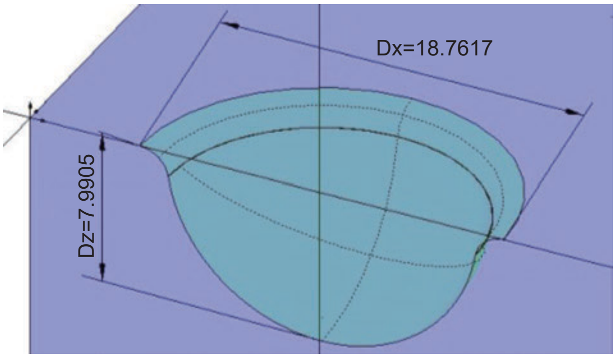


Cutting Performance

AISI H13 (52 HRC) Comparison of Cutting Surface



Model Shape



<Cutting Conditions>

Workpiece : AISI H13 (52HRC)
Tool : VFR2SBFR0300
Revolution : n=32000 min^{-1}
Cutting Speed : vc=1980 SFM
Table Feed : vf=50.4 IPM

Feed per Tooth : fz=.001 IPT
Depth of Cut : ap=.001 inch, ae=.001 inch
Overhang Length : .591 inch
Cutting Mode : Air Blow
Machine : Vertical MC (HSK-E25)

DIAEDGE

TOOL NEWS B262A

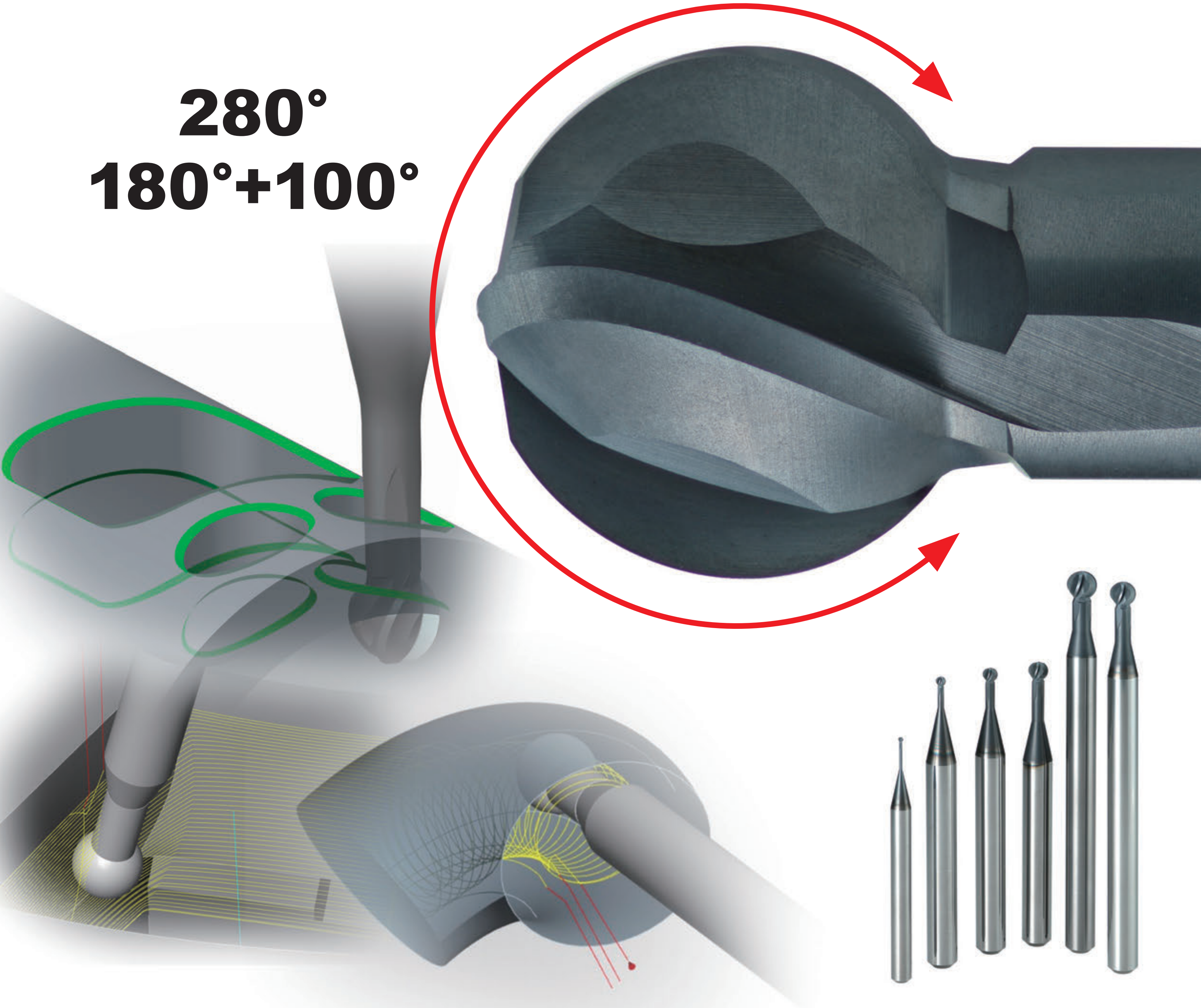
Lollipop End Mill for Multi-Functional Difficult-to-Cut Machining

SMART MIRACLE End Mill Series

VQ4WB

NEW Products

280° Extended Cutting Edge Enables a Wide Range of Applications



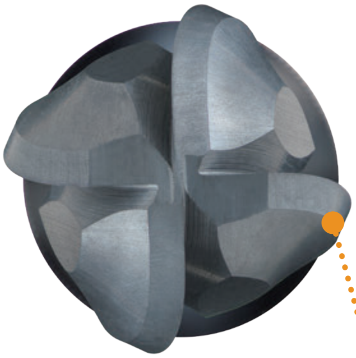
MITSUBISHI MATERIALS CORPORATION

Lollipop End Mill for Multi-Functional Difficult-to-Cut Machining

SMART MIRACLE End Mill Series

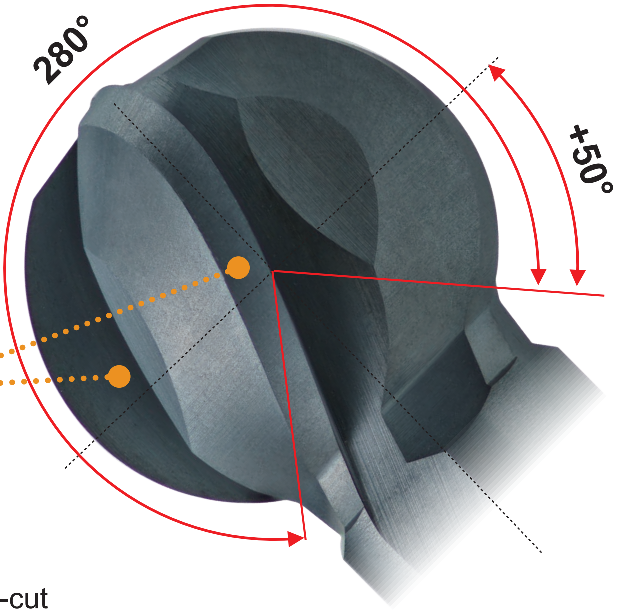
VQ4WB

280º extended cutting edge and special geometry of the cutting edge & rake face realizes multi-functional machining and wide range of applications. Optimal choice for machining undercut and complex shapes when using a 5-axis machine.



Multiple-Applications

True round ball cutting edge over the full 280º achieves stable cutting even during undercut machining.



High Efficiency

4 flutes, extended cutting edge, specialized geometry and long tool life make for a highly efficient tool.

Low Cutting Resistance

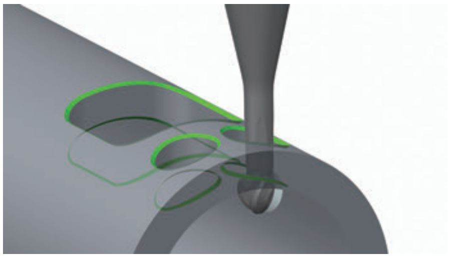
Constant edge and rake geometry helps to prevent burrs and chattering.

Long Tool Life

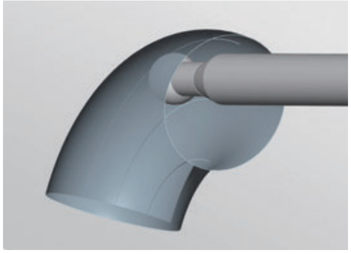
Long life when machining carbon steel to difficult-to-cut materials by (Al,Cr)N based SMART MIRACLE coating.

Multiple Applications

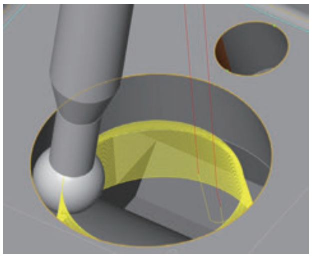
Deburring (Chamfering)



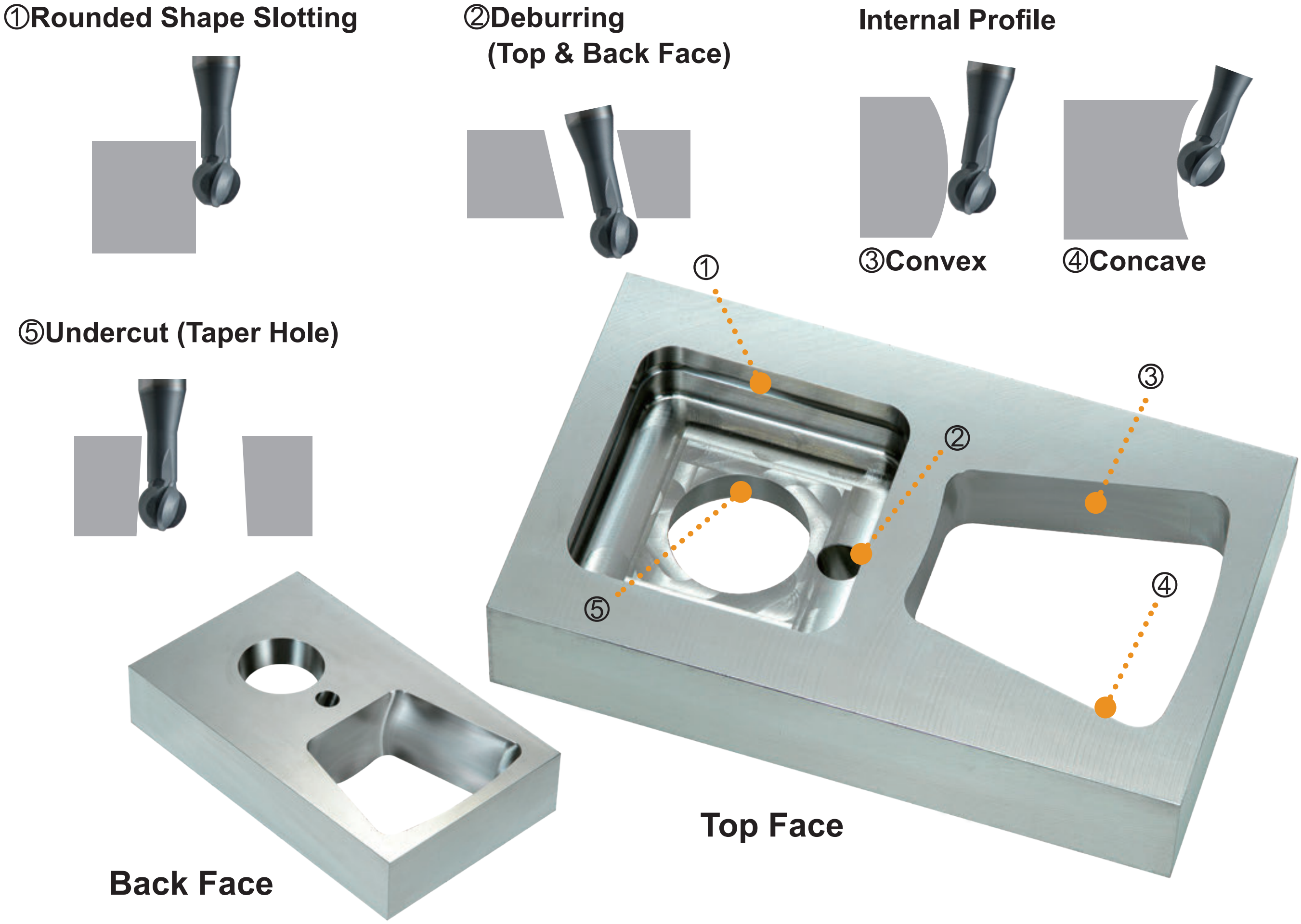
Internal Profile Milling



Undercut Machining

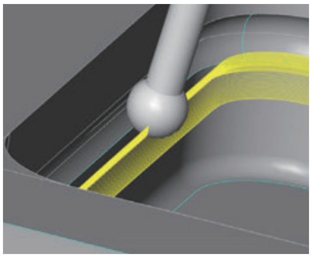


Application Example

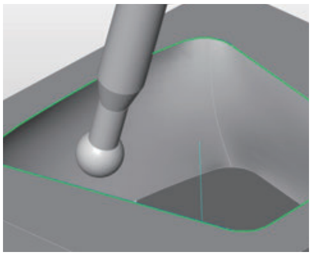


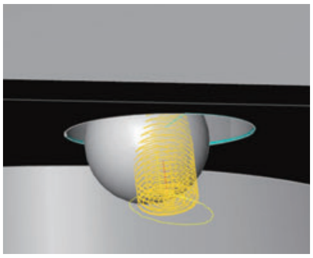
Multiple Applications

Rounded Shape Slotting

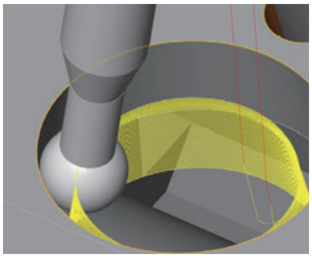


Deburring and Chamfering

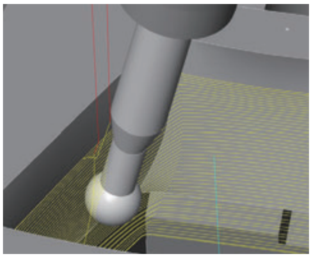


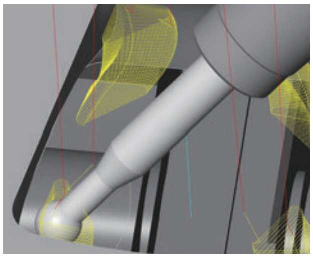


Under Cut (Taper Hole)



Internal Profile Milling





Cutting Performance

Comparison of Back Deburring in AISI S17400

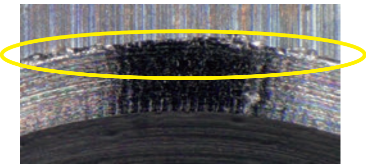
Significantly less burrs than Competing Lollipop End Mills

VQ4WB

Excellent Finish with No Burrs

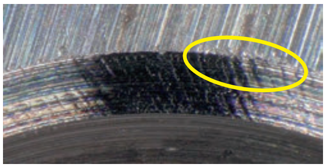
Competitor A

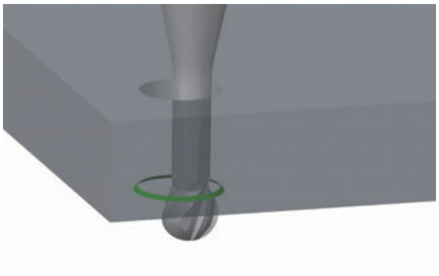
Heavy Burring Remains



Competitor B

Visible Burrs Persist

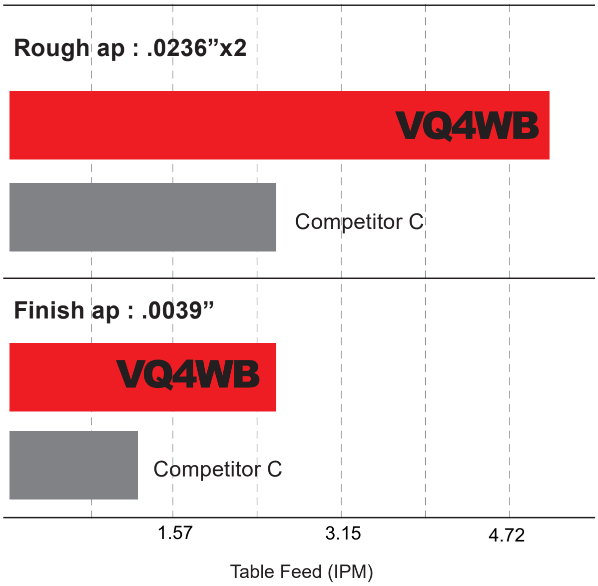


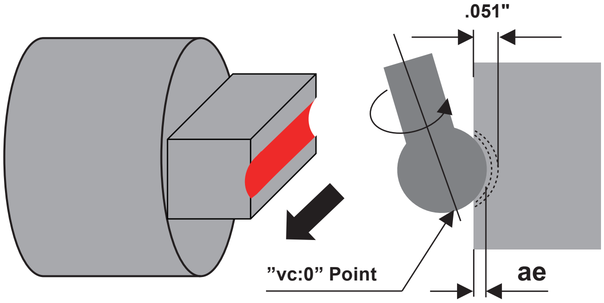


<Cutting Conditions>
Workpiece Material : AISI S17400
Tool : VQ4WBR0150N08E280
DC = .1181”
Revolution : n = 3200 min-1
Cutting Speed : vc = 98.5 SFM
Feed Rate : vf = 2.16 IPM, fz = .0002 IPT
Chamfer Width : .0394”
Cutting Mode : Hole Size .1575”
External Coolant (Emulsion)
Machine : Vertical M/C (HSK-E25)

Rounded Shape Slotting in Ti-6Al-4V ELI

VQ4WB (4 flute) achieves double machining efficiency compared to conventional lollipop end mill (2 flute).
Even after the same number of machining (rough + finish) as competitor tool, wear is minimal and VQ4WB can continue machining.





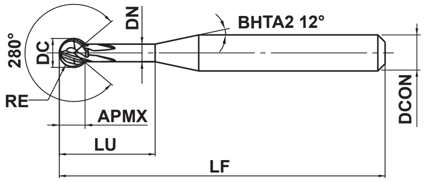
<Cutting Conditions>
Workpiece Material : Ti-6Al-4V ELI
Tool : VQ4WBR0300N12E280
DC = .2362”
Revolution : n = 800 min-1
Cutting Speed : vc = 49.0 SFM
Cutting Mode : External Coolant (Oil)
Machine : Multi-task Lathe

Lollipop End Mill for Multi-Functional Difficult-to-Cut Machining

VQ4WB NEW

Lollipop, Short cut length, 4 flute

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminum Alloy
◎	◎			◎	◎	○	



0.5≤RE≤3				
±0.01				
4≤DCON≤6				
0 - 0.008				

- ● Multi-function ball end mill with a lollipop shape for 5-axis machining.
- ● Optimal for back deburring, undercutting, and inner curved surface machining.

(mm)

Order Number	RE	DC	APMX	LU	DN	LF	DCON	* No.F	Stock
VQ4WBR0050N06E280	0.5	1.0	0.88	6	0.61	50	4	4	●
VQ4WBR0065N08E280	0.65	1.3	1.14	8	0.80	50	4	4	●
VQ4WBR0090N06E280	0.9	1.8	1.58	6	1.11	50	4	4	●
VQ4WBR0100N06E280	1.0	2.0	1.76	6	1.24	60	6	4	●
VQ4WBR0140N16E280	1.4	2.8	2.47	16	1.74	60	6	4	●
VQ4WBR0150N08E280	1.5	3.0	2.64	8	1.87	60	6	4	●
VQ4WBR0190N12E280	1.9	3.8	3.35	12	2.37	60	6	4	●
VQ4WBR0200N12E280	2.0	4.0	3.53	12	2.50	60	6	4	●
VQ4WBR0240N16E280	2.4	4.8	4.23	16	3.00	70	6	4	●
VQ4WBR0250N12E280	2.5	5.0	4.41	12	3.13	80	6	4	●
VQ4WBR0300N12E280	3.0	6.0	5.29	12	3.76	80	6	4	●

Note 1) SMART MIRACLE coating has very low electrical conductivity; therefore, an external contact type of tool setter (electric transmitted) may not work.

* Number of Flutes

<Order for Special Product>

For special products other than the above tool specifications, please contact our sales department.

DC = Dia.
RE = Radius
APMX = Length of Cut
LU = Neck Length
DN = Neck Dia.
LF = Overall Length
DCON = Shank Dia.

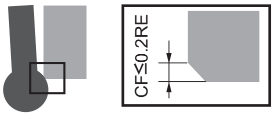
● : Inventory maintained.

Lollipop End Mill for Multi-Functional Difficult-to-Cut Machining

Recommended Cutting Conditions

Chamfering (Debarring)

(inch)

Workpiece Material				Milld Steels, Carbon Steels, Copper Alloys, Pre-hardened Steels AISI 1045, 4140, 1010, P20, P21, 4340, ASTM A36 etc.			Austentic, Ferritic and Martensitic Stainless Steels, Precipitation Hardening Stainless Steels, Cobalt Chrome Alloys, Titanium Alloys AISI 304, 316, 630, 631, 431, 420, Ti-6Al-4V, 15-5PH, 17-4PH etc.		
DC		RE		Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **Max.CF**	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **Max.CF**
mm	inch	mm	inch						
1.0	**.039**	**0.5**	**.020**	19000	11.8	.004	14000	8.7	.004
1.3	**.051**	**0.65**	**.026**	15000	16.5	.005	11000	12.2	.005
1.8	**.071**	**0.9**	**.035**	11000	22.4	.007	8000	16.5	.007
2.0	**.079**	**1.0**	**.039**	9500	24.0	.008	7200	18.1	.008
2.8	**.110**	**1.4**	**.055**	6800	29.9	.011	5100	22.4	.011
3.0	**.118**	**1.5**	**.059**	6400	30.3	.012	4800	22.8	.012
3.8	**.150**	**1.9**	**.075**	5000	33.1	.015	3800	25.2	.015
4.0	**.157**	**2.0**	**.079**	4800	34.6	.016	3600	26.0	.016
4.8	**.189**	**2.4**	**.094**	4000	37.8	.019	3000	28.3	.019
5.0	**.197**	**2.5**	**.098**	3800	38.2	.020	2900	29.1	.020
6.0	**.236**	**3.0**	**.118**	3200	39.4	.024	2400	30.3	.024
Depth of Cut				 RE : Radius					

Internal Profile / Undercut

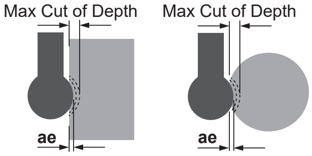
(inch)

Workpiece Material				Milld Steels, Carbon Steels, Copper Alloys, Pre-hardened Steels AISI 1045, 4140, 1010, P20, P21, 4340, ASTM A36 etc.			Austentic, Ferritic and Martensitic Stainless Steels, Precipitation Hardening Stainless Steels, Cobalt Chrome Alloys, Titanium Alloys AISI 304, 316, 630, 631, 431, 420, Ti-6Al-4V, 15-5PH, 17-4PH etc.		
DC		RE		Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ae**	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ae**
mm	inch	mm	inch						
2.0	**.079**	**1.0**	**.039**	9500	18.1	.001	7200	11.4	.001
3.0	**.118**	**1.5**	**.059**	6400	22.0	.004	4800	13.8	.004
4.0	**.157**	**2.0**	**.079**	4800	25.6	.006	3600	15.4	.006
5.0	**.197**	**2.5**	**.098**	3800	28.7	.007	2900	17.3	.007
6.0	**.236**	**3.0**	**.118**	3200	30.3	.009	2400	18.1	.009
Depth of Cut				 RE : Radius					

Note 1) SMART MIRACLE coating has very low electrical conductivity; therefore, an external contact type of tool setter (electric transmitted) may not work. When measuring the tool length, please use an internal contact type (non-electricity type) or a laser tool setter.
Note 2) If the depth of cut is smaller than this table, feed rate can be increased.
Note 3) If the rigidity of the machine or the workpiece material installation is very low, or chattering is generated, please reduce the revolution and the feed rate proportionately.
Note 4) For sizes RE 0.5, 0.65, 0.9, 1.4, 1.9 and RE 2.4 which have long neck lengths, internal profile milling and round shape slotting are not recommended.

Radiused Shape Slotting

(inch)

Workpiece Material				Milld Steels, Carbon Steels, Copper Alloys, Pre-hardened Steels AISI 1045, 4140, 1010, P20, P21, 4340, ASTM A36 etc.				Austentic, Ferritic and Martensitic Stainless Steels, Precipitation Hardening Stainless Steels, Cobalt Chrome Alloys, Titanium Alloys AISI 304, 316, 630, 631, 431, 420, Ti-6Al-4V, 15-5PH, 17-4PH etc.			
DC		**RE**		Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut		Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut	
mm	inch	mm	inch			**ae**	**Max. ae**			**ae**	**Max. ae**
2.0	**.079**	**1.0**	**.039**	9500	11.8	.001	.002	7200	5.5	.001	.002
3.0	**.118**	**1.5**	**.059**	6400	15.0	.004	.008	4800	7.5	.004	.008
4.0	**.157**	**2.0**	**.079**	4800	17.3	.006	.011	3600	9.1	.006	.011
5.0	**.197**	**2.5**	**.098**	3800	19.3	.007	.021	2900	10.2	.007	.021
6.0	**.236**	**3.0**	**.118**	3200	20.1	.009	.035	2400	10.6	.009	.035
Depth of Cut				 RE : Radius							

Note 1) SMART MIRACLE coating has very low electrical conductivity; therefore, an external contact type of tool setter (electric transmitted) may not work. When measuring the tool length, please use an internal contact type (non-electricity type) or a laser tool setter.
Note 2) If the depth of cut is smaller than this table, feed rate can be increased.
Note 3) If the rigidity of the machine or the workpiece material installation is very low, or chattering is generated, please reduce the revolution and the feed rate proportionately.
Note 4) For sizes RE 0.5, 0.65, 0.9, 1.4, 1.9 and RE 2.4 which have long neck lengths, internal profile milling and round shape slotting are not recommended.
Note 5) Though max ae means stably machinable cutting condition, maximum depth of calculated by effective cutting edge angle is 0.3 times RE. (In that case please reduce the revolution and feed rate than this table.)

Lollipop End Mill for Multi-Functional Difficult-to-Cut Machining

VQ4WB

DIAEDGE

TOOL NEWS

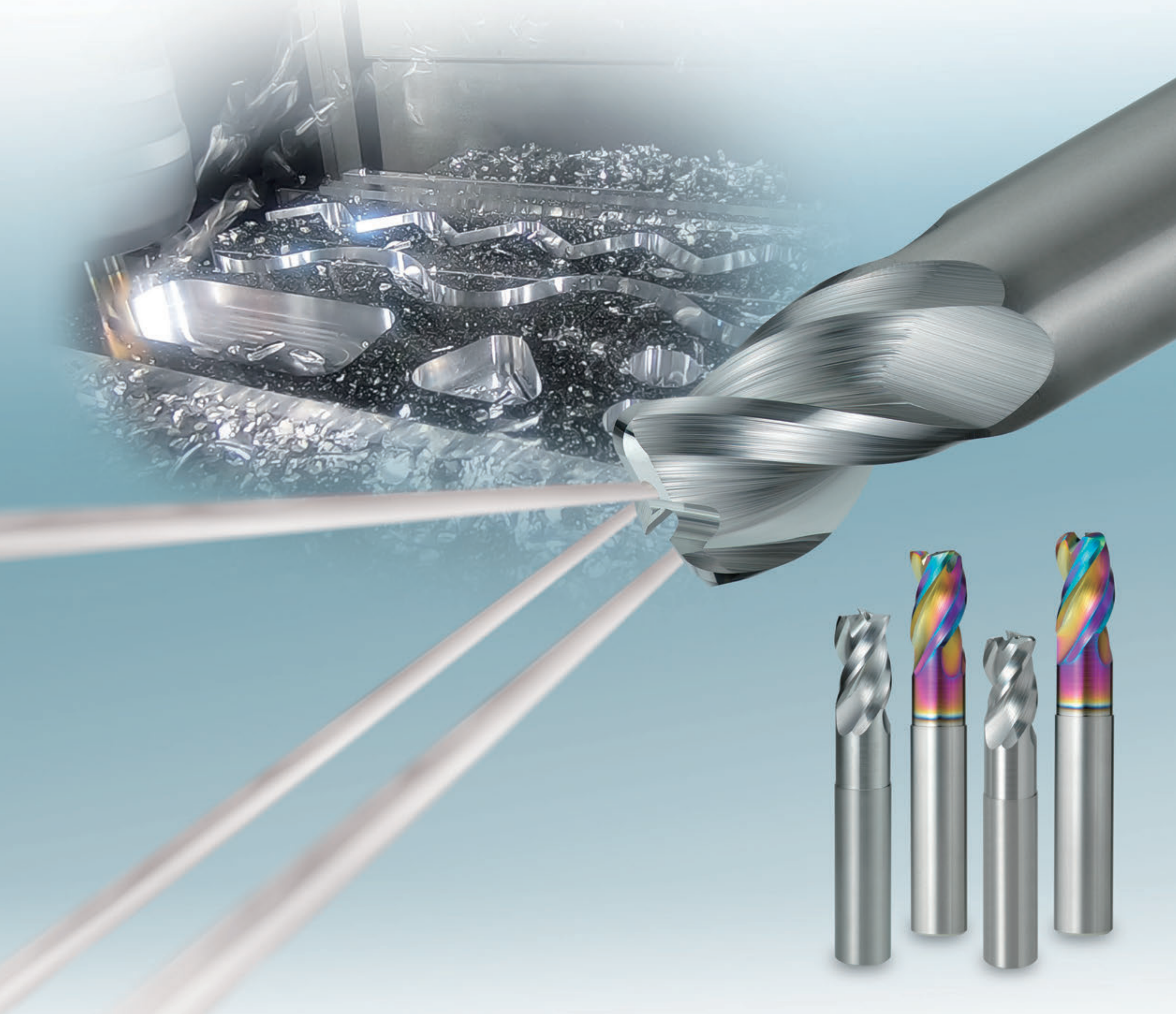
2021.9 Update
B264A

High Efficiency Machining of Aluminum Alloys

New Alimaster

NEW Products

Highly Efficient, Multi-functional Machining of Aluminum Alloys



MITSUBISHI MATERIALS CORPORATION

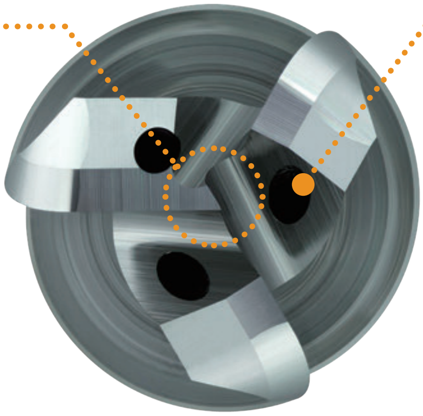
High Efficiency Machining of Aluminum Alloys

New Alimaster

Helical internal thru-coolant holes combined with an optimized cutting edge geometry enables highly efficient machining.

Strengthened Center Cutting Edges

Optimized center cutting edges provide strength and reliability even when plunging.



Helical Coolant Holes

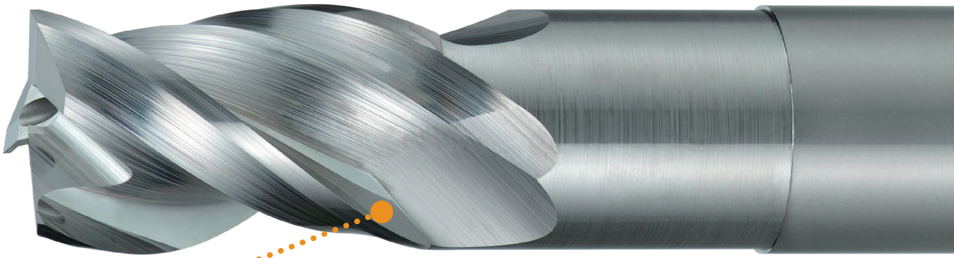
Chip discharge during plunging, ramping and grooving have been significantly improved, for stable, high efficiency cutting.
Helical holes maintain a stable coolant supply even after re-grinding.

Ideal Flute Geometry

The cross sectional geometry of the flutes is perfect for efficient chip discharge and prevents chip jamming commonly associated with high feed machining of aluminum.

Square End Mill, 3 Flute

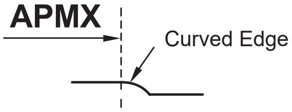
A3SA



Iregular Helix and Curved Flute Exit Geometry

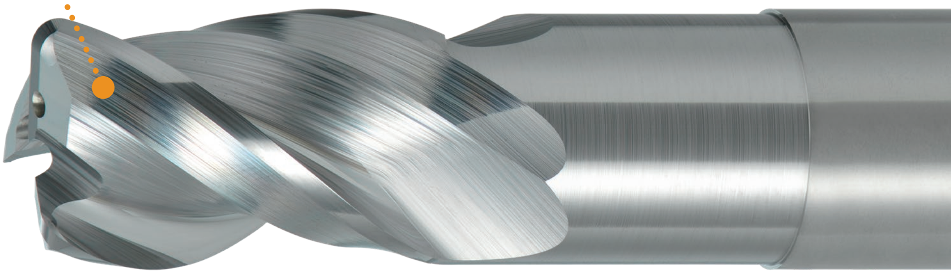
Suppresses chatter to enable excellent surface finishes.

Radius Flute Exit Geometry



Radius End Mill, 3 Flute

A3SARB



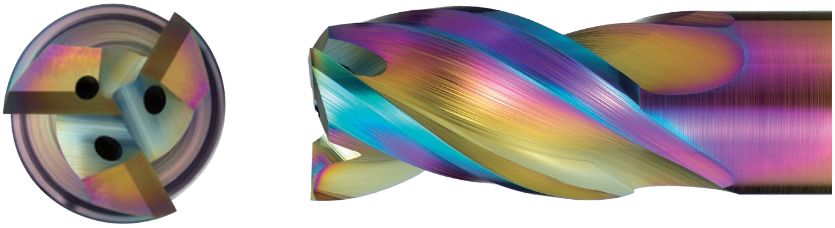
High Efficiency & Economy

DLC Coating

By adopting a unique DLC coating with excellent adhesion and weld-resistance, cutting friction is reduced thereby providing extra stability and efficiency. Additionally, wet or dry cutting is possible for slot milling and contouring.

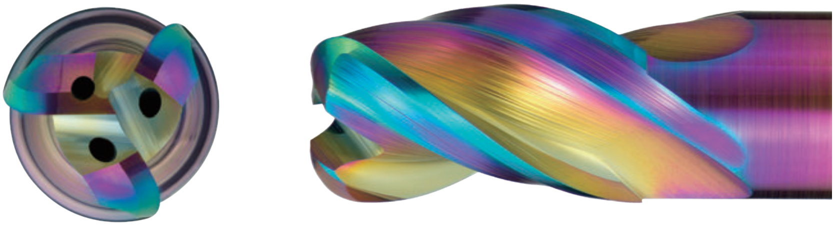
Square End Mill, 3 Flute

DLC3SA



Radius End Mill, 3 Flute

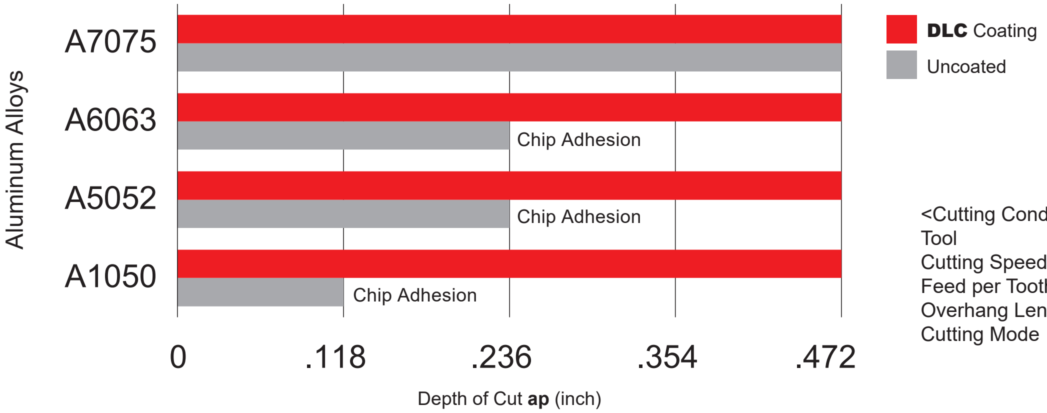
DLC3SARB



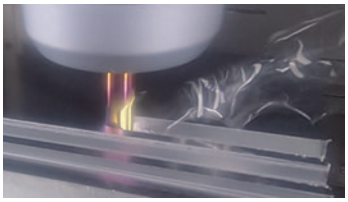
DLC coatings may differ naturally in color. This has no effect on quality or performance.

Dry Slot Milling - Comparison when Machining Different Materials

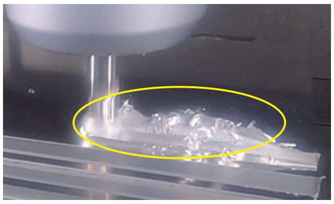
Superior weld-resistance combined with chip evacuation properties enables high efficiency slot milling even at large depths of cut.



<Cutting Conditions>
Tool : DC = ø12mm, .472 inch
Cutting Speed : vc = 1480 SFM
Feed per Tooth : fz = .004 IPT
Overhang Length : 1.417 inch
Cutting Mode : Dry Cutting



DLC Coating ap = .472 inch



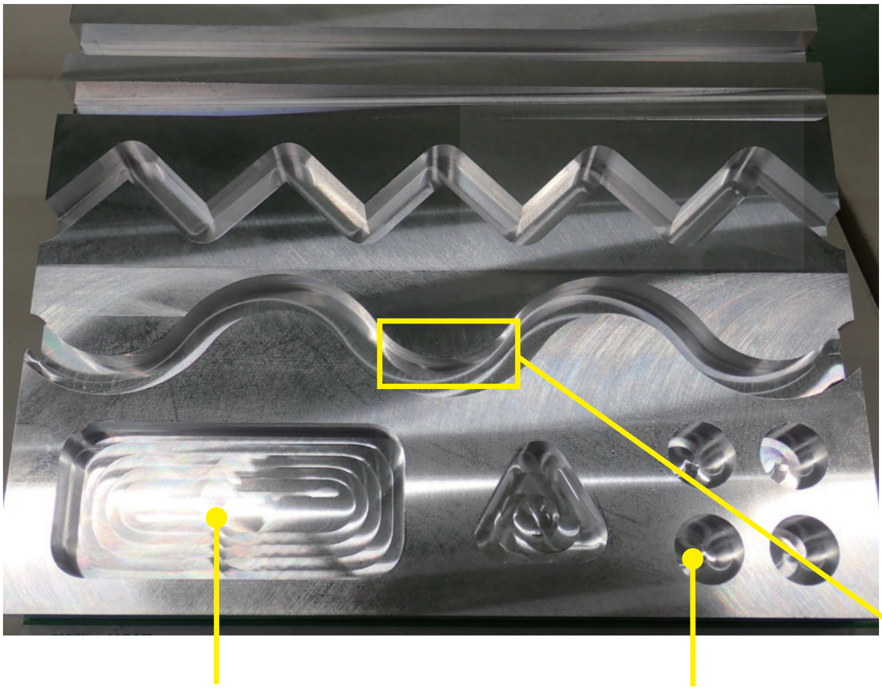
Uncoated ap = .118 inch

* Air blow both internal and external is used to effectively evacuate chips.

Cutting Performance

With DLC Coating - Example of Dry Machining A7075 Material

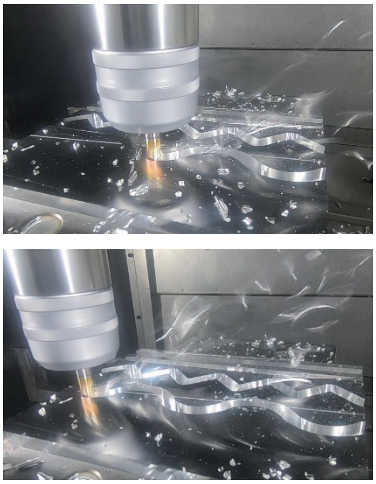
Multi-functional dry machining is possible.



Pocket Milling
3.937x1.772 inch (ap= .472 inch)

Helical Milling
ø.787 inch, Hole Depth .472 inch

Excellent Chip Evacuation



Wall Surface

<Cutting Conditions>
Workpiece Material : A7050
Tool : DLC3SA120N36C
Cutting Mode : Dry Cutting
Machine : Vertical M/C

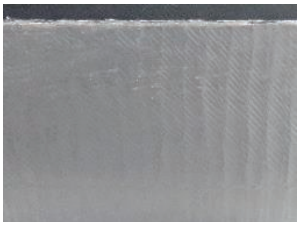
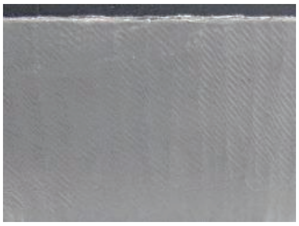
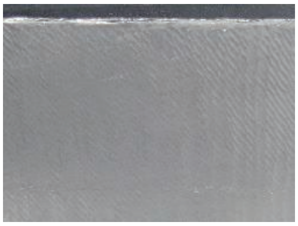
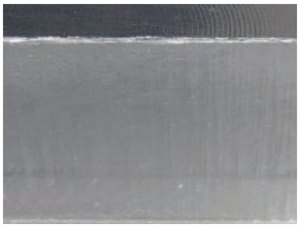
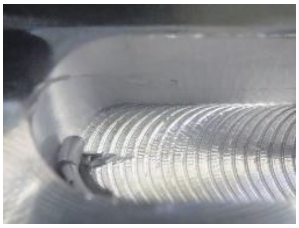
(inch)

Cutting Mode	Revolution **n** (min^{-1})	Cutting Speed **vc** (SFM)	Feed Rate **vf** (IPM)	Feed per Tooth **fz** (IPT)	Depth of Cut **ap**	Width of Cut **ae**
Slot Milling	12000	1480	171.7	.004	.472	.472
Ramping : 3°	12000	1480	70.9	.002	.472	.472
Helical Milling	12000	1480	70.9	.002	Pitch .079	–
Pocket Milling	12000	1480	171.7	.004	.472	.142

＊ Air blow both internal and external is used to effectively evacuate chips.

Uncoated Type - Slot Machining A7050 Material

Utilizing internal coolant and optimized cutting edge geometry enables double the efficiency levels of conventional products.

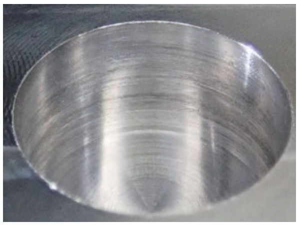
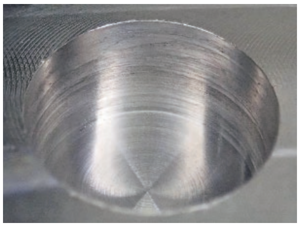
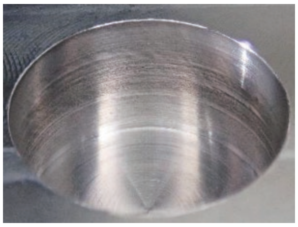
Feed Rate (IPM)	**100.4**	**118.9**	**137.8**
Feed per Tooth (IPT)	**.013**	**.015**	**.017**
New **Alimaster**	 ✓ Good Wall Surface	 ✓ Good Wall Surface	 ✓ Good Wall Surface
Conventional A	 ✓ Good Wall Surface	 ✗ Breakage due to chip clogging	
Conventional B	 ✗ Breakage due to chip clogging		

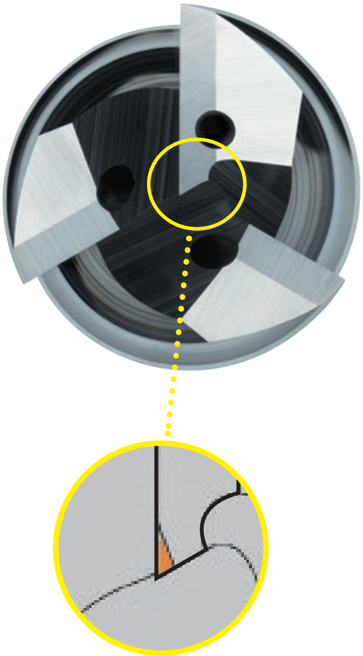
<Cutting Conditions>
Workpiece Material : A7050
Tool : A3SA120N36C
DC = ø.472 inch
Cutting Speed : vc = 330 SFM
Depth of Cut : ap = .472 inch
Overhang Length : 1.417 inch
Cutting Mode : Internal Coolant
(Water-soluble Coolants)

Cutting Performance

Uncoated Type - Plunge Machining A7050 Material

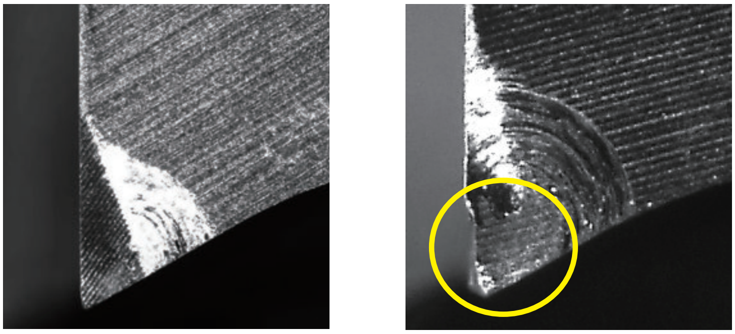
Higher feed rates than conventional products brings greater machining efficiencies.

Feed Rate (IPM)	**40.9**	**50.4**	**59.8**
Feed per Rev. (IPT)	**.005**	**.006**	**.007**
New **Alimaster**	 ✓	 ✓	 ✓



Strengthened Center Cutting Edges

After F = 59.8 IPM, fz = .007 IPT Plunging



New **Alimaster** ✓

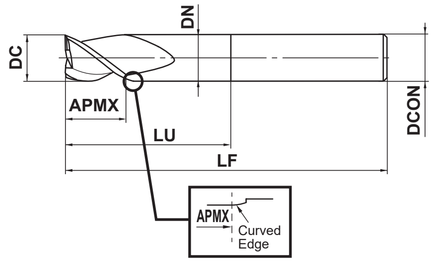
Conventional Fracture ✗

<Cutting Conditions>
Workpiece Material : A7050
Tool : A3SA120N36C
DC = ø.472 inch
Cutting Speed : vc = 985 SFM
Depth of Cut : ap = .472 inch
Overhang Length : 1.417 inch
Cutting Mode : Internal Coolant
(Water-soluble Coolants)

DLC3SA **NEW**

End mill, Short cut length, 3 flute, with multiple internal through coolant holes

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy Heat Resistant Alloy	Copper Alloy	Aluminum Alloy
							◎



DC=12	DC>12			
0 - 0.020	0 - 0.030			
12≤DCON≤16	20≤DCON≤25			
0 - 0.011	0 - 0.013			

- ● Stability and reliability even when slotting, ramping and plunging.
- ● DLC coating aids in providing excellent chip evacuation.

(mm)

Order Number	DC	APMX	LU	DN	LF	DCON	* No.F	Stock
DLC3SA120N36C	12	18	36	11.4	80	12	3	●
DLC3SA160N48C	16	24	48	15.4	90	16	3	●
DLC3SA200N55C	20	30	55	18	100	20	3	●
DLC3SA250N55C	25	37.5	55	23	100	25	3	●

* Number of Flutes

DC = Cutting Dia.
APMX = Depth of Cut Max.
LU = Usable Length
DN = Neck Dia.
LF = Functional Length
DCON = Connection Dia.

● : **USA Stock**

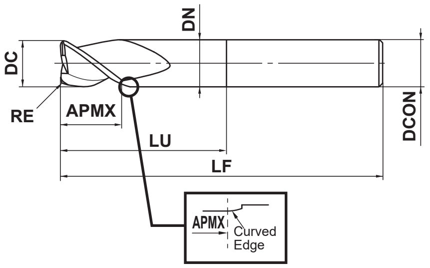
High Efficiency Machining of Aluminum Alloys

DLC3SARB NEW

Corner radius end mill, Short cut length, 3 flute, with multiple internal through coolant holes

UWC DLC γ 37.5°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy Heat Resistant Alloy	Copper Alloy	Aluminum Alloy
							◎



	DC=12	DC>12			
	0 - 0.020	0 - 0.030			
h6	12≤DCON≤16	20≤DCON≤25			
	0 - 0.011	0 - 0.013			

- Stability and reliability even when slotting, ramping and plunging.
- DLC coating aids in providing excellent chip evacuation.

(mm)

Order Number	DC	RE	APMX	LU	DN	LF	DCON	* No.F	Stock
DLC3SARB120R100N36C	12	1	18	36	11.4	80	12	3	●
DLC3SARB120R200N36C	12	2	18	36	11.4	80	12	3	●
DLC3SARB120R300N36C	12	3	18	36	11.4	80	12	3	●
DLC3SARB160R200N48C	16	2	24	48	15.4	90	16	3	●
DLC3SARB160R300N48C	16	3	24	48	15.4	90	16	3	●
DLC3SARB160R400N48C	16	4	24	48	15.4	90	16	3	●
DLC3SARB200R200N55C	20	2	30	55	18	100	20	3	●
DLC3SARB200R300N55C	20	3	30	55	18	100	20	3	●
DLC3SARB200R400N55C	20	4	30	55	18	100	20	3	●
DLC3SARB250R200N55C	25	2	37.5	55	23	100	25	3	●
DLC3SARB250R300N55C	25	3	37.5	55	23	100	25	3	●
DLC3SARB250R400N55C	25	4	37.5	55	23	100	25	3	●
DLC3SARB250R500N55C	25	5	37.5	55	23	100	25	3	●

* Number of Flutes

DC = Cutting Dia.
RE = Corner Radius
APMX = Depth of Cut Max.
LU = Usable Length
DN = Neck Dia.
LF = Functional Length
DCON = Connection Dia.

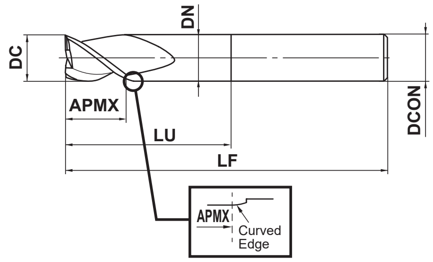
● : **USA Stock**

A3SA NEW

End mill, Short cut length, 3 flute, with multiple internal thru-coolant holes

UWC 37.5°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy Heat Resistant Alloy	Copper Alloy	Aluminum Alloy
							◎



DC=12	DC>12			
0 - 0.020	0 - 0.030			
12≤DCON≤16	20≤DCON≤25			
0 - 0.011	0 - 0.013			

- ● Stability and reliability even when slotting, ramping and plunging.
- ● The cross sectional geometry of the flutes is perfect for efficient chip discharge.

(mm)

Order Number	DC	APMX	LU	DN	LF	DCON	* No.F	Stock
A3SA120N36C	12	18	36	11.4	80	12	3	●
A3SA160N48C	16	24	48	15.4	90	16	3	●
A3SA200N55C	20	30	55	18	100	20	3	●
A3SA250N55C	25	37.5	55	23	100	25	3	●

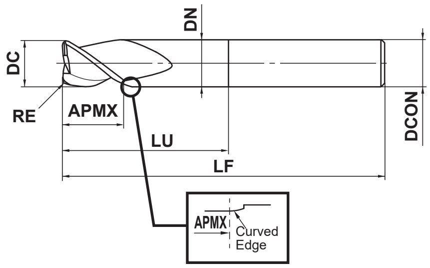
* Number of Flutes

DC = Cutting Dia.
APMX = Depth of Cut Max.
LU = Usable Length
DN = Neck Dia.
LF = Functional Length
DCON = Connection Dia.

A3SARB NEW

Corner radius end mill, Short cut length, 3 flute, with multiple internal thru-coolant holes

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy Heat Resistant Alloy	Copper Alloy	Aluminum Alloy
							◎



	DC=12	DC>12			
	0 - 0.020	0 - 0.030			
h6	12≤DCON≤16	20≤DCON≤25			
	0 - 0.011	0 - 0.013			

- Stability and reliability even when slotting, ramping and plunging.
- The cross sectional geometry of the flutes is perfect for efficient chip discharge.

(mm)

Order Number	DC	RE	APMX	LU	DN	LF	DCON	* No.F	Stock
A3SARB120R100N36C	12	1	18	36	11.4	80	12	3	●
A3SARB120R200N36C	12	2	18	36	11.4	80	12	3	●
A3SARB120R300N36C	12	3	18	36	11.4	80	12	3	●
A3SARB160R200N48C	16	2	24	48	15.4	90	16	3	●
A3SARB160R300N48C	16	3	24	48	15.4	90	16	3	●
A3SARB160R400N48C	16	4	24	48	15.4	90	16	3	●
A3SARB200R200N55C	20	2	30	55	18	100	20	3	●
A3SARB200R300N55C	20	3	30	55	18	100	20	3	●
A3SARB200R400N55C	20	4	30	55	18	100	20	3	●
A3SARB250R200N55C	25	2	37.5	55	23	100	25	3	●
A3SARB250R300N55C	25	3	37.5	55	23	100	25	3	●
A3SARB250R400N55C	25	4	37.5	55	23	100	25	3	●
A3SARB250R500N55C	25	5	37.5	55	23	100	25	3	●

* Number of Flutes

DC = Cutting Dia.
RE = Corner Radius
APMX = Depth of Cut Max.
LU = Usable Length
DN = Neck Dia.
LF = Functional Length
DCON = Connection Dia.

● : USA Stock

A3SA/A3SARB, DLC3SA/DLC3SARB

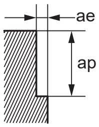
Recommended Cutting Conditions

Use high efficiency cutting conditions when the machine and workpiece rigidity, and chip evacuation properties are sufficient. Use lower, general-purpose cutting conditions when the mechanical or workpiece rigidity or chip evacuation porperties are insufficient.

High Efficiency Conditions

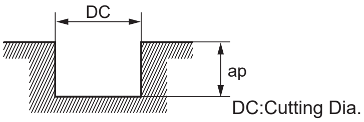
■Side Milling

(inch)

Workpiece Material		Aluminum Alloys				
Dia.**DC**		Cutting Speed (SFM)	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut ae	Depth of Cut ap
(mm)	(inch)					
12	**.472**	4070	33000	590.6	.236	.472
16	**.630**	5445	33000	787.4	.315	.630
20	**.787**	6790	33000	1023.6	.394	.787
25	**.984**	8495	33000	1259.8	.492	.984
Depth of Cut						

■Slot Milling

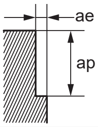
(inch)

Workpiece Material		Aluminum Alloys			
Dia.**DC**		Cutting Speed (SFM)	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut ap
(mm)	(inch)				
12	**.472**	4070	33000	590.6	.236
16	**.630**	5445	33000	787.4	.315
20	**.787**	6790	33000	1023.6	.394
25	**.984**	8495	33000	1259.8	.492
Depth of Cut					

General-purpose Conditions

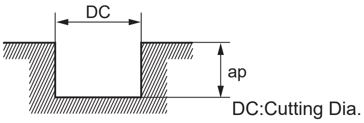
■Side Milling

(inch)

Workpiece Material		Aluminum Alloys				
Dia.**DC**		Cutting Speed (SFM)	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut ae	Depth of Cut ap
(mm)	(inch)					
12	**.472**	1970	16000	283.5	.236	.472
16	**.630**	1970	12000	283.5	.315	.630
20	**.787**	1970	9500	291.3	.394	.787
25	**.984**	1970	7600	287.4	.492	.984
Depth of Cut						

■Slot Milling

(inch)

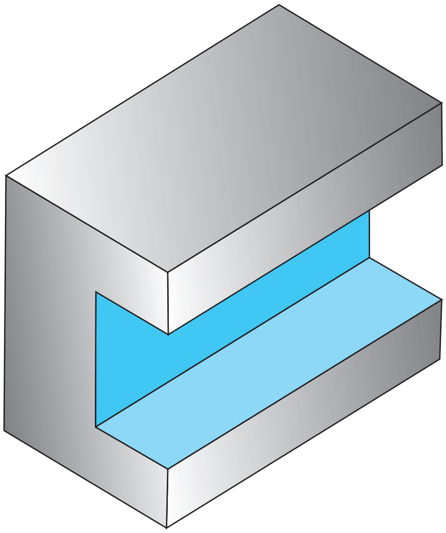
Workpiece Material		Aluminum Alloys			
Dia.**DC**		Cutting Speed (SFM)	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut ap
(mm)	(inch)				
12	**.472**	1970	16000	283.5	.236
16	**.630**	1970	12000	283.5	.315
20	**.787**	1970	9500	291.3	.394
25	**.984**	1970	7600	287.4	.492
Depth of Cut					

Note 1) It is recommended to use a water-soluble coolant. It is also possible to use air blow (external/internal) for DLC coated types.
Note 2) Climb milling is recommended for side cutting.
Note 3) This table shows the cutting condition with less than 4D overhang length. If more than 4D, spindle speed, feed rate and depth of cut should be reduced.
Note 4) When ramping, consider the chip discharge and use a feed rate 50% lower than the slotting conditions above and also use a ramping angle of 5º or less.
Note 5) If the rigidity of the machine or the workpiece materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately within the range described in the above table, or reduce the depth and width of cut.

Cutting Example

Machining with a High-speed, High-output Horizontal 5-axis Machining Center

Ultra-high efficiency processing was achieved with a stable chip discharge and no chattering.
Metal Removal Rate of 10,000cm^3/min (>600 in^3/min)



<Cutting Conditions>
Workpiece Material : A7050
Tool : A3SARB250R300N55C
DC = ø25 mm (.984 inch)
RE=3.0 mm (.118 inch)
Spindle Revolution : 33000 min^{-1}
Cutting Speed : vc = 2600 m/min (8530 SFM)
Feed Rate : f = 25000 mm/min (984 IPM)
Feed : fz = 0.25 mm/t. (.010 IPT)
Depth of Cut : ap = 16 mm (.630 inch)
ae = 25 mm (.984 inch)
Cutting Mode : Internal Coolant
(Water-soluble Coolants)
Machine : For machining aluminum
structural parts for aircraft
High-speed, high-output
horizontal 5-axis M/C

DIAEDGE

TOOL NEWS

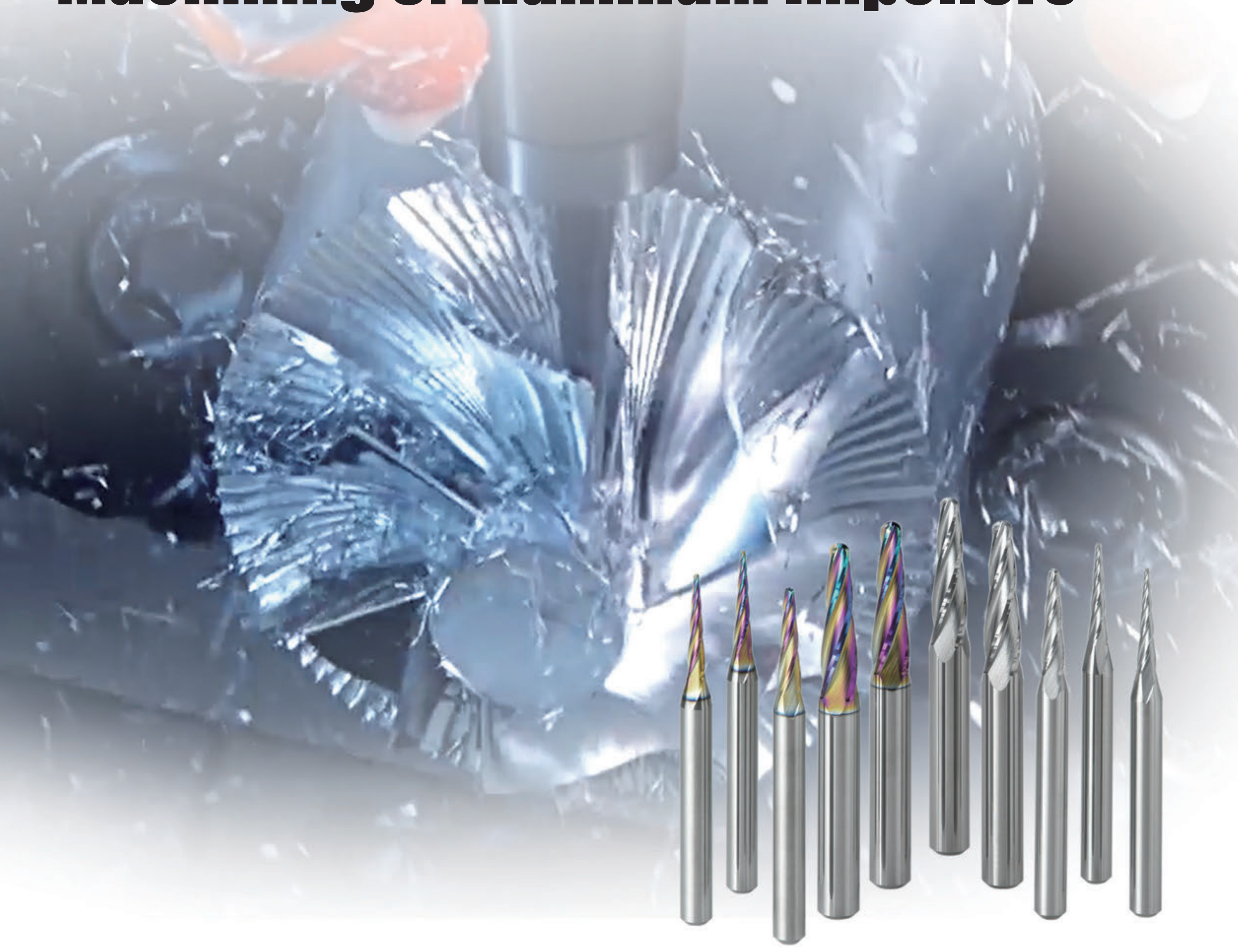
2021.6 Update
B248A

Taper Ball Nose End Mills for Machining Aluminum Alloy Impellers

DLC4LATB/C4LATB

Series Addition

Rigid Design and New DLC Coated Type for Reliable, High-Efficiency Machining of Aluminum Impellers

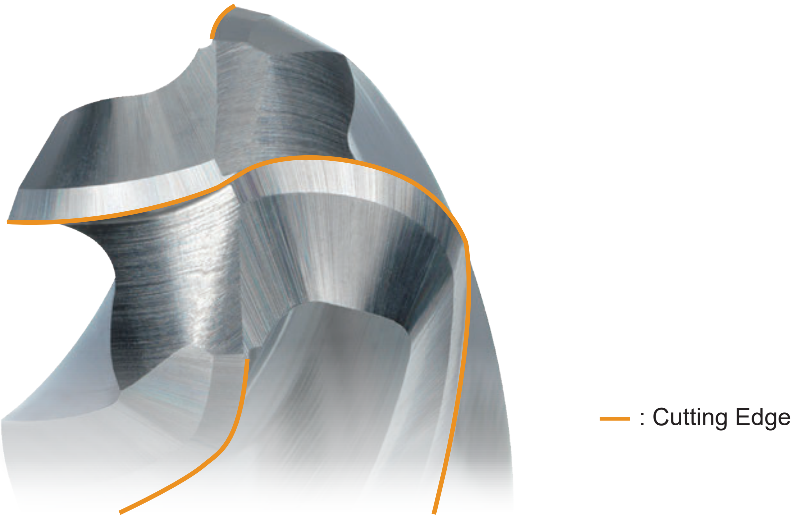


MITSUBISHI MATERIALS CORPORATION

Taper Ball Nose End Mills for Machining Aluminum Alloy Impellers

DLC4LATB/C4LATB

Featuring 4 peripheral flutes for strength and rigidity paired with only 2 ball end flutes for superior chip discharge.



A wide range of non-standard shapes are available. Please inquire for more information.

Ball Nose Taper End Mill

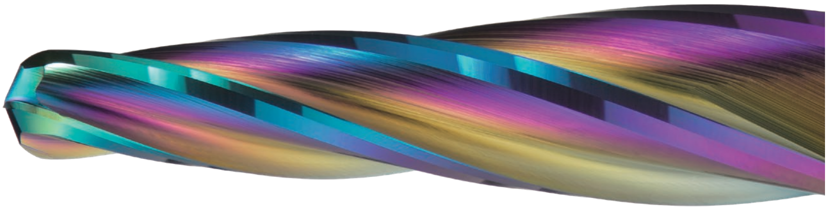
C4LATB

First Recommendation

NEW

DLC Coated Ball Nose Taper End Mill

DLC4LATB



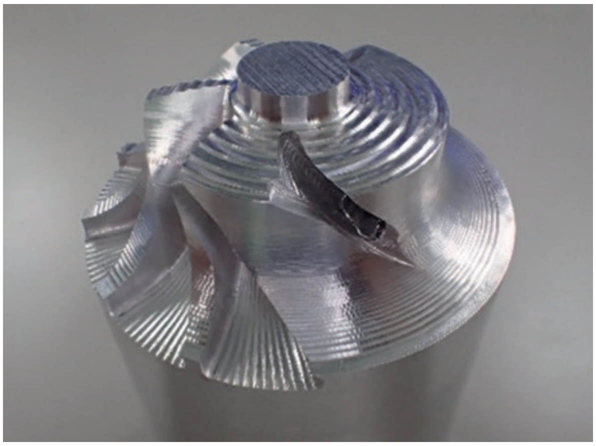
The uniquely developed DLC coating provides excellent welding resistance during high speed machining and when the coolant supply is reduced. Additionally, the low coefficient of friction reduces cutting resistance.

Application Example

High Efficiency Machining of Aluminum Alloy Impellers

Excellent high depth of cut and feed.

Conventional



Breakage During Machining

C4LATB

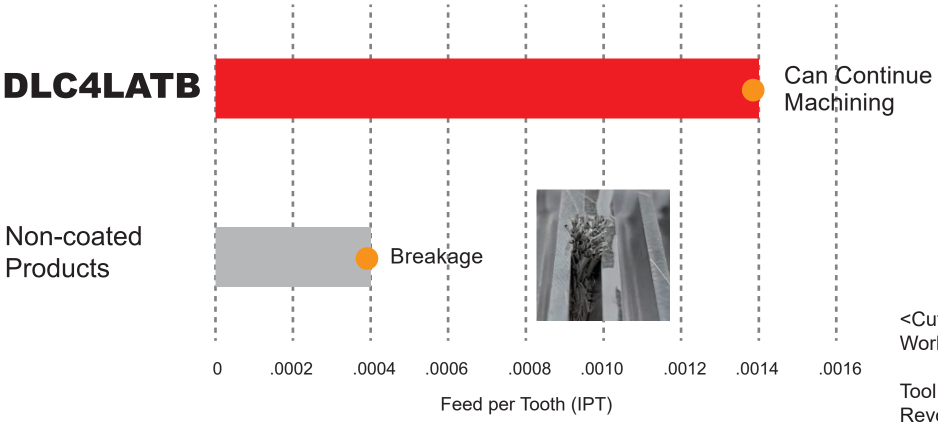
High Durability

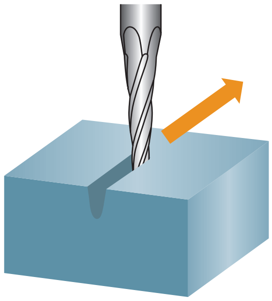
<Cutting Conditions>
Workpiece Materiall : Aluminum Alloy (A2618-T61)
Tool : C4LATBR100T040AP20
Revolution : 20000 min^{-1}
Max. Feed Rate : 78.74 IPM
Max. Depth of Cut : ap = .433 inch
Cutting Mode : Water Based
Machine : Vertical M/C

Cutting Performance

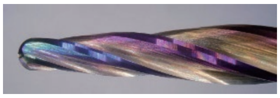
Slotting with a Limited Coolant Flow Rate

Resistance to welding prevents tool breakage when coolant supply is limited due to the geometry of the workpiece.





<Cutting Conditions>
Workpiece Material : Aluminum Alloy (A2618-T61)
Tool : DLC4LATBR100T040AP20
Revolution : 20000 min^{-1}
Feed per Tooth : fz = .0002- .0016 IPT
Depth of Cut : ap = .394 inch
Cutting Mode : Water Based
Machine : Vertical M/C (BT30)



DLC4LATB

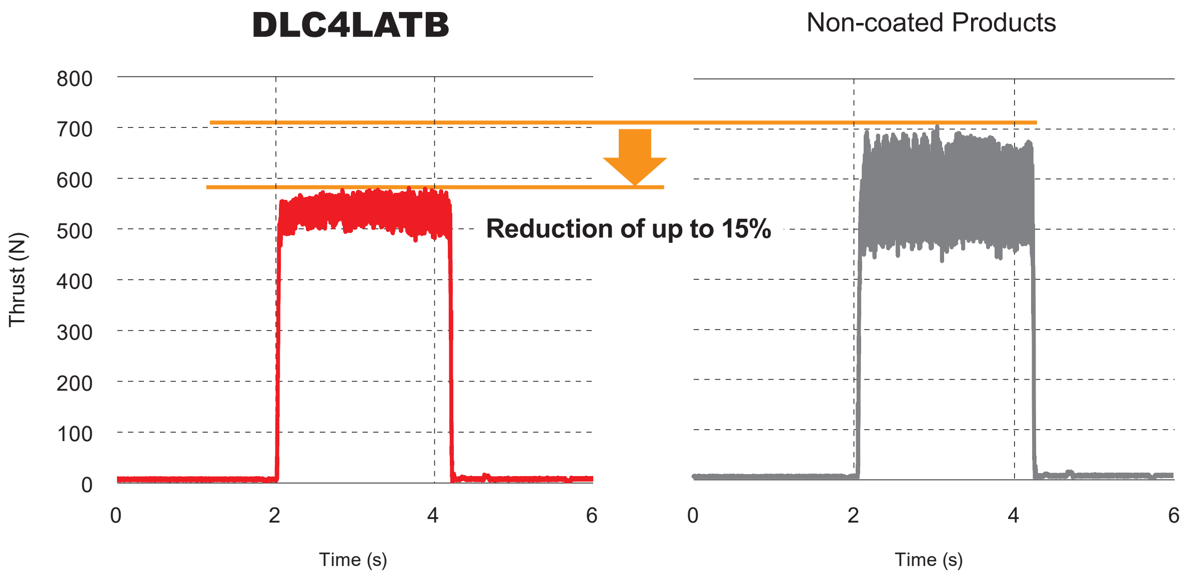
Non-coated Products

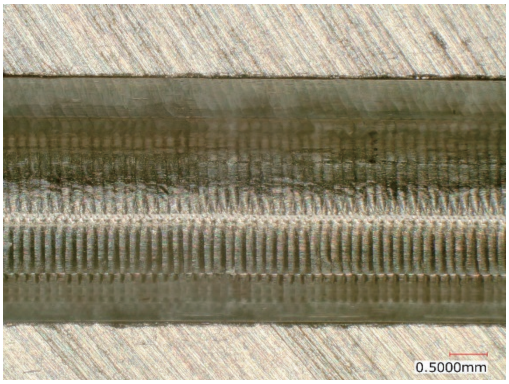
This test was performed with a limited coolant flow rate. If the coolant flow rate is sufficient, non-coated end mills can also be used.

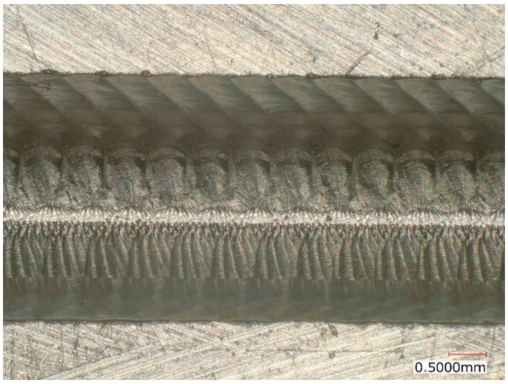
Cutting Performance

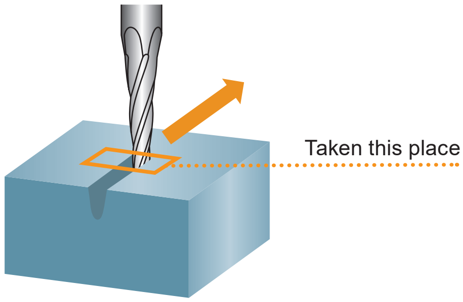
Comparison of Cutting Resistance when Slotting

Cutting resistance has been reduced by up to 15% compared to non-coated products.









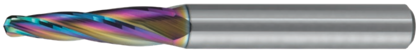
<Cutting Conditions>
Workpiece Material : Aluminum Alloy (A2618-T61)
Tool : DLC4LATBR100T040AP20
Revolution : 20000 min^{-1}
Feed per Tooth : fz=.0014 IPT
Depth of Cut : ap=.394 inch
Cutting Mode : Wet Cutting (Emulsion) External Coolant
Machine : Vertical M/C (BT30)

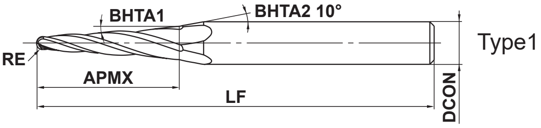
DLC4LATB NEW

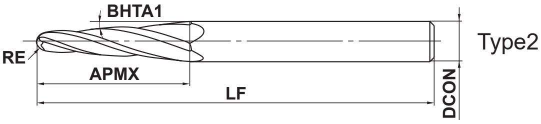
Taper ball nose end mill, Long cut length, 4 flute, For aluminum impellers

UWC DLC γ 20°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminum Alloy
							◎







RE≤2				
± 0.010				
±5'				
DCON=6	DCON=8			
0 - 0.008	0 - 0.009			

- The high-rigidity design with improved breakage resistance achieves high-efficiency machining of aluminum alloy impellers.
- High resistance to welding when there is an insufficient coolant supply or during high-speed cutting.

(mm)

Order Number	RE	BHTA1	APMX	LF	DCON	* No.F	Stock	Type
DLC4LATBR050T040AP20	0.5	4°	20	70	6	4	●	1
DLC4LATBR100T040AP20	1	4°	20	70	6	4	●	1
DLC4LATBR150T040AP20	1.5	4°	20	75	8	4	●	1
DLC4LATBR200T040AP30	2	4°	30	75	8	4	●	2

* Number of Flutes

Note 1) A wide range of non-standard shapes are available. Please inquire for more information.
(ex.: RE sizes starting from a minimum of R0.3, half included taper angles) or coatings.

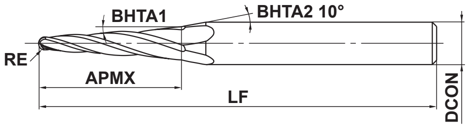
● : USA Stock

Taper Ball Nose End Mills for Machining Aluminum Alloy Impellers

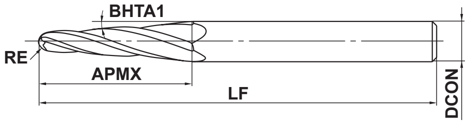
C4LATB

Taper ball nose end mill, Long cut length, 4 flute, For aluminum impellers

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminum Alloy
							◎



Type1



Type2

RE≤2				
± 0.010				
±5'				
DCON=6	DCON=8			
0 - 0.008	0 - 0.009			

- ● The high-rigidity design with improved breakage resistance achieves high-efficiency machining of aluminum alloy impellers.
- ● First recommended for machining aluminum alloy impellers.

(mm)

Order Number	RE	BHTA1	APMX	LF	DCON	* No.F	Stock	Type
C4LATBR050T040AP20	0.5	4°	20	70	6	4	●	1
C4LATBR100T040AP20	1	4°	20	70	6	4	●	1
C4LATBR150T040AP20	1.5	4°	20	75	8	4	●	1
C4LATBR200T040AP30	2	4°	30	75	8	4	●	2

* Number of Flutes
Note 1) A wide range of non-standard shapes are available. Please inquire for more information.
(ex.: RE sizes starting from a minimum of R0.3, half included taper angles) or coatings.

RE = Radius of Ball Nose
BHTA1 = Taper Angle
APMX = Length of Cut
LF = Functional Length
DCON = Shank Dia.

● : **USA Stock**

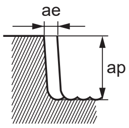
DLC4LATB/C4LATB

Taper ball nose end mill, Long cut length, 4 flute, For aluminum impellers

Recommended Cutting Conditions

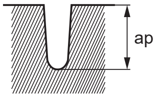
■Side Milling

(inch)

Workpiece Material		Aluminum Alloys			
RE		Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut ap	Depth of Cut ae
(mm)	(inch)				
0.5	**.020**	20000	78.7	.591	.030
1.0	**.039**	20000	157.5	.591	.059
1.5	**.059**	20000	204.7	.591	.089
2.0	**.079**	20000	204.7	.906	.118
Depth of Cut					

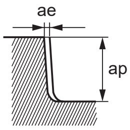
■Slotting

(inch)

Workpiece Material		Aluminum Alloys		
RE		Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut ap
(mm)	(inch)			
0.5	**.020**	20000	23.6	.394
1.0	**.039**	20000	110.2	.394
1.5	**.059**	20000	157.5	.394
2.0	**.079**	20000	157.5	.591
Depth of Cut				

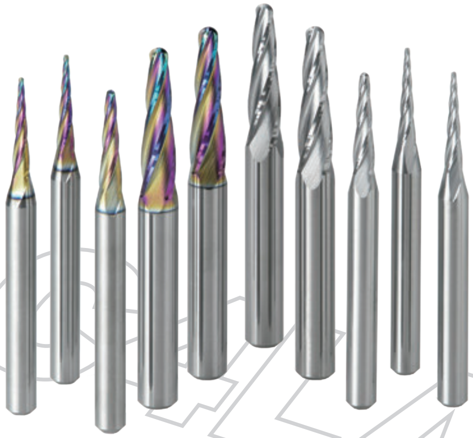
■Side Milling (Finishing)

(inch)

Workpiece Material		Aluminum Alloys			
RE		Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut ap	Depth of Cut ae
(mm)	(inch)				
0.5	**.020**	20000	31.5	.709	.004
1.0	**.039**	20000	78.7	.709	.008
1.5	**.059**	20000	94.5	.709	.012
2.0	**.079**	20000	94.5	1.063	.012
Depth of Cut					

Case Examples for Non-standard Shapes

Note 1) Water-soluble cutting fluid is recommended.
Note 2) Climb cutting is recommended for side milling.
Note 3) If the rigidity of the machine or the work materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately, or set the depth of cut smaller.



Taper Ball Nose End Mills for Machining Aluminum Alloy Impellers

DLC4LATB/C4LATB

DIAEDGE

TOOL NEWS

2022.3 Update
B251A

SMART MIRACLE End Mills
VQN Series for Heat Resistant Super Alloys

NEW Products

Cutting Edge Geometry Enables Stability, Versatility & High Efficiency Machining

MITSUBISHI MATERIALS CORPORATION

SMART MIRACLE End Mill Series for Difficult-to-Cut Materials

VQN4/6MVRB

Featuring the new (Al, Ti, Si)N-based coating which provides excellent wear resistance combined with the optimal number of irregular helix flutes to greatly dampen vibration enabling stable, efficient machining.

Features

Optimal Number of Flutes

The number of flutes has been optimized in relation to the outer diameter to achieve excellent chip evacuation and increased tool rigidity.

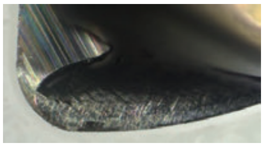
Irregular Helix Flutes

Helix angles vary from flute to flute by up to 4º.

Corner R-geometry with Improved Fracture Resistance

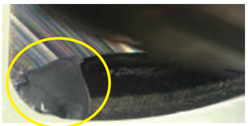
The negative shape of the rake angle for the R cutting edge allows the smooth flow of chips, thereby improving chipping resistance.

VQN4/6MVRB



Conventional

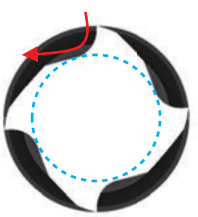
Defect due to high load



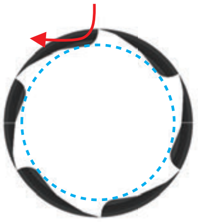
Defect due to lack of strength

Special Flute Shape

The flute shape is specifically designed for machining of heat resistant super alloys to provide excellent chip evacuation and high wear resistance.



VQN4MVRB

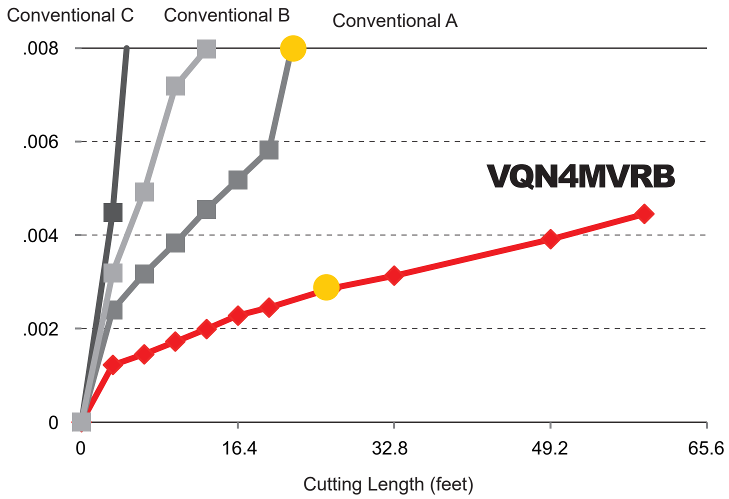


VQN6MVRB

Cutting Performance

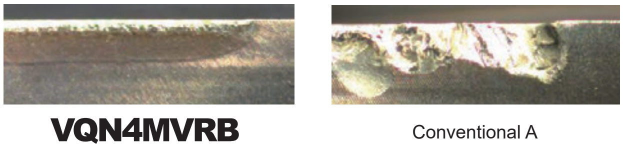
Machining Inconel 718 - Comparison of Wear Resistance

Excellent wear resistance when machining heat resistant super alloys.



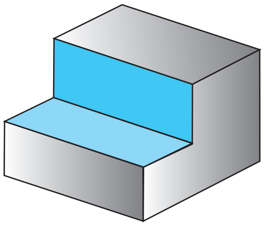
<Cutting Conditions>
Workpiece Material : Inconel718
Tool : DC=ø6mm, .236 inch, R1 mm, R.039 inch, 4 flutes
Cutting Speed : vc=130 SFM
Revolution : n=2100 min^{-1}
Table Feed : f=9.8 IPM
Depth of Cut : ap=.118 inch
ae=.024 inch
Overhang Length : .787 inch
Cutting Mode : Wet Cutting (Emulsion)
Machine : Vertical MC

After Cutting 26.2 feet



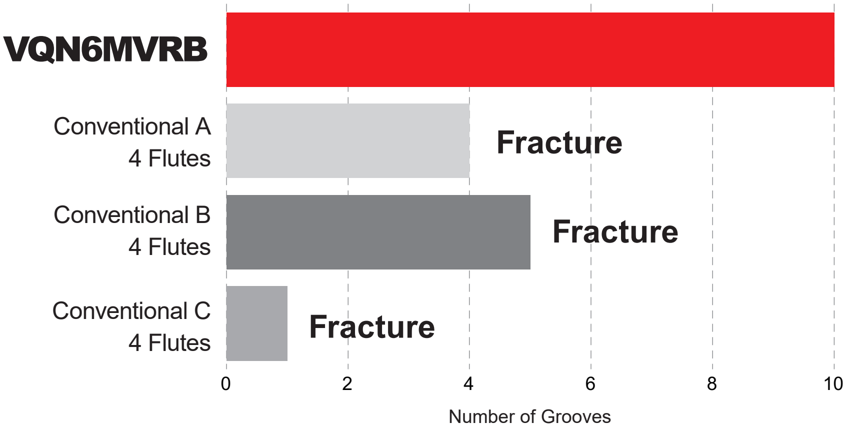
VQN4MVRB

Conventional A



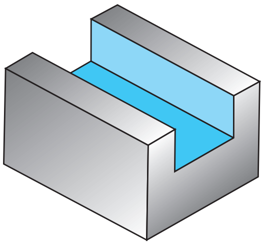
Machining Inconel 718 - Comparison of Fracture Resistance

Due to the optimized number of flutes and the enhanced R corner shape, fracture resistance is improved and tool life is more than doubled compared to conventional products.



<Cutting Conditions>
Workpiece Material : Inconel718
Tool : DC=ø12mm, .472 inch
Cutting Speed : vc=100 SFM
Revolution : n=800 min^{-1}
Table Feed : f=5.5 IPM
Depth of Cut : ap=.472 inch
Overhang Length : 1.417 inch
Cutting Mode : Wet Cutting (Emulsion)
Machine : Vertical MC

Cutting Length: 5.9 inch per groove



SMART MIRACLE End Mill Series for Difficult-to-cut Materials

VQN2MB/4MB/4MBF

(Al, Ti, Si) N-based coating with outstanding wear resistance, combined with optimized cutting edges, provide high machining efficiency and a stable cutting performance.

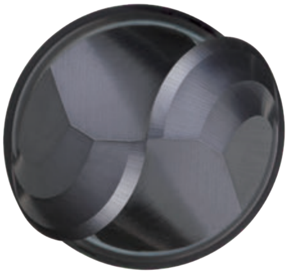
Features

(Al, Ti, Si) N-based Coating

The (Al, Ti, Si)N-based coatings maintain their film hardness and heat resistant properties under the harshest of conditions making it a highly suitable coating for end mills machining heat resistant super alloys.

New Cutting Edge Geometry

The corner radius cutting edge rake angles have been optimized for consistent contact. Additionally the structure of both the 2 and 4 flute end mills have been strengthened.



VQN2MB

Versatile 4 Flute Type

When compared to 2-flute types, end mills with 4 flutes have a longer tool life and provide higher efficiency machining. In addition the new types have a much improved chip disposal rate to prevent clogging.
Now available is the new VQN4MBF with a full 4-flute end geometry, ideal for 5 axis machining. The new VQN4MB, with 4 side flutes displays a special end geometry with only 2 flutes, designed with extra space for excellent chip evacuation during rough machining.

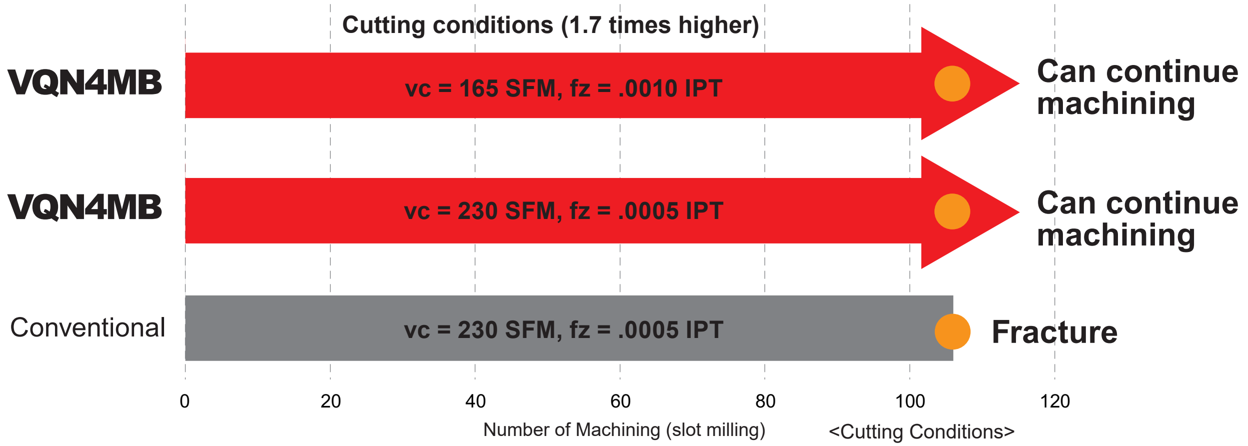
VQN4MBF

VQN4MB

Cutting Performance

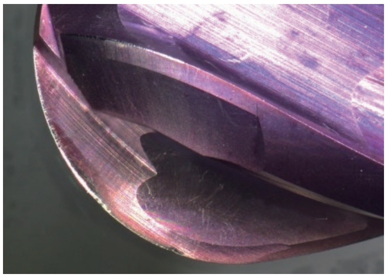
Machining Inconel 718 - Comparison of Fracture Resistance

Cutting time has been reduced due to an increased feed rate and an excellent resistance to fracturing during slotting. Ideal for machining heat resistant alloys typically used in the aerospace industry.

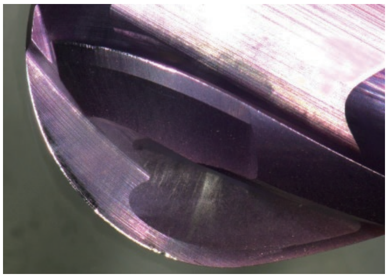


<Cutting Conditions>
Workpiece Material : Inconel718 (Aging treatment)
Tool : RE = 5.0mm, .197 inch
DC = 10.0mm, .394inch, 4 flutes
Depth of Cut : ap = Max. .134”
Cutting Mode : Slot Machining
External Coolant (Emulsion)

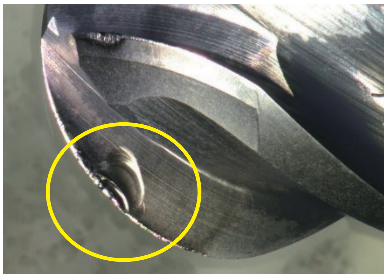
After Milling 106 Slots



VQN4MB
vc = 165 SFM, fz = .0010 IPT



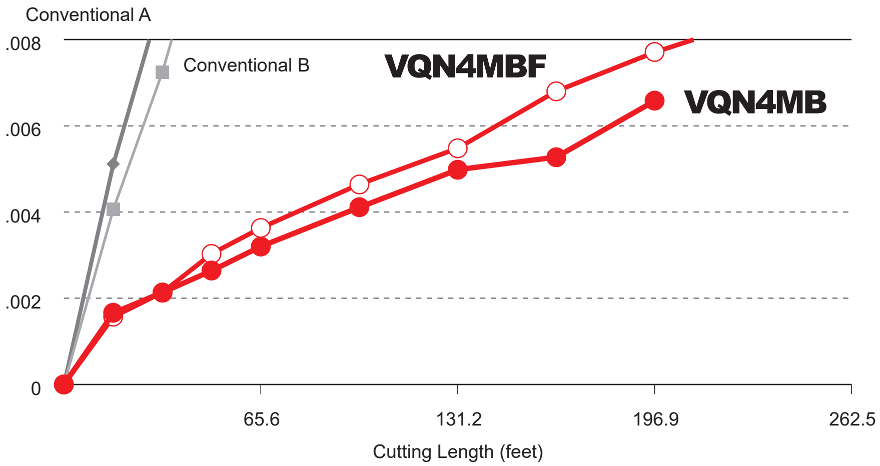
VQN4MB
vc = 230 SFM, fz = .0005 IPT



Conventional Fracture
vc = 230 SFM, fz = .0005 IPT

Machining Inconel 718 - Comparison of Wear Resistance

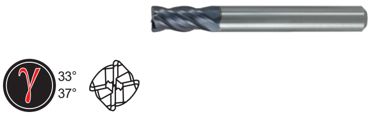
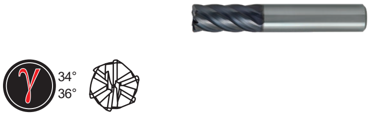
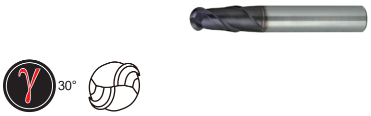
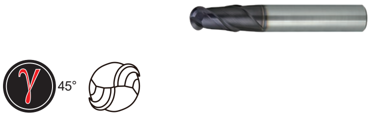
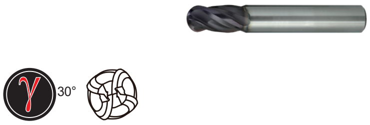
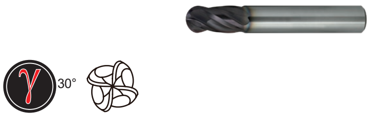
Both VQN4MBF and VQN4MB have more than four times the wear resistance of conventional products.



4 Times Tool Life

<Cutting Conditions>
Workpiece Material : Inconel718
Tool : RE = 3.0mm, .118 inch,
4 flutes
Cutting Speed : vc = 130 SFM
Feed : fz = .0020 IPT
Depth of Cut : ap = .094 inch
ae = .012 inch
Cutting Mode : Down Cut
External Coolant (Oil)

End Mills for Machining Difficult-to-cut Materials

Product Name	Coating or Substrate	End Mills	Size Range	ap	Neck Length	Flutes	Finish / Rough	Work Materials Upper : 1st Recommendation Lower : 2nd Recommendation	Slot Milling
S									
Radius End Mill									
Medium (ap−3xDC)									
VQN4MVRB	VQN	 33° 37°	DC 3−6	2.2−2.5 xDC	−	4	F 🟩🟩🟩🟩🟩 R 🟥🟥🟥☐☐	S	○
VQN6MBRB	VQN	 34° 36°	DC 8−12	2.2−2.4 xDC	−	6	F 🟩🟩🟩🟩🟩 R 🟥🟥🟥☐☐	S	○
Ball End Mill									
Medium (ap−3xDC)									
VQN2MB	VQN	 30°	RE 0.5−1.5	DC	−	2	F 🟩🟩🟩🟩🟩 R 🟥🟥🟥☐☐	S	○
	VQN	 45°	RE 2.0−6.0	2−2.4 xDC	−	2	F 🟩🟩🟩🟩🟩 R 🟥🟥🟥☐☐	S	○
VQN4MB	VQN	 30°	RE 1.0−6.0	1−2.4 xDC	−	4	F 🟩🟩🟩☐☐ R 🟥🟥🟥🟥🟥	S	○
VQN4MBF	VQN	 30°	RE 1.0−6.0	1−2.4 xDC	−	4	F 🟩🟩🟩🟩🟩 R 🟥🟥🟥☐☐	S	−

* ap : Depth of Cut
* DC : Cutting Diameter
* RE : Radius of Ball Nose

VQN4/6MVRB NEW

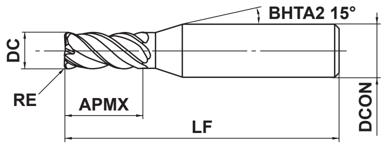
Corner Radius, Medium cut length, 4/6 flute

33° 37° VQN4

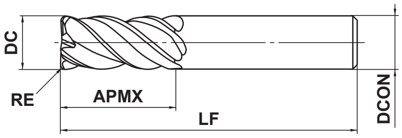
34° 36° VQN6

VQN4 VQN6

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
					◎		



Type1



Type2

	VQN4	VQN6			
	±0.015	±0.02			
	DC≤12				
	0 - 0.02				
h6	DCON=6	DCON=8,12	DCON=12		
	0 - 0.008	0 - 0.009	0 - 0.012		

● (Al, Ti, Ai) N-based coating exhibits excellent wear and chipping resistance when machining heat resistant super alloys.
● Optimized number of flutes for efficient and stable machining.

(mm)

Order Number	DC	RE	APMX	LF	DCON	* No.F	Stock	Type
VQN4MVRBD0300R030	3	0.3	7	45	6	4	●	1
VQN4MVRBD0300R050	3	0.5	7	45	6	4	●	1
VQN4MVRBD0400R030	4	0.3	10	45	6	4	●	1
VQN4MVRBD0400R050	4	0.5	10	45	6	4	●	1
VQN4MVRBD0500R050	5	0.5	12	50	6	4	●	1
VQN4MVRBD0600R050	6	0.5	13	50	6	4	●	2
VQN4MVRBD0600R100	6	1	13	50	6	4	●	2
VQN6MVRBD0800R050	8	0.5	19	60	8	6	●	2
VQN6MVRBD0800R100	8	1	19	60	8	6	●	2
VQN6MVRBD1000R050	10	0.5	22	70	10	6	●	2
VQN6MVRBD1000R100	10	1	22	70	10	6	●	2
VQN6MVRBD1200R050	12	0.5	26	75	12	6	●	2
VQN6MVRBD1200R100	12	1	26	75	12	6	●	2

* Number of Flutes

DC = Cutting Dia.
RE = Corner Radius
APMX = Length of Cut
LU = Neck Length
DN = Neck Dia.
LF = Overall Length
DCON = Shank Dia.

● : **USA Stock**

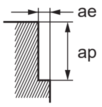
VQN4/6MVRB

Corner Radius, Medium cut length, 4/6 flute

Recommended Cutting Conditions

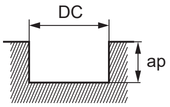
Side milling

(inch)

Workpiece Material			Nickel-based Heat Resistant Super Alloy Inconel718, Inconel713C, WASPALOY etc.			
DC		Number of Flutes	Revolution (SFM)	Feed Rate (IPM)	Depth of Cut ap	Depth of Cut ae
(mm)	(inch)					
3	**.118**	**4**	4200	13.4	.177	.012
4	**.157**	**4**	3200	10.2	.236	.016
5	**.197**	**4**	2500	11.8	.295	.020
6	**.236**	**4**	2100	9.8	.354	.024
8	**.315**	**6**	1600	11.4	.472	.031
10	**.394**	**6**	1300	12.2	.591	.039
12	**.472**	**6**	1100	10.2	.709	.047
Depth of cut						

Slot milling

(inch)

Workpiece Material			Nickel-based Heat Resistant Super Alloy Inconel718, Inconel713C, WASPALOY etc.		
DC		Number of Flutes	Revolution (SFM)	Feed Rate (IPM)	Depth of Cut ap
(mm)	(inch)				
3	**.118**	**4**	3200	10.2	.059
4	**.157**	**4**	2400	7.5	.079
5	**.197**	**4**	1900	9.1	.098
6	**.236**	**4**	1600	7.5	.118
8	**.315**	**6**	1200	8.7	.157
10	**.394**	**6**	1000	7.1	.197
12	**.472**	**6**	800	5.5	.236
Depth of cut					

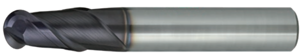
Note 1) For heat resistant super alloy, the use of water-soluble coolant is effective.
Note 2) Chattering can still occur if the machine rigidity and clamping method are insufficient.
In these cases the feed and speed should be reduced proportionately.
Note 3) If the depth of cut is shallow, the revolution and feed rate can be increased.

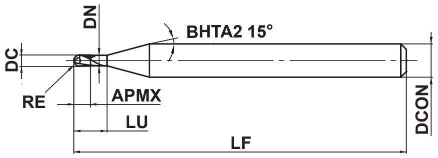
VQN2MB NEW

Ball nose, Medium cut length, 2 flute

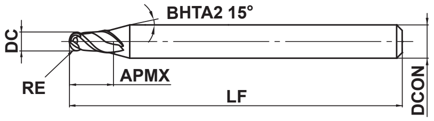
30°
RE≤1.5
45°
RE>1.5

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Heat Resistant Alloy	Copper Alloy	Aluminum Alloy
					◎		

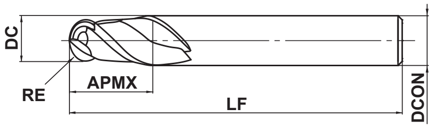




Type1



Type2



Type3

RE≤6		
±0.010		
DCON=6	8≤DCON≤10	DCON=12
0 - 0.005	0 - 0.006	0 - 0.008

- ●(Al, Ti, Si) N-based coating exhibits excellent wear and chipping resistance when machining heat resistant super alloys.
- ●The R cutting edge rake angle and ball nose geometry have been optimised to improve strength.

(mm)

Order Number	RE	DC	APMX	LU	DN	LF	DCON	* No.F	Stock	Type
VQN2MBR0050	0.5	1	1	4	0.94	60	6	2	●	1
VQN2MBR0100	1.0	2	2	6	1.9	60	6	2	●	1
VQN2MBR0150	1.5	3	3	8	2.9	60	6	2	●	1
VQN2MBR0200	2.0	4	8	–	–	60	6	2	●	2
VQN2MBR0250	2.5	5	12	–	–	60	6	2	●	2
VQN2MBR0300	3.0	6	12	–	–	60	6	2	●	3
VQN2MBR0400	4.0	8	14	–	–	70	8	2	●	3
VQN2MBR0500	5.0	10	18	–	–	80	10	2	●	3
VQN2MBR0600	6.0	12	22	–	–	80	12	2	●	3

* Number of Flutes

DC = Cutting Dia.
RE = Radius of Ball Nose
APMX = Length of Cut
LU = Neck Length
DN = Neck Dia.
LF = Overall Length
DCON = Shank Dia.

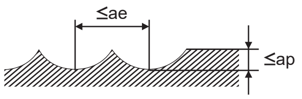
● : USA Stock

VQN2MB

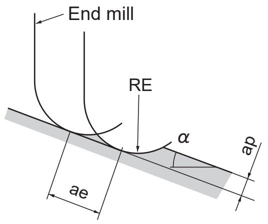
Medium cut length, 2 flute

Recommended Cutting Conditions

(inch)

Workpiece Material		Nickel-based Heat Resistant Super Alloy Inconel718, Inconel713C, WASPALOY etc.					
RE		α≤15°		α>15°		Depth of Cut ap	Depth of Cut ae
(mm)	(inch)	Revolution (SFM)	Feed Rate (IPM)	Revolution (SFM)	Feed Rate (IPM)		
0.5	**.020**	65	25.2	65	29.9	.004	.010
1.0	**.039**	65	12.6	65	15.0	.008	.020
1.5	**.059**	65	9.8	65	9.8	.012	.030
2.0	**.079**	65	7.5	65	8.7	.016	.039
2.5	**.098**	65	7.1	65	7.9	.020	.049
3.0	**.118**	65	6.7	65	8.3	.024	.059
4.0	**.157**	60	5.1	60	6.3	.031	.079
5.0	**.197**	60	5.1	60	5.5	.039	.098
6.0	**.236**	60	4.3	60	4.7	.047	.118
Depth of cut							

Note 1) For heat resistant super alloy, the use of water-soluble coolant is effective.
Note 2) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 3) Vibration may occur if the rigidity of machine or workpiece is low. In this case, please reduce the revolution and feed rate proportionately.
Note 4) α is the inclination angle of the machined surface.

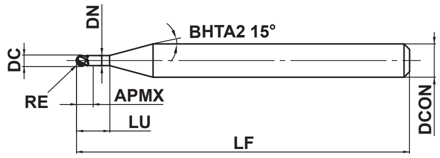


ae:Pick Feed

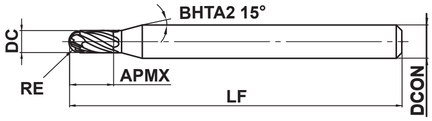
VQN4MB NEW

Ball nose, Medium cut length, 4 flute

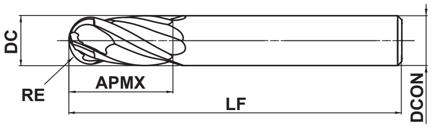
Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Heat Resistant Alloy	Copper Alloy	Aluminum Alloy
					◎		



Type1



Type2



Type3

	RE≤6		
	±0.010		
h5	DCON=6	8≤DCON≤10	DCON=12
	0 - 0.005	0 - 0.006	0 - 0.008

- (Al, Ti, Si) N-based coating exhibits excellent wear and chipping resistance when machining heat resistant super alloys.
- The 2-flute end cutting edge provides excellent chip evacuation and is ideal for rough machining.

(mm)

Order Number	RE	DC	APMX	LU	DN	LF	DCON	* No.F	Stock	Type
VQN4MBR0100	1.0	2	2	6	1.9	60	6	4	●	1
VQN4MBR0150	1.5	3	3	8	2.9	60	6	4	●	1
VQN4MBR0200	2.0	4	8	–	–	60	6	4	●	2
VQN4MBR0250	2.5	5	12	–	–	60	6	4	●	2
VQN4MBR0300	3.0	6	12	–	–	60	6	4	●	3
VQN4MBR0400	4.0	8	14	–	–	70	8	4	●	3
VQN4MBR0500	5.0	10	18	–	–	80	10	4	●	3
VQN4MBR0600	6.0	12	22	–	–	80	12	4	●	3

* Number of Flutes

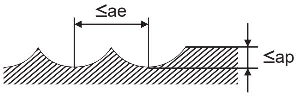
DC = Cutting Dia.
RE = Radius of Ball Nose
APMX = Length of Cut
LU = Neck Length
DN = Neck Dia.
LF = Overall Length
DCON = Shank Dia.

VQN4MB

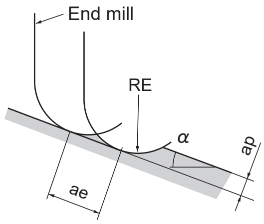
Medium cut length, 4 flute

Recommended Cutting Conditions

(inch)

Workpiece Material		Nickel-based Heat Resistant Super Alloy Inconel718, Inconel713C, WASPALOY etc.					
RE		α≤15°		α>15°		Depth of Cut ap	Depth of Cut ae
(mm)	(inch)	Revolution (SFM)	Feed Rate (IPM)	Revolution (SFM)	Feed Rate (IPM)		
1.0	**.039**	65	15.0	65	20.1	.008	.020
1.5	**.059**	65	13.4	65	16.5	.012	.030
2.0	**.079**	65	12.6	65	15.0	.016	.039
2.5	**.098**	65	9.8	65	12.2	.020	.049
3.0	**.118**	65	8.3	65	9.8	.024	.059
4.0	**.157**	60	6.3	60	7.5	.031	.079
5.0	**.197**	60	5.9	60	7.9	.039	.098
6.0	**.236**	60	5.9	60	6.7	.047	.118
Depth of cut							

Note 1) For heat resistant super alloy, the use of water-soluble coolant is effective.
Note 2) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 3) Vibration may occur if the rigidity of machine or workpiece is low. In this case, please reduce the revolution and feed rate proportionately.
Note 4) α is the inclination angle of the machined surface.



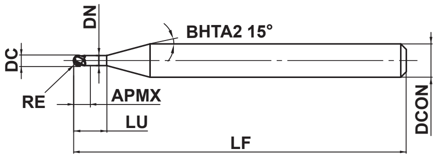
ae:Pick Feed

● : USA Stock

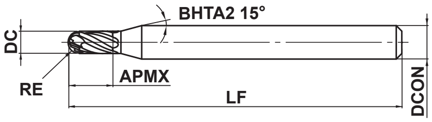
VQN4MBF NEW

Ball nose, Medium cut length, 4 flute

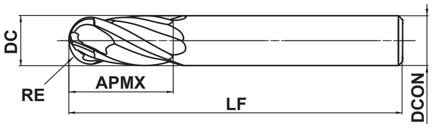
Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Heat Resistant Alloy	Copper Alloy	Aluminum Alloy
					◎		



Type1



Type2



Type3

RE≤6		
±0.010		
DCON=6	8≤DCON≤10	DCON=12
0 - 0.005	0 - 0.006	0 - 0.008

- (Al, Ti, Si) N-based coating exhibits excellent wear and chipping resistance when machining heat resistant super alloys.
- The 4-flute end cutting edge is also ideal for 5-axis machining.

(mm)

Order Number	RE	DC	APMX	LU	DN	LF	DCON	* No.F	Stock	Type
VQN4MBFR0100	1.0	2	2	6	1.9	60	6	4	●	1
VQN4MBFR0150	1.5	3	3	8	2.9	60	6	4	●	1
VQN4MBFR0200	2.0	4	8	–	–	60	6	4	●	2
VQN4MBFR0250	2.5	5	12	–	–	60	6	4	●	2
VQN4MBFR0300	3.0	6	12	–	–	60	6	4	●	3
VQN4MBFR0400	4.0	8	14	–	–	70	8	4	●	3
VQN4MBFR0500	5.0	10	18	–	–	80	10	4	●	3
VQN4MBFR0600	6.0	12	22	–	–	80	12	4	●	3

* Number of Flutes

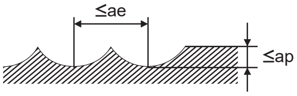
DC = Cutting Dia.
RE = Radius of Ball Nose
APMX = Length of Cut
LU = Neck Length
DN = Neck Dia.
LF = Overall Length
DCON = Shank Dia.

VQN4MBF

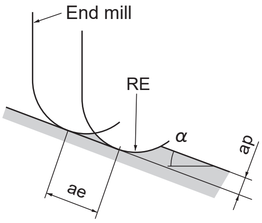
Medium cut length, 4 flute

Recommended Cutting Conditions

(inch)

Workpiece Material		Nickel-based Heat Resistant Super Alloy Inconel718, Inconel713C, WASPALOY etc.						
RE		α≤15°			α>15°			Depth of Cut ap
(mm)	(inch)	Revolution (SFM)	Feed Rate (IPM)	Depth of Cut ae	Revolution (SFM)	Feed Rate (IPM)	Depth of Cut ae	
1.0	**.039**	65	7.1	.016	65	12.2	.020	.008
1.5	**.059**	65	6.7	.024	65	13.4	.030	.012
2.0	**.079**	65	7.5	.031	65	12.6	.039	.016
2.5	**.098**	65	5.9	.039	65	9.8	.049	.020
3.0	**.118**	65	6.7	.047	65	9.8	.059	.024
4.0	**.157**	60	5.1	.063	60	7.5	.079	.031
5.0	**.197**	60	3.9	.079	60	7.9	.098	.039
6.0	**.236**	60	5.1	.094	60	6.7	.118	.047
Depth of cut								

Note 1) For heat resistant super alloy, the use of water-soluble coolant is effective.
Note 2) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 3) Vibration may occur if the rigidity of machine or workpiece is low. In this case, please reduce the revolution and feed rate proportionately.
Note 4) α is the inclination angle of the machined surface.



ae:Pick Feed

DIAEDGE

TOOL NEWS

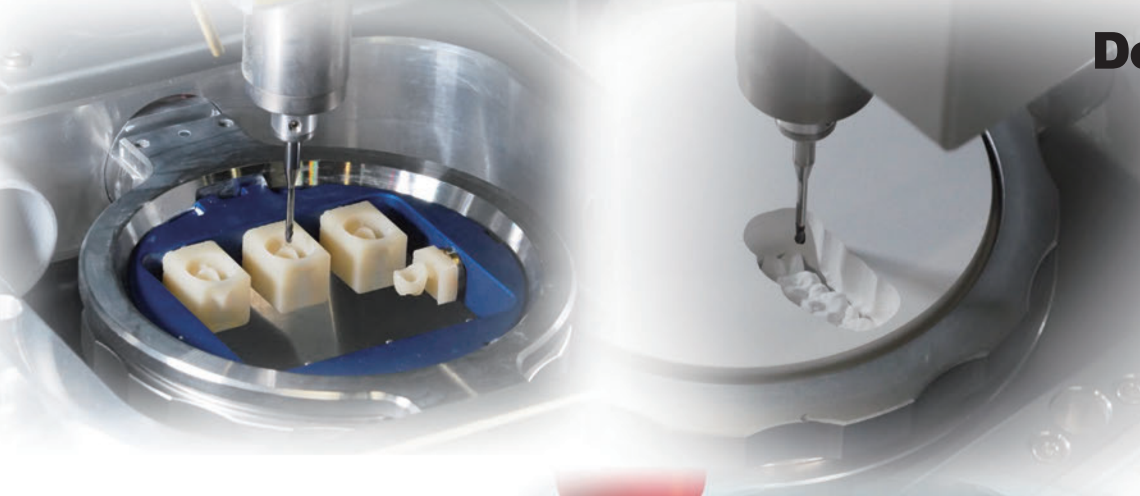
B258A

SMART MIRACLE End Mill Series for Dental Milling

VQ2XLB/HVRB/FDRB

New Product

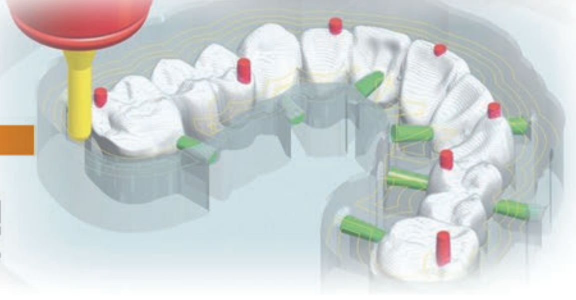
Dental Parts Machining



Dental Line Series

hyperDENT®

FOLLOW-ME!
TECHNOLOGY GROUP



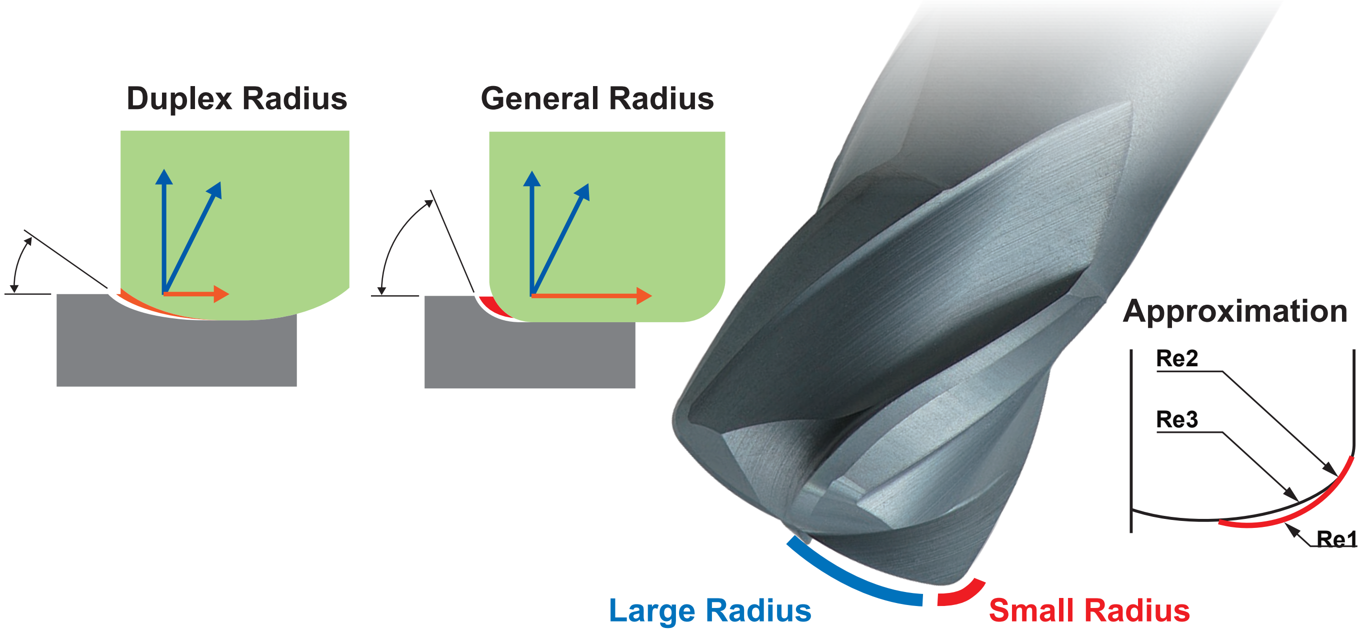
MITSUBISHI MATERIALS CORPORATION

SMART MIRACLE End Mill Series for Dental Milling

Duplex Radius End Mills VQFDRB

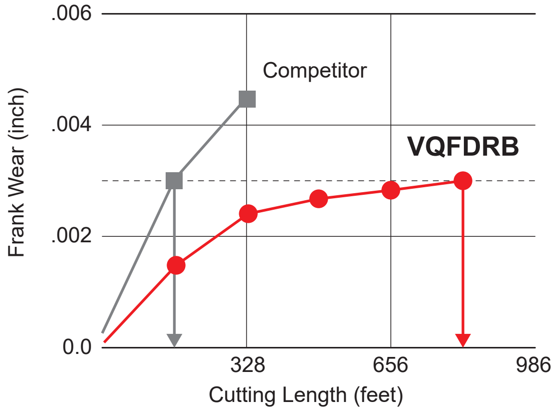
VQFDRB provides amazingly long tool life when machining Cobalt Chrome Alloy.

- **Improved notch wear via the small side cutting edge angle.**
- **Reduced flank wear through use of SMART MIRACLE coating and ultra micro-grain cemented carbide.**
- **Provides stable machining with low radial cutting force.**



Cutting Performance : Competitive Comparison

VQFDRB achieved 5 times longer tool life than competitors duplex radius when machining cobalt chrome alloy.



<Cutting Conditions>
Workpiece Material : Co-Cr-Mo Alloy
(ASTM F1537)
Tool : VQFDRBD0300N080 ø0.1181″
Revolution : n=8600 min-1(vc=260 SFM)
Feed Rate : vf=51.2 IPM (.0016 IPT)
Depth of Cut : ap=.0079 inch ae=.0512 inch
Coolant : Emulsion

Cutting Example

Competitive Comparison

<Cutting Conditions>
Part Name : Dental Crown
Workpiece Material : Co-Cr-Mo Alloy (ASTM F1537)
Cutting Process : Rough
Tool : VQFDRBD0400N120 (ø.1575” Re: .0279")
Machine : 5 axis M/C (HSK63)
Coolant : Emulsion
CAM : Hyper Dent

hyperDENT®

< Cutting conditions & Result >

VQFDRB can machine at twice the feed rate without chipping.

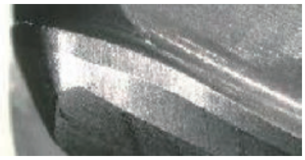
Tool	Revolution (min^{-1})	Feed rate (IPM)	Depth of Cut (inch)
VQFDRB	6000 (245 SFM)	118 (.0049 IPT)	ap=.0157 ae=.0787
Genral Radius	6000 (245 SFM)	59 (.0025 IPT)	ap=.0157 ae=.0787

Dental Cobalt Chrome Dentures

<Cutting Conditions>
Part Name : Dental Denture
Workpiece Material : Co-Cr-Mo Alloy (CAD/CAM Milling Disc)
Cutting Process : Rough
Tool : VQFDRBD0400N120 (ø.1575” Re: .0279")
Machine : 5 axis M/C (HSK63)
Coolant : Emulsion
Revolution : n=8600 min^{-1}(vc=355 SFM)
Feed Rate : vf=51.2 IPM (.0016 IPT)
Depth of Cut : ap=.0098 inch (Z Level Operation)

Wada Precision Dental Laboratories Co., Ltd.

Vb=.0018″



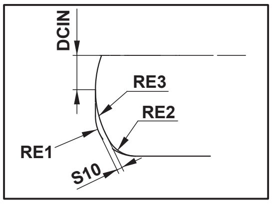
< Result >

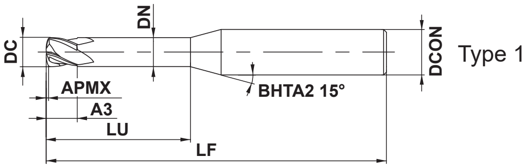
VQFDRB maintained stable machining and achieved good wear resistance throughout machining of disc.

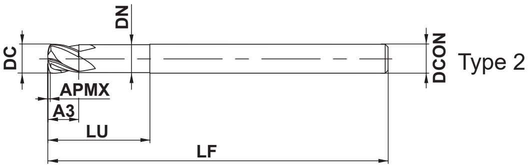
VQFDRB NEW

Duplex corner radius end mill for high speed cutting

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Precipitation Hardening Stainless Steel	Austenitic Stainless Steel	Cobalt Chrome Alloy, Heat Resistant Alloy	Titanium Alloy	Aluminum Alloy
					◎	○	







1≤DC≤4				
0 - 0.020				
DCON=6				
0 - 0.005				

- Duplex corner radius type allows more efficient high feed.
- High feed cutting realized through use of multiple cuts.

(mm)

Order Number	DC	*1 RE1	APMX	*3 A3	LU	DN	LF	DCON	*4 No. F	Multi-task radius part				*2 RMPX	Stock	Type
										S10	DCIN	RE2	RE3			
VQFDRBD0300N080	3	0.64	0.18	3	8	2.8	50	6	4	0.08	0.75	0.5	2	2.1°	●	1
VQFDRBD0300N120	3	0.64	0.18	3	12	2.8	55	6	4	0.08	0.75	0.5	2	2.1°	●	1
VQFDRBD0400N120	4	0.71	0.25	4	12	3.8	55	6	4	0.13	1.0	0.5	3	1.9°	●	1
VQFDRBD0400N160	4	0.71	0.25	4	16	3.8	60	6	4	0.13	1.0	0.5	3	1.9°	●	1
VQFDRBD0600N180	6	0.92	0.36	6	18	5.6	60	6	4	0.21	1.5	0.6	5	1.7°	●	2

*1 RE1 : Approx. R
*2 RMPX : Max. Ramping Angle
*3 A3 : Cutting Edge Effective Length
*4 Number of Flutes

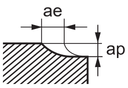
DC = Dia.
APMX = Length of Cut
LU = Neck Length

DN = Neck Dia.
LF = Overall Length
DCON = Shank Dia.

● : Inventory maintained.

Recommended Cutting Conditions

(inch)

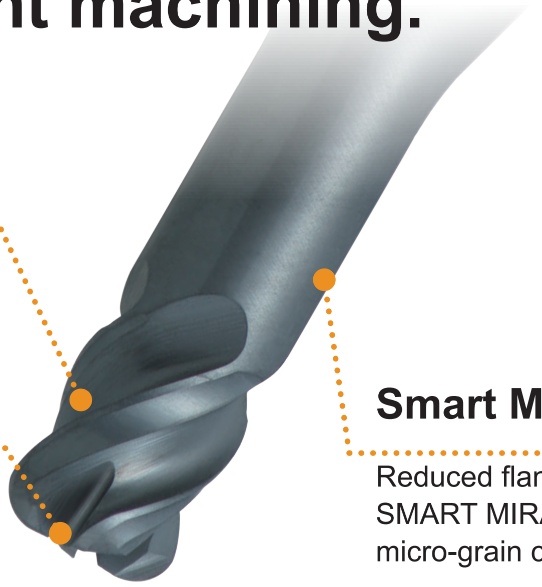
Workpiece Material		Titanium Alloys Ti-6Al-4V ELI, ASTM F136, etc.					Cobalt Chromium Alloys ASTM F75:Casting, F1537:Wrought Bar, F799:Forgings, etc.				
DC		Revolution **n** (min^{-1})	Cutting Speed **vc** (SFM)	Feed Rate **vf** (IPM)	Depth of cut **ap**	Width of cut **ae**	Revolution **n** (min^{-1})	Cutting Speed **vc** (SFM)	Feed Rate **vf** (IPM)	Depth of cut **ap**	Width of cut **ae**
(mm)	(inch)										
3	**.118**	8500	260	82.7	.008	.051	6400	195	118.1	.008	.051
4	**.157**	6400	260	86.6	.008	.067	4800	195	106.3	.008	.067
6	**.236**	4200	260	55.1	.012	.079	3200	195	82.7	.012	.102
Depth of Cut											

Note 1) SMART MIRACLE coating has very low electrical conductivity; therefore, an external contact type of tool setter (electric transmitted) may not work.
When measuring the tool length, please use an internal contact type (non-electricity type) or a laser tool setter.
Note 2) When cutting titanium alloys, the use of water-soluble cutting fluid is effective.
Note 3) If the depth of cut is smaller, the revolution and the feed rate can be increased.

SMART MIRACLE End Mill Series for Dental Milling

Vibration Control Radius End Mills VQHVRB

Increased feed rates and large depths of cut are achievable with VQHVRB resulting in highly efficient machining.



Variable Helix

Vibration control geometry
for stable and smooth cutting.

Special Gash

Good chip disposal enables both increased feed rates and large depths of cut.

Smart Miracle Coating

Reduced flank wear through use of SMART MIRACLE coating and ultra micro-grain cemented carbide.

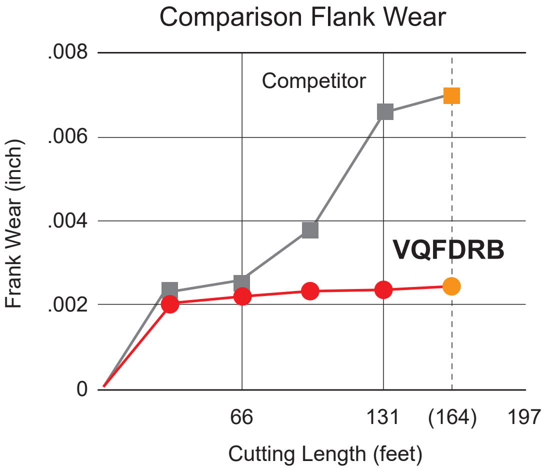
Cutting Performance : Competitive Comparison

VQHVRB wears less than competitor and enables stable cutting.

<Cutting Conditions>
Workpiece Material : Titanium Alloy
Tool : VQHVRBD0300R05N180 (ø.118")
Revolution : n=8600 min^{-1}(vc=260 SFM)
Feed Rate : vf=51.2 IPM (.002 IPT)
Depth of Cut : ap=.008" ae=.051"
Coolant : Emulsion
Cutting Length : 164 feet

VQHVRB

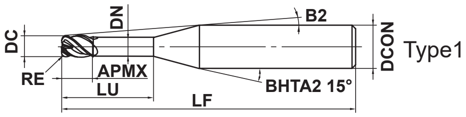
Competitor



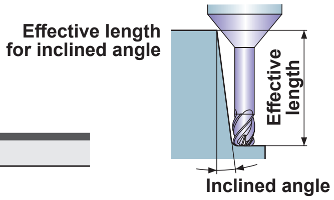
VQHVRB NEW

Corner radius, Short cut length, 4 flute, Irregular helix flutes

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Precipitation Hardening Stainless Steel	Austenitic Stainless Steel	Cobalt Chrome Alloy, Heat Resistant Alloy	Titanium Alloy	Aluminum Alloy
					◎	○	



Type1



0.1≤RE≤1			
±0.01			
1≤DC≤4			
0 - 0.02			
DCON=6			
0 - 0.005			

- SMART MIRACLE corner radius end mill for high feed rates and efficient machining.

(mm)

Order Number	DC	RE	APMX	LU	DN	B2	LF	DCON	*1 No.F	Stock	Type
VQHVRBD0100R01N080	1	0.1	1	8	0.94	8.2°	50	6	4	●	1
VQHVRBD0100R01N120	1	0.1	1	12	0.94	6.7°	55	6	4	●	1
VQHVRBD0200R02N120	2	0.2	2	12	1.9	5.9°	55	6	4	●	1
VQHVRBD0200R02N160	2	0.2	2	16	1.9	4.9°	60	6	4	●	1
VQHVRBD0300R05N100	3	0.5	3	10	2.9	5.6°	55	6	4	●	1
VQHVRBD0300R05N180	3	0.5	3	18	2.9	3.7°	60	6	4	●	1
VQHVRBD0400R10N120	4	1.0	4	12	3.9	3.9°	55	6	4	●	1
VQHVRBD0400R10N200	4	1.0	4	20	3.9	2.5°	60	6	4	●	1

*1 Number of Flutes

DC = Dia.
RE = Corner Radius
APMX = Length of Cut
LU = Neck Length
DN = Neck Dia.
LF = Overall Length
DCON = Shank Dia.

● : Inventory maintained.

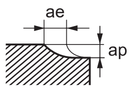
VQHVRB

Corner radius, Short cut length, 4 flute, Irregular helix flutes

Recommended Cutting Conditions

■Large Depth of Cut Conditions

(inch)

Workpiece Material				Titanium Alloys Ti-6Al-4V ELI, ASTM F136, etc.					Cobalt Chromium Alloys ASTM F75:Casting, F1537:Wrought Bar, F799:Forgings, etc.				
DC		LU		Revolution **n** (min^{-1})	Cutting Speed **vc** (SFM)	Feed Rate **vf** (IPM)	Depth of cut **ap**	Width of cut **ae**	Revolution **n** (min^{-1})	Cutting Speed **vc** (SFM)	Feed Rate **vf** (IPM)	Depth of cut **ap**	Width of cut **ae**
(mm)	(inch)	(mm)	(inch)										
1	**.039**	**8**	**.315**	2500	25	19.7	.001	.004	2500	25	19.7	.001	.004
1	**.039**	**12**	**.472**	2500	25	13.8	.001	.004	2500	25	13.8	.001	.004
2	**.079**	**12**	**.472**	4800	100	23.6	.003	.012	4800	100	23.6	.003	.012
2	**.079**	**16**	**.630**	4800	100	13.4	.003	.012	4800	100	13.8	.003	.012
3	**.118**	**10**	**.394**	8500	260	94.5	.007	.051	6400	195	86.6	.007	.051
3	**.118**	**18**	**.709**	8500	260	78.7	.007	.051	6400	195	63.0	.007	.051
4	**.157**	**12**	**.472**	6400	260	78.7	.010	.067	4800	195	70.9	.009	.067
4	**.157**	**20**	**.787**	6400	260	78.7	.010	.067	4800	195	70.9	.009	.067
Depth of Cut													

Note 1) SMART MIRACLE coating has very low electrical conductivity; therefore, an external contact type of tool setter (electric transmitted) may not work.
When measuring the tool length, please use an internal contact type (non-electricity type) or a laser tool setter.

Note 2) When cutting titanium alloys, the use of water-soluble cutting fluid is effective.

Note 3) If the depth of cut is smaller, the revolution and the feed rate can be increased.

Note 4) The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece material installation is poor, vibration or abnormal sound can occur.
In this case, please reduce the revolution and the feed rate proportionately, or set a lower depth of cut.

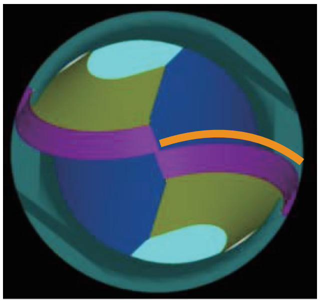
SMART MIRACLE End Mill Series for Dental Milling

Long Neck Ball Nose End Mills VQ2XLB

VQ2XLB provides long tool life and stable cutting when machining Cobalt Chrome Alloy and Titanium Alloy.

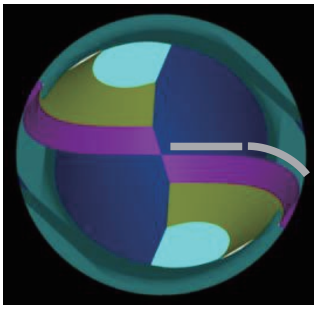
- **Improved resistance to chipping via new cutting edge geometry.**
- **SMART MIRACLE coating providing better wear resistance when machining difficult-to-cut materials.**

VQ2XLB (For Dental)



Strong S

General (For Mold)



Normal Curve

Tooling Example : Dental Crown (CAD-CAM Disc)

Workpiece Material : Co-Cr-Mo Alloys

Customer Comment

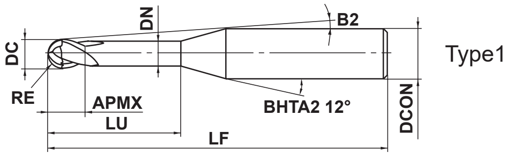
"Machined surface roughness is better than conventional tools under normal conditions"

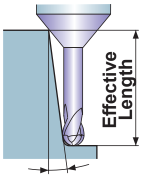
Process		Rough 1	Rough 2	Finish 1	Finish 2
Tool		VQ2XLBR0150N140 Ø.118"(RE.059")	VQ2XLBR0150N140 Ø.118"(RE.059")	VQ2XLBR0100N100S06 Ø.079"(RE.039")	VQ2XLBR0050N080N06 Ø.039"(RE.020")
Cutting Speed **vc** (SFM)		195	260	245	205
Revolution **n** (min^{-1})		6400	8500	12000	20000
Feed Rate **vf** (IPM)		31.5	37.8	31.5	26.0
fz (IPT)		.0025	.0022	.0013	.0007
Depth of Cut	**ap** (inch)	.0059	.0047	.0039	.0020
	ae (inch)	.0394	.0118	.0079	.0031
Cutting Time (min)		400	60	90	150
Wear Condition		Good	Good	Good	Good

VQ2XLB NEW

Ball nose, Short cut length, 2 flute, Long neck

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Precipitation Hardening Stainless Steel	Austenitic Stainless Steel	Cobalt Chrome Alloy, Heat Resistant Alloy	Titanium Alloy	Aluminum Alloy
					◎	◎	





0.05≤RE≤1.5			
±0.005			
4≤DCON≤6			
0 - 0.005			

- SMART MIRACLE coating providing better wear resistance when machining difficult-to-cut materials.

(mm)

Order Number	RE	DC	APMX	LU	DN	B2	LF	DCON	*1 No.F	Stock	Type
VQ2XLBR0050N080	0.5	1	0.75	8	0.94	6.4°	50	4	2	●	1
VQ2XLBR0050N100	0.5	1	0.75	10	0.94	5.6°	50	4	2	●	1
VQ2XLBR0050N080S06	0.5	1	0.75	8	0.94	8.3°	50	6	2	●	1
VQ2XLBR0050N100S06	0.5	1	0.75	10	0.94	7.5°	55	6	2	●	1
VQ2XLBR0050N120S06	0.5	1	0.75	12	0.94	6.8°	55	6	2	●	1
VQ2XLBR0075N100S06	0.75	1.5	1.1	10	1.44	7.2°	55	6	2	●	1
VQ2XLBR0075N120S06	0.75	1.5	1.1	12	1.44	6.5°	55	6	2	●	1
VQ2XLBR0100N100	1.0	2	1.5	10	1.9	4.5°	50	4	2	●	1
VQ2XLBR0100N100S06	1.0	2	1.5	10	1.9	6.9°	55	6	2	●	1
VQ2XLBR0100N120	1.0	2	1.5	12	1.9	3.9°	50	4	2	●	1
VQ2XLBR0100N120S06	1.0	2	1.5	12	1.9	6.1°	55	6	2	●	1
VQ2XLBR0150N120	1.5	3	2.3	12	2.9	5.3°	55	6	2	●	1
VQ2XLBR0150N140	1.5	3	2.3	14	2.9	4.7°	60	6	2	●	1
VQ2XLBR0150N160	1.5	3	2.3	16	2.9	4.3°	60	6	2	●	1

*1 Number of Flutes

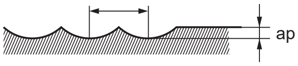
DC = Dia.
RE = Radius of Ball Nose
APMX = Length of Cut
LU = Neck Length

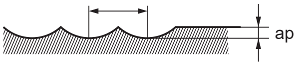
DN = Neck Dia.
LF = Overall Length
DCON = Shank Dia.

● : Inventory maintained.

Recommended Cutting Conditions

(inch)

Workpiece Material				Titanium Alloys Ti-6Al-4V ELI, ASTM F136, etc.					Cobalt Chromium Alloys ASTM F75:Casting, F1537:Wrought Bar, F799:Forgings, etc.				
RE		LU		Revolution n (min^{-1})	Cutting Speed vc (SFM)	Feed Rate vf (IPM)	Depth of cut ap	Width of cut ae	Revolution n (min^{-1})	Cutting Speed vc (SFM)	Feed Rate vf (IPM)	Depth of cut ap	Width of cut ae
(mm)	(inch)	(mm)	(inch)										
0.5	.020	8	.315	32000	330	98.4	.002	.004	27000	260	78.7	.002	.004
0.5	.020	10	.394	24000	245	59.1	.002	.004	19000	195	59.1	.002	.004
0.5	.020	12	.472	24000	245	59.1	.001	.004	19000	195	59.1	.001	.004
0.75	.030	10	.394	21000	330	82.7	.005	.012	17000	260	66.9	.003	.004
0.75	.030	12	.472	16000	245	59.1	.005	.012	13000	195	47.2	.003	.004
1	.039	10	.394	16000	330	70.9	.008	.020	13000	260	59.1	.008	.020
1	.039	12	.472	16000	330	70.9	.008	.020	13000	260	59.1	.008	.020
1.5	.059	12	.472	10000	330	63.0	.012	.031	8500	260	51.2	.012	.031
1.5	.059	14	.551	10000	330	63.0	.012	.031	8500	260	51.2	.012	.031
1.5	.059	16	.630	10000	330	63.0	.012	.031	8500	260	51.2	.012	.031
Depth of Cut				≤.004" RE (RE≤.039") ≤.008" RE (RE>.039")  RE : Radius									

Workpiece Material				Pure Titanium ASTM F67, etc.				
RE		LU		Revolution n (min^{-1})	Cutting Speed vc (SFM)	Feed Rate vf (IPM)	Depth of cut ap	Width of cut ae
(mm)	(inch)	(mm)	(inch)					
0.5	.020	8	.315	27000	260	63.0	.003	.004
0.5	.020	10	.394	19000	195	47.2	.003	.004
0.5	.020	12	.472	19000	195	47.2	.002	.004
0.75	.030	10	.394	25000	395	78.7	.005	.008
0.75	.030	12	.472	21000	330	63.0	.005	.008
1	.039	10	.394	32000	655	98.4	.013	.031
1	.039	12	.472	29000	590	66.9	.013	.031
1.5	.059	12	.472	21000	655	63.0	.019	.047
1.5	.059	14	.551	21000	655	63.0	.019	.047
1.5	.059	16	.630	21000	655	63.0	.019	.047
Depth of Cut				≤.004" RE (RE≤.039") ≤.008" RE (RE>.039")  RE : Radius				

Note 1) SMART MIRACLE coating has very low electrical conductivity; therefore, an external contact type of tool setter (electric transmitted) may not work.
When measuring the tool length, please use an internal contact type (non-electricity type) or a laser tool setter.
Note 2) When cutting titanium alloys, the use of water-soluble cutting fluid is effective.
Note 3) If the depth of cut is smaller, the revolution and the feed rate can be increased.

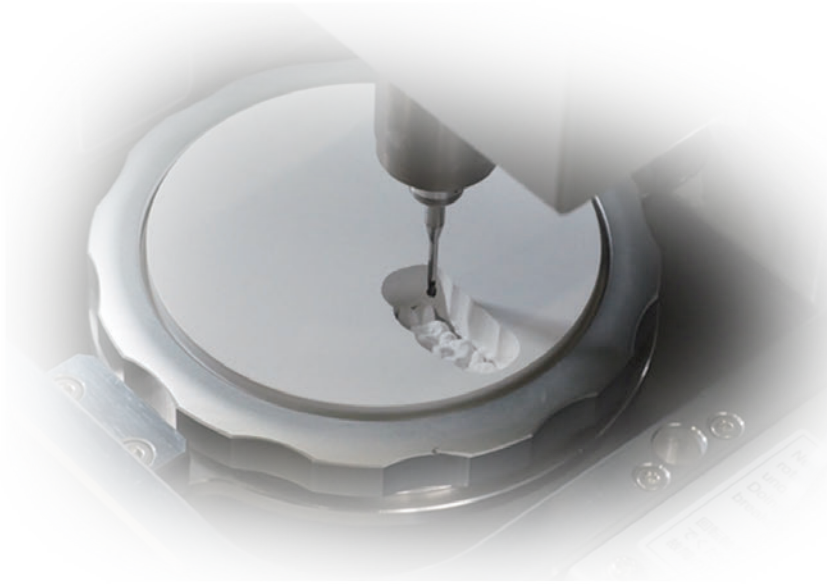
Dental Line Series

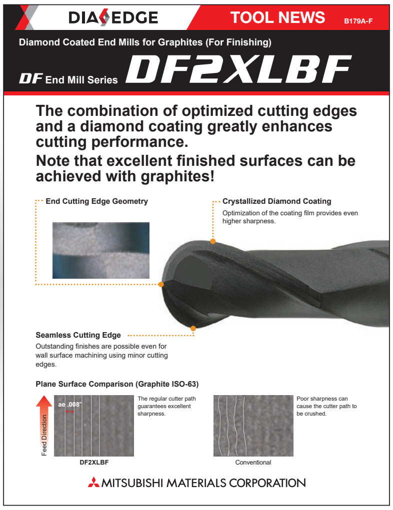
Long Neck Ball Nose End Mills

DF2XLBF

Diamond Coating End Mill for Machining Zirconium and Hybrid Resin Dental Applications

The combination of optimized cutting edges and a diamond coating greatly enhances cutting performance.
DF2XLBF provides long tool life and excellent surface finish when machining Zirconium and Hybrid resin.





DIA EDGE TOOL NEWS B179A-F

Diamond Coated End Mills for Graphites (For Finishing)

DF End Mill Series **DF2XLBF**

The combination of optimized cutting edges and a diamond coating greatly enhances cutting performance.
Note that excellent finished surfaces can be achieved with graphites!

End Cutting Edge Geometry

Crystallized Diamond Coating
Optimization of the coating film provides even higher sharpness.

Seamless Cutting Edge
Outstanding finishes are possible even for wall surface machining using minor cutting edges.

Plane Surface Comparison (Graphite ISO-63)

The regular cutter path guarantees excellent sharpness.

Poor sharpness can cause the cutter path to be crushed.

DF2XLBF

Conventional

MITSUBISHI MATERIALS CORPORATION

TOOL NEWS

For your safety
●Don't handle inserts and chips without gloves. ●Please machine within the recommended application range and exchange expired tools with new ones in advance of breakage. ●Please use safety covers and wear safety glasses. ●When using compounded cutting oils, please take fire precautions. ●When using rotating tools, please make a trial run to check run-out, vibration and abnormal sounds etc.

DIAEDGE

TOOL NEWS

B263A

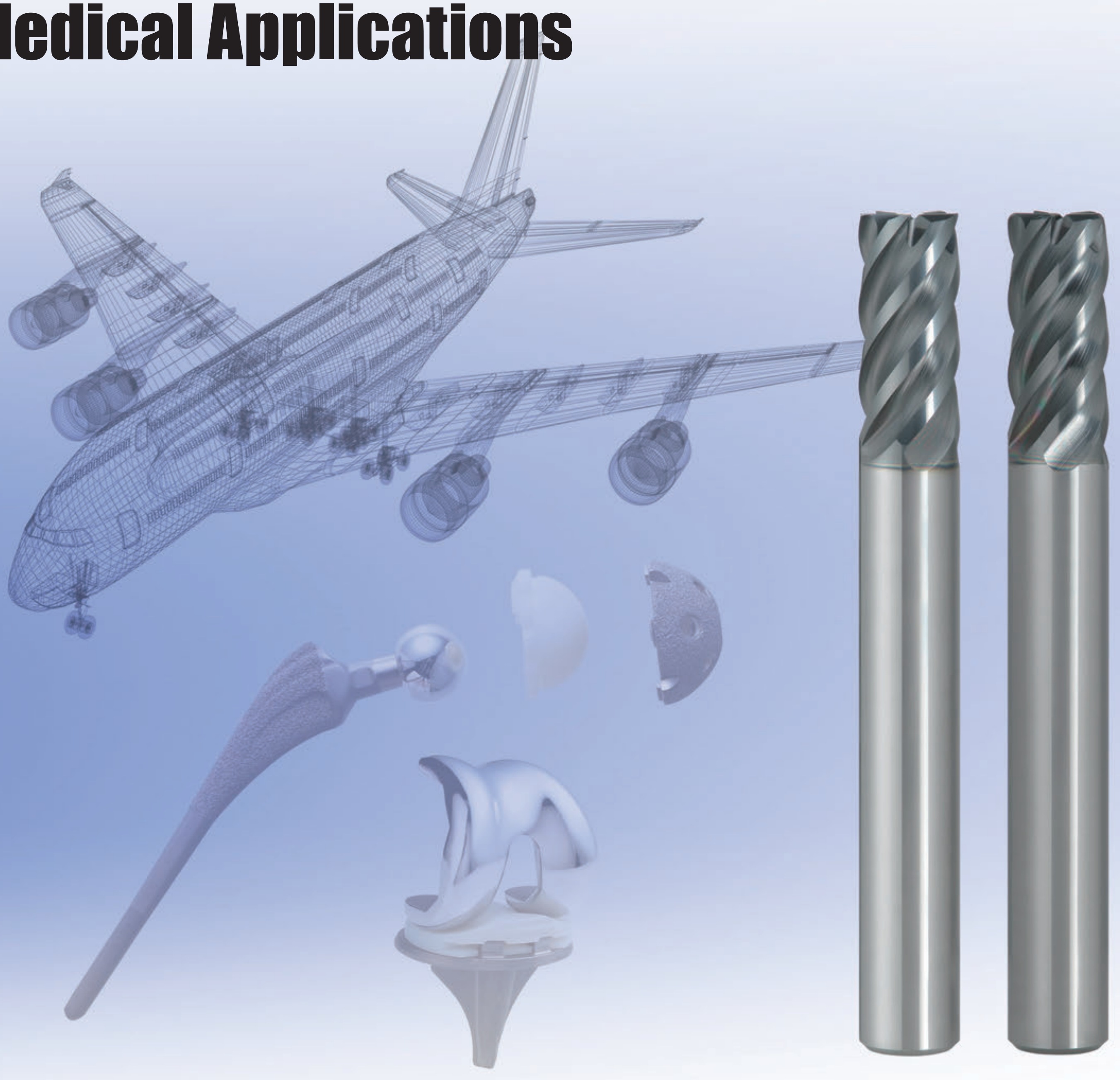
Vibration Control End Mills for High Efficiency Machining of Difficult-to-Cut Materials

SMART MIRACLE End Mill Series

VQ5MHV/MHVRB

New Products

Highly Effective Machining of Titanium & Stainless Steel Materials for Aerospace & Medical Applications



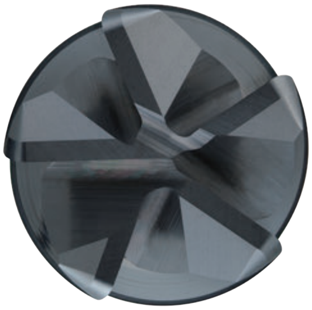
MITSUBISHI MATERIALS CORPORATION

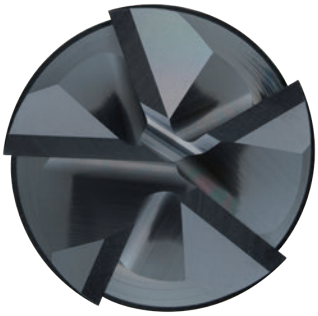
Vibration Control End Mills for High Efficiency Machining of Difficult-to-Cut Materials

SMART MIRACLE End Mill Series

VQ5MHV/MHVRB

The combination of 5 flutes and irregular helix for reducing vibration enables highly efficient machining of difficult-to-cut materials.





5 Flutes

Optimal flute shape improves chip evacuation and is ideal for slot milling with deep depths of cut.

Variable helix: 39°/40°/41°

Excellent chatter resistance with variable helix angle for stability and smooth cutting.

Corner Radius

Strong chipping resistance and increased tool life in heavy cutting as a result of a new and improved geometric design.

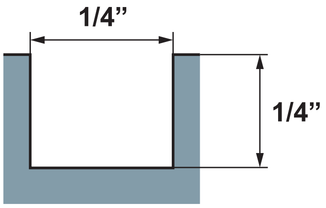
SMART MIRACLE Coating

Improved flank wear through use of SMART MIRACLE coating and Micro-grain Cemented Carbide.

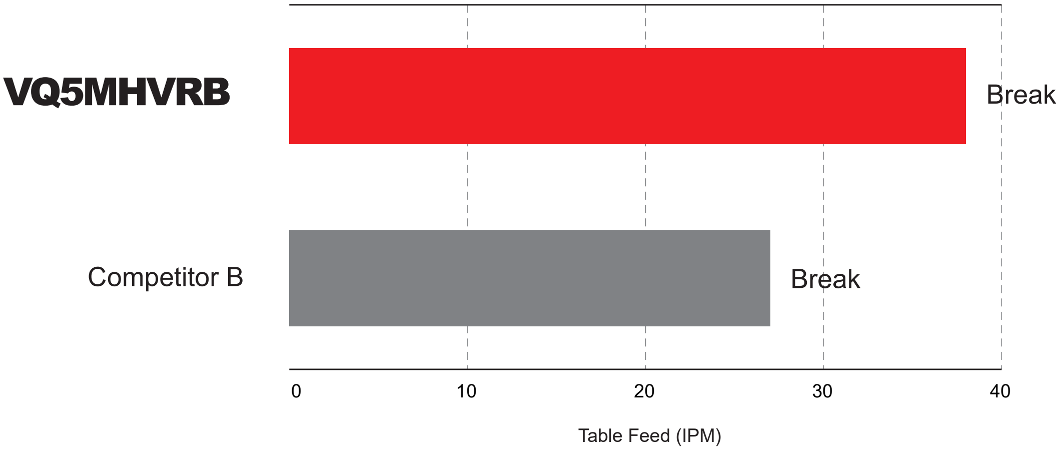
VQ5MHVRB

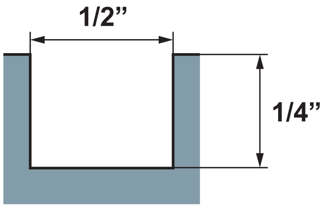
VQ5MHV

Application Example



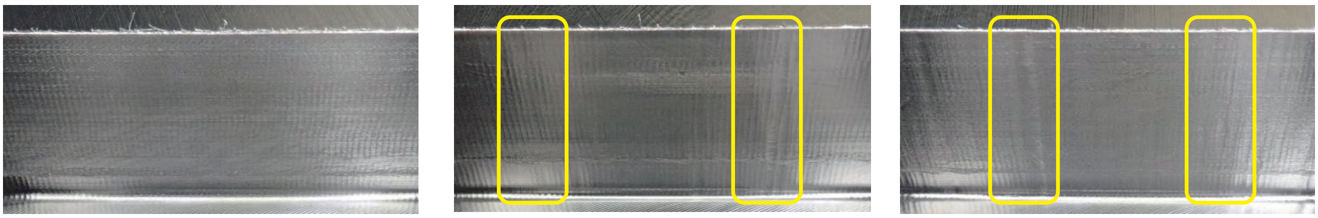
<Cutting Conditions>
Workpiece Material : 17-4PH (AISI S17400)
Tool : VQ5MHVRBD1/4R020
ø1/4 RE = .020
Revolution : n = 3509 min^{-1}
Cutting Speed : vc = 230 SFM
Cutting Modev: External Coolant (Emulsion)
Machine : Vertical M/C (HSK100A)





<Cutting Conditions>
Workpiece Material : 17-4PH (AISI S17400)
Tool : VQ5MHVRBD1/2R030
ø1/2 RE = .030
Revolution : n = 1754 min^{-1}
Cutting Speed : vc = 230 SFM
Table Feed : vf = 24.17 IPM
Feed per Tooth : .0038 inch
Cutting Mode : External Coolant (Emulsion)
Machine : Vertical M/C (HSK100A)

VQ5MHVRB Competitor A Competitor B



Smooth Surface Finish

Uneven Surface

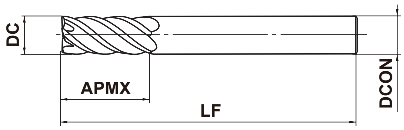
Vibration Control End Mills for High Efficiency Machining of Difficult-to-Cut Materials

VQ5MHV - Inch sizes NEW

End mill, Medium cut length, 5 flute, Irregular helix flutes

39°
40°
41°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminum Alloy
◎	○			◎	◎		



.2500"≤DC≤.5000"				
0 - .0012"				
h6				
.2500"≤DCON≤.3750"	DCON=.5000"			
0 - .0002"	0 - .0003"			

- SMART MIRACLE irregular helix end mills for reducing vibration and for delivering stable performance on difficult-to-cut materials and long overhang applications.

(inch)

Order Number	DC	APMX	LF	DCON	* No.F	Stock
VQ5MHVD1/4	.2500	.625	2.500	.2500	5	●
VQ5MHVD5/16	.3125	.750	2.750	.3125	5	●
VQ5MHVD3/8	.3750	.875	3.250	.3750	5	●
VQ5MHVD1/2	.5000	1.125	4.000	.5000	5	●

Note 1) SMART MIRACLE coating has reduced electric conductivity; therefore an external contact type (electric transmitted) tool setter may not work. When measuring the tool length, please use an internal contact type (non-electricity type) tool setter or a laser type tool setter.

* Number of Flutes

DC = Dia.
APMX = Length of Cut
LF = Overall Length
DCON = Shank Dia.

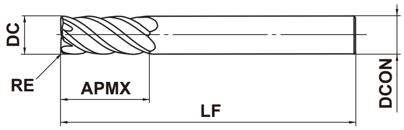
● : USA Stock

VQ5MHVRB – Inch sizes NEW

Corner radius, Medium cut length, 5 flute, Irregular helix flutes

UWC VQ γ 39° 40° 41°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminum Alloy
◎	○			◎	◎		



.0010"≤RE≤.030"				
±.0006"				
.2500"≤DC≤.5000"				
0 - .0012"				
.2500"≤DCON≤.3750"	DCON=.5000"			
0 - .0002"	0 - .0003"			

- SMART MIRACLE corner radius, irregular helix end mills for reducing vibration and for delivering stable performance on difficult-to-cut materials and long overhang applications.

(inch)

Order Number	DC	RE	APMX	LF	DCON	* No.F	Stock
VQ5MHVRBD1/4R010	.2500	.010	.625	2.500	.2500	5	●
VQ5MHVRBD5/16R010	.3125	.015	.750	2.750	.3125	5	●
VQ5MHVRBD3/8R030	.3750	.030	.875	3.250	.3750	5	●
VQ5MHVRBD1/2R030	.5000	.030	1.125	4.000	.5000	5	●

Note 1) SMART MIRACLE coating has reduced electric conductivity; therefore an external contact type (electric transmitted) tool setter may not work. When measuring the tool length, please use an internal contact type (non-electricity type) tool setter or a laser type tool setter.

* Number of Flutes

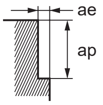
DC = Dia.
RE = Radius
APMX = Length of Cut
LF = Overall Length
DCON = Shank Dia.

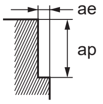
VQ5MHV/MHVRB

Recommended Cutting Conditions

■ Shoulder Milling

(inch)

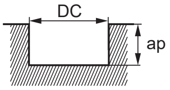
Workpiece Material		Carbon Steels(–30HRC)						Alloy Steels, Pre-hardened Steels					
DC		High Speed Cutting		General Purpose Cutting		Depth of Cut **ap**	Depth of Cut **ae**	High Speed Cutting		General Purpose Cutting		Depth of Cut **ap**	Depth of Cut **ae**
mm	inch	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)			Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)		
6.350	**.2500**	7500	90.6	6000	63.0	.375	.075	6000	47.2	5000	31.5	.375	.075
7.938	**.3125**	6000	90.6	4800	63.0	.469	.094	4800	51.2	4000	35.4	.469	.094
9.525	**.3750**	5000	90.6	4000	59.1	.563	.113	4000	51.2	3300	33.5	.563	.113
12.700	**.5000**	3800	66.9	3000	43.3	.750	.150	3000	43.3	2500	29.5	.750	.150
Depth of Cut													

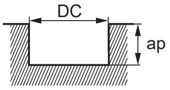
Workpiece Material		Austenitic Stainless Steels, Titanium Alloys						Precipitation Hardening Steinless Steels, Cobalt Chrome Alloys					
DC		High Speed Cutting		General Purpose Cutting		Depth of Cut **ap**	Depth of Cut **ae**	High Speed Cutting		General Purpose Cutting		Depth of Cut **ap**	Depth of Cut **ae**
mm	inch	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)			Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)		
6.350	**.2500**	5000	39.4	4000	25.6	.375	.050	3800	37.4	3500	21.7	.375	.050
7.938	**.3125**	4000	43.3	3200	29.5	.469	.063	3000	43.3	2800	25.6	.469	.063
9.525	**.3750**	3300	51.2	2700	33.5	.563	.075	2500	39.4	2300	23.6	.563	.075
12.700	**.5000**	2500	39.4	2000	27.6	.750	.100	1900	30.3	1800	19.7	.750	.100
Depth of Cut													

Note 1) SMART MIRACLE coating has very low electrical conductivity; therefore, an external contact type of tool setter (electric transmitted) may not work.
When measuring the tool length, please use an internal contact type (non-electricity type) or a laser tool setter.
Note 2) When cutting titanium alloys, the use of water-soluble cutting fluid is effective.
Note 3) The irregular helix flute end mill has a larger effect on controlling vibration when compred to standard end mills.
However, if the rigidity of the machine or the workpiece material installation is poor, vibration or abnomal sound can occur.
In this case, please reduce the revolution and the feed rate proportionately, or set a lower depth of cut.
Note 4) If the depth of cut is smaller, the revolution and the feed rate can be increased.

Slot Milling

(inch)

Workpiece Material		Carbon Steels(–30HRC)					Alloy Steels, Pre-hardened Steels				
DC		High Speed Cutting		General Purpose Cutting		Depth of Cut **ap**	High Speed Cutting		General Purpose Cutting		Depth of Cut **ap**
mm	inch	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)		Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	
6.350	**.2500**	7500	55.1	5000	37.4	.250	6000	31.5	4000	19.7	.250
7.938	**.3125**	6000	55.1	4000	35.4	.312	4800	31.5	3200	19.7	.312
9.525	**.3750**	5000	51.2	3300	33.5	.375	4000	28.3	2700	17.7	.375
12.700	**.5000**	3800	39.4	2500	25.6	.500	3000	23.2	2000	13.8	.500
Depth of Cut											

Workpiece Material		Austenitic Stainless Steels, Titanium Alloys					Precipitation Hardening Steinless Steels				
DC		High Speed Cutting		General Purpose Cutting		Depth of Cut **ap**	High Speed Cutting		General Purpose Cutting		Depth of Cut **ap**
mm	inch	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)		Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	
6.350	**.2500**	5000	34.3	3000	13.8	.250	3000	23.6	2500	11.8	.250
7.938	**.3125**	4000	39.4	2400	15.7	.312	2400	23.6	2000	11.8	.312
9.525	**.3750**	3300	37.8	2000	17.7	.375	2000	21.7	1700	9.8	.375
12.700	**.5000**	2500	31.5	1500	13.8	.500	1500	17.7	1300	7.9	.500
Depth of Cut											

Note 1) SMART MIRACLE coating has very low electrical conductivity; therefore, an external contact type of tool setter (electric transmitted) may not work.
When measuring the tool length, please use an internal contact type (non-electricity type) or a laser tool setter.
Note 2) When cutting titanium alloys, the use of water-soluble cutting fluid is effective.
Note 3) The irregular helix flute end mill has a larger effect on controlling vibration when compred to standard end mills.
However, if the rigidity of the machine or the workpiece material installation is poor, vibration or abnomal sound can occur.
In this case, please reduce the revolution and the feed rate proportionately, or set a lower depth of cut.
Note 4) If the depth of cut is smaller, the revolution and the feed rate can be increased.

Vibration Control End Mills for High Efficiency Machining of Difficult-to-Cut Materials

VQ5MHV/MHVRB

DIAEDGE

TOOL NEWS

2020.7 Update
B230A

Corner Radius End Mill for High Efficiency Titanium Alloy Machining

VQT5MVRB

Renewal

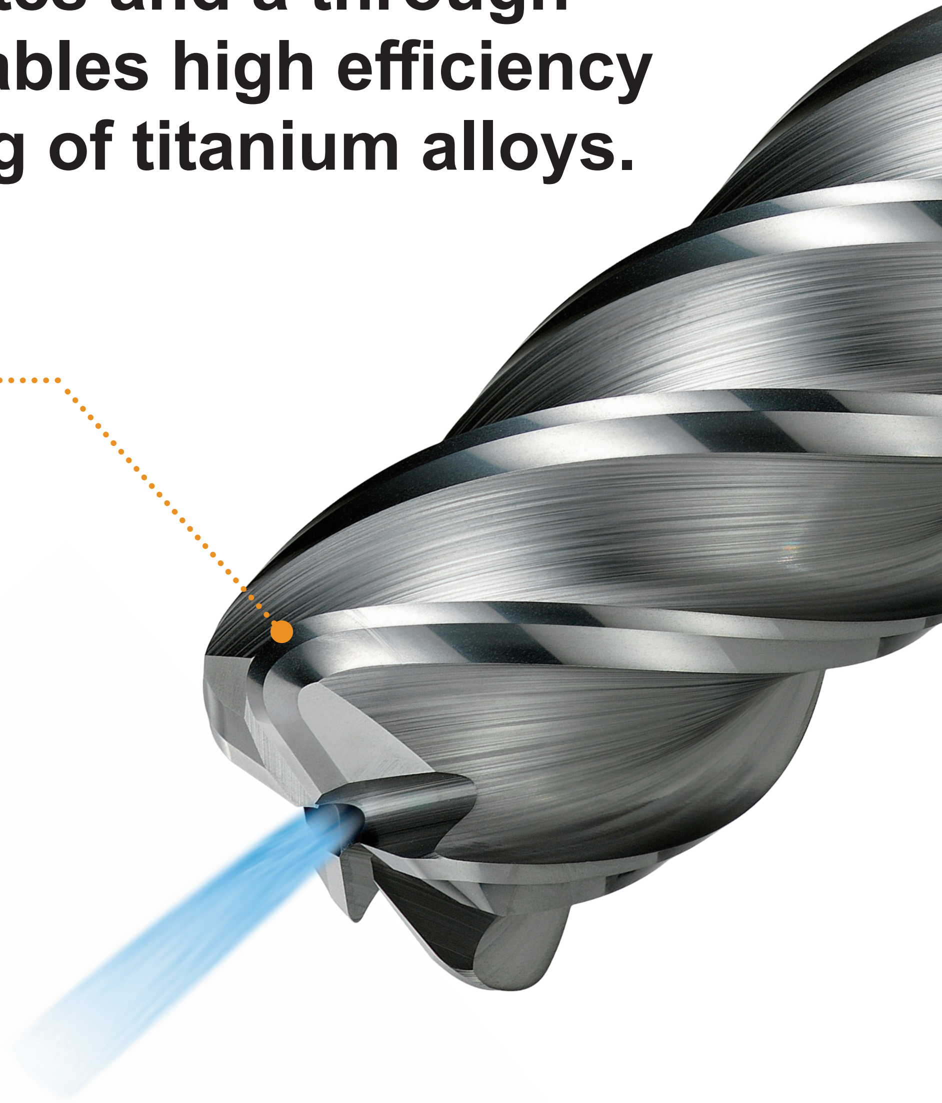
Highly Efficient Deep Slot Milling

MITSUBISHI MATERIALS CORPORATION

Corner Radius End Mill for High Efficiency Titanium Alloy Machining

VQT5MVRB

Combining 5 flutes and a through coolant hole enables high efficiency rough machining of titanium alloys.

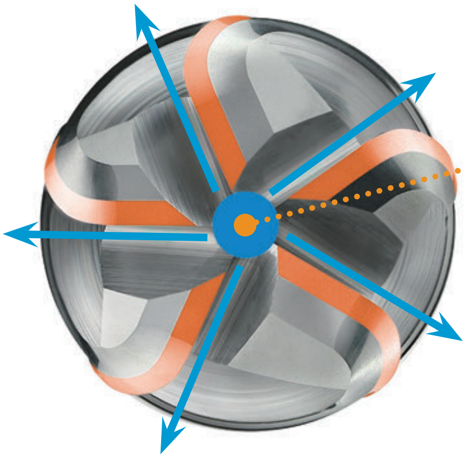


Corner Radius (Emphasis on Sharpness)

A unique rake angle improves cutting resistance and chip discharge.
The seamless blend between the corner radius and peripheral cutting edge suppresses abnormal wear and provides a stable tool life.

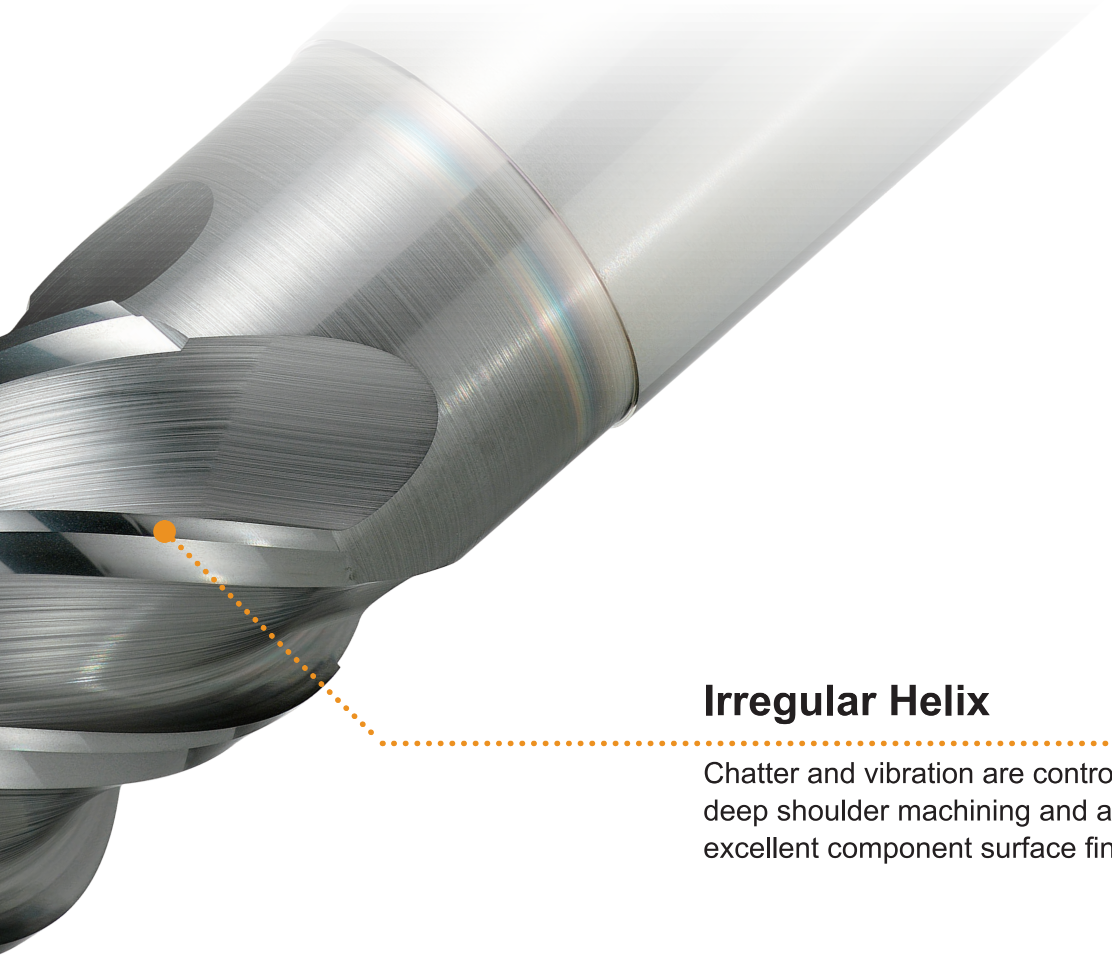
5 Flutes

Having the same chip evacuation properties of a 4 flute type enables deep slot milling.
The additional flute and deep cutting capability reduces the number of passes.



Coolant Hole

The center coolant provides a stable supply of cutting fluid and dramatically improves chip evacuation.
This also cools the cutting edge and prevents chip biting.



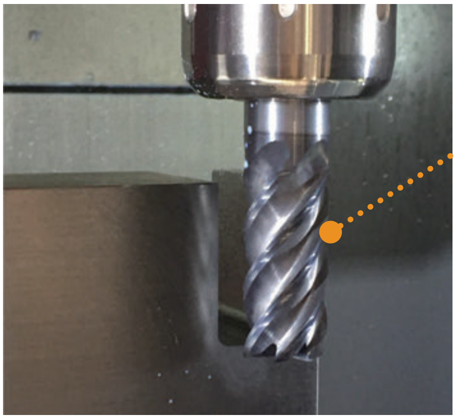
Irregular Helix

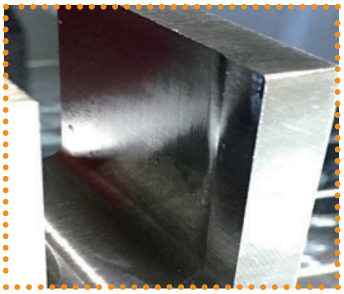
Chatter and vibration are controlled even during deep shoulder machining and also provides excellent component surface finishes.

Application Example

Material removal rate : 250cc/min achieved!

Large depths of cut when slotting (DC x 2) in titanium alloy dramatically shortens rough machining times.





Machined Surface

<Cutting Conditions>
Workpiece Material : Ti-6Al-4V
Tool : VQT5MVRB250R400N075C
Revolution : n=636 min^{-1}
Feed Rate : vf=8.110 IPM
Depth of Cut : ap=1.969 inch (DC×2)
Width of Cut : ae=.984 inch (Slot)
Overhang Length : 2.953 inch (DC×3)
Cutting Mode : Slot Milling
Internal Coolant +
External Coolant (Emulsion)
Machine : Vertical MC (BT50)

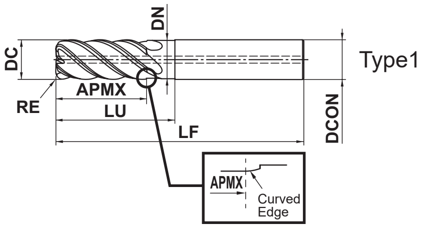
Corner Radius End Mill for High Efficiency Titanium Alloy Machining

VQT5MVRB NEW

Corner radius, Medium cut length, 5 flute, Irregular helix flutes, With coolant hole

40°
41.5°
43°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Heat Resistant Alloy	Copper Alloy	Aluminum Alloy
				◎	◎		



RE				
±0.02				
DC≤16	20≤DC≤25			
0 - 0.03	0 - 0.04			
DCON = 16	20≤DCON≤25			
0 - 0.011	0 - 0.013			

- ● Flute geometry suitable for deep slotting and effective chip evacuation.
- ● Sharp cutting edges provide long tool life when machining titanium alloys.

(mm)

Order Number	DC	RE	APMX	LU	DN	LF	DCON	* No.F	Stock	Type
VQT5MVRB160R100N48C	16	1	34	48	15.5	120	16	5	●	1
VQT5MVRB160R300N48C	16	3	34	48	15.5	120	16	5	●	1
VQT5MVRB160R400N48C	16	4	34	48	15.5	120	16	5	●	1
VQT5MVRB200R100N60C	20	1	44	60	19.5	135	20	5	●	1
VQT5MVRB200R300N60C	20	3	44	60	19.5	135	20	5	●	1
VQT5MVRB200R400N60C	20	4	44	60	19.5	135	20	5	●	1
VQT5MVRB200R600N60C	20	6	44	60	19.5	135	20	5	●	1
VQT5MVRB250R100N75C	25	1	54	75	24.5	155	25	5	●	1
VQT5MVRB250R300N75C	25	3	54	75	24.5	155	25	5	●	1
VQT5MVRB250R400N75C	25	4	54	75	24.5	155	25	5	●	1
VQT5MVRB250R600N75C	25	6	54	75	24.5	155	25	5	●	1

Note 1) SMART MIRACLE coating has very low electrical conductivity; therefore, an external contact type of tool setter (electric transmitted) may not work.
When measuring the tool length, please use an internal contact type (non-electricity type) or a laser tool setter.

* Number of Flutes

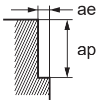
DC = Dia.
RE = Corner Radius
APMX = Length of Cut
LU = Neck Length
DN = Neck Dia.
LF = Overall Length
DCON = Shank Dia.

● : Inventory maintained.

Recommended Cutting Conditions

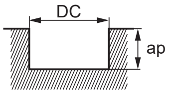
Shoulder Milling

Overhang Length DC×1 (DC=Dia.) (inch)

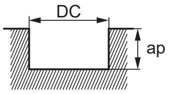
Workpiece Material		Titanium Alloys Ti-6Al-4V etc.						
DC		**RE**		Cutting Speed **vc** (SFM)	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Width of Cut **ae**
(mm)	(inch)	(mm)	(inch)					
16	**.630**	**1**	**.039**	260	1600	31.5	1.260	.097
		3	**.118**	260	1600	31.5	1.260	.094
		4	**.157**	260	1600	31.5	1.260	.094
20	**.787**	**1**	**.039**	260	1300	25.6	1.575	.118
		3	**.118**	260	1300	25.6	1.575	.118
		4	**.157**	260	1300	25.6	1.575	.118
		6	**.236**	260	1300	25.6	1.575	.118
25	**.984**	**1**	**.039**	260	1000	19.7	1.969	.150
		3	**.118**	260	1000	19.7	1.969	.150
		4	**.157**	260	1000	19.7	1.969	.150
		6	**.236**	260	1000	19.7	1.969	.150
Depth of Cut								

Slot Milling

Depth of Cut DC×1 (inch)

Workpiece Material		Titanium Alloys Ti-6Al-4V etc.					
DC		**RE**		Cutting Speed **vc** (SFM)	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**
(mm)	(inch)	(mm)	(inch)				
16	**.630**	**1**	**.039**	195	1200	16.5	.630
		3	**.118**	195	1200	16.5	.630
		4	**.157**	195	1200	11.8	.630
20	**.787**	**1**	**.039**	195	950	13.0	.787
		3	**.118**	195	950	13.0	.787
		4	**.157**	195	950	13.0	.787
		6	**.236**	195	950	9.4	.787
25	**.984**	**1**	**.039**	165	640	8.7	.984
		3	**.118**	165	640	8.7	.984
		4	**.157**	165	640	8.7	.984
		6	**.236**	165	640	6.3	.984
Depth of Cut				 DC=Dia.			

Depth of Cut DC×2 (inch)

Workpiece Material		Titanium Alloys Ti-6Al-4V etc.					
DC		**RE**		Cutting Speed **vc** (SFM)	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**
(mm)	(inch)	(mm)	(inch)				
16	**.630**	**1**	**.039**	195	1200	9.4	1.260
		3	**.118**	195	1200	9.4	1.260
		4	**.157**	195	1200	7.1	1.260
20	**.787**	**1**	**.039**	195	950	7.5	1.575
		3	**.118**	195	950	7.5	1.575
		4	**.157**	195	950	7.5	1.575
		6	**.236**	195	950	5.6	1.575
25	**.984**	**1**	**.039**	165	640	5.1	1.969
		3	**.118**	165	640	5.1	1.969
		4	**.157**	165	640	5.1	1.969
		6	**.236**	165	640	3.8	1.969
Depth of Cut				 DC=Dia.			

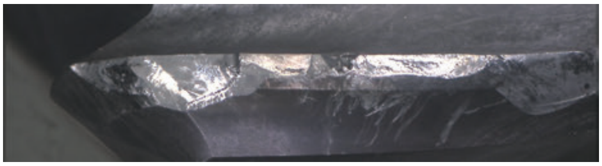
(Note 1) SMART MIRACLE coating has very low electrical conductivity; therefore, an external contact type of tool setter (electric transmitted) may not work.
When measuring the tool length, please use an internal contact type (non-electricity type) or a laser tool setter.
(Note 2) When cutting titanium alloys, the use of water-soluble cutting fluid is effective.
(Note 3) The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the work material installation is poor, vibration or abnormal sound can occur.
In this case, please reduce the revolution and the feed rate proportionately, or set a lower depth of cut.
(Note 4) If the depth of cut is smaller, the revolution and the feed rate can be increased.
(Note 5) When machining deep slots where the depth of cut exceeds the diameter DC, use a high strength holder or one equipped with a retaining mechanism.
Additionally ensure the clamping and workpiece material rigidity are sufficient.
Refer to page 307 for more information.
(Note 6) When machining a deep slot exceeding 1D, use a holder with a high gripping strength or an anti slippage mechanism.
Also, make sure that the clamping force and rigidity are sufficient before use.

Cutting Performance

Slot Milling with Deep Depths of Cut in Titanium Alloy

The seamless corner radii achieves stable tool life.

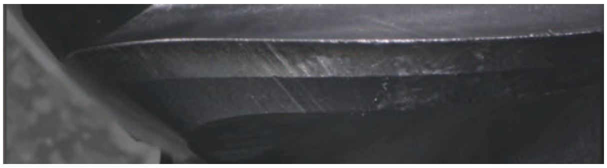
Conventional



Fractures (After 6 slots)

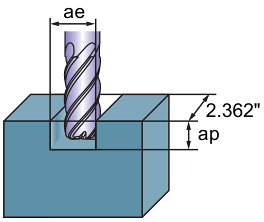
<Cutting Conditions>
Workpiece Material : Ti-6Al-4V
Tool : VQT5MVRB160R300N048C
Revolution : n = 1200 min^{-1}
Feed Rate : vf = 26.0 IPM
Depth of Cut : ap = .630 inch
Width of Cut : ae = .630 inch (slot)
Cutting Length : 2.362 inch (1 slot)
Overhang Length : 1.890 inch (DC×3)
Cutting Mode : Slot Milling
Internal Coolant +
External Coolant (Emulsion)
Machine : Vertical MC (BT50)

VQT5MVRB



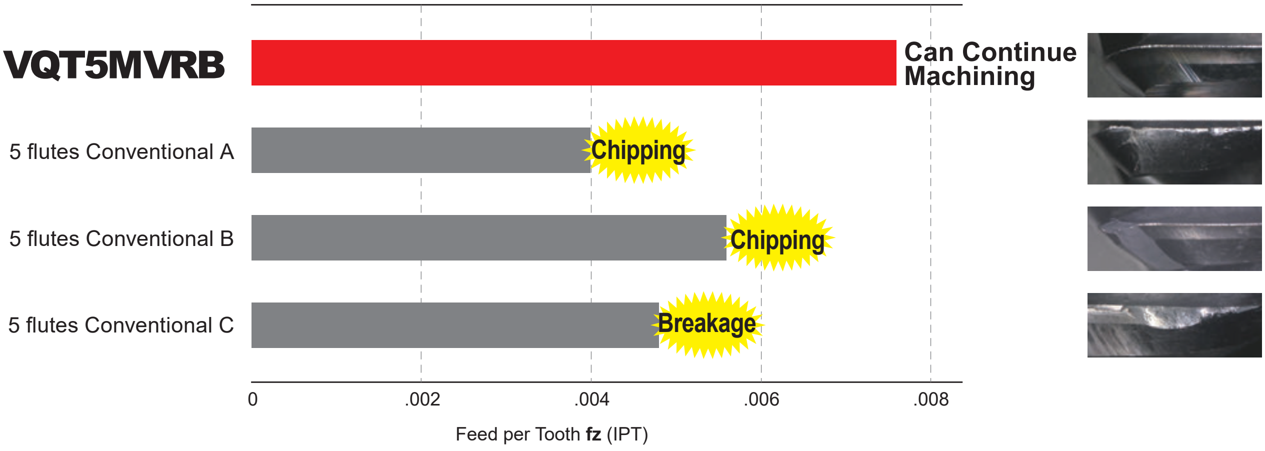
After 17 slots

Triple Tool Life



Comparison of Maximum Cutting Feed for Titanium Alloy Slot Milling

When compared with conventional products, high efficiency milling can be achieved.



<Cutting Conditions>
Workpiece Material : Ti-6Al-4V
Tool : VQT5MVRB160R300N048C
Revolution : n = 1200 min^{-1}
Depth of Cut : ap = .630 inch
Width of Cut : ae = .630 inch (Slot)
Cutting Length : 2.362 inch (1 slot)
Overhang Length : 1.890 inch (DC×3)
Cutting Mode : Slot Milling
Internal Coolant +
External Coolant (Emulsion)
Machine : Vertical MC (BT50)

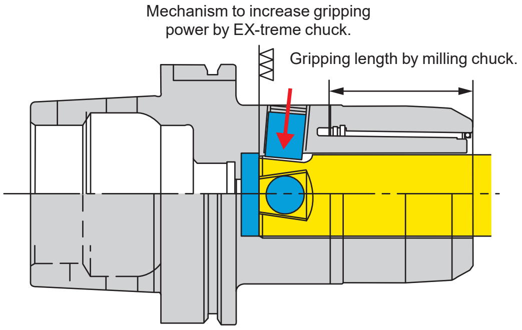
Key Point for High Efficiency Machining of Titanium Alloys

For high efficiency machining, it is recommended to use a precision, high strength holder to prevent pull out of the tool.
Some high strength holders require modification of the cutting tool shank.

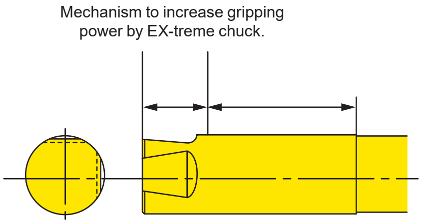
NIKKEN

Never Pull Down Great Reliability in the Aircraft Industry

X-Treme Shank
X-Treme Chuck



EX-treme Chuck



EX-treme Chuck Exclusive Shank

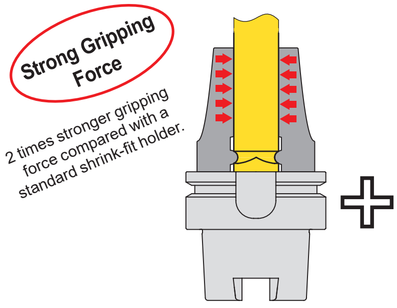
https://www.nikken-kosakusho.co.jp/en/

MST corporation

Superior Rigidity and Thick Body Design

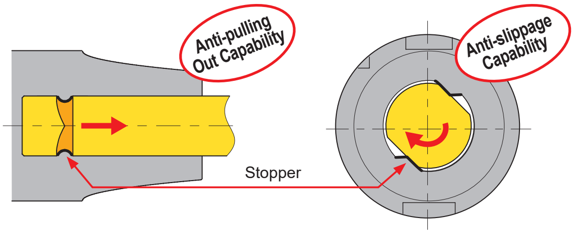
Shrink-fit Holder with Anti Slippage Capability

SLIMLINE Z



Shrink Fitting

Z Shank



Ideal for perfect clamping using separated anti-pulling and anti-slippage capability.

http://www.mst-corp.co.jp/en/slimline/z/

Corner Radius End Mill for High Efficiency Titanium Alloy Machining

VQT5MVRB

For your safety
●Don't handle inserts and chips without gloves. ●Please machine within the recommended application range and exchange expired tools with new ones in advance of breakage. ●Please use safety covers and wear safety glasses. ●When using compounded cutting oils, please take fire precautions. ●When using rotating tools, please make a trial run to check run-out, vibration and abnormal sounds etc.

DIAEDGE

TOOL NEWS

2021.5 Update
B200A

Exchangeable Head End Mills

iMX End Mill Series

“Carbide”+“Carbide”

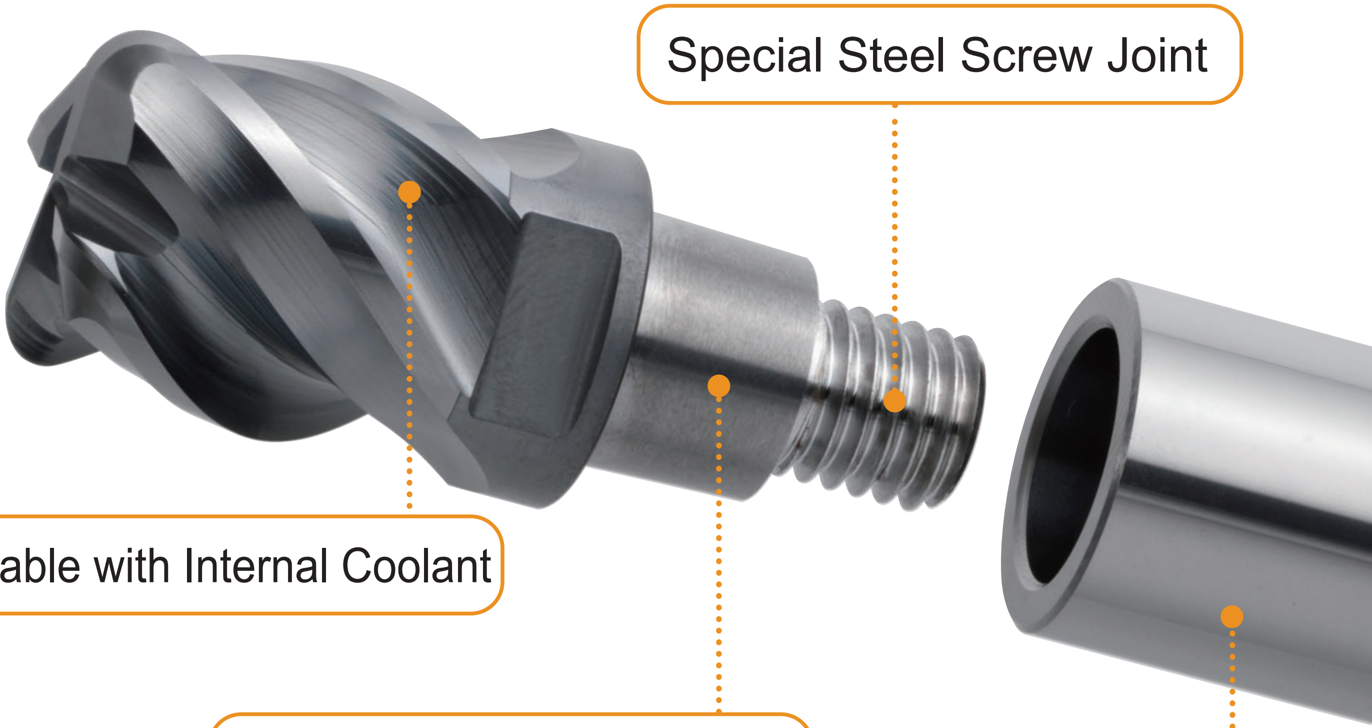
(Head) (Holder)

Double Face Contact Type

MITSUBISHI MATERIALS CORPORATION

Exchangeable Head End Mills

iMX End Mill Series

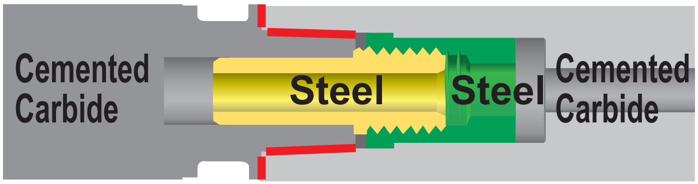


Special Steel Screw Joint

Available with Internal Coolant

Double Face Contact Type
(Taper + End Face)

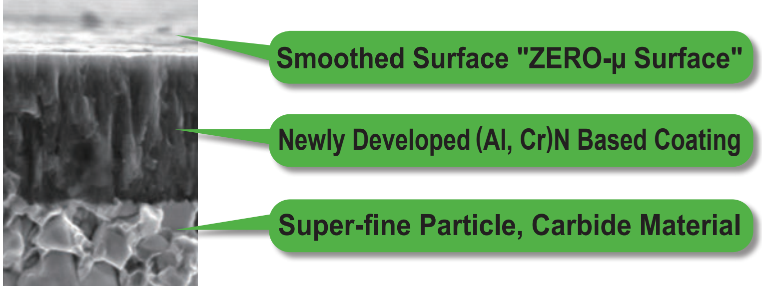
Mono-block Carbide Holder



The iMX series is a revolutionary end mill system that enables efficiency, high accuracy and rigidity by combining the advantages of both solid carbide and indexable end mills.
Security and rigidity close to that of a solid type end mill because the clamping faces are all carbide.
Excellent for reduced inventory over a variety of applications due to the exchangeable head.

Highly Versatile Grades

EP7020 Suitable for difficult-to-cut materials.



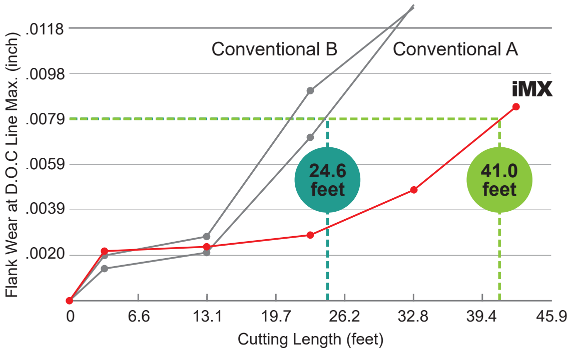
EP8100 Series (**EP8110,EP8120**)
Suitable for milling of hardened steels.

EP6120
Suitable for high feed milling of steels.

ET2020 (Uncoated)
Suitable for milling of aluminum alloys.

Tool Life Comparison when Machining Flat Surfaces in Inconel 718

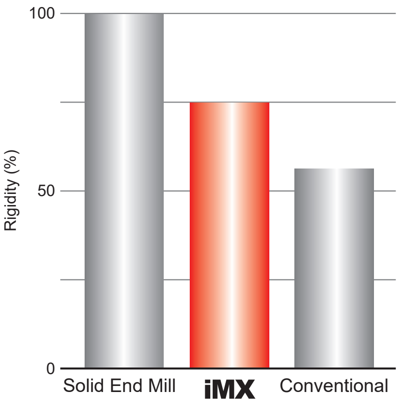
EP7020 is a new grade that enables extended tool life when machining difficult-to-cut materials.

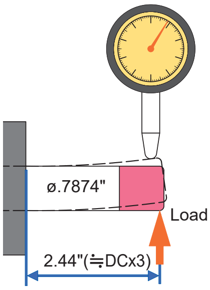


Workpiece Material : Inconel 718 (43HRC)
Holder : IMX12-U12N041L100C
Head : IMX12B4HV12012
Revolution : n=1700 min^{-1}
Cutting Speed : vc=90 SFM
Table Feed : vf=13.8 IPM
Feed per Tooth : fz=.002 IPT
Depth of Cut : ap=.024", ae=.047"
Overhang Length : 2.56"
Cutting Mode : Down(Climb) Cut,
Wet Cutting(Emulsion)
Machine : Horizontal MC (BT40)

Comparison of Tool Rigidity

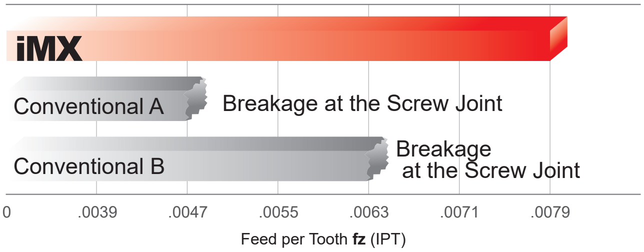
The double face contact of the carbide head and carbide holder gives an increase in rigidity of 30%.





Strength Comparison when Slot Milling Titanium Alloy

The reliability of the screw fastening is significantly improved when compared to conventional that employ only steel fastenings. It is also able to cope with high cutting loads.

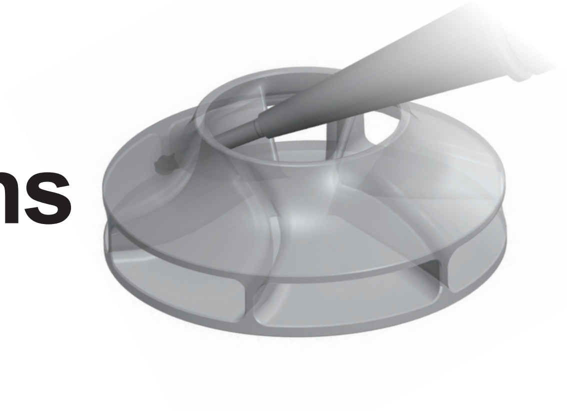


Workpiece Material : Ti-6Al-4V(32HRC)
Holder : IMX20-U20N030L090C
Head : IMX20C4HV200R10021
Revolution : n=1100 min^{-1}
Cutting Speed : vc=225 SFM

Feed per Tooth : Above (Expansion)
Depth of Cut : ap=.394", ae=.787"
Overhang Length : 2.8"
Cutting Mode : Wet Cutting (Emulsion)
Machine : Vertical MC (BT50)

Exchangeable Head End Mills

iMX New Additions

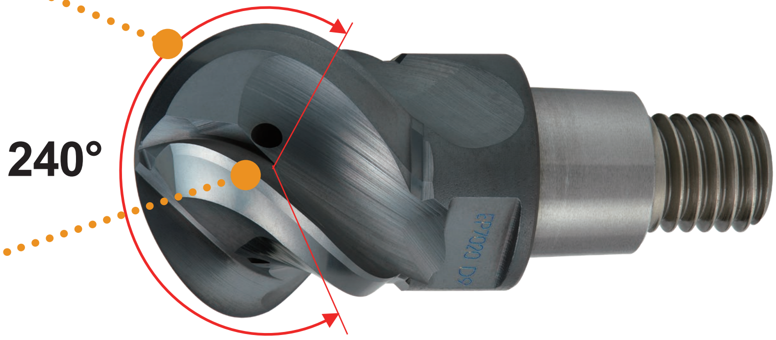


NEW

iMX-B4WH-S

Lollipop Shape

With a true round ball cutting edge that extends 240º, making it ideal for finishing undercut surfaces.

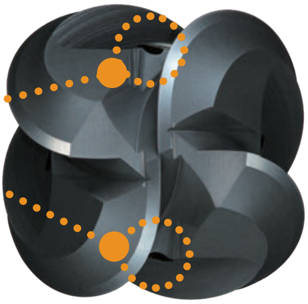


High Helix Cutting Edge

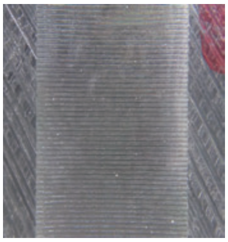
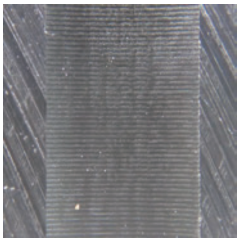
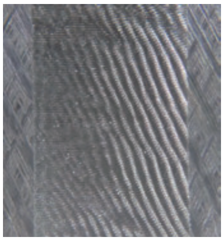
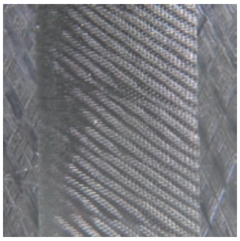
The high helix edge geometry reduces cutting resistance. This results in reduced chatter and vibration even when machining with a long tool overhang.

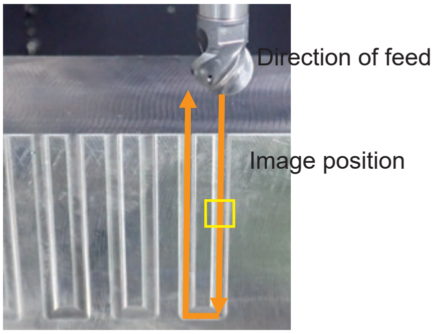
Multiple Coolant Holes

A stable supply of coolant is maintained even when machining components with complex geometries.



Surface Finish Comparison - Vertical Machining S17400

Cutting Speed	130 SFM	195 SFM	260 SFM
iMX-B4WH-S	 Surface machined without chatter	 Surface machined without chatter	 Surface machined without chatter
Conventional	 Machined surface displaying chatter	 Machined surface displaying chatter	 Machined surface displaying chatter

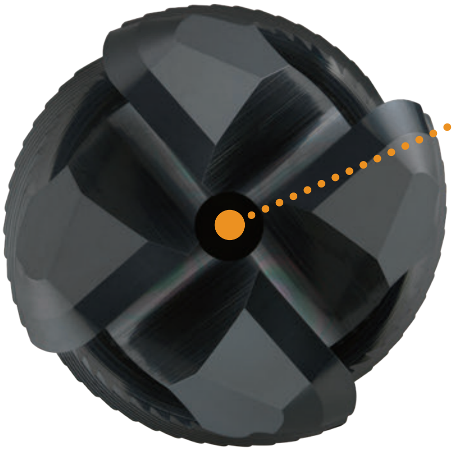


<Cutting Conditions>
Workpiece Material : AISI S17400
Tool : IMX10B4WH12008S
Feed Rate : fz=.0012 IPT
Depth of Cut : ae=.012 inch
Overhang Length : 2.362 inch, L/D = 5
Cutting Mode : Internal Coolant (Emulsion)

NEW

iMX-RC4F-C For Titanium Alloys and Stainless Steels

A corner radius roughing type with a center-thru coolant hole. The roughing edge geometry reduces cutting resistance and is effective for low rigidity and long tool overhang applications.



Center-thru Coolant Hole

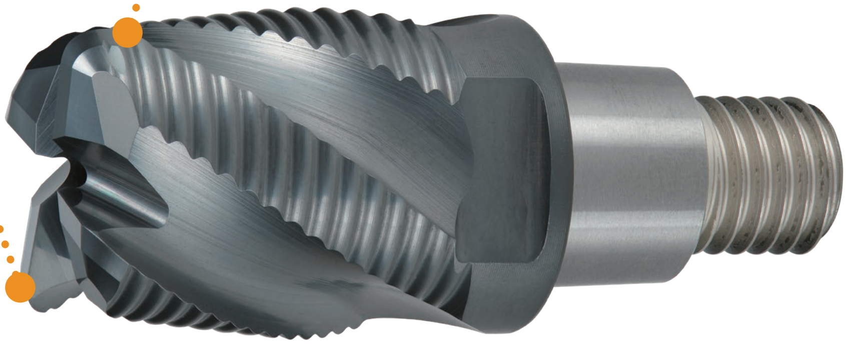
For improved chip disposal.

New Roughing Edge Geometry

The new optimized edge geometry has improved fracture resistance.

New Corner Radius Type

The new corner radius geometry is resistant to cutting edge damage.



SYMBOL DESCRIPTIONS

Tool Material

UWC

Ultra Micro Grain Carbide
Ultra micro grain carbide is used as the substrate material.

Angle, Coolant hole, Sharp corner edge and Gash land

Helix Angle
Indicates the helix angle of the end mill.

End Cutting Edge with Coolant Hole

Peripheral Cutting Edge with Coolant Hole

Sharp Corner Edge
Indicates the end mill has a sharp corner edge.

Gash Land
Indicates the end mill cutting edge has a gash land.

Tolerances

Outside Diameter Tolerance
Indicates diameter tolerance of end mill.

R Tolerance
Indicates the radial tolerance of a ball nose end mill.

R Tolerance
Indicates the radial tolerance of an end mill with a corner radius.

Tolerance of Point Angle
Indicates the tolerance of the point angle.

h6

Shank Diameter Tolerance
Indicates the shank diameter tolerance of end mill.

Identification(Shoulder Milling)

Reduce the cutting parameters by the coefficient values shown according to the length of overhang.
For long edge and oversize types heads refer to their specific recommended conditions.

(inch)

Workpiece Material	Carbon Steels, Alloy Steels, Mild Steels, Copper, Copper Alloys			Pre-hardened Steels, Carbon Steels, Alloy Steels, Alloy Tool Steels			Austenitic Stainless Steels, Ferritic and Martensitic Stainless Steels, Titanium Alloys		
L/D	Revolution **n** (min^{-1})	Feed per Tooth **fz** (IPT)	Width of Cut **ae**	Revolution **n** (min^{-1})	Feed per Tooth **fz** (IPT)	Width of Cut **ae**	Revolution **n** (min^{-1})	Feed per Tooth **fz** (IPT)	Width of Cut **ae**
2	100%	100%	100%	100%	100%	100%	100%	100%	100%
3	100%	100%	100%	100%	100%	100%	100%	100%	100%
4	80%	90%	70%	80%	90%	70%	80%	90%	70%
5	60%	80%	40%	60%	80%	40%	60%	80%	40%
6	50%	70%	30%	50%	70%	30%	50%	70%	30%
7	40%	70%	20%	40%	70%	20%	30%	60%	20%
8	40%	60%	10%	40%	60%	10%	30%	50%	10%
9	30%	60%	10%	30%	60%	10%	20%	50%	10%

Workpiece Material	Precipitation Hardening Stainless Steels, Cobalt Chromium Alloys			Heat Resistant Alloys Inconel718		
L/D	Revolution **n** (min^{-1})	Feed per Tooth **fz** (IPT)	Width of Cut **ae**	Revolution **n** (min^{-1})	Feed per Tooth **fz** (IPT)	Width of Cut **ae**
2	100%	100%	100%	100%	100%	100%
3	100%	100%	100%	100%	100%	100%
4	80%	90%	70%	80%	90%	70%
5	60%	80%	40%	60%	80%	40%
6	50%	70%	30%	50%	70%	30%
7	30%	60%	20%	30%	60%	20%
8	30%	50%	10%	30%	50%	10%
9	20%	50%	10%	20%	50%	10%

Three geometries now available with through coolant.

Head

Type	Applications, Features	No. of Flutes	Product Code	Shape	Dia. DC	Coolant	Long Cutting Edge	Workpiece Material								Dimensions	Cutting Conditions
								P		H		M	S	N			
								Carbon Steel	Tool Steel	-55HRC	55HRC-	Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminum Alloy		
SQUARE																	
	For Difficult-to-cut Materials	3	iMX-S3HV		.375"—1.000" 10—25mm			◎	○			◎	◎	○		P319,320	P321,322, 323
		4	iMX-S4HV		.375"—1.000" 10—32mm			◎	○			◎	◎	○		P324,325	P328,329, 331,332
					16, 20mm		●									P325	P330
		4	iMX-S4HV-S		.375"—1.000" 10—25mm	●		◎	○			◎	◎	○		P326,327	P328,329
	For Aluminum Alloys	3	iMX-S3A		.375"—1.000" 10—28mm										◎	P333,334	P335,336
RADIUS																	
	For Difficult-to-cut Materials	4	iMX-C4HV		.375"—1.000" 10—28mm			◎	○			◎	◎	○		P337,338	P342,343, 345,346
					16, 20mm		●									P339	P344
		4	iMX-C4HV-S		.375"—1.000" 10—25mm	●		◎	○			◎	◎	○		P340,341	P342,343
		6	iMX-C6HV		.375"—.500" 10, 12mm			◎	○			◎	◎			P347,348	P349
		10	iMX-C10HV		.625" 16mm			◎	○			◎	◎			P347,348	P349
		12	iMX-C12HV		.750"—1.000" 20, 25mm			◎	○			◎	◎			P347,348	P349
	For High Feed	4	iMX-C4FD-C		.375"—1.000" 10—25mm	●		◎	◎	◎		◎	◎	○		P350,351	P352
	For High Efficiency Machining	4	iMX-C4FV		.375"—1.000" 10—25mm			◎	◎	◎						P353,354	P355
	For Aluminum Alloys	3	iMX-C3A		.375"—1.000" 10—28mm										◎	P356,357	P358,359
	For Blade	8	iMX-C8T-C		8mm	●						◎	◎			P360	P360
		10	iMX-C10T-C		10mm	●						◎	◎				
		12	iMX-C12T-C		15, 19mm	●						◎	◎				
		15	iMX-C15T-C		15, 19mm	●						◎	◎				

Head

Type	Applications, Features	No. of Flutes	Product Code	Shape	Dia. DC	Coolant	Long Cutting Edge	Workpiece Material								Dimensions	Cutting Conditions
								P		H		M	S	N			
								Carbon Steel	Tool Steel	-55HRC	55HRC-	Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminum Alloy		
ROUGHING																	
	For Difficult-to-cut Materials	4	iMX-R4F		.375"—1.000" 10—25mm			◎	○			◎	◎	○		P361	P362,363
	For Titanium Alloys	4	NEW iMX-RC4F-C		10—20mm	●		○				○	◎			P364	P365
BALL																	
	For Hardened Steels	2	iMX-B2S		16—20mm						◎					P366	P366
		4	iMX-B4S		16—20mm						◎					P367	P367
	For High Efficiency Machining	3	iMX-B3FV		10—20mm				◎	◎						P368	P369
	For Difficult-to-cut Materials	4	iMX-B4HV		.375"—1.000" 10—25mm			◎	○			◎	◎	○		P370,371	P374
		4	iMX-B4HV-E		.375"—1.000" 10—25mm	●		◎	○			◎	◎	○		P372,373	P374
		6	iMX-B6HV		.375"—1.000" 10—25mm			◎	○			◎	◎			P375,376	P377
LOLLIPOP																	
	For Difficult-to-cut Materials	6	NEW iMX-B4WH-S		.500"—.750" 12—20mm	●		◎	○			◎	◎	○		P378,379	P380
CHAMFER																	
	For Chamfer Materials	3	iMX-CH3L		.375"—.750" 10—20mm			◎	○	○		◎	◎			P381	P382,383
		6	iMX-CH6V		.500"—.750" 12—20mm			◎	○	○		◎	◎			P384	P385

Holder

Type			Length	Taper Angle	Material	Dimensions
Undercut			Medium Semi-long Long	–	Carbide	P386,387
					Steel	P388,389
Straight	Straight		Semi-long Long	–	Carbide	P387
	Straight Oversize		Medium	–	Steel	P388,389
Taper Neck			Long	1°	Carbide	P386,387

IDENTIFICATION

iMX End Mill Series

■Head

② Basic Configurations	
S	Square
C	Corner Radius
B	Ball Nose
R	Roughing
CH	Chamfer

④ Specifications	
H	High Helix
V	Vibration Control
F	For High Efficiency Machining
S	For Finish Machining
A	For Aluminum Alloys
D	Duplex Corner Radius
F	Fine Pitch (Roughing)
T	Taper
L	Inclined
W	Lollipop

⑥ Corner R.

ex.
R050 → 0.5mm
R100 → 1mm

⑥ Corner R.

ex.
R030 → .030inch

⑧ Coolant Hole	
S	Peripheral(Side)
E	End Cutting Edge
C	End Face, Center
None	Without Hole

IMX12	**C**	**4**	**HV**	**120**	**R100**	**12**	**S**
①	②	③	④	⑤	⑥	⑦	⑧

① Series Description Head & Holder Combination	
Head Series Description	Holder Series Description
iMX 10	iMX 10 -
iMX 12	iMX 12 -
iMX 16	iMX 16 -
iMX 20	iMX 20 -
iMX 25	iMX 25 -
Head & holder combination should be the same.	

③ No. of Flutes

ex.
4 → 4 flute

⑤ Dia.

ex.
120 → 12mm

⑤ Dia.

ex.
0500 → .5inch

⑦ Flute Length

ex.
12 → 12.∗mm
(Truncate Decimal Places)
A45 → Chamfer Angle 45°

⑦ Flute Length (inch)

ex.
M → Medium = DCx1
P → DCx.8
(DC=External Diameter)

■Holder

② Hyphen

Hyphen indicates these are holders.

③ Figure	
U	Undercut
S	Straight
G	Straight Oversize
A	1° Taper Neck

⑥ Overall Length

ex.
L080 → 80mm

⑥ Overall Length

ex.
L31 → 3.1∗inch
(Two Digits Decimal Place Truncate)

IMX12	**-**	**U**	**12**	**N017**	**L080**	**C**
①	②	③	④	⑤	⑥	⑦

① Series Description Holder & Head Combination	
Holder Series Description	Head Series Description
iMX 10 -	iMX 10
iMX 12 -	iMX 12
iMX 16 -	iMX 16
iMX 20 -	iMX 20
iMX 25 -	iMX 25
Holder & head combination should be the same.	
For holder details, refer to pg.386−389.	

④ Shank Diameter

ex.
12 → 12mm

④ Shank Diameter

ex.
0500 → .5inch

⑤ Neck Length

ex.
N017 → 17.∗mm
(Truncate Decimal Places)

⑤ Neck Length

ex.
N071 → .71∗inch
(Three Digits Decimal Place Truncate)

⑦ Tool Material	
C	Carbide
S	Steel

■Run-out Accuracy and Head Exchange Accuracy

Run-out Accuracy for the Peripheral Cutting Edge	Head Exchange Accuracy (Axial)
.0006" (ø10−20mm)	±.0008"
.0008" (ø25mm)	

∗ Use the carbide holder. (Except iMX-R4F roughing head)

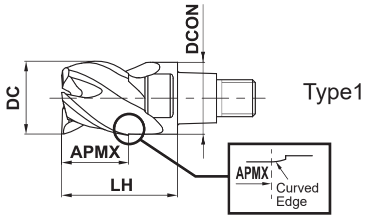
iMX-S3HV – Inch Sizes

Square head, 3 flute, Irregular helix

UWC

42°
43.5°
45°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminum Alloy
◎	○			◎	◎	○	



	DC≤.500"	DC>.500"			
	0 - .0008"	0 - .0012"			

- 3-flute end mills suitable for shoulder milling, slot milling and plunging.
- Irregular helix controls vibration and achieves stable machining.

(inch)

Order Number	DC	APMX	LH	DCON	No. of Flutes	Grade	Type
						EP7020	
IMX10S3HV0375P	.375	.300	.630	.363	3	●	1
IMX12S3HV0500P	.500	.400	.789	.488	3	●	1
IMX16S3HV0625P	.625	.500	.945	.605	3	●	1
IMX20S3HV0750P	.750	.600	1.181	.730	3	●	1
IMX25S3HV1000P	1.000	.800	1.500	.980	3	●	1

Note 1) The fastening size of the holder and head should be the same. (refer to page 318)

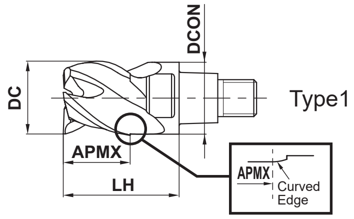
DC = Cutting Dia.
APMX = Depth of Cut Max.
LH = Head Length
DCON = Connection Dia.

iMX-S3HV

Square head, 3 flute, Irregular helix

UWC 42° 43.5° 45°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminum Alloy
◎	○			◎	◎	○	



DC≤12	DC>12			
0 - 0.020	0 - 0.030			

- 3-flute end mills that cover shoulder milling, slotting and plunging.
- Irregular helix controls vibration and achieves stable machining.

(mm)

Order Number	DC	APMX	LH	DCON	No. of Flutes	Grade EP7020	Type
IMX10S3HV10008	10	8	16	9.7	3	●	1
IMX12S3HV12009	12	9.6	19	11.7	3	●	1
IMX16S3HV16012	16	12.8	24	15.5	3	●	1
IMX20S3HV20016	20	16	30	19.5	3	●	1
IMX25S3HV25020	25	20	37.5	24.5	3	●	1

Note 1) The fastening size of the holder and head should be the same. (refer to page 318)

iMX-S3HV

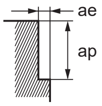
Square head, 3 flute, Irregular helix

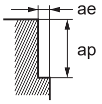
Recommended Cutting Conditions

■Shoulder Milling (L/D=3)

Other than the L/D = 3, use following recommended cutting conditions by multiplying the page 314 correction factor by overhang length.

(inch)

Workpiece Material		Carbon Steel, Alloy Steels, Mild Steels, Copper, Copper Alloys				Pre-hardened Steels, Carbon Steels, Alloy Steels, Alloy Tool Steels				Austenitic Stainless Steels, Ferritic and Martensitic Stainless Steels, Titanium Alloys			
DC (mm)	DC (inch)	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Width of Cut **ae**	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Width of Cut **ae**	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Width of Cut **ae**
	.3750	5000	52.5	.300	.075	4000	28.8	.300	.075	3400	30.6	.300	.075
10	**.3937**	4800	50.4	.315	.079	3800	27.4	.315	.079	3200	28.8	.315	.079
12	**.4724**	4000	42.0	.378	.094	3200	25.0	.378	.094	2700	25.1	.378	.094
	.5000	3700	38.9	.400	.100	3000	23.4	.400	.100	2500	23.3	.400	.100
	.6250	3000	35.1	.500	.125	2400	21.6	.500	.125	2000	21.0	.500	.125
16	**.6299**	3000	35.1	.504	.126	2400	21.6	.504	.126	2000	21.0	.504	.126
	.7500	2500	29.3	.600	.150	2000	18.0	.600	.150	1700	17.9	.600	.150
20	**.7874**	2400	28.1	.630	.157	1900	17.1	.630	.157	1600	16.8	.630	.157
25	**.9843**	1900	26.8	.787	.197	1500	13.5	.787	.197	1300	13.7	.787	.197
	1.0000	1900	26.8	.800	.200	1500	13.5	.800	.200	1300	13.7	.800	.200
Depth of Cut													

Workpiece Material		Precipitation Hardening Stainless Steels, Cobalt Chromium Alloys				Heat Resistant Alloys Inconel718			
DC (mm)	DC (inch)	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Width of Cut **ae**	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Width of Cut **ae**
	.3750	2500	18.0	.300	.075	1300	6.2	.300	.038
10	**.3937**	2400	17.3	.315	.079	1300	6.2	.315	.039
12	**.4724**	2000	15.6	.378	.094	1100	5.9	.378	.047
	.5000	1900	14.8	.400	.100	990	5.3	.400	.050
	.6250	1500	13.5	.500	.125	790	4.7	.500	.063
16	**.6299**	1500	13.5	.504	.126	790	4.7	.504	.063
	.7500	1200	10.8	.600	.150	660	4.0	.600	.075
20	**.7874**	1200	10.8	.630	.157	630	3.8	.630	.079
25	**.9843**	950	8.6	.787	.197	500	3.0	.787	.098
	1.0000	940	8.5	.800	.200	500	3.0	.800	.100
Depth of Cut									

Note 1) The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the work material installation is poor, vibration or abnormal sound can occur.
In this case, please reduce the revolution and the feed rate proportionately, or set a lower depth of cut.

Note 2) If the depth of cut is smaller, the revolution and the feed rate can be increased.

Note 3) For stainless steel, titanium alloy and heat resistant alloy, the use of water-soluble coolant is effective.

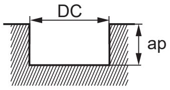
iMX-S3HV

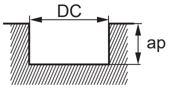
Square head, 3 flute, Irregular helix

Recommended Cutting Conditions

Slot Milling

(inch)

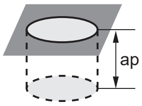
Workpiece Material		Carbon Steels, Alloy Steels, Mild Steels, Copper, Copper Alloys			Pre-hardened Steels, Carbon Steels, Alloy Steels, Alloy Tool Steels			Austenitic Stainless Steels, Ferritic and Martensitic Stainless Steels, Titanium Alloys		
DC		Revolution **n** (min-1)	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Revolution **n** (min-1)	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Revolution **n** (min-1)	Feed Rate **vf** (IPM)	Depth of Cut **ap**
(mm)	(inch)									
	.3750	3400	16.1	.188	2600	9.4	.188	2500	9.0	.188
10	**.3937**	3200	15.4	.197	2500	9.0	.197	2400	8.6	.197
12	**.4724**	2700	16.2	.236	2100	10.1	.236	2000	9.6	.236
	.5000	2500	15.0	.250	2000	9.6	.250	1900	9.1	.250
	.6250	2000	16.8	.313	1600	9.6	.313	1500	10.8	.313
16	**.6299**	2000	16.8	.315	1600	9.6	.315	1500	10.8	.315
	.7500	1700	14.3	.375	1300	7.8	.375	1200	8.6	.375
20	**.7874**	1600	13.4	.394	1300	7.8	.394	1200	8.6	.394
25	**.9843**	1300	12.1	.472	1000	6.0	.472	950	6.8	.472
	1.0000	1300	12.1	.480	990	5.9	.480	940	6.8	.480
Depth of Cut		 DC=Dia.								

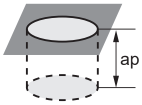
Workpiece Material		Precipitation Hardening Stainless Steels, Cobalt Chromium Alloys			Heat Resistant Alloys Inconel718		
DC		Revolution **n** (min-1)	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Revolution **n** (min-1)	Feed Rate **vf** (IPM)	Depth of Cut **ap**
(mm)	(inch)						
	.3750	2000	6.0	.188	1000	2.4	.075
10	**.3937**	1900	5.7	.197	970	2.3	.079
12	**.4724**	1600	6.7	.236	810	2.9	.094
	.5000	1500	6.3	.250	760	2.7	.100
	.6250	1200	7.2	.313	610	3.7	.125
16	**.6299**	1200	7.2	.315	610	3.7	.126
	.7500	990	5.9	.375	510	3.1	.150
20	**.7874**	950	5.7	.394	490	2.9	.157
25	**.9843**	760	4.6	.472	390	2.3	.197
	1.0000	740	4.4	.480	380	2.3	.200
Depth of Cut		 DC=Dia.					

Note 1) The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece material installation is poor, vibration or abnormal sound can occur.
In this case, please reduce the revolution and the feed rate proportionately, or set a lower depth of cut.
Note 2) If the depth of cut is smaller, the revolution and the feed rate can be increased.
Note 3) For stainless steels, titanium alloys and heat resistant alloys, the use of water-soluble coolant is effective.

Plunging

(inch)

Workpiece Material		Carbon Steels, Alloy Steels, Mild Steels, Copper, Copper Alloys				Pre-hardened Steels, Carbon Steels, Alloy Steels, Alloy Tool Steels				Austenitic Stainless Steels, Ferritic and Martensitic Stainless Steels, Titanium Alloys			
DC (mm)	DC (inch)	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Step Feed **ap2**	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Step Feed **ap2**	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Step Feed **ap2**
	.3750	3400	18.7	.188	.100	2300	8.1	.188	.080	2000	2.4	.188	.023
10	**.3937**	3200	17.6	.197	.100	2200	7.7	.197	.080	1900	2.3	.197	.023
12	**.4724**	2700	14.9	.236	.100	1900	6.7	.236	.080	1600	1.9	.236	.023
	.5000	2500	13.8	.250	.100	1800	6.3	.250	.080	1500	1.8	.250	.023
	.6250	2000	11.0	.313	.100	1400	4.9	.313	.080	1200	1.4	.313	.023
16	**.6299**	2000	11.0	.315	.100	1400	4.9	.315	.080	1200	1.4	.315	.023
	.7500	1700	9.4	.375	.100	1200	4.2	.375	.080	990	1.2	.375	.023
20	**.7874**	1600	8.8	.394	.100	1100	3.9	.394	.080	950	1.1	.394	.023
25	**.9843**	1300	7.2	.492	.100	880	3.1	.492	.080	760	.9	.492	.023
	1.0000	1300	7.2	.500	.100	880	3.1	.500	.080	740	.9	.500	.023
Depth of Cut													

Workpiece Material		Precipitation Hardening Stainless Steels, Cobalt Chromium Alloys			
DC (mm)	DC (inch)	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Step Feed **ap2**
	.3750	1300	1.6	.188	.023
10	**.3937**	1300	1.6	.197	.023
12	**.4724**	1100	1.3	.236	.023
	.5000	990	1.2	.250	.023
	.6250	790	.9	.313	.023
16	**.6299**	790	.9	.315	.023
	.7500	660	.8	.375	.023
20	**.7874**	630	.8	.394	.023
25	**.9843**	500	.6	.492	.023
	1.0000	500	.6	.500	.023
Depth of Cut					

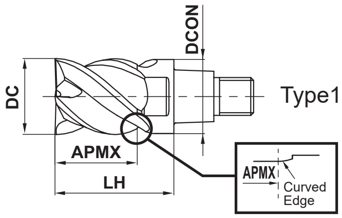
Note 1) The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece material installation is poor, vibration or abnormal sound can occur.
Note 2) If the depth of cut is smaller, the revolution and the feed rate can be increased.
Note 3) For stainless steels, titanium alloys and heat resistant alloys, the use of water-soluble coolant is effective.

iMX-S4HV- Inch Sizes

Square head, 4 flute, Irregular helix

UWC 42° 45°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminum Alloy
◎	○			◎	◎	○	



DC≤.500"	DC>.500"			
0 - .0008"	0 - .0012"			

- Irregular helix controls vibration and achieves stable machining.

(inch)

Order Number	DC	APMX	LH	DCON	No. of Flutes	Grade	Type
						EP7020	
IMX10S4HV0375M	.375	.375	.630	.363	4	●	1
IMX12S4HV0500M	.500	.500	.789	.488	4	●	1
IMX16S4HV0625M	.625	.625	.945	.605	4	●	1
IMX20S4HV0750M	.750	.750	1.181	.730	4	●	1
IMX25S4HV1000M	1.000	1.000	1.500	.980	4	●	1

Note 1) The fastening size of the holder and head should be the same. (refer to page 318)

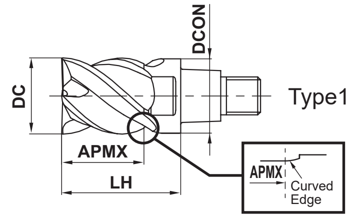
DC = Cutting Dia.
APMX = Depth of Cut Max.
LH = Head Length
DCON = Connection Dia.

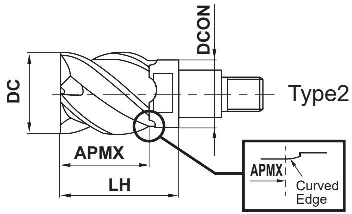
iMX-S4HV

Square head, 4 flute, Irregular helix

UWC 42° 45°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminum Alloy
◎	○			◎	◎	○	





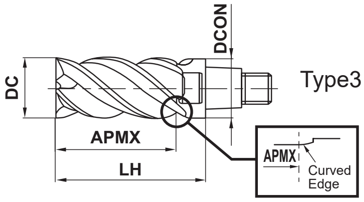
Oversize Type

DC ≤12	DC>12			
0 - 0.020	0 - 0.030			

- Irregular helix controls vibration and achieves stable machining.

(mm)

Order Number	DC	APMX	LH	DCON	No. of Flutes	Grade EP7020	Type
IMX10S4HV10010	10	10	16	9.7	4	●	1
IMX10S4HV12012	12	12.5	19	9.7	4	●	2
IMX12S4HV12012	12	12	19	11.7	4	●	1
IMX12S4HV14014	14	14.5	22.5	11.7	4	●	2
IMX16S4HV16016	16	16	24	15.5	4	●	1
IMX16S4HV18018	18	18.5	27	15.5	4	●	2
IMX20S4HV20020	20	20	30	19.5	4	●	1
IMX20S4HV22023	22	23	33	19.5	4	●	2
IMX25S4HV25025	25	25	37.5	24.5	4	●	1
IMX25S4HV28029	28	29	41.5	24.5	4	●	2
IMX25S4HV30031	30	31	43.5	24.5	4	●	2
IMX25S4HV32033	32	33	45.5	24.5	4	●	2



■Long Cutting Edge Type

(mm)

Order Number	DC	APMX	LH	DCON	No. of Flutes	Grade EP7020	Type
IMX16S4HV16032	16	32	40	15.5	4	●	3
IMX20S4HV20040	20	40	50	19.5	4	●	3

Note 1) The fastening size of the holder and head should be the same. (refer to page 318)

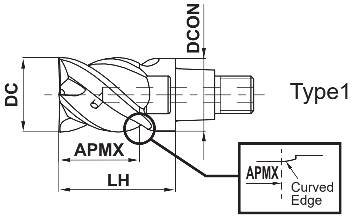
iMX-S4HV-S – Inch Sizes

Square head, 4 flute, Irregular helix, With coolant holes

UWC

42°
45°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminum Alloy
◎	○			◎	◎	○	



DC≤.500"	DC>.500"			
0 - .0008"	0 - .0012"			

- Irregular helix controls vibration and achieves stable machining.
- Coolant holes for each cutting edge enables a stable coolant supply.

(inch)

Order Number	DC	APMX	LH	DCON	No. of Flutes	Grade	Type
						EP7020	
IMX10S4HV0375MS	.375	.375	.630	.363	4	●	1
IMX12S4HV0500MS	.500	.500	.789	.488	4	●	1
IMX16S4HV0625MS	.625	.625	.945	.605	4	●	1
IMX20S4HV0750MS	.750	.750	1.181	.730	4	●	1
IMX25S4HV1000MS	1.000	1.000	1.500	.980	4	●	1

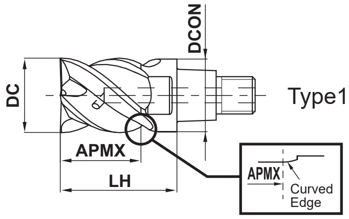
Note 1) The fastening size of the holder and head should be the same. (refer to page 318)

DC = Cutting Dia.
APMX = Depth of Cut Max.
LH = Head Length
DCON = Connection Dia.

iMX-S4HV-S

Square head, 4 flute, Irregular helix, With coolant holes

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminum Alloy
◎	○			◎	◎	○	



DC≤12	DC>12			
0 - 0.020	0 - 0.030			

- Coolant holes for each cutting edge enables a stable coolant supply.
- Irregular helix controls vibration and achieves stable machining.

(mm)

Order Number	DC	APMX	LH	DCON	No. of Flutes	Grade	Type
						EP7020	
IMX10S4HV10010S	10	10	16	9.7	4	●	1
IMX12S4HV12012S	12	12	19	11.7	4	●	1
IMX16S4HV16016S	16	16	24	15.5	4	●	1
IMX20S4HV20020S	20	20	30	19.5	4	●	1
IMX25S4HV25025S	25	25	37.5	24.5	4	●	1

Note 1) The fastening size of the holder and head should be the same. (refer to page 318)

Exchangeable Head End Mills

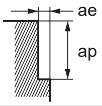
iMX-S4HV/iMX-S4HV-S

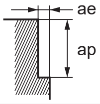
Square radius head, 4 flute, Irregular helix (With/Without coolant holes)

Recommended Cutting Conditions

Shoulder Milling

(inch)

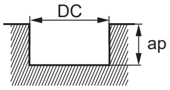
Workpiece Material		Carbon Steels, Alloy Steels, Mild Steels, Copper, Copper Alloys				Pre-hardened Steels, Carbon Steels, Alloy Steels, Alloy Tool Steels				Austenitic Stainless Steels, Ferritic and Martensitic Stainless Steels, Titanium Alloys			
DC (mm)	DC (inch)	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Width of Cut **ae**	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Width of Cut **ae**	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Width of Cut **ae**
	.3750	5000	70.0	.375	.075	4000	38.4	.375	.075	3400	40.8	.375	.075
10	**.3937**	4800	67.2	.394	.079	3800	36.5	.394	.079	3200	38.4	.394	.079
12	**.4724**	4000	56.0	.472	.094	3200	33.3	.472	.094	2700	33.5	.472	.094
	.5000	3700	51.8	.500	.100	3000	31.2	.500	.100	2500	31.0	.500	.100
	.6250	3000	46.8	.625	.125	2400	28.8	.625	.125	2000	28.0	.625	.125
16	**.6299**	3000	46.8	.630	.126	2400	28.8	.630	.126	2000	28.0	.630	.126
	.7500	2500	39.0	.750	.150	2000	24.0	.750	.150	1700	23.8	.750	.150
20	**.7874**	2400	37.4	.787	.157	1900	22.8	.787	.157	1600	22.4	.787	.157
25	**.9843**	1900	35.7	.984	.197	1500	18.0	.984	.197	1300	18.2	.984	.197
	1.0000	1900	35.7	1.000	.200	1500	18.0	1.000	.200	1300	18.2	1.000	.200
Depth of Cut													

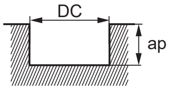
Workpiece Material		Precipitation Hardening Stainless Steels, Cobalt Chromium Alloys				Heat Resistant Alloys Inconel718			
DC (mm)	DC (inch)	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Width of Cut **ae**	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Width of Cut **ae**
	.3750	2500	24.0	.375	.075	1300	8.3	.375	.038
10	**.3937**	2400	23.0	.394	.079	1300	8.3	.394	.039
12	**.4724**	2000	20.8	.472	.094	1100	7.9	.472	.047
	.5000	1900	19.8	.500	.100	990	7.1	.500	.050
	.6250	1500	18.0	.625	.125	790	6.3	.625	.063
16	**.6299**	1500	18.0	.630	.126	790	6.3	.630	.063
	.7500	1200	14.4	.750	.150	660	5.3	.750	.075
20	**.7874**	1200	14.4	.787	.157	630	5.0	.787	.079
25	**.9843**	950	11.4	.984	.197	500	4.1	.984	.098
	1.0000	940	11.3	1.000	.200	500	4.0	1.000	.100
Depth of Cut									

Note 1) The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece material installation is poor, vibration or abnormal sound can occur.
In this case, please reduce the revolution and the feed rate proportionately, or set a lower depth of cut.
Note 2) If the depth of cut is smaller, the revolution and the feed rate can be increased.
Note 3) For stainless steels, titanium alloys and heat resistant alloys, the use of water-soluble coolant is effective.

Slot Milling

(inch)

Workpiece Material		Carbon Steels, Alloy Steels, Mild Steels, Copper, Copper Alloys			Pre-hardened Steels, Carbon Steels, Alloy Steels, Alloy Tool Steels			Austenitic Stainless Steels, Ferritic and Martensitic Stainless Steels, Titanium Alloys		
DC (mm)	DC (inch)	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**
	.3750	3400	21.4	.188	2600	12.5	.188	2500	12.0	.188
10	**.3937**	3200	20.5	.197	2500	12.0	.197	2400	11.5	.197
12	**.4724**	2700	21.6	.236	2100	13.4	.236	2000	12.8	.236
	.5000	2500	20.0	.250	2000	12.8	.250	1900	12.2	.250
	.6250	2000	22.4	.313	1600	12.8	.313	1500	14.4	.313
16	**.6299**	2000	22.4	.315	1600	12.8	.315	1500	14.4	.315
	.7500	1700	19.0	.375	1300	10.4	.375	1200	11.5	.375
20	**.7874**	1600	17.9	.394	1300	10.4	.394	1200	11.5	.394
25	**.9843**	1300	16.1	.472	1000	8.0	.472	950	9.1	.472
	1.0000	1300	16.1	.480	990	7.9	.480	940	9.0	.480
Depth of Cut		 DC=Dia.								

Workpiece Material		Precipitation Hardening Stainless Steels, Cobalt Chromium Alloys			Heat Resistant Alloys Inconel718		
DC (mm)	DC (inch)	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**
	.3750	2000	8.0	.188	1000	3.2	.075
10	**.3937**	1900	7.6	.197	970	3.1	.079
12	**.4724**	1600	9.0	.236	810	3.9	.094
	.5000	1500	8.4	.250	760	3.6	.100
	.6250	1200	9.6	.313	610	4.9	.125
16	**.6299**	1200	9.6	.315	610	4.9	.126
	.7500	1000	7.9	.375	510	4.1	.150
20	**.7874**	950	7.6	.394	490	3.9	.157
25	**.9843**	760	6.1	.472	390	3.1	.197
	1.0000	740	5.9	.480	380	3.0	.200
Depth of Cut		 DC=Dia.					

Note 1) The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece material installation is poor, vibration or abnormal sound can occur.
In this case, please reduce the revolution and the feed rate proportionately, or set a lower depth of cut.
Note 2) If the depth of cut is smaller, the revolution and the feed rate can be increased.
Note 3) For stainless steels, titanium alloys and heat resistant alloys, the use of water-soluble coolant is effective.

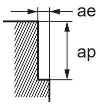
iMX-S4HV

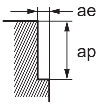
Square radius head, 4 flute, Irregular helix, Long cutting edge type

Recommended Cutting Conditions

Shoulder Milling

(inch)

Workpiece Material		Carbon Steels, Alloy Steels, Mild Steels, Copper, Copper Alloys				Pre-hardened Steels, Carbon Steels, Alloy Steels, Alloy Tool Steels				Austenitic Stainless Steels, Ferritic and Martensitic Stainless Steels, Titanium Alloys			
L/D	**DC** (mm)	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Width of Cut **ae**	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Width of Cut **ae**	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Width of Cut **ae**
4	**16**	2000	28.0	1.260	.031	1600	17.9	1.260	.031	1200	14.9	1.260	.031
	20	1600	22.4	1.575	.039	1300	14.6	1.575	.039	950	11.8	1.575	.039
6	**16**	1200	13.4	1.260	.031	990	8.0	1.260	.031	790	7.6	1.260	.031
	20	950	10.6	1.575	.039	800	6.4	1.575	.039	630	6.0	1.575	.039
Depth of Cut		 											

Workpiece Material		Precipitation Hardening Stainless Steels, Cobalt Chromium Alloys				Heat Resistant Alloys Inconel718			
L/D	**DC** (mm)	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Width of Cut **ae**	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Width of Cut **ae**
4	**16**	1000	11.2	1.260	.031	610	4.9	1.260	.016
	20	800	9.0	1.575	.039	490	3.9	1.575	.020
6	**16**	610	4.9	1.260	.031	390	2.5	1.260	.016
	20	490	3.9	1.575	.039	320	2.0	1.575	.020
Depth of Cut		 							

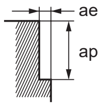
Note 1) The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece material installation is poor, vibration or abnormal sound can occur.
In this case, please reduce the revolution and the feed rate proportionately, or set a lower depth of cut.
Note 2) If the depth of cut is smaller, the revolution and the feed rate can be increased.
Note 3) L/D will be +1 when using a long cutting edge type head.
Note 4) For stainless steels, titanium alloys and heat resistant alloys, the use of water-soluble coolant is effective.

iMX-S4HV

Square radius head, 4 flute, Irregular helix, Oversize type head

Shoulder Milling

(inch)

Workpiece Material		Carbon Steels, Alloy Steels, Mild Steels, Copper, Copper Alloys				Pre-hardened Steels, Carbon Steels, Alloy Steels, Alloy Tool Steels				Austenitic Stainless Steels, Ferritic and Martensitic Stainless Steels, Titanium Alloys			
L/D	DC (mm)	Revolution n (min^{-1})	Feed Rate vf (IPM)	Depth of Cut ap	Width of Cut ae	Revolution n (min^{-1})	Feed Rate vf (IPM)	Depth of Cut ap	Width of Cut ae	Revolution n (min^{-1})	Feed Rate vf (IPM)	Depth of Cut ap	Width of Cut ae
3	**11**	4300	60.2	.433	.043	3500	33.6	.433	.043	2900	34.8	.433	.043
	12	4000	56.0	.472	.047	3200	30.7	.472	.047	2700	32.4	.472	.047
	13	3700	51.8	.512	.051	2900	30.2	.512	.051	2500	31.0	.512	.051
	14	3400	47.6	.551	.055	2700	28.1	.551	.055	2300	28.5	.551	.055
	17	2800	43.7	.669	.067	2300	27.6	.669	.067	1900	23.6	.669	.067
	18	2600	40.6	.709	.071	2100	25.2	.709	.071	1800	25.2	.709	.071
	22	2200	34.3	.866	.087	1700	20.4	.866	.087	1500	21.0	.866	.087
	28	1700	32.0	1.102	.110	1400	16.8	1.102	.110	1100	15.4	1.102	.110
	30	1600	30.1	1.181	.118	1300	15.6	1.181	.118	1100	15.4	1.181	.118
	32	1500	28.2	1.260	.126	1200	14.4	1.260	.126	1000	14.0	1.260	.126
5	**11**	2600	29.1	.433	.016	2000	16.0	.433	.016	1700	16.3	.433	.016
	12	2400	26.9	.472	.020	1900	15.2	.472	.020	1600	15.4	.472	.020
	13	2200	24.6	.512	.020	1700	13.6	.512	.020	1500	14.4	.512	.020
	14	2000	22.4	.551	.024	1600	12.8	.551	.024	1400	13.4	.551	.024
	17	1700	21.1	.669	.028	1300	12.5	.669	.028	1100	12.3	.669	.028
	18	1600	19.8	.709	.028	1200	11.5	.709	.028	1100	12.3	.709	.028
	22	1300	16.1	.866	.035	1000	9.6	.866	.035	860	9.6	.866	.035
	28	1000	15.6	1.102	.043	800	7.7	1.102	.043	680	7.6	1.102	.043
	30	950	14.8	1.181	.047	740	7.1	1.181	.047	630	7.1	1.181	.047
	32	890	13.9	1.260	.051	700	6.7	1.260	.051	590	6.6	1.260	.051
7	**11**	1700	16.3	.433	.008	1500	9.6	.433	.008	930	7.4	.433	.008
	12	1600	15.4	.472	.008	1300	8.3	.472	.008	850	6.8	.472	.008
	13	1500	14.4	.512	.012	1200	9.6	.512	.012	780	7.5	.512	.012
	14	1400	13.4	.551	.012	1100	8.8	.551	.012	730	7.0	.551	.012
	17	1100	12.3	.669	.012	940	7.5	.669	.012	600	5.8	.669	.012
	18	1100	12.3	.709	.016	890	7.1	.709	.016	570	5.5	.709	.016
	22	860	9.6	.866	.016	730	5.8	.866	.016	460	4.4	.866	.016
	28	680	8.4	1.102	.024	570	4.6	1.102	.024	360	3.5	1.102	.024
	30	630	7.8	1.181	.024	530	4.2	1.181	.024	340	3.3	1.181	.024
	32	590	7.3	1.260	.024	500	4.0	1.260	.024	320	3.1	1.260	.024
Depth of Cut													

Note 1) The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece material installation is poor, vibration or abnormal sound can occur.
In this case, please reduce the revolution and the feed rate proportionately, or set a lower depth of cut.
Note 2) If the depth of cut is smaller, the revolution and the feed rate can be increased.
Note 3) For stainless steels, titanium alloys and heat resistant alloys, the use of water-soluble coolant is effective.

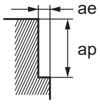
iMX-S4HV

Square radius head, 4 flute, Irregular helix, Oversize type head

Recommended Cutting Conditions

Shoulder Milling

(inch)

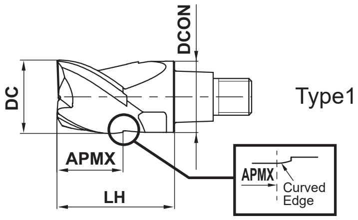
Workpiece Material		Precipitation Hardening Stainless Steels, Cobalt Chromium Alloys				Heat Resistant Alloys Inconel718			
L/D	DC (mm)	Revolution n (min^{-1})	Feed Rate vf (IPM)	Depth of Cut ap	Width of Cut ae	Revolution n (min^{-1})	Feed Rate vf (IPM)	Depth of Cut ap	Width of Cut ae
3	11	2200	21.1	.433	.043	880	5.6	.433	.032
	12	2000	19.2	.472	.047	810	5.2	.472	.035
	13	1800	18.7	.512	.051	750	5.4	.512	.039
	14	1700	17.7	.551	.055	690	5.0	.551	.043
	17	1400	14.6	.669	.067	740	5.3	.669	.051
	18	1300	15.6	.709	.071	700	5.6	.709	.055
	22	1100	13.2	.866	.087	570	4.6	.866	.067
	28	850	10.2	1.102	.110	450	3.6	1.102	.083
	30	790	9.5	1.181	.118	420	3.4	1.181	.091
	32	740	8.9	1.260	.126	390	3.1	1.260	.094
5	11	1500	12.0	.433	.016	310	1.5	.433	.012
	12	1300	10.4	.472	.020	280	1.3	.472	.016
	13	1200	9.6	.512	.020	260	1.7	.512	.016
	14	1100	8.8	.551	.024	240	1.5	.551	.016
	17	940	9.0	.669	.028	340	2.2	.669	.020
	18	890	8.5	.709	.028	320	2.0	.709	.024
	22	730	7.0	.866	.035	260	1.7	.866	.028
	28	570	5.5	1.102	.043	210	1.3	1.102	.031
	30	530	5.1	1.181	.047	190	1.2	1.181	.035
	32	500	4.8	1.260	.051	180	1.2	1.260	.039
7	11	710	4.5	.433	.008	–	–	–	–
	12	650	4.2	.472	.008	–	–	–	–
	13	600	4.8	.512	.012	–	–	–	–
	14	550	4.4	.551	.012	–	–	–	–
	17	460	3.7	.669	.012	–	–	–	–
	18	430	3.4	.709	.016	–	–	–	–
	22	350	2.8	.866	.016	–	–	–	–
	28	280	2.2	1.102	.024	–	–	–	–
	30	260	2.1	1.181	.024	–	–	–	–
	32	240	1.9	1.260	.024	–	–	–	–
Depth of Cut									

Note 1) The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece material installation is poor, vibration or abnormal sound can occur.
In this case, please reduce the revolution and the feed rate proportionately, or set a lower depth of cut.
Note 2) If the depth of cut is smaller, the revolution and the feed rate can be increased.
Note 3) For stainless steels, titanium alloys and heat resistant alloys, the use of water-soluble coolant is effective.

iMX-S3A- Inch Sizes

Square head, 3 flute, For aluminum alloy

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminum Alloy
							◎



DC≤.500"	DC>.500"			
0 - .0008"	0 - .0012"			

- High efficiency machining is possible due to the polished rake face and sharp cutting edge.

(inch)

Order Number	DC	APMX	LH	DCON	No. of Flutes	Grade ET2020	Type
IMX10S3A0375P	.375	.300	.630	.363	3	●	1
IMX12S3A0500P	.500	.400	.789	.488	3	●	1
IMX16S3A0625P	.625	.500	.945	.605	3	●	1
IMX20S3A0750P	.750	.600	1.181	.730	3	●	1
IMX25S3A1000P	1.000	.800	1.500	.980	3	●	1

Note 1) The fastening size of the holder and head should be the same. (refer to page 318)

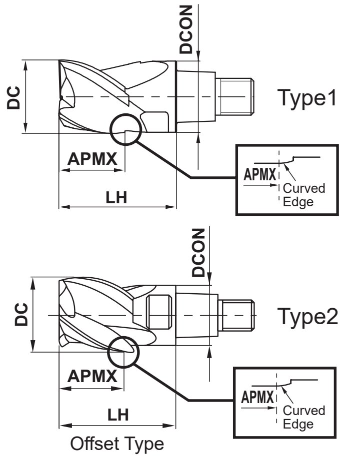
DC = Cutting Dia.
APMX = Depth of Cut Max.
LH = Head Length
DCON = Connection Dia.

iMX-S3A

Square head, 3 flute, For aluminum alloy

UWC 37.5°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminum Alloy
							◎



DC≤12	DC>12			
0 - 0.020	0 - 0.030			

- High efficiency machining due to the sharp cutting edge suitable for aluminum alloy machining and polished rake face.

(mm)

Order Number	DC	APMX	LH	DCON	No. of Flutes	Grade ET2020	Type
IMX10S3A10008	10	8	16	9.7	3	●	1
IMX10S3A12010	12	10.1	19	9.7	3	●	2
IMX12S3A12009	12	9.6	19	11.7	3	●	1
IMX12S3A14011	14	11.7	22.5	11.7	3	●	2
IMX16S3A16012	16	12.8	24	15.5	3	●	1
IMX16S3A18014	18	14.9	27	15.5	3	●	2
IMX20S3A20016	20	16	30	19.5	3	●	1
IMX20S3A22018	22	18.6	33	19.5	3	●	2
IMX25S3A25020	25	20	37.5	24.5	3	●	1
IMX25S3A28023	28	23.4	41.5	24.5	3	●	2

Note 1) The fastening size of the holder and head should be the same. (refer to page 318)

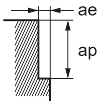
iMX-S3A

Square head, 3 flute, For aluminum alloys

Recommended Cutting Conditions

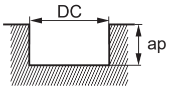
Shoulder Milling

(inch)

Workpiece Material		Aluminum Alloys			
DC		Revolution n	Feed Rate vf	Depth of Cut ap	Width of Cut ae
(mm)	(inch)	(min^{-1})	(IPM)		
	.3750	17000	234.6	.300	.113
10	**.3937**	16000	220.8	.315	.118
12	**.4724**	13000	179.4	.378	.142
	.5000	13000	179.4	.400	.150
	.6250	10000	180.0	.500	.188
16	**.6299**	9900	178.2	.504	.189
	.7500	8400	173.9	.600	.225
20	**.7874**	8000	165.6	.630	.236
25	**.9843**	6400	159.4	.787	.295
	1.0000	6300	156.9	.800	.300
Depth of Cut					

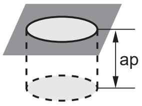
Slot Milling

(inch)

Workpiece Material		Aluminum Alloys		
DC		Revolution n	Feed Rate vf	Depth of Cut ap
(mm)	(inch)	(min^{-1})	(IPM)	
	.3750	17000	137.7	.188
10	**.3937**	16000	129.6	.197
12	**.4724**	13000	109.2	.236
	.5000	13000	109.2	.250
	.6250	10000	111.0	.313
16	**.6299**	9900	109.9	.315
	.7500	8400	108.4	.375
20	**.7874**	8000	103.2	.394
25	**.9843**	6400	96.0	.492
	1.0000	6300	94.5	.500
Depth of Cut			DC=Dia.	

Plunging

(inch)

Workpiece Material		Aluminum Alloys			
DC		Revolution n	Feed Rate vf	Depth of Cut ap	Step Feed ap2
(mm)	(inch)	(min^{-1})	(IPM)		
	.3750	10000	39.0	.188	.10
10	**.3937**	9600	37.4	.197	.10
12	**.4724**	8000	31.2	.236	.10
	.5000	7500	29.3	.250	.10
	.6250	6000	23.4	.313	.10
16	**.6299**	6000	23.4	.315	.10
	.7500	5000	19.5	.375	.10
20	**.7874**	4800	18.7	.394	.10
25	**.9843**	3800	14.8	.492	.10
	1.0000	3800	14.8	.500	.10
Depth of Cut					

Note 1) Vibration may occur if the rigidity of machine or workpiece material is low.
In this case, please reduce the revolution and the feed rate proportionately, or set a lower depth of cut.
Note 2) The use of water-soluble coolant is effective.

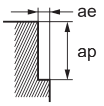
iMX-S3A

Square head, 3 flute, For aluminum alloys, Oversize type head

Recommended Cutting Conditions

Shoulder Milling

(inch)

Workpiece Material			Aluminum Alloys			
L/D	DC		Revolution n (min^{-1})	Feed Rate vf (IPM)	Depth of Cut ap	Width of Cut ae
	(mm)	(inch)				
3	12	.4720	13000	181.1	.378	.094
	14	.5510	11000	153.5	.441	.110
	18	.7090	8800	157.5	.567	.142
	22	.8660	7200	149.6	.693	.173
	28	1.1020	5700	141.7	.882	.220
5	12	.4720	8000	86.6	.378	.039
	14	.5510	6800	70.9	.441	.043
	18	.7090	5300	74.8	.567	.055
	22	.8660	4300	70.9	.693	.071
	28	1.1020	3400	66.9	.882	.087
7	12	.4720	5300	51.2	.378	.020
	14	.5510	4500	43.3	.441	.024
	18	.7090	3500	47.2	.567	.028
	22	.8660	2900	39.4	.693	.035
	28	1.1020	2300	39.4	.882	.043
Depth of Cut						

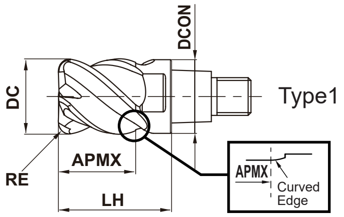
Note 1) Vibration may occur if the rigidity of machine or workpiece material is low.
In this case, please reduce the revolution and the feed rate proportionately, or set a lower depth of cut.
Note 2) The use of water-soluble coolant is effective.

iMX-C4HV – Inch Sizes

Corner radius head, 4 flute, Irregular helix

UWC 42° 45°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminum Alloy
◎	○			◎	◎	○	



±.0008"				
DC≤.500"	DC>.500"			
0 - .0008"	0 - .0012"			

- Irregular helix controls vibration and achieves stable machining.

(inch)

Order Number	DC	RE	APMX	LH	DCON	No. of Flutes	Grade	Type
							EP7020	
IMX10C4HV0375R015M	.375	.015	.375	.630	.363	4	●	1
IMX10C4HV0375R030M	.375	.030	.375	.630	.363	4	●	1
IMX10C4HV0375R060M	.375	.060	.375	.630	.363	4	●	1
IMX12C4HV0500R015M	.500	.015	.500	.789	.488	4	●	1
IMX12C4HV0500R030M	.500	.030	.500	.789	.488	4	●	1
IMX12C4HV0500R060M	.500	.060	.500	.789	.488	4	●	1
IMX16C4HV0625R015M	.625	.015	.625	.945	.605	4	●	1
IMX16C4HV0625R030M	.625	.030	.625	.945	.605	4	●	1
IMX16C4HV0625R060M	.625	.060	.625	.945	.605	4	●	1
IMX20C4HV0750R030M	.750	.030	.750	1.181	.730	4	●	1
IMX20C4HV0750R060M	.750	.060	.750	1.181	.730	4	●	1
IMX20C4HV0750R125M	.750	.125	.750	1.181	.730	4	●	1
IMX20C4HV0750R190M	.750	.190	.750	1.181	.730	4	●	1
IMX20C4HV0750R250M	.750	.250	.750	1.181	.730	4	●	1
IMX25C4HV1000R030M	1.000	.030	1.000	1.500	.980	4	●	1
IMX25C4HV1000R060M	1.000	.060	1.000	1.500	.980	4	●	1
IMX25C4HV1000R125M	1.000	.125	1.000	1.500	.980	4	●	1
IMX25C4HV1000R190M	1.000	.190	1.000	1.500	.980	4	●	1
IMX25C4HV1000R250M	1.000	.250	1.000	1.500	.980	4	●	1

Note 1) The fastening size of the holder and head should be the same. (refer to page 318)

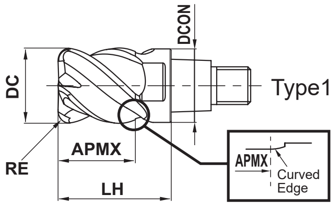
DC = Cutting Dia.
RE = Corner Radius
APMX = Depth of Cut Max.
LH = Head Length
DCON = Connection Dia.

iMX-C4HV

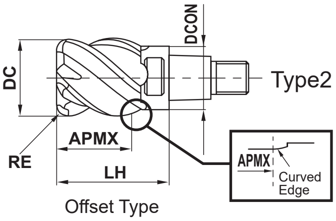
Corner radius head, 4 flute, Irregular helix

UWC 42° 45°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminum Alloy
◎	○			◎	◎	○	



Type1



Type2

Offset Type

RE≤6.35				
±0.020				
DC≤12	DC>12			
0 - 0.020	0 - 0.030			

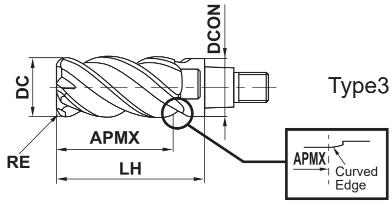
- Irregular helix controls vibration and achieves stable machining.

(mm)

Order Number	DC	RE	APMX	LH	DCON	No. of Flutes	Grade	Type
							EP7020	
IMX10C4HV100R03010	10	0.3	10	16	9.7	4	●	1
IMX10C4HV100R05010	10	0.5	10	16	9.7	4	●	1
IMX10C4HV100R10010	10	1	10	16	9.7	4	●	1
IMX10C4HV100R15010	10	1.5	10	16	9.7	4	●	1
IMX10C4HV100R20010	10	2	10	16	9.7	4	●	1
IMX10C4HV100R25010	10	2.5	10	16	9.7	4	●	1
IMX10C4HV100R30010	10	3	10	16	9.7	4	●	1
IMX10C4HV110R05011	11	0.5	11.5	18	9.7	4	●	2
IMX10C4HV110R10011	11	1	11.5	18	9.7	4	●	2
IMX10C4HV120R03012	12	0.3	12.5	19	9.7	4	●	2
IMX10C4HV120R05012	12	0.5	12.5	19	9.7	4	●	2
IMX10C4HV120R10012	12	1	12.5	19	9.7	4	●	2
IMX10C4HV120R20012	12	2	12.5	19	9.7	4	●	2
IMX12C4HV120R03012	12	0.3	12	19	11.7	4	●	1
IMX12C4HV120R05012	12	0.5	12	19	11.7	4	●	1
IMX12C4HV120R10012	12	1	12	19	11.7	4	●	1
IMX12C4HV120R15012	12	1.5	12	19	11.7	4	●	1
IMX12C4HV120R20012	12	2	12	19	11.7	4	●	1
IMX12C4HV120R25012	12	2.5	12	19	11.7	4	●	1
IMX12C4HV120R30012	12	3	12	19	11.7	4	●	1
IMX12C4HV120R40012	12	4	12	19	11.7	4	●	1
IMX12C4HV130R05013	13	0.5	13.5	21.5	11.7	4	●	2
IMX12C4HV130R10013	13	1	13.5	21.5	11.7	4	●	2
IMX12C4HV140R03014	14	0.3	14.5	22.5	11.7	4	●	2
IMX12C4HV140R05014	14	0.5	14.5	22.5	11.7	4	●	2
IMX12C4HV140R10014	14	1	14.5	22.5	11.7	4	●	2
IMX12C4HV140R20014	14	2	14.5	22.5	11.7	4	●	2
IMX16C4HV160R03016	16	0.3	16	24	15.5	4	●	1
IMX16C4HV160R05016	16	0.5	16	24	15.5	4	●	1
IMX16C4HV160R10016	16	1	16	24	15.5	4	●	1
IMX16C4HV160R15016	16	1.5	16	24	15.5	4	●	1
IMX16C4HV160R20016	16	2	16	24	15.5	4	●	1
IMX16C4HV160R25016	16	2.5	16	24	15.5	4	●	1
IMX16C4HV160R30016	16	3	16	24	15.5	4	●	1

Order Number	DC	RE	APMX	LH	DCON	No. of Flutes	Grade	Type
							EP7020	
IMX16C4HV160R40016	16	4	16	24	15.5	4	●	1
IMX16C4HV160R50016	16	5	16	24	15.5	4	●	1
IMX16C4HV170R05017	17	0.5	17	26	15.5	4	●	2
IMX16C4HV170R10017	17	1	17	26	15.5	4	●	2
IMX16C4HV180R03018	18	0.3	18	27	15.5	4	●	2
IMX16C4HV180R05018	18	0.5	18.5	27	15.5	4	●	2
IMX16C4HV180R10018	18	1	18.5	27	15.5	4	●	2
IMX16C4HV180R20018	18	2	18.5	27	15.5	4	●	2
IMX16C4HV180R30018	18	3	18.5	27	15.5	4	●	2
IMX20C4HV200R03020	20	0.3	20	30	19.5	4	●	1
IMX20C4HV200R05020	20	0.5	20	30	19.5	4	●	1
IMX20C4HV200R10020	20	1	20	30	19.5	4	●	1
IMX20C4HV200R15020	20	1.5	20	30	19.5	4	●	1
IMX20C4HV200R20020	20	2	20	30	19.5	4	●	1
IMX20C4HV200R25020	20	2.5	20	30	19.5	4	●	1
IMX20C4HV200R30020	20	3	20	30	19.5	4	●	1
IMX20C4HV200R40020	20	4	20	30	19.5	4	●	1
IMX20C4HV200R50020	20	5	20	30	19.5	4	●	1
IMX20C4HV200R60020	20	6	20	30	19.5	4	●	1
IMX20C4HV200R63520	20	6.35	20	30	19.5	4	●	1
IMX20C4HV220R05023	22	0.5	23	33	19.5	4	●	2
IMX20C4HV220R10023	22	1	23	33	19.5	4	●	2
IMX20C4HV220R20023	22	2	23	33	19.5	4	●	2
IMX20C4HV220R30023	22	3	23	33	19.5	4	●	2
IMX25C4HV250R10025	25	1	25	37.5	24.5	4	●	1
IMX25C4HV250R20025	25	2	25	37.5	24.5	4	●	1
IMX25C4HV250R30025	25	3	25	37.5	24.5	4	●	1
IMX25C4HV250R40025	25	4	25	37.5	24.5	4	●	1
IMX25C4HV250R50025	25	5	25	37.5	24.5	4	●	1
IMX25C4HV250R60025	25	6	25	37.5	24.5	4	●	1
IMX25C4HV250R63525	25	6.35	25	37.5	24.5	4	●	1
IMX25C4HV280R10029	28	1	29	41.5	24.5	4	●	2
IMX25C4HV280R30029	28	3	29	41.5	24.5	4	●	2

Note 1) The fastening size of the holder and head should be the same. (refer to page 318)



Long Cutting Edge Type

(mm)

Order Number	DC	RE	APMX	LH	DCON	No. of Flutes	Grade	Type
							EP7020	
IMX16C4HV160R10032	16	1	32	40	15.5	4	●	3
IMX16C4HV160R30032	16	3	32	40	15.5	4	●	3
IMX20C4HV200R10040	20	1	40	50	19.5	4	●	3
IMX20C4HV200R30040	20	3	40	50	19.5	4	●	3

Note 1) The fastening size of the holder and head should be the same. (refer to page 318)

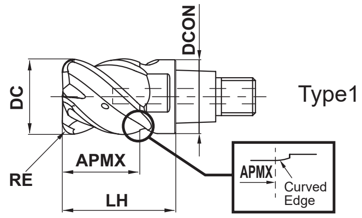
DC = Cutting Dia.
RE = Corner Radius
APMX = Depth of Cut Max.
LH = Head Length
DCON = Connection Dia.

iMX-C4HV-S – Inch Sizes

Corner radius head, 4 flute, Irregular helix, With coolant holes

42°
45°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminum Alloy
◎	○			◎	◎	○	



±.0008"				
DC≤.500"	DC>.500"			
0 - .0008"	0 - .0012"			

- Irregular helix controls vibration and achieves stable machining.
- Coolant holes for each cutting edge enables a stable coolant supply.

(inch)

Order Number	DC	RE	APMX	LH	DCON	No. of Flutes	Grade EP7020	Type
IMX10C4HV0375R030MS	.375	.030	.375	.630	.363	4	●	1
IMX12C4HV0500R030MS	.500	.030	.500	.789	.488	4	●	1
IMX16C4HV0625R030MS	.625	.030	.625	.945	.605	4	●	1
IMX20C4HV0750R030MS	.750	.030	.750	1.181	.730	4	●	1
IMX25C4HV1000R030MS	1.000	.030	1.000	1.500	.980	4	●	1

Note 1) The fastening size of the holder and head should be the same. (refer to page 318)

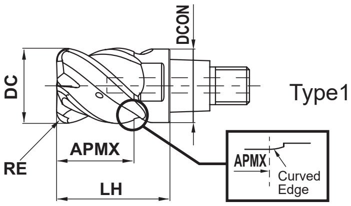
DC = Cutting Dia.
RE = Corner Radius
APMX = Depth of Cut Max.
LH = Head Length
DCON = Connection Dia.

iMX-C4HV-S

Corner radius head, 4 flute, Irregular helix, With coolant holes

UWC 42° 45°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminum Alloy
◎	○			◎	◎	○	



RE≤6.35				
±0.020				

DC≤12	DC>12			
0 - 0.020	0 - 0.030			

- Coolant holes for each cutting edge enable stable coolant supply.
- Irregular helix controls vibration and achieves stable machining even on difficult-to-cut materials and long overhang applications.

(mm)

Order Number	DC	RE	APMX	LH	DCON	No. of Flutes	Grade EP7020	Type
IMX10C4HV100R03010S	10	0.3	10	16	9.7	4	●	1
IMX10C4HV100R05010S	10	0.5	10	16	9.7	4	●	1
IMX10C4HV100R10010S	10	1	10	16	9.7	4	●	1
IMX10C4HV100R15010S	10	1.5	10	16	9.7	4	●	1
IMX10C4HV100R20010S	10	2	10	16	9.7	4	●	1
IMX10C4HV100R30010S	10	3	10	16	9.7	4	●	1
IMX12C4HV120R03012S	12	0.3	12	19	11.7	4	●	1
IMX12C4HV120R05012S	12	0.5	12	19	11.7	4	●	1
IMX12C4HV120R10012S	12	1	12	19	11.7	4	●	1
IMX12C4HV120R15012S	12	1.5	12	19	11.7	4	●	1
IMX12C4HV120R20012S	12	2	12	19	11.7	4	●	1
IMX12C4HV120R30012S	12	3	12	19	11.7	4	●	1
IMX12C4HV120R40012S	12	4	12	19	11.7	4	●	1
IMX16C4HV160R05016S	16	0.5	16	24	15.5	4	●	1
IMX16C4HV160R10016S	16	1	16	24	15.5	4	●	1
IMX16C4HV160R15016S	16	1.5	16	24	15.5	4	●	1
IMX16C4HV160R20016S	16	2	16	24	15.5	4	●	1
IMX16C4HV160R30016S	16	3	16	24	15.5	4	●	1
IMX16C4HV160R40016S	16	4	16	24	15.5	4	●	1
IMX20C4HV200R05020S	20	0.5	20	30	19.5	4	●	1
IMX20C4HV200R10020S	20	1	20	30	19.5	4	●	1
IMX20C4HV200R15020S	20	1.5	20	30	19.5	4	●	1
IMX20C4HV200R20020S	20	2	20	30	19.5	4	●	1
IMX20C4HV200R30020S	20	3	20	30	19.5	4	●	1
IMX20C4HV200R40020S	20	4	20	30	19.5	4	●	1
IMX20C4HV200R60020S	20	6	20	30	19.5	4	●	1
IMX20C4HV200R63520S	20	6.35	20	30	19.5	4	●	1
IMX25C4HV250R10025S	25	1	25	37.5	24.5	4	●	1
IMX25C4HV250R15025S	25	1.5	25	37.5	24.5	4	●	1
IMX25C4HV250R20025S	25	2	25	37.5	24.5	4	●	1
IMX25C4HV250R30025S	25	3	25	37.5	24.5	4	●	1
IMX25C4HV250R40025S	25	4	25	37.5	24.5	4	●	1
IMX25C4HV250R60025S	25	6	25	37.5	24.5	4	●	1
IMX25C4HV250R63525S	25	6.35	25	37.5	24.5	4	●	1

Note 1) The fastening size of the holder and head should be the same. (refer to page 318)

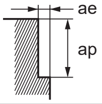
iMX-C4HV/iMX-C4HV-S

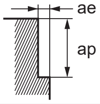
Corner radius head, 4 flute, Irregular helix (With/Without coolant holes)

Recommended Cutting Conditions

Shoulder Milling

(inch)

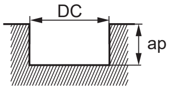
Workpiece Material		Carbon Steels, Alloy Steels, Mild Steels, Copper, Copper Alloys				Pre-hardened Steels, Carbon Steels, Alloy Steels, Alloy Tool Steels				Austenitic Stainless Steels, Ferritic and Martensitic Stainless Steels, Titanium Alloys			
DC (mm)	DC (inch)	Revolution n (min-1)	Feed Rate vf (IPM)	Depth of Cut ap	Width of Cut ae	Revolution n (min-1)	Feed Rate vf (IPM)	Depth of Cut ap	Width of Cut ae	Revolution n (min-1)	Feed Rate vf (IPM)	Depth of Cut ap	Width of Cut ae
	.3750	5000	70.0	.375	.075	4000	38.4	.375	.075	3400	40.8	.375	.075
10	**.3937**	4800	67.2	.394	.079	3800	36.5	.394	.079	3200	38.4	.394	.079
12	**.4724**	4000	56.0	.472	.094	3200	33.3	.472	.094	2700	33.5	.472	.094
	.5000	3700	51.8	.500	.100	3000	31.2	.500	.100	2500	31.0	.500	.100
	.6250	3000	46.8	.625	.125	2400	28.8	.625	.125	2000	28.0	.625	.125
16	**.6299**	3000	46.8	.630	.126	2400	28.8	.630	.126	2000	28.0	.630	.126
	.7500	2500	39.0	.750	.150	2000	24.0	.750	.150	1700	23.8	.750	.150
20	**.7874**	2400	37.4	.787	.157	1900	22.8	.787	.157	1600	22.4	.787	.157
25	**.9843**	1900	35.7	.984	.197	1500	18.0	.984	.197	1300	18.2	.984	.197
	1.0000	1900	35.7	1.000	.200	1500	18.0	1.000	.200	1300	18.2	1.000	.200
Depth of Cut													

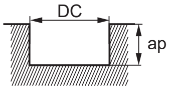
Workpiece Material		Precipitation Hardening Stainless Steels, Cobalt Chromium Alloys				Heat Resistant Alloys Inconel718			
DC (mm)	DC (inch)	Revolution n (min-1)	Feed Rate vf (IPM)	Depth of Cut ap	Width of Cut ae	Revolution n (min-1)	Feed Rate vf (IPM)	Depth of Cut ap	Width of Cut ae
	.3750	2500	24.0	.375	.075	1300	8.3	.375	.038
10	**.3937**	2400	23.0	.394	.079	1300	8.3	.394	.039
12	**.4724**	2000	20.8	.472	.094	1100	7.9	.472	.047
	.5000	1900	19.8	.500	.100	990	7.1	.500	.050
	.6250	1500	18.0	.625	.125	790	6.3	.625	.063
16	**.6299**	1500	18.0	.630	.126	790	6.3	.630	.063
	.7500	1200	14.4	.750	.150	660	5.3	.750	.075
20	**.7874**	1200	14.4	.787	.157	630	5.0	.787	.079
25	**.9843**	950	11.4	.984	.197	500	4.1	.984	.098
	1.0000	940	11.3	1.000	.200	500	4.0	1.000	.100
Depth of Cut									

Note 1) The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece material installation is poor, vibration or abnormal sound can occur.
In this case, please reduce the revolution and the feed rate proportionately, or set a lower depth of cut.
Note 2) If the depth of cut is smaller, the revolution and the feed rate can be increased.
Note 3) For stainless steels, titanium alloys and heat resistant alloys, the use of water-soluble coolant is effective.

Slot Milling

(inch)

Workpiece Material		Carbon Steels, Alloy Steels, Mild Steels, Copper, Copper Alloys			Pre-hardened Steels, Carbon Steels, Alloy Steels, Alloy Tool Steels			Austenitic Stainless Steels, Ferritic and Martensitic Stainless Steels, Titanium Alloys		
DC		Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**
(mm)	(inch)									
	.3750	3400	21.4	.188	2600	12.5	.188	2500	12.0	.188
10	**.3937**	3200	20.5	.197	2500	12.0	.197	2400	11.5	.197
12	**.4724**	2700	21.6	.236	2100	13.4	.236	2000	12.8	.236
	.5000	2500	20.0	.250	2000	12.8	.250	1900	12.2	.250
	.6250	2000	22.4	.313	1600	12.8	.313	1500	14.4	.313
16	**.6299**	2000	22.4	.315	1600	12.8	.315	1500	14.4	.315
	.7500	1700	19.0	.375	1300	10.4	.375	1200	11.5	.375
20	**.7874**	1600	17.9	.394	1300	10.4	.394	1200	11.5	.394
25	**.9843**	1300	16.1	.472	1000	8.0	.472	950	9.1	.472
	1.0000	1300	16.1	.480	990	7.9	.480	940	9.0	.480
Depth of Cut		 DC=Dia.								

Workpiece Material		Precipitation Hardening Stainless Steels, Cobalt Chromium Alloys			Heat Resistant Alloys Inconel718		
DC		Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**
(mm)	(inch)						
	.3750	2000	8.0	.188	1000	3.2	.075
10	**.3937**	1900	7.6	.197	970	3.1	.079
12	**.4724**	1600	9.0	.236	810	3.9	.094
	.5000	1500	8.4	.250	760	3.6	.100
	.6250	1200	9.6	.313	610	4.9	.125
16	**.6299**	1200	9.6	.315	610	4.9	.126
	.7500	1000	7.9	.375	510	4.1	.150
20	**.7874**	950	7.6	.394	490	3.9	.157
25	**.9843**	760	6.1	.472	390	3.1	.197
	1.0000	740	5.9	.480	380	3.0	.200
Depth of Cut		 DC=Dia.					

Note 1) The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece material installation is poor, vibration or abnormal sound can occur.
In this case, please reduce the revolution and the feed rate proportionately, or set a lower depth of cut.
Note 2) If the depth of cut is smaller, the revolution and the feed rate can be increased.
Note 3) For stainless steels, titanium alloys and heat resistant alloys, the use of water-soluble coolant is effective.

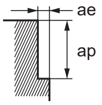
iMX-C4HV

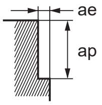
Corner radius head, 4 flute, Irregular helix, Long cutting edge type

Recommended Cutting Conditions

Shoulder Milling

(inch)

Workpiece Material		Carbon Steels, Alloy Steels, Mild Steels, Copper, Copper Alloys				Pre-hardened Steels, Carbon Steels, Alloy Steels, Alloy Tool Steels				Austenitic Stainless Steels, Ferritic and Martensitic Stainless Steels, Titanium Alloys			
L/D	**DC** (mm)	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Width of Cut **ae**	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Width of Cut **ae**	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Width of Cut **ae**
4	**16**	2000	28.0	1.260	.031	1600	17.9	1.260	.031	1200	14.9	1.260	.031
	20	1600	22.4	1.575	.039	1300	14.6	1.575	.039	950	11.8	1.575	.039
6	**16**	1200	13.4	1.260	.031	990	8.0	1.260	.031	790	7.6	1.260	.031
	20	950	10.6	1.575	.039	800	6.4	1.575	.039	630	6.0	1.575	.039
Depth of Cut		 ae ap											

Workpiece Material		Precipitation Hardening Stainless Steels, Cobalt Chromium Alloys				Heat Resistant Alloys Inconel718			
L/D	**DC** (mm)	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Width of Cut **ae**	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Width of Cut **ae**
4	**16**	1000	11.2	1.260	.031	610	4.9	1.260	.016
	20	800	9.0	1.575	.039	490	3.9	1.575	.020
6	**16**	610	4.9	1.260	.031	390	2.5	1.260	.016
	20	490	3.9	1.575	.039	320	2.0	1.575	.020
Depth of Cut		 ae ap							

Note 1) The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece material installation is poor, vibration or abnormal sound can occur.
In this case, please reduce the revolution and the feed rate proportionately, or set a lower depth of cut.
Note 2) If the depth of cut is smaller, the revolution and the feed rate can be increased.
Note 3) L/D will be +1 when using a long cutting edge type head.
Note 4) For stainless steels, titanium alloys and heat resistant alloys, the use of water-soluble coolant is effective.

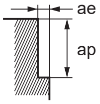
SQUARE
BALL
RADIUS
TAPER
CHAMFER
ROUGHING

iMX-C4HV

Corner radius head, 4 flute, Irregular helix, Oversize type head

Shoulder Milling

(inch)

Workpiece Material		Carbon Steels, Alloy Steels, Mild Steels, Copper, Copper Alloys				Pre-hardened Steels, Carbon Steels, Alloy Steels, Alloy Tool Steels				Austenitic Stainless Steels, Ferritic and Martensitic Stainless Steels, Titanium Alloys			
L/D	DC (mm)	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Width of Cut **ae**	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Width of Cut **ae**	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Width of Cut **ae**
3	**11**	4300	60.2	.433	.043	3500	33.6	.433	.043	2900	34.8	.433	.043
	12	4000	56.0	.472	.047	3200	30.7	.472	.047	2700	32.4	.472	.047
	13	3700	51.8	.512	.051	2900	30.2	.512	.051	2500	31.0	.512	.051
	14	3400	47.6	.551	.055	2700	28.1	.551	.055	2300	28.5	.551	.055
	17	2800	43.7	.669	.067	2300	27.6	.669	.067	1900	23.6	.669	.067
	18	2600	40.6	.709	.071	2100	25.2	.709	.071	1800	25.2	.709	.071
	22	2200	34.3	.866	.087	1700	20.4	.866	.087	1500	21.0	.866	.087
	28	1700	32.0	1.102	.110	1400	16.8	1.102	.110	1100	15.4	1.102	.110
	30	1600	30.1	1.181	.118	1300	15.6	1.181	.118	1100	15.4	1.181	.118
	32	1500	28.2	1.260	.126	1200	14.4	1.260	.126	1000	14.0	1.260	.126
5	**11**	2600	29.1	.433	.016	2000	16.0	.433	.016	1700	16.3	.433	.016
	12	2400	26.9	.472	.020	1900	15.2	.472	.020	1600	15.4	.472	.020
	13	2200	24.6	.512	.020	1700	13.6	.512	.020	1500	14.4	.512	.020
	14	2000	22.4	.551	.024	1600	12.8	.551	.024	1400	13.4	.551	.024
	17	1700	21.1	.669	.028	1300	12.5	.669	.028	1100	12.3	.669	.028
	18	1600	19.8	.709	.028	1200	11.5	.709	.028	1100	12.3	.709	.028
	22	1300	16.1	.866	.035	1000	9.6	.866	.035	860	9.6	.866	.035
	28	1000	15.6	1.102	.043	800	7.7	1.102	.043	680	7.6	1.102	.043
	30	950	14.8	1.181	.047	740	7.1	1.181	.047	630	7.1	1.181	.047
	32	890	13.9	1.260	.051	700	6.7	1.260	.051	590	6.6	1.260	.051
7	**11**	1700	16.3	.433	.008	1500	9.6	.433	.008	930	7.4	.433	.008
	12	1600	15.4	.472	.008	1300	8.3	.472	.008	850	6.8	.472	.008
	13	1500	14.4	.512	.012	1200	9.6	.512	.012	780	7.5	.512	.012
	14	1400	13.4	.551	.012	1100	8.8	.551	.012	730	7.0	.551	.012
	17	1100	12.3	.669	.012	940	7.5	.669	.012	600	5.8	.669	.012
	18	1100	12.3	.709	.016	890	7.1	.709	.016	570	5.5	.709	.016
	22	860	9.6	.866	.016	730	5.8	.866	.016	460	4.4	.866	.016
	28	680	8.4	1.102	.024	570	4.6	1.102	.024	360	3.5	1.102	.024
	30	630	7.8	1.181	.024	530	4.2	1.181	.024	340	3.3	1.181	.024
	32	590	7.3	1.260	.024	500	4.0	1.260	.024	320	3.1	1.260	.024
Depth of Cut													

Note 1) The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece material installation is poor, vibration or abnormal sound can occur.
In this case, please reduce the revolution and the feed rate proportionately, or set a lower depth of cut.

Note 2) If the depth of cut is smaller, the revolution and the feed rate can be increased.

Note 3) For stainless steels, titanium alloys and heat resistant alloys, the use of water-soluble coolant is effective.

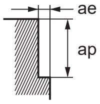
iMX-C4HV

Corner radius head, 4 flute, Irregular helix, Oversize type head

Recommended Cutting Conditions

Shoulder Milling

(inch)

Workpiece Material		Precipitation Hardening Stainless Steels, Cobalt Chromium Alloys				Heat Resistant Alloys Inconel718			
L/D	DC (mm)	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Width of Cut **ae**	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Width of Cut **ae**
3	**11**	2200	21.1	.433	.043	880	5.6	.433	.032
	12	2000	19.2	.472	.047	810	5.2	.472	.035
	13	1800	18.7	.512	.051	750	5.4	.512	.039
	14	1700	17.7	.551	.055	690	5.0	.551	.043
	17	1400	14.6	.669	.067	740	5.3	.669	.051
	18	1300	15.6	.709	.071	700	5.6	.709	.055
	22	1100	13.2	.866	.087	570	4.6	.866	.067
	28	850	10.2	1.102	.110	450	3.6	1.102	.083
	30	790	9.5	1.181	.118	420	3.4	1.181	.091
	32	740	8.9	1.260	.126	390	3.1	1.260	.094
5	**11**	1500	12.0	.433	.016	310	1.5	.433	.012
	12	1300	10.4	.472	.020	280	1.3	.472	.016
	13	1200	9.6	.512	.020	260	1.7	.512	.016
	14	1100	8.8	.551	.024	240	1.5	.551	.016
	17	940	9.0	.669	.028	340	2.2	.669	.020
	18	890	8.5	.709	.028	320	2.0	.709	.024
	22	730	7.0	.866	.035	260	1.7	.866	.028
	28	570	5.5	1.102	.043	210	1.3	1.102	.031
	30	530	5.1	1.181	.047	190	1.2	1.181	.035
	32	500	4.8	1.260	.051	180	1.2	1.260	.039
7	**11**	710	4.5	.433	.008	–	–	–	–
	12	650	4.2	.472	.008	–	–	–	–
	13	600	4.8	.512	.012	–	–	–	–
	14	550	4.4	.551	.012	–	–	–	–
	17	460	3.7	.669	.012	–	–	–	–
	18	430	3.4	.709	.016	–	–	–	–
	22	350	2.8	.866	.016	–	–	–	–
	28	280	2.2	1.102	.024	–	–	–	–
	30	260	2.1	1.181	.024	–	–	–	–
	32	240	1.9	1.260	.024	–	–	–	–
Depth of Cut									

Note 1) The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece material installation is poor, vibration or abnormal sound can occur.
In this case, please reduce the revolution and the feed rate proportionately, or set a lower depth of cut.
Note 2) If the depth of cut is smaller, the revolution and the feed rate can be increased.
Note 3) For stainless steels, titanium alloys and heat resistant alloys, the use of water-soluble coolant is effective.

● :USA Stock

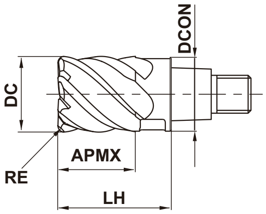
iMX-C6HV/C10HV/C12HV – Inch Sizes

Corner radius head, Multi-flute, Irregular helix

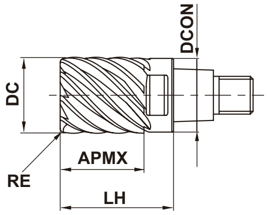
UWC

43.5° 45° DC≤.500" | 44.5° 45° DC>.500" | DC≤.500" | DC>.500"

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminum Alloy
◎	○			◎	◎		



Type1



Type2

±.0008"				
DC≤.500"	DC>.500"			
0 - .0008"	0 - .0012"			

- Irregular helix controls vibration and achieves stable machining.
- High machining efficiency due to multi-flute design.

(inch)

Order Number	DC	RE	APMX	LH	DCON	No. of Flutes	Grade EP7020	Type
IMX10C6HV0375R030M	.375	.030	.395	.630	.363	6	●	1
IMX12C6HV0500R030M	.500	.030	.520	.789	.488	6	●	1
IMX16C10HV0625R030M	.625	.030	.645	.945	.605	10	●	2
IMX20C12HV0750R030M	.750	.030	.800	1.181	.730	12	●	2
IMX25C12HV1000R030M	1.000	.030	1.050	1.500	.980	12	●	2

Note 1) The fastening size of the holder and head should be the same. (refer to page 318)

DC = Cutting Dia.
RE = Corner Radius
APMX = Depth of Cut Max.
LH = Head Length
DCON = Connection Dia.

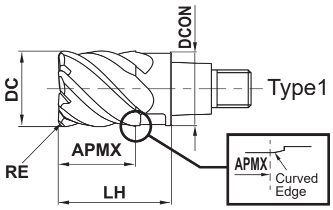
Exchangeable Head End Mills

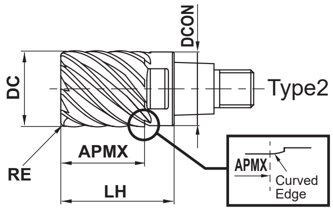
iMX-C6HV/C10HV/C12HV

Corner radius head, Multi-flute, Irregular helix

UWC 43.5° 45° DC≤12 44.5° 45° DC>12 DC≤12 DC>12

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminum Alloy
◎	○			◎	◎		





RE≤1				
±0.020				
DC≤12	DC>12			
0 - 0.020	0 - 0.030			

- High machining efficiency due to the multi-flute design.
- Irregular helix controls vibration and achieves stable machining.

(mm)

Order Number	DC	RE	APMX	LH	DCON	No. of Flutes	Grade EP7020	Type
IMX10C6HV100R05010	10	0.5	10	16	9.7	6	●	1
IMX10C6HV100R10010	10	1	10	16	9.7	6	●	1
IMX12C6HV120R10012	12	1	12	19	11.7	6	●	1
IMX16C10HV160R10016	16	1	16	24	15.5	10	●	2
IMX20C12HV200R10020	20	1	20	30	19.5	12	●	2
IMX25C12HV250R10025	25	1	25	37.5	24.5	12	●	2

Note 1) The fastening size of the holder and head should be the same. (refer to page 318)

DC = Cutting Dia.
RE = Corner Radius
DCIN = Cutting Dia. Internal Max.
APMX = Depth of Cut Max.
LH = Head Length
DCON = Connection Dia.
A3 = Cutting Edge Length

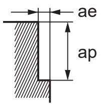
iMX-C6HV/C10HV/C12HV

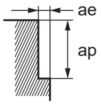
Corner radius head, Multi-flute, Irregular helix

Recommended Cutting Conditions

Shoulder Milling

(inch)

Workpiece Material		Pre-hardened Steels, Carbon Steels, Alloy Steels, Alloy Tool Steels				Austenitic Stainless Steels, Ferritic and Martensitic Stainless Steels, Titanium Alloys				Precipitation Hardening Stainless Steels, Cobalt Chromium Alloys			
DC		Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Width of Cut **ae**	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Width of Cut **ae**	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Width of Cut **ae**
(mm)	(inch)												
	.3750	6700	112.6	.375	.038	5000	84.0	.375	.038	3400	57.1	.375	.038
10	**.3937**	6400	107.5	.394	.039	4800	80.6	.394	.039	3200	53.8	.394	.039
12	**.4724**	5300	104.9	.472	.047	4000	79.2	.472	.047	2700	53.5	.472	.047
	.5000	5000	99.0	.500	.050	3700	73.3	.500	.050	2500	49.5	.500	.050
	.6250	4000	140.0	.625	.025	3000	105.0	.625	.025	2000	70.0	.625	.025
16	**.6299**	4000	140.0	.630	.025	3000	105.0	.630	.025	2000	70.0	.630	.025
	.7500	3300	154.4	.750	.030	2500	117.0	.750	.030	1700	79.6	.750	.030
20	**.7874**	3200	149.8	.787	.031	2400	112.3	.787	.031	1600	74.9	.787	.031
25	**.9843**	2500	117.0	.984	.039	1900	88.9	.984	.039	1300	60.8	.984	.039
	1.0000	2500	117.0	1.000	.040	1900	88.9	1.000	.040	1300	60.8	1.000	.040
Depth of Cut													

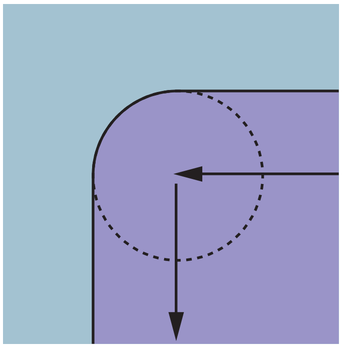
Workpiece Material		Heat Resistant Alloys Inconel718			
DC		Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Width of Cut **ae**
(mm)	(inch)				
	.3750	1300	10.1	.375	.019
10	**.3937**	1300	10.1	.394	.020
12	**.4724**	1100	9.2	.472	.024
	.5000	990	8.3	.500	.025
	.6250	790	11.9	.625	.025
16	**.6299**	790	11.9	.630	.025
	.7500	660	12.7	.750	.030
20	**.7874**	630	12.1	.787	.031
25	**.9843**	500	9.6	.984	.039
	1.0000	500	9.6	1.000	.040
Depth of Cut					

Note 1) The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece material installation is poor, vibration or abnormal sound can occur.
In this case, please reduce the revolution and the feed rate proportionately, or set a lower depth of cut.

Note 2) If the depth of cut is smaller, the revolution and the feed rate can be increased.

Note 3) If the machining radius at the corner is the same as the tool radius when using a head with more than 10 flutes, please set the depth of cut and feed rate to half of the above.

Note 4) For stainless steels, titanium alloys and heat resistant alloys, the use of water-soluble coolant is effective.

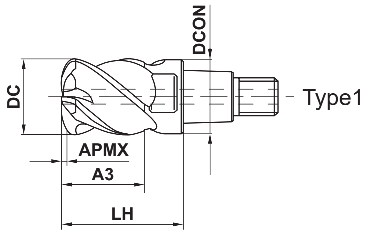


iMX-C4FD-C - Inch Sizes

Duplex corner radius head, 4 flute, For high feed, With coolant hole

45°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminum Alloy
◎	◎	◎		◎	◎	○	



DC≤.500"	DC>.500"			
0 - .0008"	0 - .0012"			

- The duplex corner radius and 4 flute geometry enables efficient machining at higher feed rates.
- End face center coolant hole provides a stable supply of coolant.

(inch)

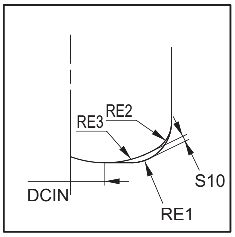
Order Number	DC	RE1	APMX	A3	LH	DCON	No. of Flutes	RMPX	Grade EP7020	Type
IMX10C4FD0375MC	.375	.076	.024	.395	.630	.363	4	2.3°	●	1
IMX12C4FD0500MC	.500	.086	.033	.520	.789	.488	4	3.6°	●	1
IMX16C4FD0625MC	.625	.110	.039	.645	.945	.605	4	2.8°	●	1
IMX20C4FD0750MC	.750	.117	.047	.800	1.181	.730	4	3.6°	●	1
IMX25C4FD1000MC	1.000	.171	.067	1.050	1.500	.980	4	4.5°	●	1

Note 1) The fastening size of the holder and head should be the same. (refer to page 318)
Note 2) Duplex corner radius end mill is not suitable for corner radius machining due to the possibility of leaving unmachined areas.

RE1 = Approximate Radius
RMPX = Max. Ramping Angle

(inch)

Order Number	RE1	Duplex Corner Radius			
		S10	DCIN	RE2	RE3
IMX10C4FD0375MC	.076	.009	.134	.060	.181
IMX12C4FD0500MC	.086	.014	.196	.060	.236
IMX16C4FD0625MC	.110	.017	.236	.080	.315
IMX20C4FD0750MC	.117	.020	.314	.080	.354
IMX25C4FD1000MC	.171	.028	.394	.120	.472

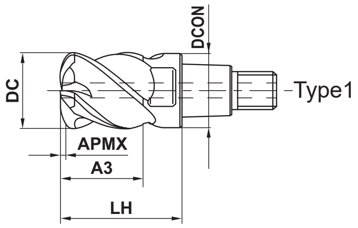


When using this iMX-C4FD-C, please program as an radius cutter.
The approximate remaining stocks for program are as the left table.

iMX-C4FD-C

Duplex corner radius head, 4 flute, For high feed, With coolant hole

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminum Alloy
◎	◎	◎		◎	◎	○	



DC≤12	DC>12			
0 - 0.020	0 - 0.030			

- Multi-task corner radius type and 4 flutes offer high feed and high efficiency.
- Coolant hole with the end cutting edge as the center provides a stable supply of coolant.

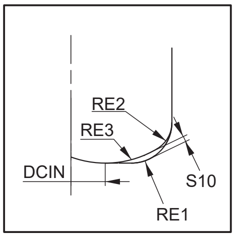
(mm)

Order Number	DC	RE1 *1	APMX	A3	LH	DCON	No. of Flutes	RMPX *2	Grade EP7020	Type
IMX10C4FD10010C	10	1.99	0.7	10.5	16	9.7	4	2.1°	●	1
IMX12C4FD12012C	12	2.1	0.8	12.5	19	11.7	4	2.8°	●	1
IMX16C4FD16016C	16	2.75	1	16.5	24	15.5	4	3°	●	1
IMX20C4FD20021C	20	3.07	1.3	21	30	19.5	4	3.3°	●	1
IMX25C4FD25026C	25	4.21	1.6	26	37.5	24.5	4	4.5°	●	1

Note 1) The fastening size of the holder and head should be the same. (refer to page 318)
Note 2) Multi-task corner radius is not suitable for corner radius milling that transfers an R-shape because cutting at R is incomplete.
*1 RE1 : Approx. R
*2 RMPX : Max. Ramping Angle

(mm)

Order Number	RE1 *1	Multi-task Radius Part			
		S10	DCIN	RE2	RE3
IMX10C4FD10010C	1.99	0.27	3.4	1.5	5
IMX12C4FD12012C	2.1	0.33	4.5	1.5	6
IMX16C4FD16016C	2.75	0.42	6.2	2	8
IMX20C4FD20021C	3.07	0.59	8	2	10
IMX25C4FD25026C	4.21	0.67	10	3	12



Please programme CAM as an R2 cutter radius, when using the **iMX**.
The approximate uncut portions for the programme are as follows.

iMX-C4FD-C

Duplex corner radius head, 4 flute, For high feed, With coolant holes

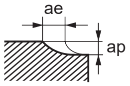
Recommended Cutting Conditions

Shoulder Milling

(inch)

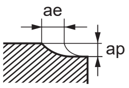
Workpiece Material		Carbon steels, Alloy Steels, Mild Steels, Copper, Copper Alloys				Pre-hardened Steels, Carbon Steels, Alloy Steels, Alloy Tool Steels				Hardened Steels, Precipitation Hardening Stainless Steels, Ferritic and Martensitic Stainless Steels			
DC (mm)	DC (inch)	Revolution **n** (min-1)	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Width of Cut **ae**	Revolution **n** (min-1)	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Width of Cut **ae**	Revolution **n** (min-1)	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Width of Cut **ae**
	.3750	5000	314.0	.019	.225	4500	282.6	.019	.225	4000	188.8	.019	.225
10	**.3937**	4800	301.4	.020	.236	4300	270.0	.020	.236	3800	179.4	.020	.236
12	**.4724**	4000	283.2	.024	.283	3600	254.9	.024	.283	3200	151.0	.024	.283
	.5000	3700	262.0	.025	.300	3400	240.7	.025	.300	3000	141.6	.025	.300
	.6250	3000	236.4	.031	.375	2700	212.8	.031	.375	2400	150.7	.031	.375
16	**.6299**	3000	236.4	.031	.378	2700	212.8	.031	.378	2400	150.7	.031	.378
	.7500	2500	197.0	.038	.450	2300	181.2	.038	.450	2000	125.6	.038	.450
20	**.7874**	2400	189.1	.039	.472	2200	173.4	.039	.472	1900	119.3	.039	.472
25	**.9843**	1900	149.7	.049	.591	1700	134.0	.049	.591	1500	94.2	.049	.591
	1.0000	1900	149.7	.050	.600	1700	134.0	.050	.600	1500	94.2	.050	.600

Depth of Cut



Workpiece Material		Austenitic Stainless Steels, Titanium Alloys, Cobalt Chromium Alloys				Heat Resistant Alloys Inconel718			
DC (mm)	DC (inch)	Revolution **n** (min-1)	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Width of Cut **ae**	Revolution **n** (min-1)	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Width of Cut **ae**
	.3750	1300	41.1	.019	.225	810	12.6	.019	.225
10	**.3937**	1300	41.1	.020	.236	780	12.2	.020	.236
12	**.4724**	1100	34.8	.024	.283	650	10.1	.024	.283
	.5000	990	31.3	.025	.300	610	9.5	.025	.300
	.6250	790	37.3	.031	.375	490	11.6	.031	.375
16	**.6299**	790	37.3	.031	.378	490	11.6	.031	.378
	.7500	660	31.2	.038	.450	410	9.7	.038	.450
20	**.7874**	630	29.7	.039	.472	390	9.2	.039	.472
25	**.9843**	500	23.6	.049	.591	310	7.3	.049	.591
	1.0000	500	23.6	.050	.600	310	7.3	.050	.600

Depth of Cut



Note 1) Vibration may occur if the rigidity of machine or workpiece material is low.
In this case, please reduce the revolution and the feed rate proportionately, or set a lower depth of cut.
Note 2) If the depth of cut is smaller, the revolution and the feed rate can be increased.
Note 3) Please reduce the feed rate by half when ramping.
Note 4) For stainless steels, titanium alloys and heat resistant alloys, the use of water-soluble coolant is effective.

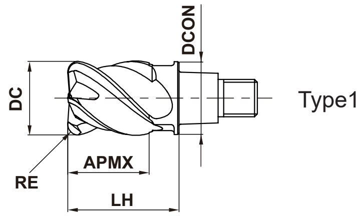
iMX-C4FV – Inch Sizes

Corner radius head, 4 flute, Irregular helix, For high efficiency machining

UWC

43°
45°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminum Alloy
◎	◎	◎					



DC≤.750"	DC=1.000"			
±.0004"	±.0008"			
DC≤.500"	DC>.500"			
0 - .0008"	0 - .0012"			

- Corner radius end mill for high efficiency machining.
- Irregular helix controls vibration and achieves stable machining.

(inch)

Order Number	DC	RE	APMX	LH	DCON	No. of Flutes	Grade EP6120	Type
IMX10C4FV0375R090M	.375	.090	.395	.630	.363	4	●	1
IMX12C4FV0500R090M	.500	.090	.520	.789	.488	4	●	1
IMX16C4FV0625R125M	.625	.125	.645	.945	.605	4	●	1
IMX20C4FV0750R125M	.750	.125	.800	1.181	.730	4	●	1
IMX25C4FV1000R190M	1.000	.190	1.050	1.500	.980	4	●	1

Note 1) The fastening size of the holder and head should be the same. (refer to page 318)

DC = Cutting Dia.
RE = Corner Radius
APMX = Depth of Cut Max.
LH = Head Length
DCON = Connection Dia.

Exchangeable Head End Mills

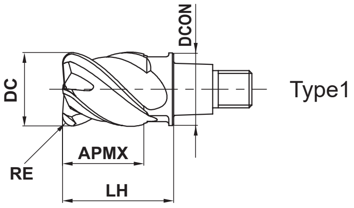
iMX-C4FV

Corner radius head, 4 flute, Irregular helix, For high efficiency machining

UWC

43°
45°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminum Alloy
◎	◎	◎					



RE≦3	RE=4			
±0.010	±0.020			
DC≦12	DC>12			
0 - 0.020	0 - 0.030			

- Corner radius end mill for high efficiency machining
- Irregular helix controls vibration and achieves stable machining.

(mm)

Order Number	DC	RE	APMX	LH	DCON	No. of Flutes	Grade	Type
							EP6120	
IMX10C4FV100R20010	10	2	10.5	16	9.7	4	●	1
IMX12C4FV120R20012	12	2	12.5	19	11.7	4	●	1
IMX16C4FV160R30016	16	3	16.5	24	15.5	4	●	1
IMX20C4FV200R30021	20	3	21	30	19.5	4	●	1
IMX25C4FV250R40026	25	4	26	37.5	24.5	4	●	1

Note 1) The fastening size of the holder and head should be the same. (refer to page 318)

DC = Cutting Dia.
RE = Corner Radius
APMX = Depth of Cut Max.
LH = Head Length
DCON = Connection Dia.

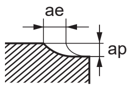
iMX-C4FV

Corner radius head, 4 flute, Irregular helix, For high efficiency machining

Recommended Cutting Conditions

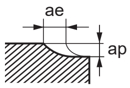
■Large Depth of Cut Milling

(inch)

Workpiece Material		Carbon Steels, Alloy Steels, Gray Cast Irons				Pre-hardened Steels, Alloy Tool Steels				Hardened Steels (45–55HRC)			
DC (mm)	(inch)	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Width of Cut **ae**	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Width of Cut **ae**	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Width of Cut **ae**
	.3750	3000	117.6	.045	.169	2500	91.0	.038	.169	2000	69.6	.026	.169
10	**.3937**	2900	113.7	.047	.177	2400	87.4	.039	.177	1900	66.1	.028	.177
12	**.4724**	2400	94.1	.071	.236	2000	72.8	.055	.236	1600	55.7	.035	.236
	.5000	2300	90.2	.075	.250	1900	69.2	.058	.250	1500	52.2	.038	.250
	.6250	1800	70.6	.070	.293	1500	54.6	.055	.293	1200	41.8	.035	.293
16	**.6299**	1800	70.6	.071	.295	1500	54.6	.055	.295	1200	41.8	.035	.295
	.7500	1500	58.8	.068	.338	1300	43.7	.053	.338	990	34.5	.034	.338
20	**.7874**	1400	54.9	.071	.354	1200	43.7	.055	.354	950	33.1	.035	.354
25	**.9843**	1100	43.1	.094	.453	950	34.6	.071	.453	760	26.4	.047	.453
	1.0000	1100	43.1	.096	.460	940	34.2	.072	.460	740	25.8	.048	.460
Depth of Cut													

■High Speed Milling

(inch)

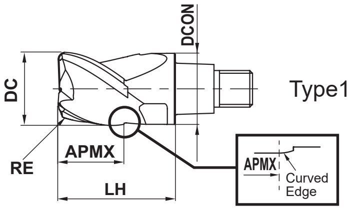
Workpiece Material		Carbon Steels, Alloy Steels, Gray Cast Irons				Pre-hardened Steels, Alloy Tool Steels				Hardened Steels (40–55HRC)			
DC (mm)	(inch)	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Width of Cut **ae**	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Width of Cut **ae**	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Width of Cut **ae**
	.3750	5000	314.0	.023	.169	4200	231.8	.017	.169	3400	160.5	.014	.169
10	**.3937**	4800	301.4	.024	.177	4000	220.8	.018	.177	3200	151.0	.014	.177
12	**.4724**	4000	283.2	.035	.236	3300	207.2	.028	.236	2700	127.4	.018	.236
	.5000	3700	262.0	.038	.250	3100	194.7	.029	.250	2500	118.0	.019	.250
	.6250	3000	236.4	.035	.293	2500	177.0	.027	.293	2000	94.4	.018	.293
16	**.6299**	3000	236.4	.035	.295	2500	177.0	.028	.295	2000	94.4	.018	.295
	.7500	2500	197.0	.034	.338	2100	148.7	.026	.338	1700	93.8	.017	.338
20	**.7874**	2400	189.1	.035	.354	2000	141.6	.028	.354	1600	88.3	.018	.354
25	**.9843**	1900	149.7	.047	.453	1600	113.3	.035	.453	1300	71.8	.024	.453
	1.0000	1900	149.7	.048	.460	1600	113.3	.036	.460	1300	71.8	.024	.460
Depth of Cut													

Note 1) The irregular helix flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece material installation is poor, vibration or abnormal sound can occur.
In this case, please reduce the revolution and the feed rate proportionately, or set a lower depth of cut.
Note 2) If the depth of cut is smaller, the revolution and the feed rate can be increased.
Note 3) For profile machining such as molds, machining conditions may differ considerably depending on the workpiece material geometry, machining methods and depth of cut. Reduce the feed rate especially when machining the corner sections of a workpiece material.
Note 4) Air blow or oil mist is recommended for good chip evacuation.

iMX-C3A – Inch Sizes

Corner radius head, 3 flute, For aluminum alloy

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminum Alloy
							◎



±.0008"				
DC≤.500"	DC>.500"			
0 - .0008"	0 - .0012"			

- High efficiency machining is possible due to the polished rake face and sharp cutting edge.

(inch)

Order Number	DC	RE	APMX	LH	DCON	No. of Flutes	Grade	Type
							ET2020	
IMX10C3A0375R015P	.375	.015	.300	.630	.363	3	●	1
IMX10C3A0375R030P	.375	.030	.300	.630	.363	3	●	1
IMX12C3A0500R015P	.500	.015	.400	.789	.488	3	●	1
IMX12C3A0500R030P	.500	.030	.400	.789	.488	3	●	1
IMX16C3A0625R030P	.625	.030	.500	.945	.605	3	●	1
IMX16C3A0625R060P	.625	.060	.500	.945	.605	3	●	1
IMX20C3A0750R030P	.750	.030	.600	1.181	.730	3	●	1
IMX20C3A0750R060P	.750	.060	.600	1.181	.730	3	●	1
IMX25C3A1000R060P	1.000	.060	.800	1.500	.980	3	●	1
IMX25C3A1000R125P	1.000	.125	.800	1.500	.980	3	●	1

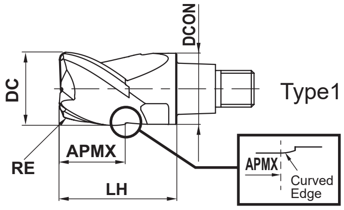
Note 1) The fastening size of the holder and head should be the same. (refer to page 318)

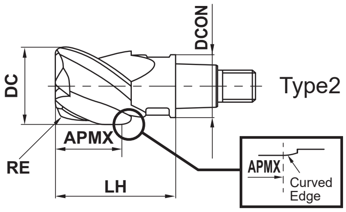
DC = Cutting Dia.
RE = Corner Radius
APMX = Depth of Cut Max.
LH = Head Length
DCON = Connection Dia.

iMX-C3A

Corner radius head, 3 flute, For aluminum alloy

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminum Alloy
							◎





Offset Type

RE≤5				
±0.020				
DC≤12	DC>12			
0 - 0.020	0 - 0.030			

- High efficiency machining due to the sharp cutting edge suitable for aluminum alloy machining and polished rake face.

(mm)

Order Number	DC	RE	APMX	LH	DCON	No. of Flutes	Grade	Type
							ET2020	
IMX10C3A100R10008	10	1	8	16	9.7	3	●	1
IMX10C3A100R25008	10	2.5	8	16	9.7	3	●	1
IMX10C3A120R10010	12	1	10.1	19	9.7	3	●	2
IMX12C3A120R10009	12	1	9.6	19	11.7	3	●	1
IMX12C3A120R32009	12	3.2	9.6	19	11.7	3	●	1
IMX12C3A140R10011	14	1	11.7	22.5	11.7	3	●	2
IMX16C3A160R10012	16	1	12.8	24	15.5	3	●	1
IMX16C3A160R32012	16	3.2	12.8	24	15.5	3	●	1
IMX16C3A180R32014	18	3.2	14.9	27	15.5	3	●	2
IMX20C3A200R10016	20	1	16	30	19.5	3	●	1
IMX20C3A200R32016	20	3.2	16	30	19.5	3	●	1
IMX20C3A220R32018	22	3.2	18.6	33	19.5	3	●	2
IMX25C3A250R10020	25	1	20	37.5	24.5	3	●	1
IMX25C3A250R32020	25	3.2	20	37.5	24.5	3	●	1
IMX25C3A250R50020	25	5	20	37.5	24.5	3	●	1
IMX25C3A280R32023	28	3.2	23.4	41.5	24.5	3	●	2

Note 1) The fastening size of the holder and head should be the same. (refer to page 318)

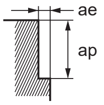
iMX-C3A

Corner radius head, 3 flute, For aluminum alloys

Recommended Cutting Conditions

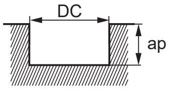
Shoulder Milling

(inch)

Workpiece Material		Aluminum Alloys			
DC (mm)	DC (inch)	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Width of Cut **ae**
	.3750	17000	234.6	.300	.113
10	**.3937**	16000	220.8	.315	.118
12	**.4724**	13000	179.4	.378	.142
	.5000	13000	179.4	.400	.150
	.6250	10000	180.0	.500	.188
16	**.6299**	9900	178.2	.504	.189
	.7500	8400	173.9	.600	.225
20	**.7874**	8000	165.6	.630	.236
25	**.9843**	6400	159.4	.787	.295
	1.0000	6300	156.9	.800	.300
Depth of Cut					

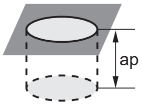
Slot Milling

(inch)

Workpiece Material		Aluminum Alloys		
DC (mm)	DC (inch)	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**
	.3750	17000	137.7	.188
10	**.3937**	16000	129.6	.197
12	**.4724**	13000	109.2	.236
	.5000	13000	109.2	.250
	.6250	10000	111.0	.313
16	**.6299**	9900	109.9	.315
	.7500	8400	108.4	.375
20	**.7874**	8000	103.2	.394
25	**.9843**	6400	96.0	.492
	1.0000	6300	94.5	.500
Depth of Cut				DC=Dia.

Plunging

(inch)

Workpiece Material		Aluminum Alloys			
DC (mm)	DC (inch)	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Step Feed **ap2**
	.3750	10000	39.0	.188	.10
10	**.3937**	9600	37.4	.197	.10
12	**.4724**	8000	31.2	.236	.10
	.5000	7500	29.3	.250	.10
	.6250	6000	23.4	.313	.10
16	**.6299**	6000	23.4	.315	.10
	.7500	5000	19.5	.375	.10
20	**.7874**	4800	18.7	.394	.10
25	**.9843**	3800	14.8	.492	.10
	1.0000	3800	14.8	.500	.10
Depth of Cut					

Note 1) Vibration may occur if the rigidity of machine or workpiece material is low.
In this case, please reduce the revolution and the feed rate proportionately, or set a lower depth of cut.
Note 2) The use of water-soluble coolant is effective.

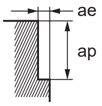
iMX-C3A

Corner radius head, 3 flute, For aluminum alloys, Oversize type head

Recommended Cutting Conditions

Shoulder Milling

(inch)

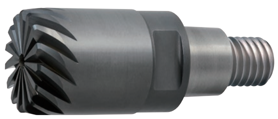
Workpiece Material			Aluminum Alloys			
L/D	DC		Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Width of Cut **ae**
	(mm)	(inch)				
3	**12**	**.4720**	13000	181.1	.378	.094
	14	**.5510**	11000	153.5	.441	.110
	18	**.7090**	8800	157.5	.567	.142
	22	**.8660**	7200	149.6	.693	.173
	28	**1.1020**	5700	141.7	.882	.220
5	**12**	**.4720**	8000	86.6	.378	.039
	14	**.5510**	6800	70.9	.441	.043
	18	**.7090**	5300	74.8	.567	.055
	22	**.8660**	4300	70.9	.693	.071
	28	**1.1020**	3400	66.9	.882	.087
7	**12**	**.4720**	5300	51.2	.378	.020
	14	**.5510**	4500	43.3	.441	.024
	18	**.7090**	3500	47.2	.567	.028
	22	**.8660**	2900	39.4	.693	.035
	28	**1.1020**	2300	39.4	.882	.043
Depth of Cut						

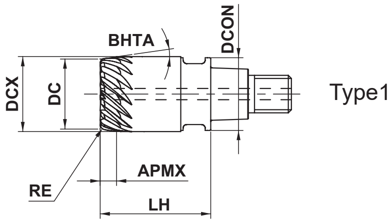
Note 1) Vibration may occur if the rigidity of machine or workpiece material is low.
In this case, please reduce the revolution and the feed rate proportionately, or set a lower depth of cut.
Note 2) The use of water-soluble coolant is effective.

iMX-C8T/C10T/C12T/C15T-C

Corner radius, Taper head, Multi-flute, With coolant hole

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel, Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminum Alloy
				◎	◎		





RE ≤2				
±0.015				
DC ≤12	DC>12			
0 - 0.020	0 - 0.030			

- Suitable for 3-dimensional free-form surface cutting such as blades.
- High feed cutting is possible due to multiple cutting edges.

(mm)

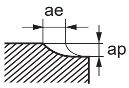
Order Number	DC	RE	APMX	DCX	LH	DCON	BHTA	No. of Flutes	Grade EP7020	Type
IMX10C8T080R05T080C	8	0.5	7.12	10	16	9.7	8°	8	●	1
IMX10C8T080R10T080C	8	1	7.12	10	16	9.7	8°	8	●	1
IMX12C10T100R05T080C	10	0.5	7.12	12	19	11.7	8°	10	●	1
IMX12C10T100R10T080C	10	1	7.12	12	19	11.7	8°	10	●	1
IMX16C15T150R05T080C	15	0.5	3.56	16	24	15.5	8°	15	●	1
IMX16C15T150R10T080C	15	1	3.56	16	24	15.5	8°	15	●	1
IMX16C12T150R20T080C	15	2	3.56	16	24	15.5	8°	12	●	1
IMX20C15T190R05T080C	19	0.5	3.56	20	30	19.5	8°	15	●	1
IMX20C15T190R10T080C	19	1	3.56	20	30	19.5	8°	15	●	1
IMX20C12T190R20T080C	19	2	3.56	20	30	19.5	8°	12	●	1

Note 1) The fastening size of the holder and head should be the same. (refer to page 318)

Recommended Cutting Conditions

Shoulder Milling

(inch)

Workpiece Material		Austenitic Stainless Steels, Ferritic and Martensitic Stainless Steels				Precipitation Hardening Stainless Steels, Titanium Alloys				Heat Resistant Alloys			
DC (mm)	No. of Flutes	Revolution n (min-1)	Feed Rate vf (IPM)	Depth of Cut ap	Width of Cut ae	Revolution n (min-1)	Feed Rate vf (IPM)	Depth of Cut ap	Width of Cut ae	Revolution n (min-1)	Feed Rate vf (IPM)	Depth of Cut ap	Width of Cut ae
8	**8**	12000	378.0	.012	.047	8000	252.0	.012	.047	2400	59.1	.012	.031
10	**10**	9500	374.0	.012	.059	6400	252.0	.012	.059	1900	59.1	.012	.039
15	**12**	6400	362.2	.012	.087	4200	236.2	.012	.087	1300	63.0	.012	.059
15	**15**	6400	378.0	.012	.087	4200	248.0	.012	.087	1300	63.0	.012	.059
19	**12**	5000	283.5	.012	.110	3400	192.9	.012	.110	1000	47.2	.012	.075
19	**15**	5000	295.3	.012	.110	3400	200.8	.012	.110	1000	47.2	.012	.075
Depth of Cut		 ae ap											

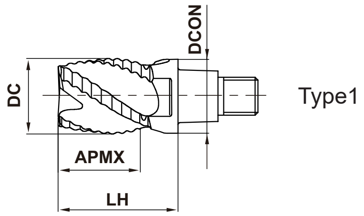
Note 1) Vibration may occur if the rigidity of machine or workpiece material is low.
In this case, please reduce the revolution and the feed rate proportionately, or set a lower depth of cut.
Note 2) The use of water-soluble coolant is effective.

iMX-R4F – Inch Sizes

Roughing head, 4 flute

35°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminum Alloy
◎	○			◎	◎	○	



- The roughing edge geometry reduces cutting resistance.
Effective when rigidity of the machine or work material is low.

(inch)

Order Number	DC	APMX	LH	DCON	No. of Flutes	Grade EP7020	Type
IMX10R4F0375M	.375	.395	.630	.363	4	●	1
IMX12R4F0500M	.500	.520	.789	.488	4	●	1
IMX16R4F0625M	.625	.645	.945	.605	4	●	1
IMX20R4F0750M	.750	.800	1.181	.730	4	●	1
IMX25R4F1000M	1.000	1.050	1.500	.980	4	●	1

Note 1) The fastening size of the holder and head should be the same. (refer to page 318)

iMX-R4F

Roughing head, 4 flute

(mm)

Order Number	DC	APMX	LH	DCON	No. of Flutes	Grade EP7020	Type
IMX10R4F10010	10	10.5	16	9.7	4	●	1
IMX12R4F12012	12	12.5	19	11.7	4	●	1
IMX16R4F16016	16	16.5	24	15.5	4	●	1
IMX20R4F20021	20	21	30	19.5	4	●	1
IMX25R4F25026	25	26	37.5	24.5	4	●	1

Note 1) The fastening size of the holder and head should be the same. (refer to page 318)

DC = Cutting Dia.
APMX = Depth of Cut Max.
LH = Head Length
DCON = Connection Dia.

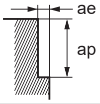
iMX-R4F

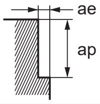
Roughing head, 4 flute

Recommended Cutting Conditions

Shoulder Milling

(inch)

Workpiece Material		Carbon Steels, Alloy Steels, Mild Steels, Copper, Copper Alloys				Pre-hardened Steels, Carbon Steels, Alloy Steels, Alloy Tool Steels				Austenitic Stainless Steels, Ferritic and Martensitic Stainless Steels, Titanium Alloys			
DC		Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Width of Cut **ae**	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Width of Cut **ae**	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Width of Cut **ae**
(mm)	(inch)												
	.3750	5000	36.0	.300	.015	4000	19.2	.300	.150	3400	20.4	.300	.150
10	**.3937**	4800	34.6	.320	.160	3800	18.2	.320	.160	3200	19.2	.320	.160
12	**.4724**	4000	28.8	.380	.190	3200	16.6	.380	.190	2700	17.3	.380	.190
	.5000	3700	26.6	.400	.200	3000	15.6	.400	.200	2500	16.0	.400	.200
	.6250	3000	24.0	.500	.250	2400	14.4	.500	.250	2000	14.4	.500	.250
16	**.6299**	3000	24.0	.500	.250	2400	14.4	.500	.250	2000	14.4	.500	.250
	.7500	2500	20.0	.600	.300	2000	12.0	.600	.300	1700	12.2	.600	.300
20	**.7874**	2400	19.2	.630	.320	1900	11.4	.630	.320	1600	11.5	.630	.320
25	**.9843**	1900	18.2	.790	.390	1500	9.0	.790	.390	1300	9.4	.790	.390
	1.0000	1900	18.2	.800	.400	1500	9.0	.800	.400	1300	9.4	.800	.400
Depth of Cut													

Workpiece Material		Precipitation Hardening Stainless Steels, Cobalt Chromium Alloys				Heat Resistant Alloys Inconel718			
DC		Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Width of Cut **ae**	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Width of Cut **ae**
(mm)	(inch)								
	.3750	2500	12.0	.300	.150	1300	8.3	.300	.038
10	**.3937**	2400	11.5	.320	.160	1300	8.3	.320	.039
12	**.4724**	2000	10.4	.380	.190	1100	7.9	.380	.047
	.5000	1900	9.9	.400	.200	990	7.1	.400	.050
	.6250	1500	9.0	.500	.250	790	6.3	.500	.063
16	**.6299**	1500	9.0	.500	.250	790	6.3	.500	.063
	.7500	1200	7.2	.600	.300	660	5.3	.600	.075
20	**.7874**	1200	7.2	.630	.320	630	5.0	.630	.079
25	**.9843**	950	5.7	.790	.390	500	4.0	.790	.098
	1.0000	940	5.6	.800	.400	500	4.0	.800	.100
Depth of Cut									

Note 1) Vibration may occur if the rigidity of machine or workpiece material is low.
In this case, please reduce the revolution and the feed rate proportionately, or set a lower depth of cut.
Note 2) If the depth of cut is smaller, the revolution and the feed rate can be increased.
Note 3) For stainless steels, titanium alloys and heat resistant alloys, the use of water-soluble coolant is effective.

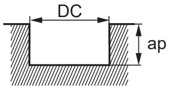
iMX-R4F

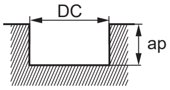
Roughing head, 4 flute

Recommended Cutting Conditions

Slot Milling

(inch)

Workpiece Material		Carbon Steels, Alloy Steels, Mild Steels, Copper, Copper Alloys			Pre-hardened Steels, Carbon Steels, Alloy Steels, Alloy Tool Steels			Austenitic Stainless Steels, Ferritic and Martensitic Stainless Steels, Titanium Alloys		
DC (mm)	DC (inch)	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**
	.3750	3400	21.4	.190	2600	12.5	.190	2000	6.4	.150
10	**.3937**	3200	20.5	.200	2500	12.0	.200	1900	6.1	.160
12	**.4724**	2700	19.4	.240	2100	10.9	.240	1600	6.4	.190
	.5000	2500	18.0	.250	2000	10.4	.250	1500	6.0	.200
	.6250	2000	16.0	.310	1600	9.6	.310	1200	5.8	.250
16	**.6299**	2000	16.0	.320	1600	9.6	.320	1200	5.8	.250
	.7500	1700	13.6	.380	1300	7.8	.380	990	5.1	.300
20	**.7874**	1600	12.8	.390	1300	7.8	.390	950	4.9	.320
25	**.9843**	1300	12.5	.470	1000	6.0	.470	760	4.0	.390
	1.0000	1300	12.5	.480	990	5.9	.480	740	3.8	.400
Depth of Cut		 DC=Dia.								

Workpiece Material		Precipitation Hardening Stainless Steels, Cobalt Chromium Alloys		
DC (mm)	DC (inch)	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**
	.3750	1300	3.1	.150
10	**.3937**	1300	3.1	.160
12	**.4724**	1100	3.5	.190
	.5000	990	3.2	.200
	.6250	790	2.8	.250
16	**.6299**	790	2.8	.250
	.7500	660	2.9	.300
20	**.7874**	630	2.8	.320
25	**.9843**	500	2.2	.390
	1.0000	500	2.2	.400
Depth of Cut		 DC=Dia.		

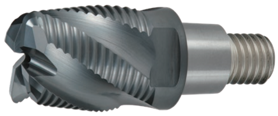
Note 1) Vibration may occur if the rigidity of machine or workpiece material is low.
In this case, please reduce the revolution and the feed rate proportionately, or set a lower depth of cut.
Note 2) If the depth of cut is smaller, the revolution and the feed rate can be increased.
Note 3) For stainless steels, titanium alloys and heat resistant alloys, the use of water-soluble coolant is effective.

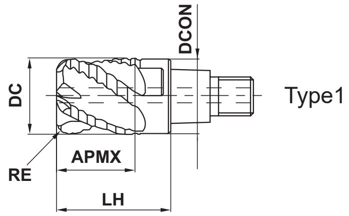
iMX-RC4F-C NEW

Roughing head, 4 flute, with coolant hole

35°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminum Alloy
◎				◎	◎		





- The roughing edge geometry reduces cutting resistance. Effective when the rigidity of the machine or work material is low.
- Centre through coolant hole provides excellent chip evacuation.

(mm)

Order Number	DC	RE	APMX	LH	DCON	No. of Flutes	Grade	Type
							EP7020	
IMX10RC4F100R05010C	10	0.5	10.5	16	9.7	4	●	1
IMX10RC4F100R10010C	10	1	10.5	16	9.7	4	●	1
IMX12RC4F120R05012C	12	0.5	12.5	19	11.7	4	●	1
IMX12RC4F120R10012C	12	1	12.5	19	11.7	4	●	1
IMX12RC4F120R15012C	12	1.5	12.5	19	11.7	4	●	1
IMX12RC4F120R20012C	12	2	12.5	19	11.7	4	●	1
IMX16RC4F160R05016C	16	0.5	16.5	24	15.5	4	●	1
IMX16RC4F160R10016C	16	1	16.5	24	15.5	4	●	1
IMX16RC4F160R15016C	16	1.5	16.5	24	15.5	4	●	1
IMX16RC4F160R20016C	16	2	16.5	24	15.5	4	●	1
IMX16RC4F160R30016C	16	3	16.5	24	15.5	4	●	1
IMX20RC4F200R05021C	20	0.5	21	30	19.5	4	●	1
IMX20RC4F200R10021C	20	1	21	30	19.5	4	●	1
IMX20RC4F200R20021C	20	2	21	30	19.5	4	●	1
IMX20RC4F200R30021C	20	3	21	30	19.5	4	●	1

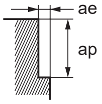
Note 1) The fastening size of the holder and head should be the same. (refer to page 318)

RE = Radius of Ball Nose
DC = Cutting Dia.
APMX = Depth of Cut Max.
LH = Head Length
DCON = Connection Dia.

Recommended Cutting Conditions

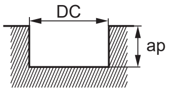
Shoulder Milling

(inch)

Workpiece Material		Carbon Steels, Alloy Steels, Mild Steels AISI 1045, AISI 4140				Titanium Alloys, Austenitic Stainless Steels, Ferritic and Martensitic Stainless Steels Ti-6Al-4V, AISI 304, AISI 316LN, AISI 410, AISI 420J2				Precipitation Hardening Stainless Steels AISI 630, AISI 631			
DC (mm)	DC (inch)	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut ap	Width of Cut ae	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut ap	Width of Cut ae	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut ap	Width of Cut ae
10	**.3937**	4800	33.9	.315	.157	2000	12.6	.315	.157	1900	9.1	.315	.157
12	**.4724**	4000	31.5	.378	.189	1900	13.4	.378	.189	1600	9.1	.378	.189
16	**.6299**	3000	23.6	.504	.252	1400	11.0	.504	.252	1200	7.9	.504	.252
20	**.7874**	2400	20.9	.630	.315	1100	8.7	.630	.315	950	7.1	.630	.315
Depth of Cut													

Slot Milling

(inch)

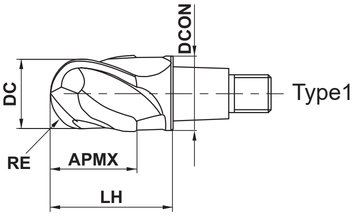
Workpiece Material		Carbon Steels, Alloy Steels, Mild Steels AISI 1045, AISI 4140			Titanium Alloys, Austenitic Stainless Steels, Ferritic and Martensitic Stainless Steels Ti-6Al-4V, AISI 304, AISI 316LN, AISI 410, AISI 420J2			Precipitation Hardening Stainless Steels AISI 630, AISI 631		
DC (mm)	DC (inch)	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut ap	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut ap	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut ap
10	**.3937**	3200	20.1	.197	1900	9.1	.197	1300	3.9	.197
12	**.4724**	2700	19.3	.236	1600	10.2	.236	1100	4.3	.236
16	**.6299**	2000	15.7	.315	1200	8.7	.315	800	3.8	.315
20	**.7874**	1600	13.8	.394	950	6.7	.394	640	3.5	.394
Depth of Cut										DC=Dia.

Note 1) Vibration may occur if the rigidity of machine or workpiece is low.In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.
Note 2) If the depth of cut is shallow, the revolution and feed rate can be increased.
Note 3) For stainless steel, titanium alloy, the use of water-soluble coolant is effective.

iMX-B2S

Ball nose head, 2 flute, For hardened steels

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminum Alloy
			◎				



RE≥8				
±0.020				

- Ideal for machining with long overhangs.

(mm)

Order Number	RE	DC	APMX	LH	DCON	No. of Flutes	Grade EP8110	Type
IMX16B2S16016	8	16	16	24	15.5	2	●	1
IMX20B2S20020	10	20	20	30	19.5	2	●	1

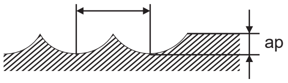
Note 1) The fastening size of the holder and head should be the same. (refer to page 318)

RE = Radius of Ball Nose
DC = Cutting Dia.
APMX = Depth of Cut Max.
LH = Head Length
DCON = Connection Dia.

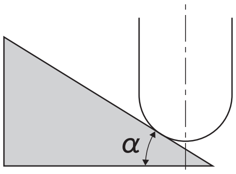
Recommended Cutting Conditions

Shoulder Milling

(inch)

Workpiece Material				Hardened Steels (55–65HRC)					
Inclination Angle				α≤15°		α>15°		Depth of Cut **ap**	Width of Cut **ae**
DC		**RE**		Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)		
(mm)	(inch)	(mm)	(inch)						
16	**.630**	**8**	**.315**	6000	66.9	3000	18.9	.012	.063
20	**.787**	**10**	**.394**	4800	51.2	2400	15.0	.012	.079
Depth of Cut				 ae ap					

Note 1) If the depth of cut is smaller, the revolution and the feed rate can be increased.
Note 2) α is the inclination angle of the machined surface.

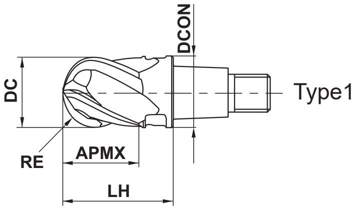


iMX-B4S

Ball nose head, 4 flute, For hardened steels

UWC 30°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminum Alloy
			◎				



RE≥8				
±0.020				

- High efficiency machining is realized even with machining using the tip.

(mm)

Order Number	RE	DC	APMX	LH	DCON	No. of Flutes	Grade EP8110	Type
IMX16B4S16016	8	16	16	24	15.5	4	●	1
IMX20B4S20020	10	20	20	30	19.5	4	●	1

Note 1) The fastening size of the holder and head should be the same. (refer to page 318)

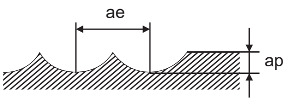
Recommended Cutting Conditions

Shoulder Milling

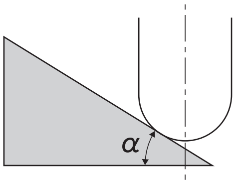
(inch)

Workpiece Material				Hardened Steels (55–65HRC)					
Inclination Angle				α≤15°		α>15°		Depth of Cut ap	Width of Cut ae
DC		RE		Revolution n (min⁻¹)	Feed Rate vf (IPM)	Revolution n (min⁻¹)	Feed Rate vf (IPM)		
(mm)	(inch)	(mm)	(inch)						
16	**.630**	**8**	**.315**	6000	66.9	3000	28.3	.012	.063
20	**.787**	**10**	**.394**	4800	51.2	2400	22.8	.012	.079

Depth of Cut



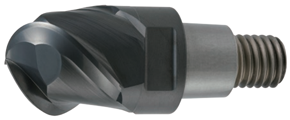
Note 1) If the depth of cut is smaller, the revolution and the feed rate can be increased.
Note 2) α is the inclination angle of the machined surface.

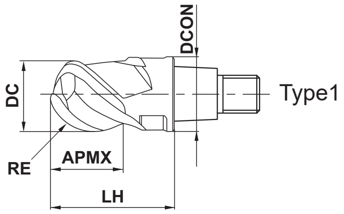


iMX-B3FV

Ball nose head, 3 flute, Irregular pitch flutes, For high efficiency machining

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminum Alloy
	◎	◎					





RE≤6	RE>6			
±0.010	±0.020			

- High efficiency machining is possible in deep engraving processing(DCx5)
- High wear resistance and high chip evacuation is achieved in roughing.
- High vibration control effect enables high efficiency machining in finishing.

(mm)

Order Number	RE	DC	APMX	LH	DCON	No. of Flutes	Grade EP8120	Type
IMX10B3FV10008	5	10	8	16	9.7	3	●	1
IMX12B3FV12009	6	12	9.6	19	11.7	3	●	1
IMX16B3FV16012	8	16	12.8	24	15.5	3	●	1
IMX20B3FV20016	10	20	16	30	19.5	3	●	1

Note 1) The fastening size of the holder and head should be the same. (refer to page 318)

RE = Radius of Ball Nose
DC = Cutting Dia.
APMX = Depth of Cut Max.
LH = Head Length
DCON = Connection Dia.

iMX-B3FV

Ball nose head, 3 flute, Irregular pitch flutes, For high efficiency machining

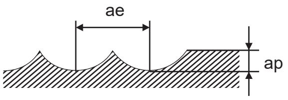
Recommended Cutting Conditions

Shoulder Milling (L/D=5)

(inch)

Workpiece Material				Pre-hardened Steels, Alloy Tool Steels						Hardened Steels (40–55HRC)					
Inclination Angle				α≤15°		α>15°		Depth of Cut ap	Width of Cut ae	α≤15°		α>15°		Depth of Cut ap	Width of Cut ae
DC		RE		Revolution n (min^{-1})	Feed Rate vf (IPM)	Revolution n (min^{-1})	Feed Rate vf (IPM)			Revolution n (min^{-1})	Feed Rate vf (IPM)	Revolution n (min^{-1})	Feed Rate vf (IPM)		
(mm)	(inch)	(mm)	(inch)												
10	**.394**	**5**	**.197**	5600	145.7	3700	66.9	.028	.102	4800	102.4	3200	47.2	.020	.079
12	**.472**	**6**	**.236**	4600	118.1	3100	55.1	.039	.126	4000	86.6	2700	38.2	.028	.098
16	**.630**	**8**	**.315**	3500	90.6	2300	39.4	.043	.150	3000	63.0	2000	28.3	.035	.138
20	**.787**	**10**	**.394**	2800	70.9	1800	31.9	.047	.189	2400	51.2	1600	22.8	.043	.165

Depth of Cut

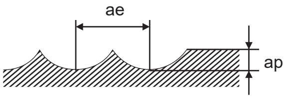


Shoulder Milling (L/D=7)

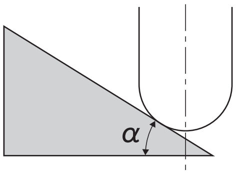
(inch)

Workpiece Material				Pre-hardened Steels, Alloy Tool Steels						Hardened Steels (40–55HRC)					
Inclination Angle				α≤15°		α>15°		Depth of Cut ap	Width of Cut ae	α≤15°		α>15°		Depth of Cut ap	Width of Cut ae
DC		RE		Revolution n (min^{-1})	Feed Rate vf (IPM)	Revolution n (min^{-1})	Feed Rate vf (IPM)			Revolution n (min^{-1})	Feed Rate vf (IPM)	Revolution n (min^{-1})	Feed Rate vf (IPM)		
(mm)	(inch)	(mm)	(inch)												
10	**.394**	**5**	**.197**	3800	90.6	2500	38.6	.020	.051	3200	47.2	2100	21.3	.016	.039
12	**.472**	**6**	**.236**	3200	74.8	2100	32.3	.028	.063	2700	43.3	1700	16.9	.024	.051
16	**.630**	**8**	**.315**	2400	55.1	1600	24.4	.031	.075	2000	30.7	1300	13.0	.028	.071
20	**.787**	**10**	**.394**	1900	43.3	1300	20.1	.035	.094	1600	24.4	1000	10.2	.031	.083

Depth of Cut



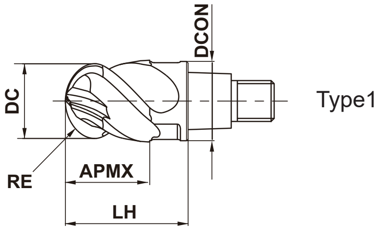
Note 1) The irregular pitch flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece material installation is poor, vibration or abnormal sound can occur.
In this case, please reduce the revolution and the feed rate proportionately, or set a lower depth of cut.
Note 2) If the depth of cut is smaller, the revolution and the feed rate can be increased.
Note 3) α is the inclination angle of the machined surface.



iMX-B4HV – Inch Sizes

Ball nose head, 4 flute, Irregular pitch flutes

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminum Alloy
◎	○			◎	◎	○	



RE≤.250"	RE>.250"			
±.0004"	±.0008"			
DC≤.500"	DC>.500"			
0 - .0008"	0 - .0012"			

- The irregular pitch flutes controls vibration and achieves stable machining.

(inch)

Order Number	RE	DC	APMX	LH	DCON	No. of Flutes	Grade	Type
							EP7020	
IMX10B4HV0375M	.1875	.375	.395	.630	.363	4	●	1
IMX12B4HV0500M	.2500	.500	.520	.789	.488	4	●	1
IMX16B4HV0625M	.3125	.625	.645	.945	.605	4	●	1
IMX20B4HV0750M	.3750	.750	.800	1.181	.730	4	●	1
IMX25B4HV1000M	.5000	1.000	1.050	1.500	.980	4	●	1

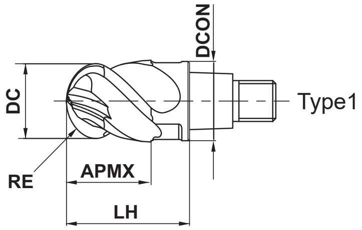
Note 1) The fastening size of the holder and head should be the same. (refer to page 318)

RE = Radius of Ball Nose
DC = Cutting Dia.
APMX = Depth of Cut Max.
LH = Head Length
DCON = Connection Dia.

iMX-B4HV

Ball nose head, 4 flute, Irregular pitch flutes

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminum Alloy
◎	○			◎	◎	○	



DC≤12	RE>6			
±0.010	±0.020			
DC≤12	DC>12			
0 - 0.020	0 - 0.030			

- The irregular pitch flutes controls vibration and achieves stable machining.

(mm)

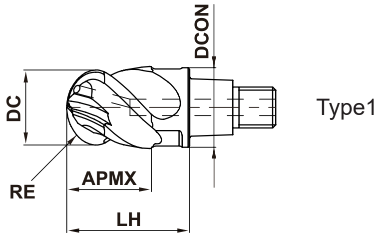
Order Number	RE	DC	APMX	LH	DCON	No. of Flutes	Grade EP7020	Type
IMX10B4HV10010	5	10	10.5	16	9.7	4	●	1
IMX12B4HV12012	6	12	12.5	19	11.7	4	●	1
IMX16B4HV16016	8	16	16.5	24	15.5	4	●	1
IMX20B4HV20021	10	20	21	30	19.5	4	●	1
IMX25B4HV25026	12.5	25	26	37.5	24.5	4	●	1

Note 1) The fastening size of the holder and head should be the same. (refer to page 318)

iMX-B4HV-E – Inch Sizes

Ball nose head, 4 flute, Irregular pitch flutes, With coolant holes

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminum Alloy
◎	○			◎	◎	○	



RE≤.250"	RE>.250"			
±.0004"	±.0008"			
DC≤.500"	DC>.500"			
0 - .0008"	0 - .0012"			

- Coolant holes for each cutting edge enables a stable coolant supply.
- The irregular pitch flutes controls vibration and achieves stable machining.

(inch)

Order Number	RE	DC	APMX	LH	DCON	No. of Flutes	Grade EP7020	Type
IMX10B4HV0375ME	.1875	.375	.395	.630	.363	4	●	1
IMX12B4HV0500ME	.2500	.500	.520	.789	.488	4	●	1
IMX16B4HV0625ME	.3125	.625	.645	.945	.605	4	●	1
IMX20B4HV0750ME	.3750	.750	.800	1.181	.730	4	●	1
IMX25B4HV1000ME	.5000	1.000	1.050	1.500	.980	4	●	1

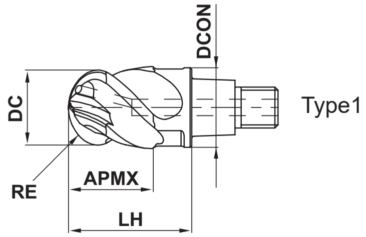
Note 1) The fastening size of the holder and head should be the same. (refer to page 318)

RE = Radius of Ball Nose
DC = Cutting Dia.
APMX = Depth of Cut Max.
LH = Head Length
DCON = Connection Dia.

iMX-B4HV-E

Ball nose head, 4 flute, Irregular pitch flutes, With coolant holes

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminum Alloy
◎	○			◎	◎	○	



DC≤12	RE>6			
±0.010	±0.020			
DC≤12	DC>12			
0 - 0.020	0 - 0.030			

- Coolant holes for each cutting edge enable stable coolant supply.
- The irregular pitch flutes controls vibration and achieves stable machining of difficult-to-cut materials and for long overhang applications.

(mm)

Order Number	RE	DC	APMX	LH	DCON	No. of Flutes	Grade EP7020	Type
IMX10B4HV10010E	5	10	10.5	16	9.7	4	●	1
IMX12B4HV12012E	6	12	12.5	19	11.7	4	●	1
IMX16B4HV16016E	8	16	16.5	24	15.5	4	●	1
IMX20B4HV20021E	10	20	21	30	19.5	4	●	1
IMX25B4HV25026E	12.5	25	26	37.5	24.5	4	●	1

Note 1) The fastening size of the holder and head should be the same. (refer to page 318)

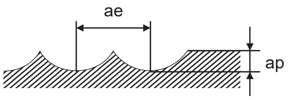
iMX-B4HV/iMX-B4HV-E

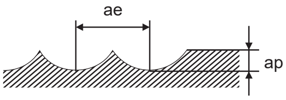
Ball nose head, 4 flute, Irregular pitch flutes (With/Without coolant holes)

Recommended Cutting Conditions

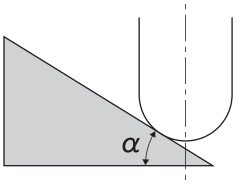
Shoulder Milling

(inch)

Workpiece Material		Carbon Steels, Alloy Steels, Mild Steels, Pre-hardened Steels, Copper, Copper Alloys						Austenitic Stainless Steels, Ferritic and Martensitic Stainless Steels, Cobalt Chromium Alloys, Titanium Alloys					
Inclination Angle		α≤15°		α>15°		Depth of Cut **ap**	Width of Cut **ae**	α≤15°		α>15°		Depth of Cut **ap**	Width of Cut **ae**
RE		Revolution **n**	Feed Rate **vf**	Revolution **n**	Feed Rate **vf**			Revolution **n**	Feed Rate **vf**	Revolution **n**	Feed Rate **vf**		
(mm)	(inch)	(min^{-1})	(IPM)	(min^{-1})	(IPM)			(min^{-1})	(IPM)	(min^{-1})	(IPM)		
	.1875	10000	168.0	6700	75.0	.038	.100	7500	123.0	5000	52.0	.038	.100
5	**.1969**	9500	157.5	6400	71.7	.039	.100	7200	118.1	4800	49.9	.039	.100
6	**.2362**	8000	156.8	5300	70.0	.047	.120	6000	117.6	4000	49.6	.047	.120
	.2500	7500	147.0	5000	66.0	.050	.120	5700	111.7	3700	45.9	.050	.120
	.3125	6000	127.2	4000	56.0	.063	.160	4500	99.0	3000	42.0	.063	.160
8	**.3150**	6000	127.2	4000	56.0	.063	.160	4500	99.0	3000	42.0	.063	.160
	.3750	5000	122.0	3300	51.5	.075	.190	3800	95.8	2500	41.0	.075	.190
10	**.3937**	4800	117.1	3200	49.9	.079	.200	3600	90.7	2400	39.4	.079	.200
12.5	**.4921**	3800	95.8	2500	39.0	.098	.240	2900	73.1	1900	31.2	.098	.240
	.5000	3800	95.8	2500	39.0	.100	.240	2800	70.6	1900	31.2	.100	.240
Depth of Cut													

Workpiece Material		Heat Resistant Alloys Inconel718					
Inclination Angle		α≤15°		α>15°		Depth of Cut **ap**	Width of Cut **ae**
RE		Revolution **n**	Feed Rate **vf**	Revolution **n**	Feed Rate **vf**		
(mm)	(inch)	(min^{-1})	(IPM)	(min^{-1})	(IPM)		
	.1875	2000	17.6	1300	7.3	.019	.038
5	**.1969**	1900	16.7	1300	7.3	.020	.039
6	**.2362**	1600	14.1	1100	6.2	.024	.047
	.2500	1500	13.2	990	5.5	.025	.050
	.3125	1200	11.5	790	5.1	.031	.063
8	**.3150**	1200	11.5	790	5.1	.031	.063
	.3750	990	9.5	660	4.2	.038	.075
10	**.3937**	950	9.1	630	4.0	.039	.079
12.5	**.4921**	760	7.3	500	3.2	.047	.100
	.5000	740	7.1	500	3.2	.048	.100
Depth of Cut							

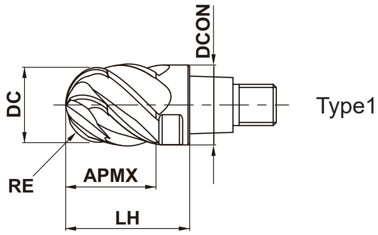
Note 1) The irregular pitch flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece material installation is poor, vibration or abnormal sound can occur.
In this case, please reduce the revolution and the feed rate proportionately, or set a lower depth of cut.
Note 2) If the depth of cut is smaller, the revolution and the feed rate can be increased.
Note 3) For stainless steels, titanium alloys and heat resistant alloys, the use of water-soluble coolant is effective.
Note 4) α is the inclination angle of the machined surface.



iMX-B6HV – Inch Sizes

Ball nose head, 6 flute, Irregular pitch flutes

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminum Alloy
◎	○			◎	◎		



RE≤.250"	RE>.250"			
±.0004"	±.0008"			
DC≤.500"	DC>.500"			
0 - .0008"	0 - .0012"			

- Irregular pitch flutes cutting edge controls vibration and achieves stable machining.
- 6 flutes enables high machining efficiency.

(inch)

Order Number	RE	DC	APMX	LH	DCON	No. of Flutes	Grade	Type
							EP7020	
IMX10B6HV0375M	.1875	.375	.395	.630	.363	6	●	1
IMX12B6HV0500M	.2500	.500	.520	.789	.488	6	●	1
IMX16B6HV0625M	.3125	.625	.645	.945	.605	6	●	1
IMX20B6HV0750M	.3750	.750	.800	1.181	.730	6	●	1
IMX25B6HV1000M	.5000	1.000	1.050	1.500	.980	6	●	1

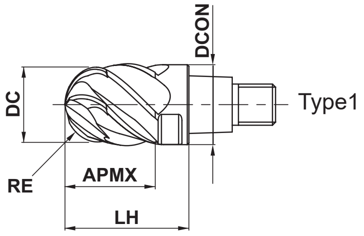
Note 1) The fastening size of the holder and head should be the same. (refer to page 318)

RE = Radius of Ball Nose
DC = Cutting Dia.
APMX = Depth of Cut Max.
LH = Head Length
DCON = Connection Dia.

iMX-B6HV

Ball nose head, 6 flute, Irregular pitch flutes

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminum Alloy
◎	○			◎	◎		



RE≤6	RE>6			
±0.010	±0.020			
DC≤12	DC>12			
0 - 0.020	0 - 0.030			

- The irregular pitch flutes controls vibration and achieves stable machining of difficult-to-cut materials and for long overhang applications.
- 6 flutes enable high machining efficiency.

(mm)

Order Number	RE	DC	APMX	LH	DCON	No. of Flutes	Grade	Type
							EP7020	
IMX10B6HV10010	5	10	10.5	16	9.7	6	●	1
IMX12B6HV12012	6	12	12.5	19	11.7	6	●	1
IMX16B6HV16016	8	16	16.5	24	15.5	6	●	1
IMX20B6HV20021	10	20	21	30	19.5	6	●	1
IMX25B6HV25026	12.5	25	26	37.5	24.5	6	●	1

Note 1) The fastening size of the holder and head should be the same. (refer to page 318)

RE = Radius of Ball Nose
DC = Cutting Dia.
APMX = Depth of Cut Max.
LH = Head Length
DCON = Connection Dia.

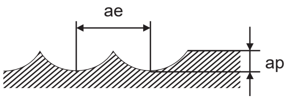
iMX-B6HV

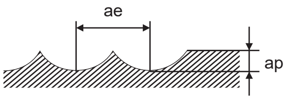
Ball nose head, 6 flute, Irregular pitch flutes

Recommended Cutting Conditions

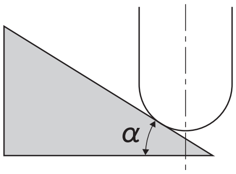
Shoulder Milling

(inch)

Workpiece Material		Carbon Steels, Alloy Steels, Mild Steels, Pre-hardened Steels						Austenitic Stainless Steels, Ferritic and Martensitic Stainless Steels, Cobalt Chromium Alloys, Titanium Alloys					
Inclination Angle		α≤15°		α>15°		Depth of Cut **ap**	Width of Cut **ae**	α≤15°		α>15°		Depth of Cut **ap**	Width of Cut **ae**
RE (mm)	(inch)	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)			Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)		
	.1875	10000	252.0	6700	112.6	.019	.075	7500	184.5	5000	78.0	.019	.075
5	**.1969**	9500	236.2	6400	107.5	.020	.079	7200	177.1	4800	74.9	.020	.079
6	**.2362**	8000	235.2	5300	104.9	.024	.094	6000	176.4	4000	74.4	.024	.094
	.2500	7500	220.5	5000	99.0	.025	.100	5700	167.6	3700	68.8	.025	.100
	.3125	6000	190.8	4000	84.0	.031	.125	4500	148.5	3000	63.0	.031	.125
8	**.3150**	6000	190.8	4000	84.0	.031	.126	4500	148.5	3000	63.0	.031	.126
	.3750	5000	183.0	3300	77.2	.038	.150	3800	143.6	2500	61.5	.038	.150
10	**.3937**	4800	175.7	3200	74.9	.039	.157	3600	136.1	2400	59.0	.039	.157
12.5	**.4921**	3800	143.6	2500	58.5	.047	.197	2900	109.6	1900	46.7	.047	.197
	.5000	3800	143.6	2500	58.5	.048	.200	2800	105.8	1900	46.7	.048	.200
Depth of Cut													

Workpiece Material		Heat Resistant Alloys Inconel718					
Inclination Angle		α≤15°		α>15°		Depth of Cut **ap**	Width of Cut **ae**
RE (mm)	(inch)	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)		
	.1875	2000	26.4	1300	10.9	.019	.038
5	**.1969**	1900	25.1	1300	10.9	.020	.039
6	**.2362**	1600	21.1	1100	9.2	.024	.047
	.2500	1500	19.8	990	8.3	.025	.050
	.3125	1200	17.3	790	7.6	.031	.063
8	**.3150**	1200	17.3	790	7.6	.031	.063
	.3750	990	14.3	660	6.3	.038	.075
10	**.3937**	950	13.7	630	6.0	.039	.079
12.5	**.4921**	760	10.9	500	4.8	.047	.098
	.5000	740	10.7	500	4.8	.048	.100
Depth of Cut							

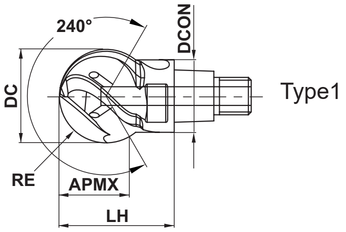
Note 1) The irregular pitch flute end mill has a larger effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece material installation is poor, vibration or abnormal sound can occur.
In this case, please reduce the revolution and the feed rate proportionately, or set a lower depth of cut.
Note 2) If the depth of cut is smaller, the revolution and the feed rate can be increased.
Note 3) For stainless steels, titanium alloys and heat resistant alloys, the use of water-soluble coolant is effective.
Note 4) α is the inclination angle of the machined surface.



iMX-B4WH-S – Inch Sizes NEW

Lollipop head, 4 flute, with coolant holes

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminum Alloy
◎	○			◎	◎	○	



RE≥.250"				
±.0006"				

- Optimal choice for machining undercut and complex shapes when using a 5-axis machine.
- A stable supply of coolant is maintained even when machining complex component geometries.

(inch)

Order Number	RE	DC	APMX	LH	DCON	No. of Flutes	Grade	Type
							EP7020	
IMX10B4WH0500MS	.2500	.500	.375	.693	.382	4	●	1
IMX12B4WH0625MS	.3125	.625	.469	.799	.488	4	●	1
IMX16B4WH0750MS	.3750	.750	.563	.925	.606	4	●	1

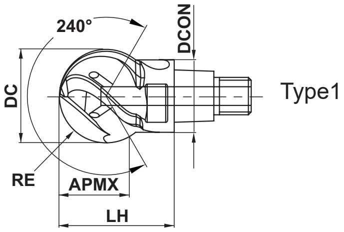
Note 1) The fastening size of the holder and head should be the same. (refer to page 318)

RE = Radius of Ball Nose
DC = Cutting Dia.
APMX = Depth of Cut Max.
LH = Head Length
DCON = Connection Dia.

iMX-B4WH-S NEW

Lollipop head, 4 flute, with coolant holes

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminum Alloy
◎	○			◎	◎	○	



RE≥6				
±0.015				

- Optimal choice for machining undercut and complex shapes when using a 5-axis machine.
- A stable supply of coolant is maintained even when machining complex component geometries.

(mm)

Order Number	RE	DC	APMX	LH	DCON	No. of Flutes	Grade	Type
							EP7020	
IMX10B4WH12008S	6	12	9	16.5	9.7	4	●	1
IMX12B4WH16008S	8	16	12	20.9	11.7	4	●	1
IMX16B4WH20008S	10	20	15	24.7	15.5	4	●	1

Note 1) The fastening size of the holder and head should be the same. (refer to page 318)

iMX-B4WH-S

Lollipop head with coolant holes, 4 flute

Recommended Cutting Conditions

■Internal Profile Milling, Undercut Machining (L/D=3)

(inch)

Workpiece Material				Mild Steels, Carbon Steels, Alloy Steels, Pre-hardened Steels, Copper Alloys			Austentic, Ferritic and Martensitic Steels, Precipitation Hardening Stainless Steels, Cobalt Chrome Alloys, Titanium Alloys			Heat Resistant Alloys		
DC		RE		Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of cut ae	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of cut ae	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of cut ae
(mm)	(inch)	(mm)	(inch)									
12	**.4724**	**6**	**.2362**	2700	38.2	.018	2100	24.8	.018	800	5.1	.014
	.5000		**.2500**	2500	35.4	.019	2000	23.6	.019	750	4.7	.015
	.6250		**.3125**	2000	31.5	.024	1600	20.1	.024	600	4.3	.019
16	**.6300**	**8**	**.3150**	2000	31.5	.024	1600	20.1	.024	600	4.3	.019
	.7500		**.3750**	1700	26.8	.028	1300	18.5	.028	500	3.9	.022
20	**.7870**	**10**	**.3937**	1600	25.2	.030	1300	18.5	.030	480	3.8	.024

■Internal Profile Milling, Undercut Machining (L/D=5)

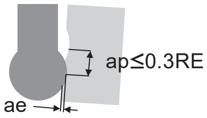
(inch)

Workpiece Material				Mild Steels, Carbon Steels, Alloy Steels, Pre-hardened Steels, Copper Alloys			Austentic, Ferritic and Martensitic Steels, Precipitation Hardening Stainless Steels, Cobalt Chrome Alloys, Titanium Alloys			Heat Resistant Alloys		
DC		RE		Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of cut ae	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of cut ae	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of cut ae
(mm)	(inch)	(mm)	(inch)									
12	**.4724**	**6**	**.2362**	1900	20.9	.012	1300	10.2	.012	530	2.5	.009
	.5000		**.2500**	1800	19.7	.013	1300	10.2	.013	500	2.4	.010
	.6250		**.3125**	1400	17.7	.016	1000	9.4	.016	400	2.5	.013
16	**.6300**	**8**	**.3150**	1400	17.7	.016	990	9.4	.016	400	2.5	.013
	.7500		**.3750**	1200	15.0	.019	840	9.4	.019	330	2.1	.015
20	**.7870**	**10**	**.3937**	1100	13.8	.020	800	8.7	.020	320	2.0	.016

■Internal Profile Milling, Undercut Machining (L/D=7)

(inch)

Workpiece Material				Mild Steels, Carbon Steels, Alloy Steels, Pre-hardened Steels, Copper Alloys			Austentic, Ferritic and Martensitic Steels, Precipitation Hardening Stainless Steels, Cobalt Chrome Alloys, Titanium Alloys		
DC		RE		Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of cut ae	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of cut ae
(mm)	(inch)	(mm)	(inch)						
12	**.4724**	**6**	**.2362**	1300	6.3	.006	800	3.1	.006
	.5000		**.2500**	1300	6.3	.006	750	3.5	.006
	.6250		**.3125**	1000	5.5	.008	600	3.3	.008
16	**.6300**	**8**	**.3150**	990	5.5	.008	600	2.8	.008
	.7500		**.3750**	840	5.1	.009	500	2.8	.009
20	**.7870**	**10**	**.3937**	800	5.1	.010	480	2.6	.010



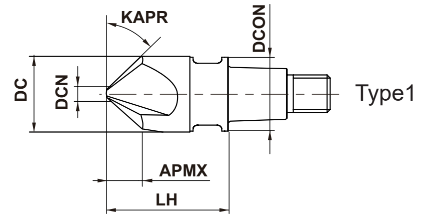
Note 1) Vibration may occur if the rigidity of machine or workpiece material is low.
In this case, please reduce the revolution and the feed rate proportionately, or set a lower depth of cut.
Note 2) If the depth of cut is smaller, the revolution and the feed rate can be increased.
Note 3) In case of L/D >5, It is recommended to use taper neck type holder.
Note 4) For stainless steels, titanium alloys and heat resistant alloys, the use of water-soluble coolant is effective.

iMX-CH3L – Inch Sizes

Chamfer head, 3 flute

UWC 5°

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminum Alloy
◎	○	○		◎	◎		



DCN=.060"				
±0.0008"				

- Chamfered cutting head suitable for inner and outer circumference.
- Anti-vibration priority design.

(inch)

Order Number	DC	APMX	KAPR	DCN	LH	DCON	No. of Flutes	Grade EP7020	Type
IMX10CH3L0375A45	.375	.157	45°	.060	.630	.363	3	●	1
IMX12CH3L0500A45	.500	.220	45°	.060	.789	.488	3	●	1
IMX16CH3L0625A45	.625	.283	45°	.060	.945	.605	3	●	1
IMX20CH3L0750A45	.750	.345	45°	.060	1.181	.730	3	●	1

Note 1) The fastening size of the holder and head should be the same. (refer to page 318)
Note 2) This end mill is not capable of drilling.

iMX-CH3L

Chamfer head, 3 flute

UWC 5°

DCN=1.5				
±0.020				

- Chamfered cutting head suitable for inner and outer circumference.
- Anti-vibration priority design.

(mm)

Order Number	DC	APMX	KAPR	DCN	LH	DCON	No. of Flutes	Grade EP7020	Type
IMX10CH3L100A45	10	4.2	45°	1.5	16	9.7	3	●	1
IMX12CH3L120A45	12	5.2	45°	1.5	19	11.7	3	●	1
IMX16CH3L160A45	16	7.2	45°	1.5	24	15.5	3	●	1
IMX20CH3L200A45	20	9.2	45°	1.5	30	19.5	3	●	1

Note 1) The fastening size of the holder and head should be the same. (refer to page 318)
Note 2) This end mill is not capable of drilling.

DC = Cutting Dia.
APMX = Depth of Cut Max.
KAPR = Tool Cutting Edge Angle
DCN = Cutting Dia. Min.
LH = Head Lengh
DCON = Connection Dia.

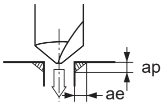
iMX-CH3L

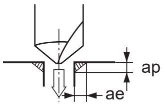
Chamfer head, 3 flute

Recommended Cutting Conditions

Chamfer Milling (Hole Circumference)

(inch)

Workpiece Material		Carbon Steels, Alloy Steels, Gray Cast Irons				Alloy Tool Steels, Carbon Steels, Alloy Steels, Pre-hardened Steels				Austenitic Stainless Steels, Titanium Alloys			
DC		Revolution n (min^{-1})	Feed Rate vf (IPM)	Depth of Cut ap	Width of Cut ae	Revolution n (min^{-1})	Feed Rate vf (IPM)	Depth of Cut ap	Width of Cut ae	Revolution n (min^{-1})	Feed Rate vf (IPM)	Depth of Cut ap	Width of Cut ae
(mm)	(inch)												
	.3750	1300	6.2	.071	.071	1300	4.7	.071	.071	1000	3.6	.071	.071
10	**.3937**	1300	6.2	.071	.071	1300	4.7	.071	.071	970	3.5	.071	.071
12	**.4724**	1100	5.3	.085	.085	1100	4.0	.085	.085	810	2.9	.085	.085
	.5000	990	4.8	.085	.085	990	3.6	.085	.085	760	2.7	.085	.085
	.6250	790	3.8	.094	.094	790	2.8	.094	.094	610	2.2	.094	.094
16	**.6299**	790	3.8	.094	.094	790	2.8	.094	.094	610	2.2	.094	.094
	.7500	660	3.2	.102	.102	660	2.4	.102	.102	510	1.8	.102	.102
20	**.7874**	630	3.0	.102	.102	630	2.3	.102	.102	490	1.8	.102	.102
Depth of Cut													

Workpiece Material		Hardenned Steels (40-55HRC)				Heat Resistant Alloys Inconel718			
DC		Revolution n (min^{-1})	Feed Rate vf (IPM)	Depth of Cut ap	Width of Cut ae	Revolution n (min^{-1})	Feed Rate vf (IPM)	Depth of Cut ap	Width of Cut ae
(mm)	(inch)								
	.3750	1000	2.4	.071	.071	1000	4.8	.071	.071
10	**.3937**	970	2.3	.071	.071	970	4.7	.071	.071
12	**.4724**	810	1.9	.085	.085	810	3.9	.085	.085
	.5000	760	1.8	.085	.085	760	3.6	.085	.085
	.6250	610	1.5	.094	.094	610	2.9	.094	.094
16	**.6299**	610	1.5	.094	.094	610	2.9	.094	.094
	.7500	510	1.2	.102	.102	510	2.4	.102	.102
20	**.7874**	490	1.2	.102	.102	490	2.4	.102	.102
Depth of Cut									

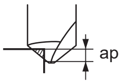
Note 1) Vibration may occur if the rigidity of machine or work material is low.
In this case, please reduce the revolution and the feed rate proportionately.
Note 2) For stainless steel, titanium alloy and heat resistant alloy, the use of water-soluble coolant is effective.

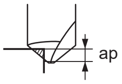
iMX-CH3L

Chamfer head, 3 flute

Chamfer Milling (Shape Circumference)

(inch)

Workpiece Material		Carbon Steels, Alloy Steels, Gray Cast Irons			Alloy Tool Steels, Carbon Steels, Alloy Steels, Pre-hardened Steels			Austenitic Stainless Steels, Titanium Alloys		
DC (mm)	DC (inch)	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**
	.3750	3400	20.4	.079	2300	12.4	.079	2000	9.6	.079
10	**.3937**	3200	19.2	.079	2200	11.9	.079	1900	9.1	.079
12	**.4724**	2700	16.2	.094	1900	10.3	.094	1600	7.7	.094
	.5000	2500	15.0	.094	1800	9.7	.094	1500	7.2	.094
	.6250	2000	12.0	.107	1400	7.6	.107	1200	5.8	.107
16	**.6299**	2000	12.0	.107	1400	7.6	.107	1200	5.8	.107
	.7500	1700	10.2	.126	1200	6.5	.126	990	4.8	.126
20	**.7874**	1600	9.6	.126	1100	5.9	.126	950	4.6	.126
Depth of Cut										

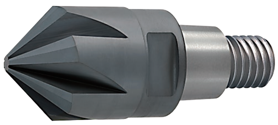
Workpiece Material		Hardenned Steels (40-55HRC)			Heat Resistant Alloys Inconel718		
DC (mm)	DC (inch)	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**
	.3750	1700	6.1	.079	1000	4.8	.079
10	**.3937**	1600	5.8	.079	970	4.7	.079
12	**.4724**	1300	4.7	.094	810	3.9	.094
	.5000	1300	4.7	.094	760	3.6	.094
	.6250	1000	3.6	.107	610	2.9	.107
16	**.6299**	1000	3.6	.107	610	2.9	.107
	.7500	840	3.0	.126	510	2.4	.126
20	**.7874**	800	2.9	.126	490	2.4	.126
Depth of Cut							

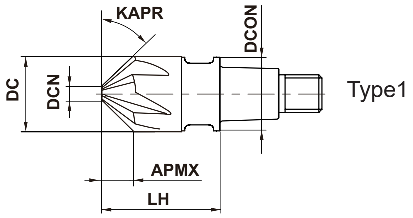
Note 1) Vibration may occur if the rigidity of machine or work material is low.
In this case, please reduce the revolution and the feed rate proportionately.
Note 2) For stainless steel, titanium alloy and heat resistant alloy, the use of water-soluble coolant is effective.

iMX-CH6V – Inch Sizes

Chamfer head, 6 flute

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy, Heat Resistant Alloy	Copper Alloy	Aluminum Alloy
◎	○	○		◎	◎		





DCN=.120"				
±0.0008"				

- Suitable for outer circumference.
- Multiple cutting design for extended tool life.

(inch)

Order Number	DC	APMX	KAPR	DCN	LH	DCON	No. of Flutes	Grade	Type
								EP7020	
IMX12CH6V0500A45	.500	.190	45°	.120	.789	.488	6	●	1
IMX16CH6V0625A45	.625	.252	45°	.120	.945	.605	6	●	1
IMX20CH6V0750A45	.750	.315	45°	.120	1.181	.730	6	●	1

Note 1) The fastening size of the holder and head should be the same. (refer to page 318)
Note 2) This end mill is not capable of drilling.

iMX-CH6V

Chamfer head, 6 flute

DCN=3.0				
±0.020				

- Suitable for outer circumference.
- Multiple cutting design for extended tool life.

(mm)

Order Number	DC	APMX	KAPR	DCN	LH	DCON	No. of Flutes	Grade	Type
								EP7020	
IMX12CH6V120A45	12	4.5	45°	3	19	11.7	6	●	1
IMX16CH6V160A45	16	6.5	45°	3	24	15.5	6	●	1
IMX20CH6V200A45	20	8.5	45°	3	30	19.5	6	●	1

Note 1) The fastening size of the holder and head should be the same. (refer to page 318)
Note 2) This end mill is not capable of drilling.

DC = Cutting Dia.
APMX = Depth of Cut Max.
KAPR = Tool Cutting Edge Angle
DCN = Cutting Dia. Min.
LH = Head Lengh
DCON = Connection Dia.

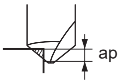
iMX-CH6V

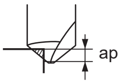
Chamfer head, 6 flute

Recommended Cutting Conditions

Chamfer Milling (Shape Circumference)

(inch)

Workpiece Material		Carbon Steels, Alloy Steels, Gray Cast Irons			Alloy Tool Steels, Carbon Steels, Alloy Steels, Pre-hardened Steels			Austenitic Stainless Steels, Titanium Alloys		
DC		Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**
(mm)	(inch)									
12	**.4724**	2700	32.4	.094	1900	20.5	.094	1600	15.4	.094
	.5000	2500	30.0	.094	1800	19.4	.094	1500	14.4	.094
	.6250	2000	24.0	.107	1400	15.1	.107	1200	11.5	.107
16	**.6299**	2000	24.0	.107	1400	15.1	.107	1200	11.5	.107
	.7500	1700	20.4	.126	1200	13.0	.126	990	9.5	.126
20	**.7874**	1600	19.2	.126	1100	11.9	.126	950	9.1	.126
Depth of Cut										

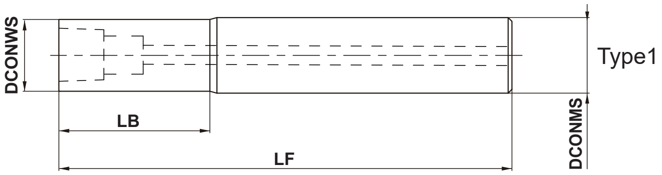
Workpiece Material		Hardenned Steels (40-55HRC)			Heat Resistant Alloys Inconel718		
DC		Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**	Revolution **n** (min^{-1})	Feed Rate **vf** (IPM)	Depth of Cut **ap**
(mm)	(inch)						
12	**.4724**	1300	9.4	.094	810	7.8	.094
	.5000	1300	9.4	.094	760	7.3	.094
	.6250	1000	7.2	.107	610	5.9	.107
16	**.6299**	1000	7.2	.107	610	5.9	.107
	.7500	840	6.0	.126	510	4.9	.126
20	**.7874**	800	5.8	.126	490	4.7	.126
Depth of Cut							

Note 1) Vibration may occur if the rigidity of machine or work material is low.
In this case, please reduce the revolution and the feed rate proportionately.
Note 2) For stainless steel, titanium alloy and heat resistant alloy, the use of water-soluble coolant is effective.

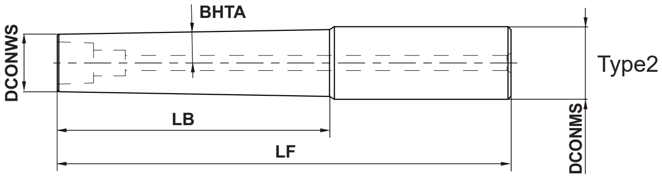
iMX- Inch Sizes

Carbide Holder

Undercut



Taper Neck Type



h6

DCONMS=.375	.500 ≤DCONMS ≤.625	.750 ≤DCONMS ≤1.000		
0 - .00035"	0 - .00043"	0 - .00051"		

Carbide Holder

(inch)

Order Number	BHTA	LB	DCONWS	LF	DCONMS	Stock	Type	Suitable Head	Wrench
IMX10-U0375N049L27C	—	.495	.363	2.755	.375	●	1	IMX10⬚	IMX10-WR
IMX10-U0375N124L35C	—	1.245	.363	3.543	.375	●	1	IMX10⬚	IMX10-WR
IMX10-U0375N199L43C	—	1.995	.363	4.330	.375	●	1	IMX10⬚	IMX10-WR
IMX10-A0500N199L43C	1°	1.995	.363	4.330	.500	●	2	IMX10⬚	IMX10-WR
IMX12-U0500N071L31C	—	.711	.488	3.149	.500	●	1	IMX12⬚	IMX12-WR
IMX12-U0500N171L39C	—	1.711	.488	3.937	.500	●	1	IMX12⬚	IMX12-WR
IMX12-U0500N271L51C	—	2.711	.488	5.118	.500	●	1	IMX12⬚	IMX12-WR
IMX12-A0625N271L51C	1°	2.711	.488	5.118	.625	●	2	IMX12⬚	IMX12-WR
IMX16-U0625N093L31C	—	.930	.605	3.149	.625	●	1	IMX16⬚	IMX16-WR
IMX16-U0625N218L43C	—	2.180	.605	4.330	.625	●	1	IMX16⬚	IMX16-WR
IMX16-U0625N343L59C	—	3.430	.605	5.905	.625	●	1	IMX16⬚	IMX16-WR
IMX16-A0750N343L59C	1°	3.430	.605	5.905	.750	●	2	IMX16⬚	IMX16-WR
IMX20-U0750N106L35C	—	1.069	.730	3.543	.750	●	1	IMX20⬚	IMX20-WR
IMX20-U0750N256L51C	—	2.569	.730	5.118	.750	●	1	IMX20⬚	IMX20-WR
IMX20-U0750N406L70C	—	4.069	.730	7.086	.750	●	1	IMX20⬚	IMX20-WR
IMX20-A1000N406L70C	1°	4.069	.730	7.086	1.000	●	2	IMX20⬚	IMX20-WR
IMX25-U1000N150L43C	—	1.500	.980	4.330	1.000	●	1	IMX25⬚	IMX25-WR
IMX25-U1000N350L62C	—	3.500	.980	6.299	1.000	●	1	IMX25⬚	IMX25-WR

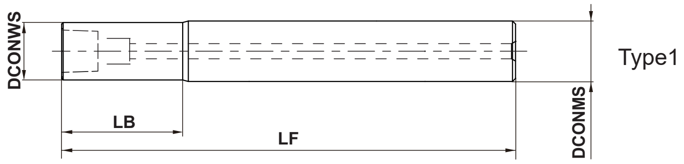
Note 1) The fastening size of the holder and head should be the same. (refer to page 318)

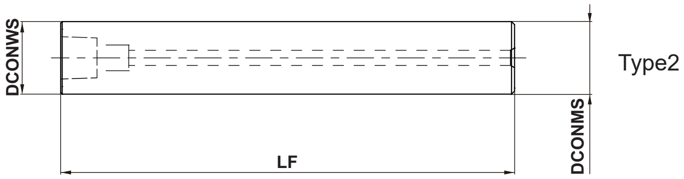
∗ See page 390 and 391 regarding how to install the head.

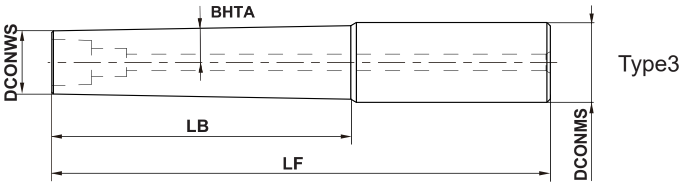
Undercut

Straight

Taper Neck Type







h6

DCONMS=10	12≤DCONMS≤16	20≤DCONMS≤25		
0 - 0.009	0 - 0.011	0 - 0.013		

Carbide Holder

(mm)

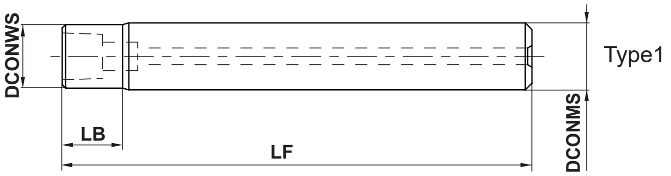
Order Number	BHTA	LB	DCONWS	LF	DCONMS	Stock	Type	Suitable Head	Wrench
IMX10-U10N014L070C	–	14	9.7	70	10	●	1	IMX10⬚	IMX10-WR
IMX10-S10L090C	–	–	10	90	10	●	2	IMX10⬚	IMX10-WR
IMX10-U10N034L090C	–	34	9.7	90	10	●	1	IMX10⬚	IMX10-WR
IMX10-S10L110C	–	–	10	110	10	●	2	IMX10⬚	IMX10-WR
IMX10-U10N054L110C	–	54	9.7	110	10	●	1	IMX10⬚	IMX10-WR
IMX10-A12N054L110C	1°	54	9.7	110	12	●	3	IMX10⬚	IMX10-WR
IMX12-U12N017L080C	–	17	11.7	80	12	●	1	IMX12⬚	IMX12-WR
IMX12-S12L100C	–	–	12	100	12	●	2	IMX12⬚	IMX12-WR
IMX12-U12N041L100C	–	41	11.7	100	12	●	1	IMX12⬚	IMX12-WR
IMX12-S12L130C	–	–	12	130	12	●	2	IMX12⬚	IMX12-WR
IMX12-U12N065L130C	–	65	11.7	130	12	●	1	IMX12⬚	IMX12-WR
IMX12-A16N065L130C	1°	65	11.7	130	16	●	3	IMX12⬚	IMX12-WR
IMX16-U16N024L080C	–	24	15.5	80	16	●	1	IMX16⬚	IMX16-WR
IMX16-S16L110C	–	–	16	110	16	●	2	IMX16⬚	IMX16-WR
IMX16-U16N056L110C	–	56	15.5	110	16	●	1	IMX16⬚	IMX16-WR
IMX16-S16L150C	–	–	16	150	16	●	2	IMX16⬚	IMX16-WR
IMX16-U16N088L150C	–	88	15.5	150	16	●	1	IMX16⬚	IMX16-WR
IMX16-A20N088L150C	1°	88	15.5	150	20	●	3	IMX16⬚	IMX16-WR
IMX20-U20N030L090C	–	30	19.5	90	20	●	1	IMX20⬚	IMX20-WR
IMX20-S20L130C	–	–	20	130	20	●	2	IMX20⬚	IMX20-WR
IMX20-U20N070L130C	–	70	19.5	130	20	●	1	IMX20⬚	IMX20-WR
IMX20-S20L180C	–	–	20	180	20	●	2	IMX20⬚	IMX20-WR
IMX20-U20N110L180C	–	110	19.5	180	20	●	1	IMX20⬚	IMX20-WR
IMX20-A25N110L180C	1°	110	19.5	180	25	●	3	IMX20⬚	IMX20-WR
IMX25-U25N037L110C	–	37.5	24.5	110	25	●	1	IMX25⬚	IMX25-WR
IMX25-S25L160C	–	–	25	160	25	●	2	IMX25⬚	IMX25-WR
IMX25-U25N087L160C	–	87.5	24.5	160	25	●	1	IMX25⬚	IMX25-WR
IMX25-S25L210C	–	–	25	210	25	●	2	IMX25⬚	IMX25-WR

Note 1) The fastening size of the holder and head should be the same. (refer to page 318)

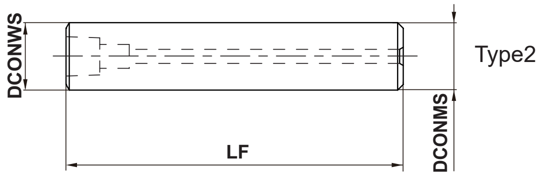
iMX– Inch Sizes

Steel Holder

Undercut



Straight Oversize



h6

DCONMS=.375"	.500" ≤DCONMS ≤.625"	.625" ≤DCONMS ≤.750"	DCONMS=1.250"	
0 - 0.00035"	0 - 0.00043"	0 - 0.00051"	0 - 0.00063"	

Steel Holder

(inch)

Order Number	LB	DCONWS	LF	DCONMS	Stock	Type	Suitable Head	Wrench
IMX10-U0375N030L27S	.308	.363	2.755	.375	●	1	IMX10⬚	IMX10-WR
IMX10-G0500L23S	—	.500	2.362	.500	●	2	IMX10⬚	IMX10-WR
IMX12-U0500N046L31S	.461	.488	3.149	.500	●	1	IMX12⬚	IMX12-WR
IMX12-G0625L27S	—	.625	2.755	.625	●	2	IMX12⬚	IMX12-WR
IMX16-U0625N061L31S	.618	.605	3.149	.625	●	1	IMX16⬚	IMX16-WR
IMX16-G0750L27S	—	.750	2.755	.750	●	2	IMX16⬚	IMX16-WR
IMX20-U0750N069L35S	.694	.730	3.543	.750	●	1	IMX20⬚	IMX20-WR
IMX20-G1000L31S	—	1.000	3.149	1.000	●	2	IMX20⬚	IMX20-WR
IMX25-U1000N100L43S	1.000	.980	4.330	1.000	●	1	IMX25⬚	IMX25-WR
IMX25-G1250L39S	—	1.250	3.937	1.250	●	2	IMX25⬚	IMX25-WR

Note 1) The fastening size of the holder and head should be the same. (refer to page 318)

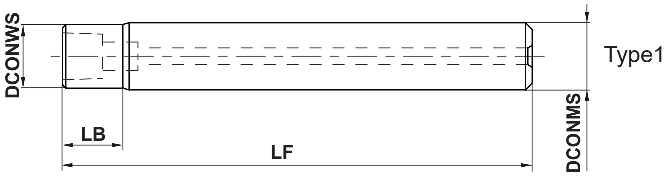
⁎ See page 390 and 391 regarding how to install the head.

LB = Body Length
LF = Functional Length
DCONWS = Connection Dia. Workpiece Side
DCONMS = Connection Dia. Machine Side

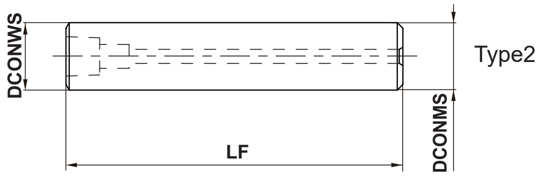
iMX

Steel Holder

Undercut



Straight Oversize



h6

DCONMS=10	12≤DCONMS≤16	20≤DCONMS≤25	DCONMS=32	
0 - 0.009	0 - 0.011	0 - 0.013	0 - 0.160	

Steel Holder

(mm)

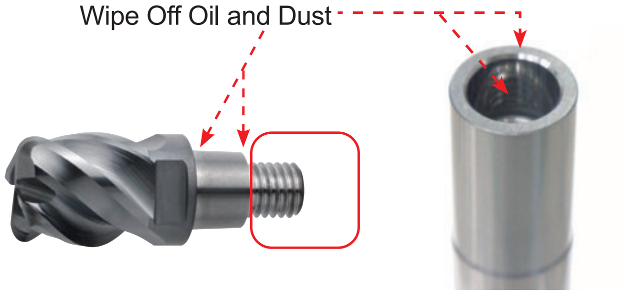
Order Number	LB	DCONWS	LF	DCONMS	Stock	Type	Suitable Head	Wrench
IMX10-U10N009L070S	9	9.7	70	10	●	1	IMX10⬚	IMX10-WR
IMX10-G12L060S	—	12	60	12	●	2	IMX10⬚	IMX10-WR
IMX12-U12N011L080S	11	11.7	80	12	●	1	IMX12⬚	IMX12-WR
IMX12-G16L070S	—	16	70	16	●	2	IMX12⬚	IMX12-WR
IMX16-U16N016L080S	16	15.5	80	16	●	1	IMX16⬚	IMX16-WR
IMX16-G20L070S	—	20	70	20	●	2	IMX16⬚	IMX16-WR
IMX20-U20N020L090S	20	19.5	90	20	●	1	IMX20⬚	IMX20-WR
IMX20-G25L080S	—	25	80	25	●	2	IMX20⬚	IMX20-WR
IMX25-U25N025L110S	25	24.5	110	25	●	1	IMX25⬚	IMX25-WR
IMX25-G32L100S	—	32	100	32	●	2	IMX25⬚	IMX25-WR

Note 1) The fastening size of the holder and head should be the same. (refer to page 318)

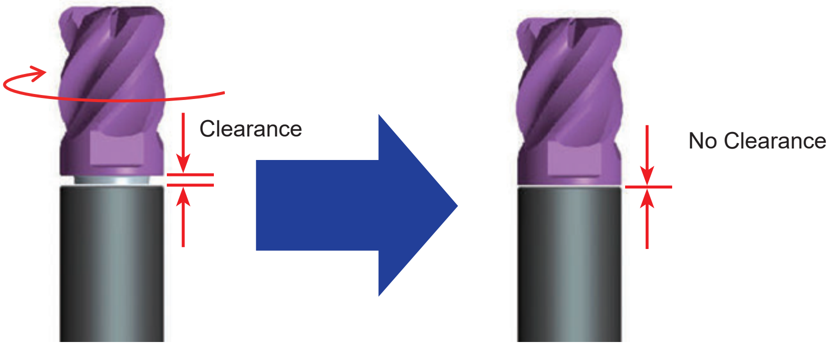
∗ See page 390 and 391 regarding how to install the head.

How to Install the Head

1 Using a clean cloth, wipe away oil and dust from the taper and end surfaces of the head and holder.

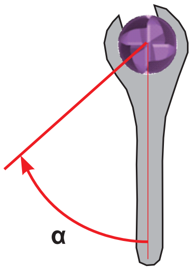


2 Be careful to avoid the possibility of cutting hands when fastening with bare hands directly near the blade tip.
Securely fasten the head and holder end surfaces using the enclosed wrench to close off any remaining gap.



3 Refer to the table at below regarding angles for recommended torque when necessary.
For stricter usage, refer to the table below for torque wrench fastening.

Fastening Size	Reference Tightening Angle α	Recommended Clamping Torque (lbf-in)
IMX10	50°	88
IMX12	50°	132
IMX16	50°	265
IMX20	40°	440
IMX25	35°	660

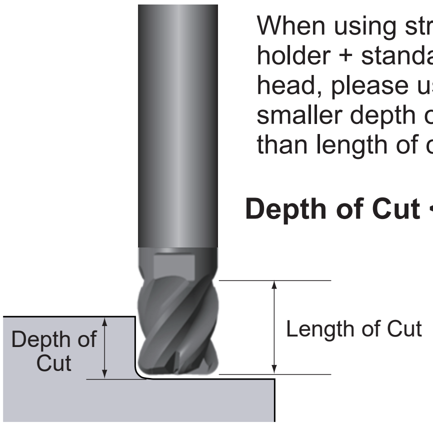


(Note 1) Use the enclosed wrench only.
(Typical wrenches differ in thickness.)

How to Select iMX Holders

- When using straight holder + standard head, interference will occur in cases where the depth of cut is larger than the length of cut of the head.
- When using straight holder + oversize head, larger depths of cut are possible because the diameter of the head is larger than the holder.

Straight + Standard Head

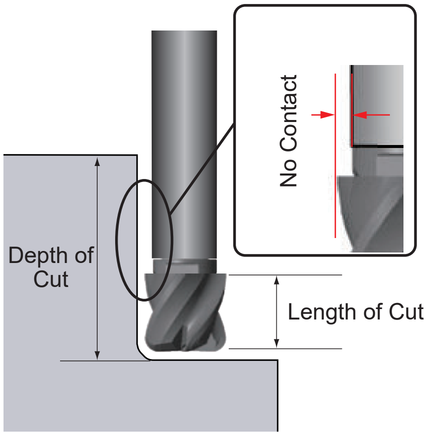


When using straight holder + standard head, please use at smaller depth of cut than length of cut.

Depth of Cut < Length of Cut

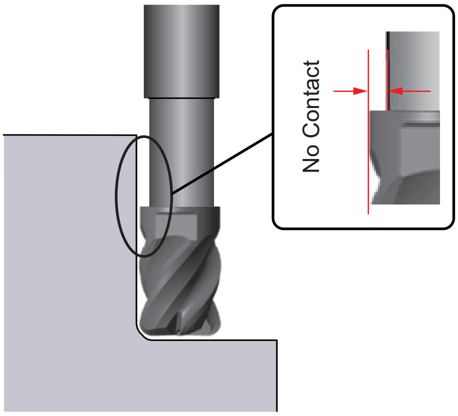
Less than DC x 3 overhang is recommended when depth of cut < length of cut.

Straight + Oversize Head

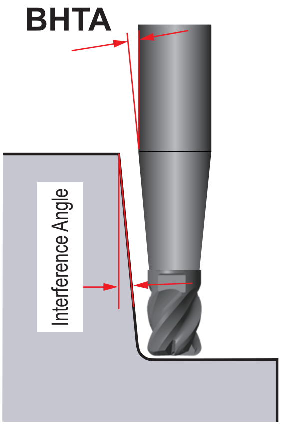


- Undercut type with relieved neck is suitable for vertical wall machining.
- The large diameter of the taper neck holder provides stability in long overhang applications.
- Undercut and taper neck types are now also available. (Please refer to diameter DC of each type for minimum diameter.)

Undercut + Standard Head



Taper Neck + Standard Head

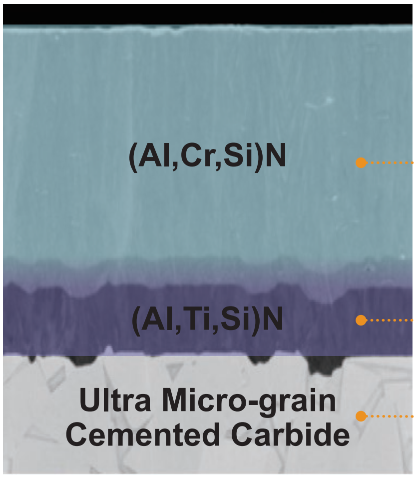


Exchangeable Head End Mills

iMX New Line-up

EP8100 Series (EP8110/EP8120)

The combination of the (Al,Cr,Si)N coating (newly-developed),which has a high oxidation temperature and high lubricity,together with the (Al,Ti,Si)N coating,which has better wear resistance and high adhesion, improves machinability of hardened steels up to 65 HRC.

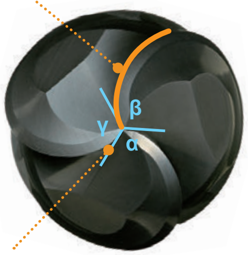


★High Oxidation Temperature
★High Lubricity

★Better Wear Resistance
★High Adhesion

iMX-B3FV

High Helical tooth improves fracture resistance.



Reduced vibration by optimized irregular pitch flutes.

α ≠ β ≠ γ

Stable wall machining is possible with a strong back taper angle.

EP8120 is ideal for processing hot forging dies.

iMX-B2S/iMX-B4S

(Picture is **iMX-B2S**)

Low helix tooth is suitable for finishing.

EP8110 is ideal for processing high hardned steels.(≤ 65HRC)

Corner radius, Taper head, Multi-flute, With Coolant hole

Taper radius end mills (Torus cutter) were conventionally used for turbine blade finishing. iMX taper radius offers the performance equivalent to solid end mills and it can achieve lower milling cost.

Features

Extensive Size Line-up of Corner Radius

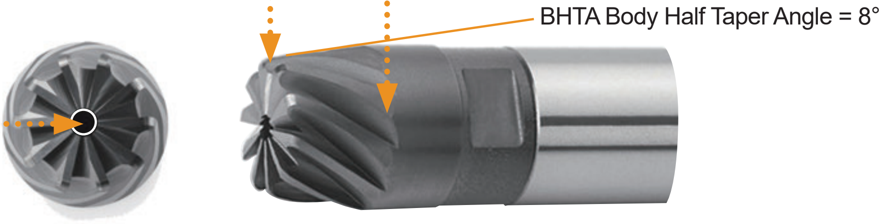
For a wide range of applications

Ultra Multi-flute

Ultra multi-flute design results in higher efficiency milling compared to conventional design.

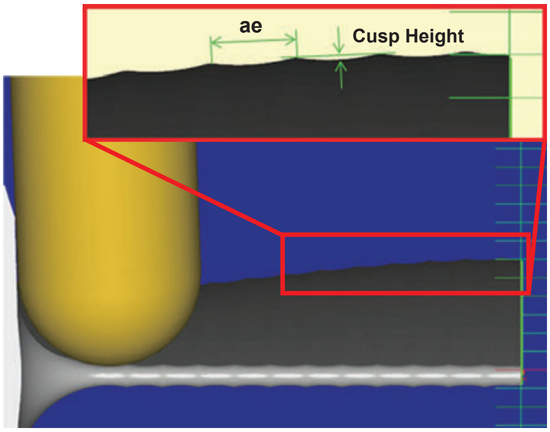
Coolant Through Hole

For efficient chip evacuation

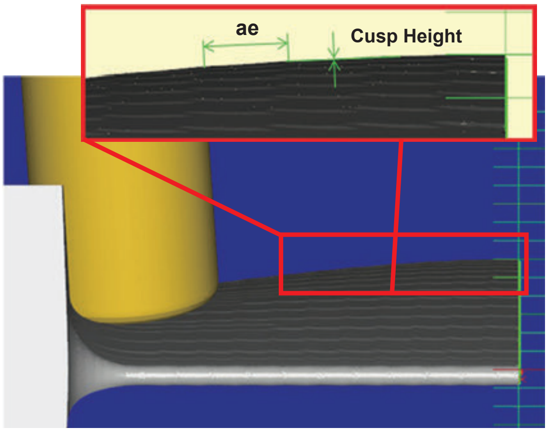


Drastically Reduces Cutting Time

Possible to process using a large pick feed (ae) due to the torus cutter design reduces cusp height.



Set pick feed (ae) = .079 inch, with RE5 of the ball nose end mill



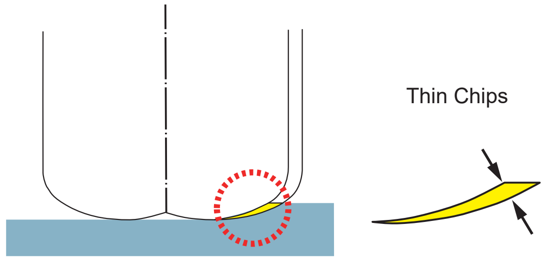
Set pick feed (ae) = .079 inch, with IMX10C8T080R10T080C

iMX-C4FD-C

Duplex corner radius head, 4 flute, For high feed, With coolant holes

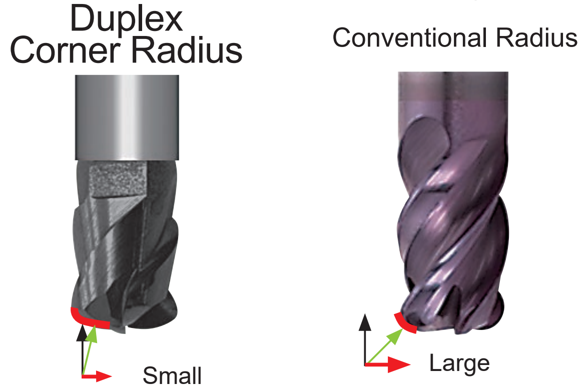
Features

High Efficiency Machining Geometry



Thin chips and a long cutting edge combine to provide both high performance and long tool life.

Vibration Control Geometry

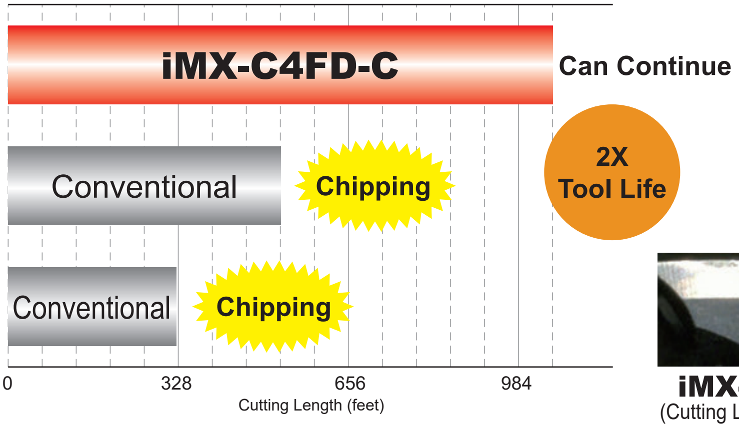


Reduced cutting resistance in the radius direction suppresses tool vibration and reduces deflection.

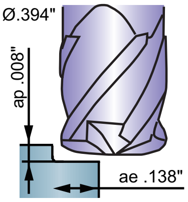
Cutting Performance

Tool Life Comparison in Cobalt Chromium Alloy (DC=.394 inch)

Tool Life (Co-Cr Alloy)



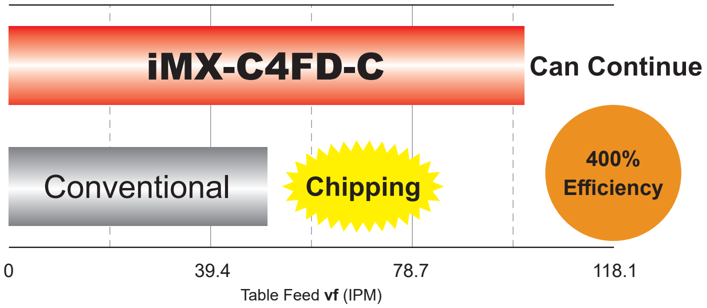
Workpiece Material : Co-Cr Alloy
Tool Size : DC=.394"
Revolution : n=3185 min^{-1} (330 SFM)
Table Feed : vf=75.2 IPM (.006 IPT)
Depth of Cut : ap=.008", ae=.138"
Overhang Length : 1.260"
Cutting Mode : Down(Climb) Cut, Soluble
Machine : Vertical MC (BT40)



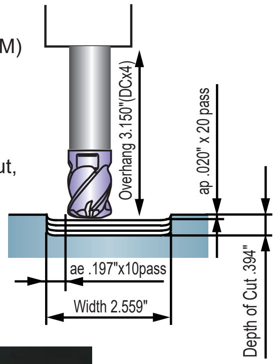
iMX-C4FD-C (Cutting Length 1050 feet)
Conventional (Cutting Length 525 feet)
Conventional (Cutting Length 315 feet)

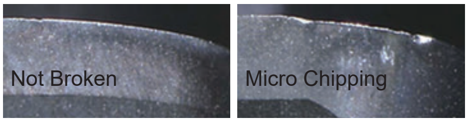
Efficiency Comparison in ASTM H13 (DC=.787 inch)

Machining Efficiency Comparison in ASTM H13



Workpiece Material : ASTM H13 (52 HRC)
Tool Size : DC=.787"
Revolution : n=1600 min^{-1} (330 SFM)
Table Feed : vf=25.2-100.8 IPM (.004-.016 IPT)
Depth of Cut : ap=.020", ae=.197"
Overhang Length : 3.150"
Cutting Mode : Slot & Down(Climb) Cut, Air Blow
Machine : Vertical MC (BT50)





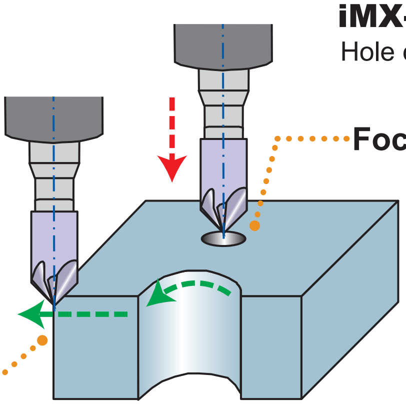
iMX-C4FD-C (Table Feed **vf** 100.8 IPM)
Conventional (Table Feed **vf** 50.4 IPM)

Recommended cutting conditions may vary according to the stability of the set up.

Chamfer Head

Features

Standardized ideal shape for different chamfer cutting regions.



iMX-CH3L
Hole circumference (inner rim)=3 flute

Focusing on Vibration Resistant

iMX-CH6V
Shape circumference (outer rim)
=6 flute

Focusing on Tool Life

Steel Holder

Features

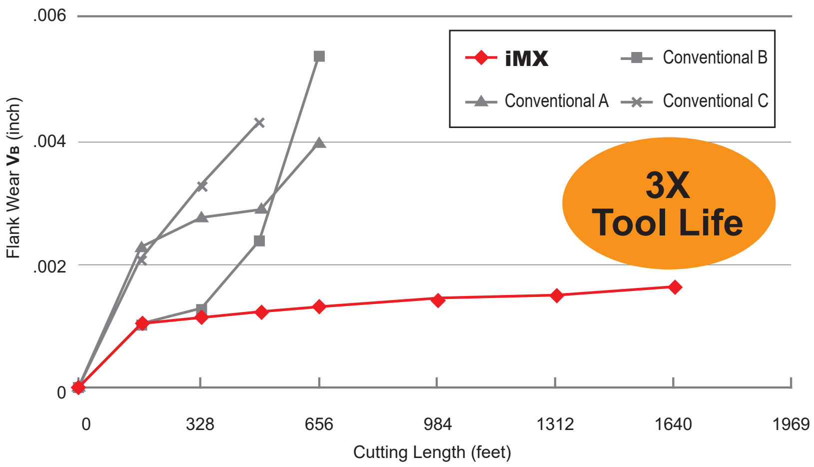
Series expansion of efficient steel holders.

Steel Holder

Developed series of efficient steel holders based on a carbide holder for low cost processing when the overhang is short.

Cutting Performance

3X greater tool life is achieved compared to conventional steel holders.

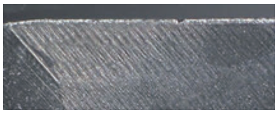


<Cutting Conditions>
Workpiece Material: AISI 1055
Holder : iMX10-U10N009L070S
Head : IMX10C4HV100R10010
Cutting Speed : n=5100 min^{-1} (525SFM)
Table Feed : vf=60IPM (.003IPT)

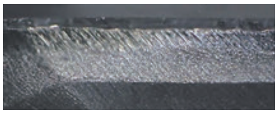
Depth of cut : ap=.197"
Width of cut : ae=.020"
Overhang Length: 1.181"
Cutting Mode : Down(Climb) Cut
Wet Cutting (Emulsion)
Machine : Vertical MC (BT50)

Tip Damage

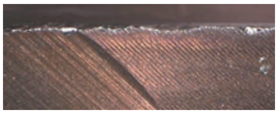
iMX S4HV
(Cutting Length 492 feet)



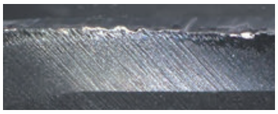
Conventional A
(Cutting Length 328 feet)



Conventional B
(Cutting Length 328 feet)

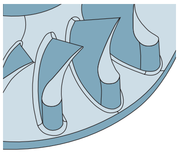
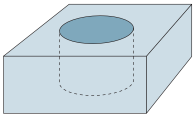
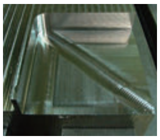


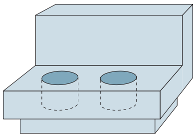
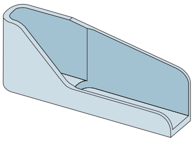
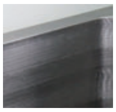
Conventional C
(Cutting Length 328 feet)

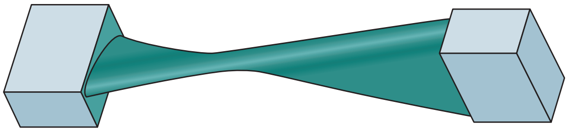


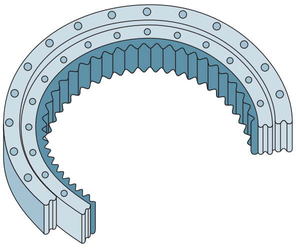
Application Examples

■ The examples shown are actual applications and can differ from the recommended cutting conditions.

Head		**IMX12B6HV12012**	**IMX20C4HV200R10021**	**IMX16C10HV160R10016**
Holder		**IMX12-U12N041L100C**	**IMX20-U20N070L130C**	**IMX16-U16N024L080C**
Workpiece		AISI 1049 	Mild Steel 	Titanium Alloy (Ti-6Al4V) 
Component		Impeller for Torque Converter	Die Steel	Test Work
Intended Process		Finishing of Blade Faces	Hole Finishing	Shoulder Milling (Down(Climb) Cut)
Cutting Conditions	Cutting Speed **vc** (SFM)	655	330	495
	Feed per Tooth **fz** (IPT)	.0031	.0020	.0031
	Width of Cut **ae** (inch)	Approx. .055	.039	.020
	Depth of Cut **ap** (inch)	Approx. .039	.118	.630
	Overhang Length (inch)	—	4.134	2.047
Cutting Mode		—	—	Wet Cutting (Emulsion)
Machine		5-Axis MC (HSK A63)	Vertical MC	Vertical MC
Results		The tool reduced machining time by 30% and also produced a good surface finish.	The irregular helix flutes combined with the solid carbide holder gave better performance than the conventional tools.	Machining without vibration was achieved even when the workpiece radius and tool radius were the same.

Head		**IMX10B4HV10010**	**IMX20C4HV220R10023**
Holder		**IMX10-U10N034L090C**	**IMX20-S20L180C**
Workpiece		Stainless Steel 	Titanium Alloy (Ti-6Al4V) 
Component		—	—
Intended Process		—	Deep Wall Machining
Cutting Conditions	Cutting Speed **vc** (SFM)	755	195
	Feed per Tooth **fz** (IPT)	.006	.003
	Width of Cut **ae** (inch)	.039	.008
	Depth of Cut **ap** (inch)	.055	.591
	Overhang Length (inch)	—	5.59 (L/D=7)
Cutting Mode		—	Wet Cutting (Emulsion)
Machine		Vertical MC	Vertical MC
Results		Conventional products machined 8 pieces. iMX produced a good surface finish even after machining 70 pieces, giving 9X tool life.	The oversize type head achieved good surface finishes that reduced step differences in vertical wall surfaces.  **iMX**  Conventional

Head		**IMX20C15T190R10T080C**
Holder		**IMX20-U20N030L090C**
Workpiece		Stainless Steel 
Component		Blade
Intended Process		Finished Wing Surface
Cutting Conditions	Cutting Speed **vc** (SFM)	995
	Feed per Tooth **fz** (IPT)	.004
	Width of Cut **ae** (inch)	.098
	Depth of Cut **ap** (inch)	.016
	Overhang Length (inch)	—
Cutting Mode		Wet Cutting (Emulsion)
Machine		5-Axis MC
Results		Advanced cutting surface roughness compared with conventional.

Head		**IMX12CH6V120A45**
Holder		**IMX12-S12L100C**
Workpiece		AISI 4140 
Component		Swing Bearing
Intended Process		Gear Part Chamfer Milling
Cutting Conditions	Cutting Speed **vc** (SFM)	245
	Feed per Tooth **fz** (IPT)	.002
	Width of Cut **ae** (inch)	.079
	Depth of Cut **ap** (inch)	.079
	Overhang Length (inch)	—
Cutting Mode		Dry Cutting
Machine		Machining Center
Results		iMX achieved more long tool life than conventional.

Exchangeable Head End Mills

iMX End Mill Series

For your safety
●Don't handle inserts and chips without gloves. ●Please machine within the recommended application range and exchange expired tools with new ones in advance of breakage. ●Please use safety covers and wear safety glasses. ●When using compounded cutting oils, please take fire precautions. ●When using rotating tools, please make a trial run to check run-out, vibration and abnormal sounds etc.

DIAEDGE

TOOL NEWS

2022.4 Update
B260A

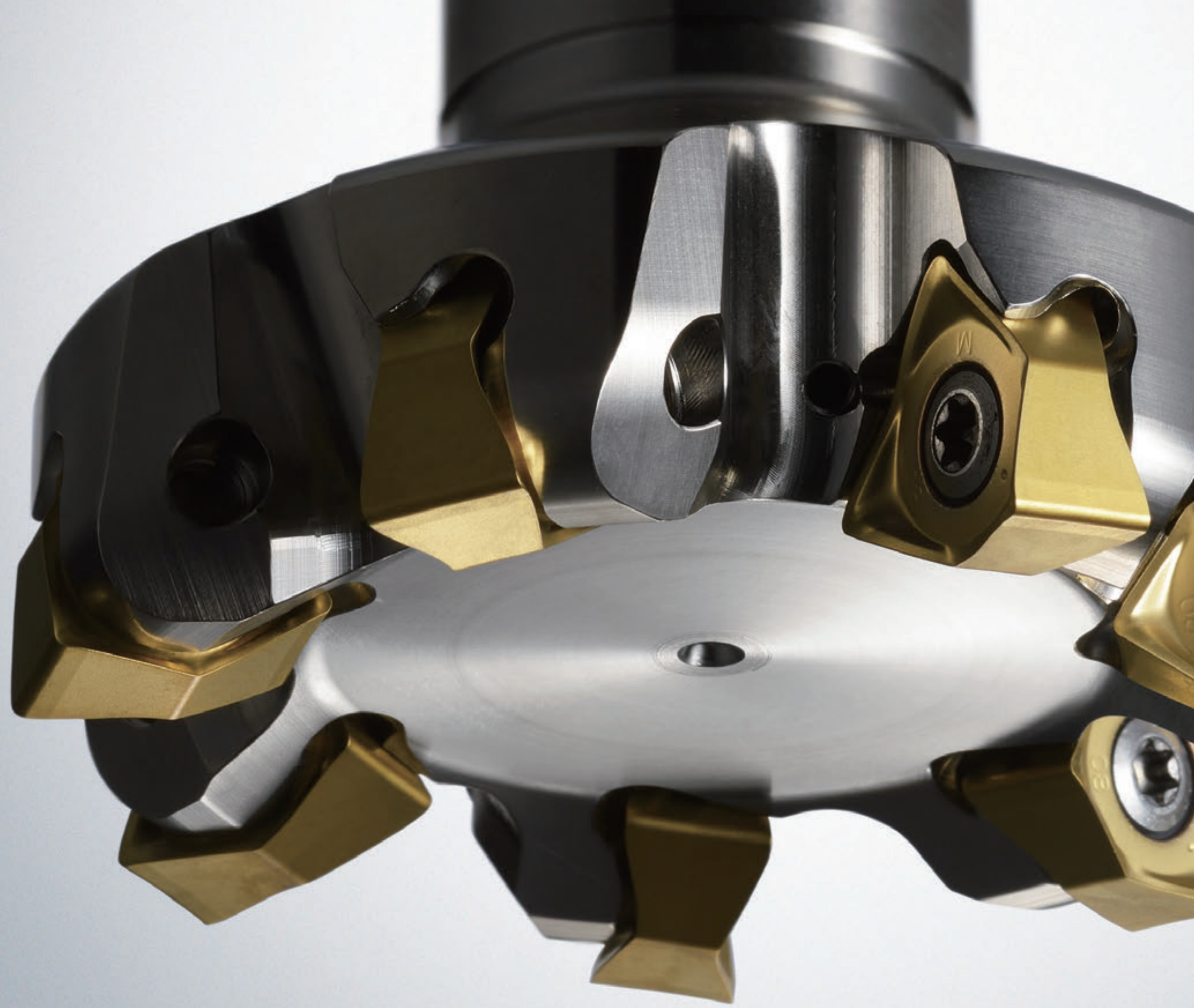
Double Sided Insert Type Shoulder Mill

WWX400

New Products

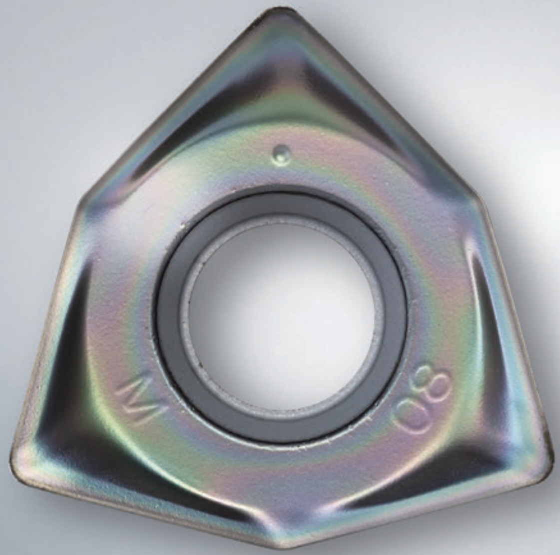
High Rigidity and High Quality Performance

MITSUBISHI MATERIALS CORPORATION



Double Sided Insert Type Shoulder Mill

WWX400 Series



Economical double sided insert with 6 corners.

The insert thickness was greatly increased to markedly improve the fracture resistance (MMC comparison).

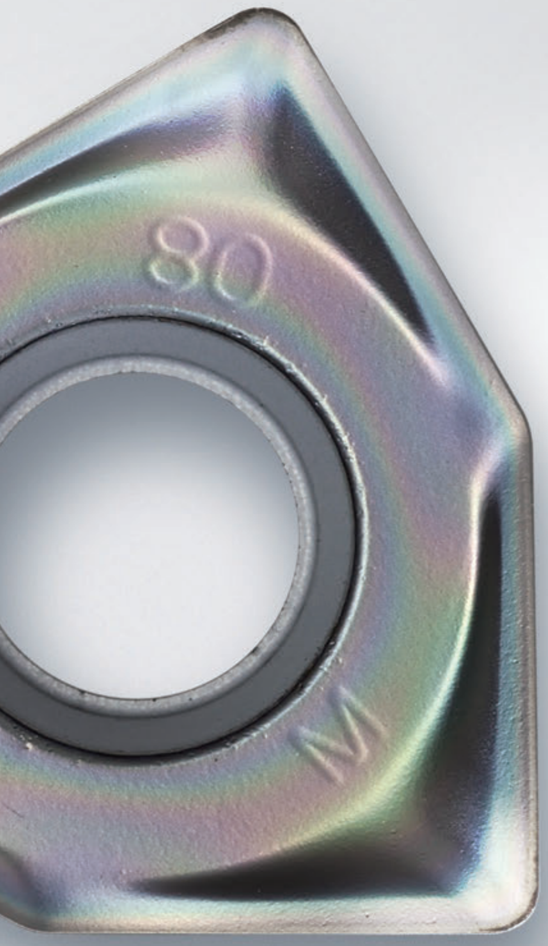
Stable and Reliable

The optimized “X-type” insert realizes stable and high-quality machining.

Strong X Geometry

Body damage is suppressed by arching the insert support.

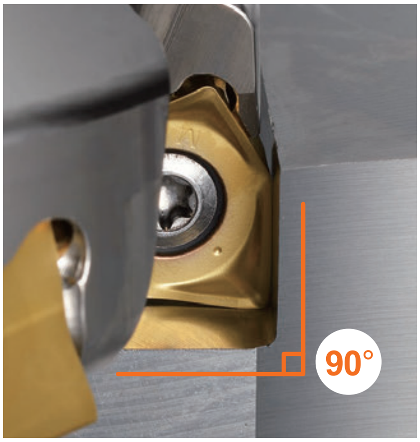
Wide variety of holder sizes and insert grades available covering most all machined workpiece material applications.



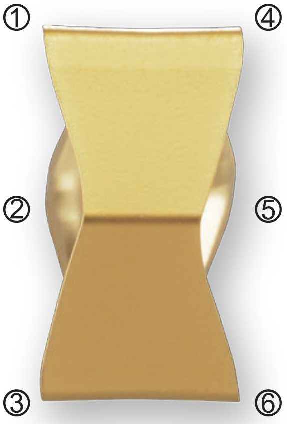
The optimized "X-type" insert meets the demand for greater strength.

The "X-Type" insert shape achieves both high quality surface finish and economic efficiency.

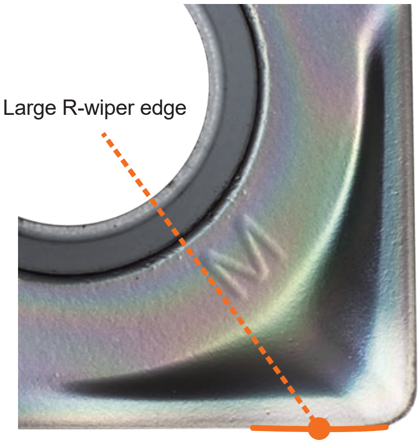
The insert's main cutting edge can machine a 90° wall surface. Additionally, the large R-wiper edge is adopted for achieving a good surface finish, while, the optimized "X-type" with 6 corners contributes to lower tool costs.



High-quality wall surface machining is possible.



Economical double sided 6 corners.

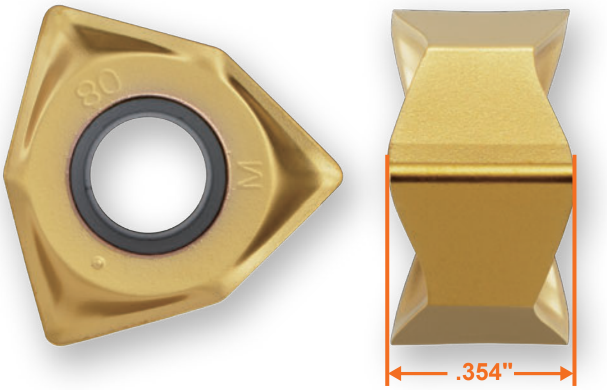


Large R-wiper edge achieves a good surface finish.

The generous thickness of the insert provides high rigidity.

Discover excellent fracture resistance and high rigidity made possible via the thick (.354"/9mm) insert pocketed on 3 sides and secured with a large M5 screw offering robust clamping.

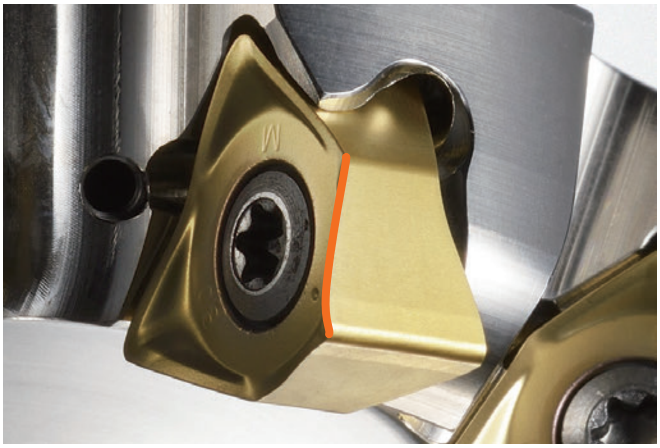
Strong X Geometry



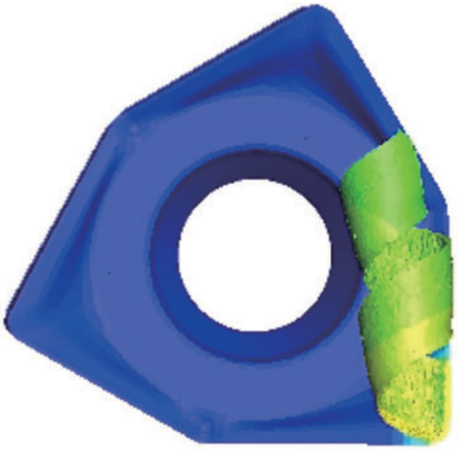
Excellent control and chip abrasion prevention.

Utilizing CAE*, the main cutting edge design was developed with a twisted cutting edge and a convex rake angle resulting in an optimal shape that provides excellent chip formation and evacuation greatly suppressing the scattering of chips at the bottom and periphery surface of the tool leading to high wall accuracy, a superior surface finish and markedly improved efficiency.

*CAE : Computer Aided Engneering



Curved cutting edge shape designed with an optimum rake face.



Chips are created with a good helical shape.

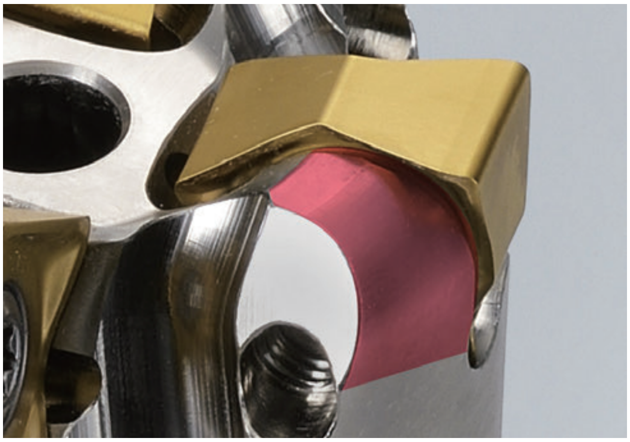
Comments from Developer

The WWX400 was developed under the concept of “Stable and Worry-free” using an optimized insert shape with a maximum thickness of .354”/9mm in response to recent trends of unmanned operations and the demand for increased efficiency. The main attributes improved were rigidity and fracture resistance. Attention was also given to the cutting edge shape to achieve improved finished surface quality and good chip discharge. Be sure to experience the proprietary “X-type” insert developed by Mitsubishi Materials.

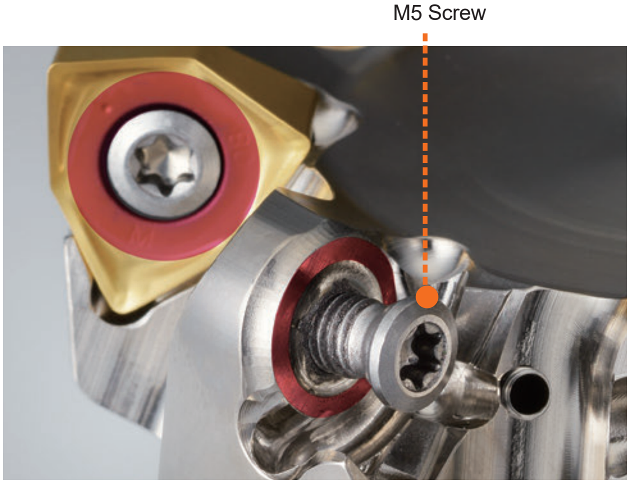
High-stability clamping and high-quality machining.

The optimized insert support and high clamp rigidity improve stability.

The conical shaped seating surface widely supports the insert surface area, while the arched insert support provides necessary clearance to suppress body damage from scratches and chip abrasion. Additionally, the strong clamping force of the M5 screws prevents loosening to provide robust clamping.



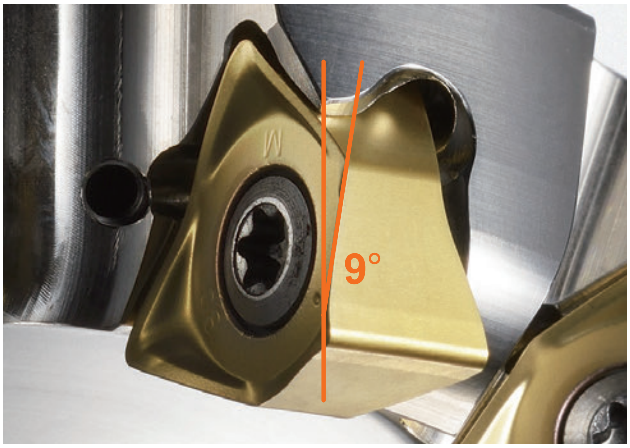
Arched insert support.



Conical shaped seat and M5 screw.

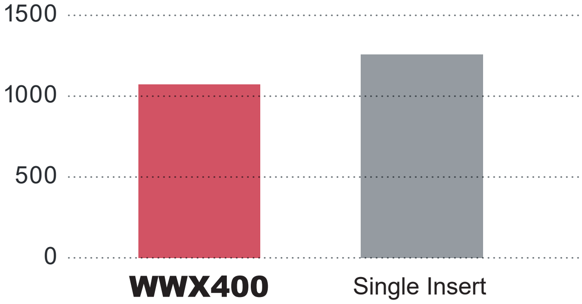
Low cutting resistance suppresses chatter vibration even for thin workpiece materials.

Although a double-sided insert type with an axial rake angle of 9°(close to that of a single-sided insert type) is used, the WWX400 insert achieves lower cutting resistance than a single-sided insert (MMC comparison) and suppresses chatter vibration when machining thin workpiece materials.



Axial Rake Angle of 9°

Comparison of Cutting Force by Resultant Force(Single Insert)



<Cutting Conditions>

Workpiece Material : AISI 4140

Cutter Dia. : DC=3.000"

Cutting Speed : vc=525 SFM

Feed per Tooth : fz=.008 IPT

Depth of Cut : ap=.079"

Width of Cut : ae=2.520"

Cutting Mode : Dry Cutting

Variety of cutter types, diameters & pitches.

Increasing the insert thickness, while achieving seat-less clamping made it possible to incorporate a large number of teeth while maintaining large chip pockets to provide a variety of cutter options. A standard inventory is maintained consisting of 3 pitch types of both arbor and shank type cutters of same diameter. Fine pitch types in particular allow a high table feed and greatly improve efficiency.

DC=ø3.000"

Fine Pitch Type

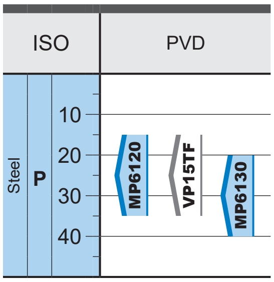
DC=ø3.000"

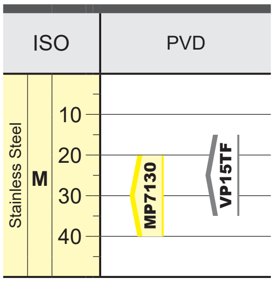
Coarse Pitch Type

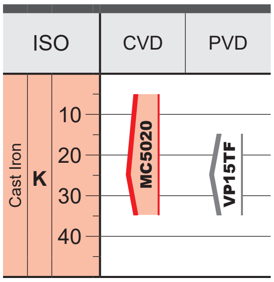
Comments from Developer

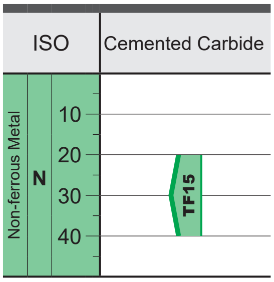
The result of pursuing “worry-free” is our cutter body. The highly rigid arching insert support achieves a stable installed feeling by using a conical shaped seat and the M5 screws. This design allows for long use and is the answer to the dissatisfied customers who have experienced “when damage to the insert has also made the cutter body unusable.”

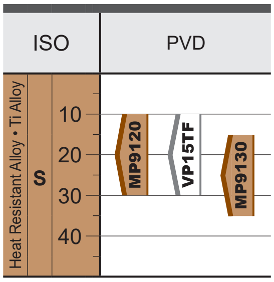
Insert Grades for a Wide Range of Materials

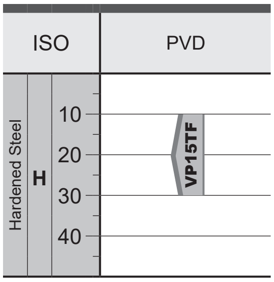












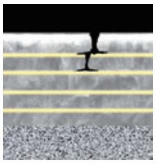
MP6100/MP7100/MP9100 Series

TOUGH-∑ Technology

A fusion of the separate coating technologies; PVD and multi-layering provides extra toughness.

Base Layer
High Al-(Al, Ti)N

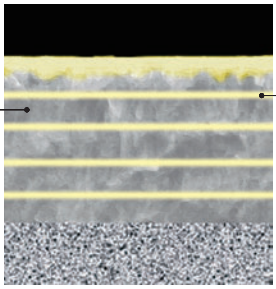
The new technology Al-(Al, Ti)N coating provides stabilisation of the high hardness phase and succeeds in dramatically improving wear, crater and welding resistance.



Multi-layering of the coating prevents any cracks penetrating through to the substrate.

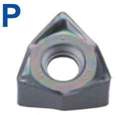
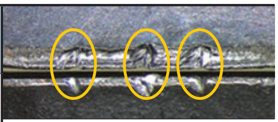
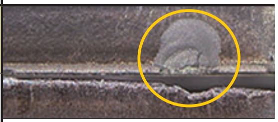
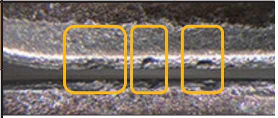
*Graphical Representation.

Al-Ti-Cr-N Based PVD Coating



*Graphical Representation.

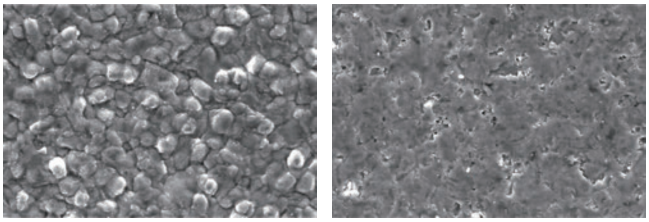
Best Layer of Each Work Material

P 	**(Al,Cr)N** **Tough! Thermal Cracks**	 Thermal Cracks
M 	**TiN** **Tough! Notching**	 Notching
S 	**CrN** **Tough! Resistant Chipping**	 Welding by Chipping

CVD Coating MC5020

First recommendation for cast iron milling.
MC5020 has excellent wear resistance and also controls thermal cracking and chipping that are common when machining ductile cast iron.

Comparison of Coating Surface

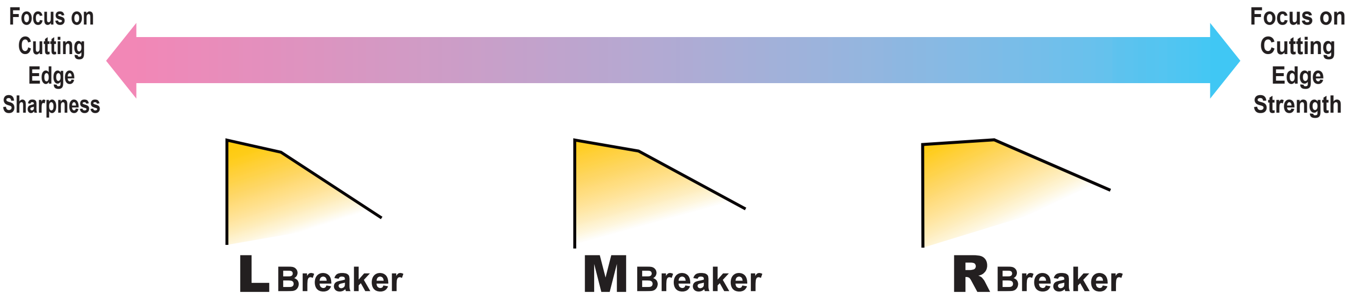


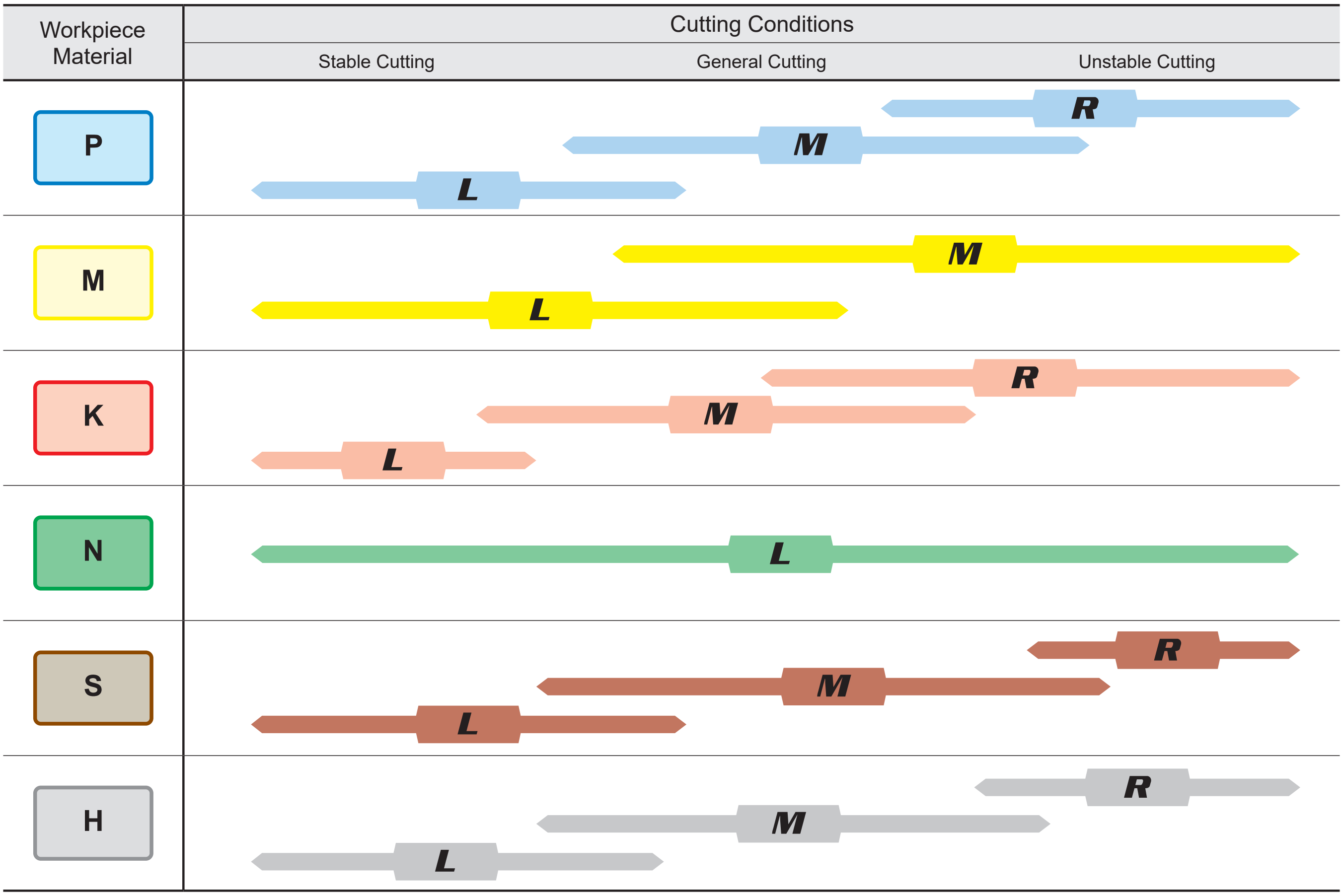
Conventional Coating
Black Super-smooth Coating

Black Super-smooth Coating

Black super-smooth coating prevents abnormal damage such as weld chipping.

Chip Breaker System

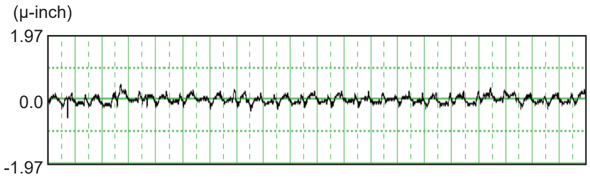
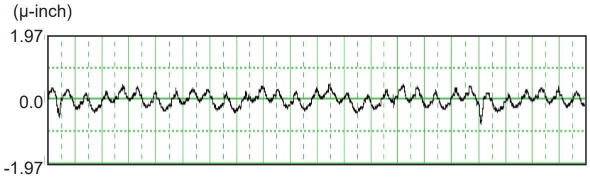
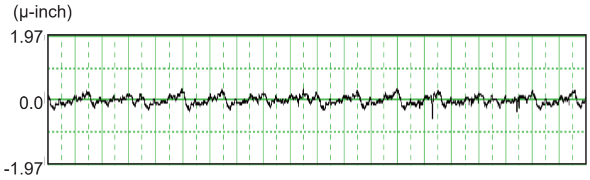




Cutting Performance

AISI 4140 Finished Surface Comparison

WWX400 M class insert achieves the good surface finish as well as conventional G class product.

	Ra (μ-inch)	Rz (μ-inch)	Measured Value
WWX400 MP6120 (Grade M)	**.009**	**.054**	
Conventional (Grade M)	.016	.090	
Conventional (Grade G)	.011	.067	

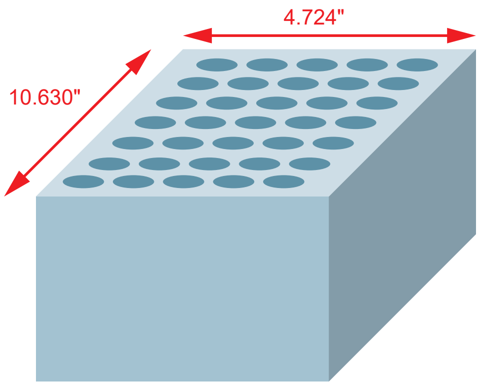
<Cutting Conditions>
Workpiece Material : AISI 4140
Cutter Dia. : DC=ø3.150"
Cutting Speed : vc = 720 SFM
Feed per Tooth : fz = .004 IPT
Depth of Cut : ap = .039"
Width of Cut : ae = 2.520" (.8DC)
Cutting Mode : Dry Cutting
Single Insert

AISI 4140 Fracture Resistance Comparison

High stability is achieved without fracturing even at a feed of fz=.014 IPT.

fz (IPT) Item	**.008**	**.010**	**.012**	**.014**
WWX400 MP6120 (Grade M)	**Good**	**Good**	**Good**	**Good**
Conventional Single-sided Insert	**NG**			

Good : Cutting Length 5.32 Feet Possible
NG : Fracture



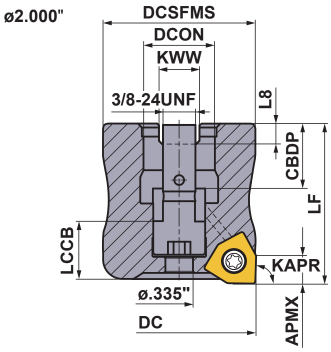
2.66 feet x 2 = 5.32 feet

<Cutting Conditions>
Workpiece Material : AISI 4140
Cutter Dia. : DC=ø3.150"
Cutting Speed : vc = 460 SFM
Depth of Cut : ap = .079"
Width of Cut : ae = 1.575" (.5DC)
Cutting Mode : Dry Cutting
Single Insert

SHOULDER MILLING
<GENERAL CUTTING>

WWX400 2.000" NEW

P M K N S H



Right hand tool holder only.
The set bolt is built in.
Allen wrench (1/4 inch Hex Key size) is used to tighten the set bolt.

■Arbor Type

DCON = inch size, With Coolant Hole

(inch)

DC	Order Number	Stock	*1 No.T	Pitch	LF	DCON	WT (lbs)	APMX	RMPX	RPMX (min^{-1})
		R								
2.000	**WWX400UR2.0003AA**	●	3	Coarse	2.125	.750	1.1	.323	.4°	5000
2.000	**WWX400UR2.0004AA**	●	4	Fine	2.125	.750	1.1	.323	.4°	5000

*1 Number of Teeth
Note 1) The maximum spindle speeds **RPMX** are set to ensure tool and insert stability.
Note 2) When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.
Note 3) The milling cutter has a built-in set bolt. The set bolt cannot be replaced.
Therefore, absolutely do not disassemble the milling cutter.

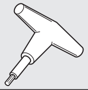
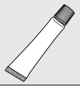
Mounting Dimensions

(inch)

DC	Order Number	DCON	CBDP	LCCB	DCSFMS	KWW	L8
2.000	**WWX400UR2.0003AA**	.750	.858	.787	1.750	.313	.187
2.000	**WWX400UR2.0004AA**	.750	.858	.787	1.750	.313	.187

Spare Parts

(inch)

Tool Holder Type	 *		
	Clamp Screw	Wrench (Insert)	Anti-seize Lubricant
WWX400	TS5R	TKY20T	MK1KS

* Clamp Torque (lbf-in) : TS5R = 44

● : USA Stock

SHOULDER MILLING
<GENERAL CUTTING>

90° KAPR

WWX400

NEW

P M K N S H

Fig.1

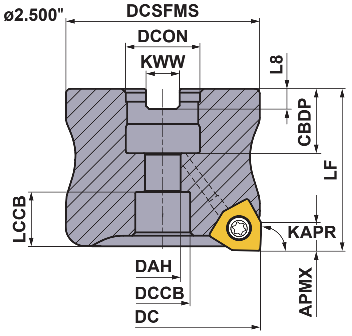
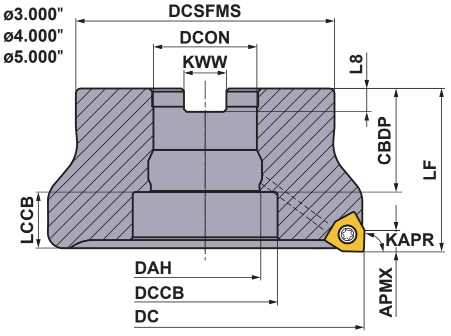


Fig.2



Right hand tool holder only.

Arbor Type

DCON = inch size (inch)

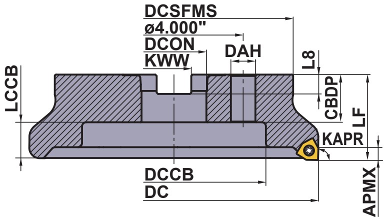
DC	Order Number	Stock	*1 Coolant Hole	*2 No.T	Pitch	LF	DCON	WT (lbs)	APMX	RMPX	RPMX (min^{-1})	Fig.
		R										
2.500	**WWX400UR2.5003CA**	●	Y	3	Coarse	2.000	1.000	1.6	.323	.26°	14000	1
2.500	**WWX400UR2.5004CA**	●	Y	4	Fine	2.000	1.000	1.5	.323	.26°	14000	1
2.500	**WWX400UR2.5005CA**	●	Y	5	Extra Fine	2.000	1.000	1.5	.323	.26°	14000	1
3.000	**WWX400UR3.0004CA**	●	Y	4	Coarse	2.000	1.000	2.1	.323	.16°	12600	2
3.000	**WWX400UR3.0005CA**	●	Y	5	Fine	2.000	1.000	2.1	.323	.16°	12600	2
3.000	**WWX400UR3.0007CA**	●	Y	7	Extra Fine	2.000	1.000	1.9	.323	.16°	12600	2
4.000	**WWX400UR4.0005EA**	●	Y	5	Coarse	2.500	1.500	4.9	.323	—	10700	2
4.000	**WWX400UR4.0007EA**	●	Y	7	Fine	2.500	1.500	4.8	.323	—	10700	2
4.000	**WWX400UR4.0009EA**	●	Y	9	Extra Fine	2.500	1.500	4.7	.323	—	10700	2
5.000	**WWX400UR5.0006EA**	●	Y	6	Coarse	2.500	1.500	7.6	.323	—	9400	2
5.000	**WWX400UR5.0008EA**	●	Y	8	Fine	2.500	1.500	7.5	.323	—	9400	2
5.000	**WWX400UR5.0012EA**	●	Y	12	Extra Fine	2.500	1.500	7.3	.323	—	9400	2
6.000	**WWX400UR6.0008EA**	●	Y	8	Coarse	2.500	1.500	9.9	.323	—	8500	2
6.000	**WWX400UR6.0010EA**	●	Y	10	Fine	2.500	1.500	9.8	.323	—	8500	2
6.000	**WWX400UR6.0014EA**	●	Y	14	Extra Fine	2.500	1.500	9.7	.323	—	8500	2
8.000	**WWX400UR8.0010MN**	●	N	10	Coarse	2.500	2.500	17.3	.323	—	7200	3
8.000	**WWX400UR8.0012MN**	●	N	12	Fine	2.500	2.500	17.2	.323	—	7200	3
8.000	**WWX400UR8.0016MN**	●	N	16	Extra Fine	2.500	2.500	17	.323	—	7200	3
10.000	**WWX400UR10.0012MN**	●	N	12	Coarse	2.500	2.500	29.3	.323	—	6400	3
10.000	**WWX400UR10.0014MN**	●	N	14	Fine	2.500	2.500	29.3	.323	—	6400	3
10.000	**WWX400UR10.0018MN**	●	N	18	Extra Fine	2.500	2.500	29	.323	—	6400	3

*1 Y=Yes, N=No
*2 Number of Teeth

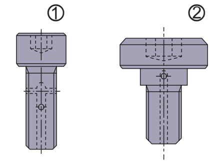
● : USA Stock

Fig.3

ø8.000"
ø10.000"



Right hand tool holder only.

DC	Set Bolt		Geometry
2.500	HSCU50014H	①	 ① ②
3.000	HSCU50014H		
4.000	MBAU75016H	②	
5.000	MBAU75016H		
6.000	MBAU75016H		
8.000	–	–	
10.000	–		

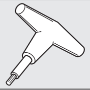
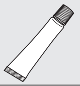
Mounting Dimensions

(inch)

DC	Order Number	DCON	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8	Fig.
2.500	**WWX400UR2.5003CA**	1.000	.945	.539	.787	.670	2.190	.375	.219	1
2.500	**WWX400UR2.5004CA**	1.000	.945	.539	.787	.670	2.190	.375	.219	1
2.500	**WWX400UR2.5005CA**	1.000	.945	.539	.787	.670	2.190	.375	.219	1
3.000	**WWX400UR3.0004CA**	1.000	.945	.539	.787	.670	2.190	.375	.219	2
3.000	**WWX400UR3.0005CA**	1.000	.945	.539	.787	.670	2.190	.375	.219	2
3.000	**WWX400UR3.0007CA**	1.000	.945	.539	.787	.670	2.190	.375	.219	2
4.000	**WWX400UR4.0005EA**	1.500	1.654	1.500	2.205	.776	3.500	.625	.375	2
4.000	**WWX400UR4.0007EA**	1.500	1.654	1.500	2.205	.776	3.500	.625	.375	2
4.000	**WWX400UR4.0009EA**	1.500	1.654	1.500	2.205	.776	3.500	.625	.375	2
5.000	**WWX400UR5.0006EA**	1.500	1.654	1.500	2.205	.776	3.813	.625	.375	2
5.000	**WWX400UR5.0008EA**	1.500	1.654	1.500	2.205	.776	3.813	.625	.375	2
5.000	**WWX400UR5.0012EA**	1.500	1.654	1.500	2.205	.776	3.813	.625	.375	2
6.000	**WWX400UR6.0008EA**	1.500	1.654	1.500	2.205	.776	3.813	.625	.375	2
6.000	**WWX400UR6.0010EA**	1.500	1.654	1.500	2.205	.776	3.813	.625	.375	2
6.000	**WWX400UR6.0014EA**	1.500	1.654	1.500	2.205	.776	3.813	.625	.375	2
8.000	**WWX400UR8.0010MN**	2.500	1.378	.709	5.512	1.052	6.890	1.000	.560	3
8.000	**WWX400UR8.0012MN**	2.500	1.378	.709	5.512	1.052	6.890	1.000	.560	3
8.000	**WWX400UR8.0016MN**	2.500	1.378	.709	5.512	1.052	6.890	1.000	.560	3
10.000	**WWX400UR10.0012MN**	2.500	1.378	.709	7.087	1.052	8.661	1.000	.560	3
10.000	**WWX400UR10.0014MN**	2.500	1.378	.709	7.087	1.052	8.661	1.000	.560	3
10.000	**WWX400UR10.0018MN**	2.500	1.378	.709	7.087	1.052	8.661	1.000	.560	3

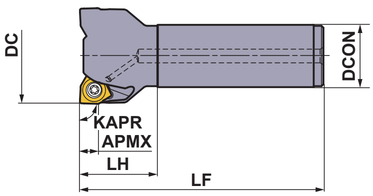
Spare Parts

(inch)

Tool Holder Type	 *		
	Clamp Screw	Wrench (Insert)	Anti-seize Lubricant
WWX400	TS5R	TKY20T	MK1KS

∗ Clamp Torque (lbf-in) : TS5R = 44

Double Sided Insert Type Shoulder Mill



Right hand tool holder only.

Shank Type

With Coolant Hole

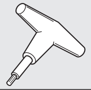
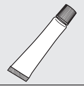
(inch)

DC	Order Number	Stock	* No.T	Pitch	LF	DCON	LH	WT (lbs)	APMX	RMPX	RPMX (min^{-1})
		R									
2.000	**WWX400UR3203FA20M**	●	3	Coarse	4.750	1.250	1.500	1.7	.323	.4°	15800
2.000	**WWX400UR3204FA20M**	●	4	Fine	4.750	1.250	1.500	1.7	.323	.4°	15800
2.500	**WWX400UR4003FA20M**	●	3	Coarse	4.750	1.250	1.500	2.1	.323	.26°	14000
2.500	**WWX400UR4004FA20M**	●	4	Fine	4.750	1.250	1.500	2	.323	.26°	14000
2.500	**WWX400UR4005FA20M**	●	5	Extra Fine	4.750	1.250	1.500	2	.323	.26°	14000
3.000	**WWX400UR4804FA20M**	●	4	Coarse	4.750	1.250	1.500	2.5	.323	.16°	12600
3.000	**WWX400UR4805FA20M**	●	5	Fine	4.750	1.250	1.500	2.4	.323	.16°	12600
3.000	**WWX400UR4807FA20M**	●	7	Extra Fine	4.750	1.250	1.500	2.3	.323	.16°	12600

* Number of Teeth

Spare Parts

(inch)

Tool Holder Type	*  Clamp Screw	 Wrench (Insert)	 Anti-seize Lubricant
WWX400	TS5R	TKY20T	MK1KS

* Clamp Torque (lbf-in) : TS5R = 44

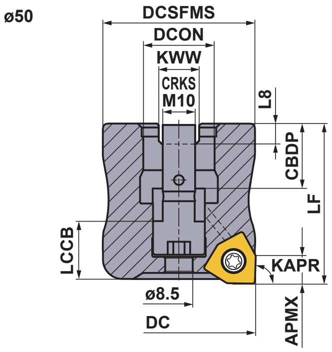
SHOULDER MILLING
<GENERAL CUTTING>

90° KAPR

WWX400 50 NEW

P M K N S H

Metric Standard



Right hand tool holder only.
The set bolt is built in.
Allen wrench (7 mm Hex Key size) is used to tighten the set bolt.

■Arbor Type

DCON = mm size, With Coolant Hole

(mm)

DC	Order Number	Stock R	*1 No.T	Pitch	LF	DCON	WT (kg)	APMX	RMPX	RPMX (min^{-1})
50	**WWX400-050A03AR**	★	3	Coarse	55	22	0.5	8.2	0.4°	5000
50	**WWX400-050A04AR**	★	4	Fine	55	22	0.5	8.2	0.4°	5000

*1 Number of Teeth
Note 1) The maximum spindle speeds **RPMX** are set to ensure tool and insert stability.
Note 2) When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.
Note 3) The milling cutter has a built-in set bolt. The set bolt cannot be replaced.
Therefore, absolutely do not disassemble the milling cutter.

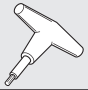
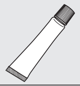
Mounting Dimensions

(mm)

DC	Order Number	DCON	CBDP	LCCB	DCSFMS	KWW	L8
50	**WWX400-050A03AR**	22	20	12.2	47	10.4	6.3
50	**WWX400-050A04AR**	22	20	12.2	47	10.4	6.3

Spare Parts

(mm)

Tool Holder Type	 *		
	Clamp Screw	Wrench (Insert)	Anti-seize Lubricant
WWX400	TS5R	TKY20T	MK1KS

* Clamp Torque (lbf-in) : TS5R = 44

SHOULDER MILLING
<GENERAL CUTTING>

WWX400 NEW

P M K N S H

Fig.1

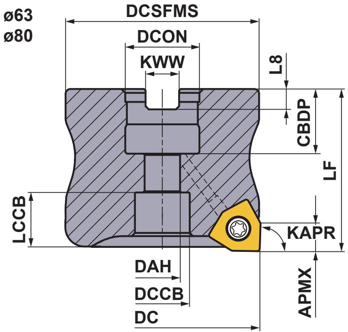


Fig.2

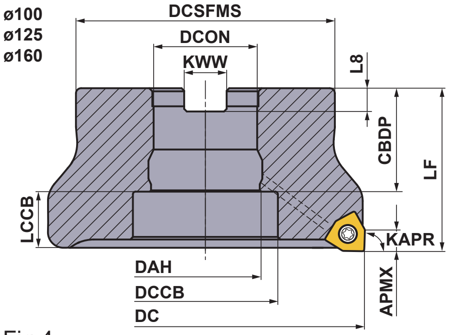


Fig.3

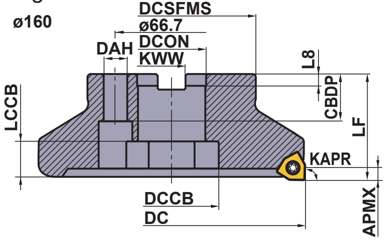
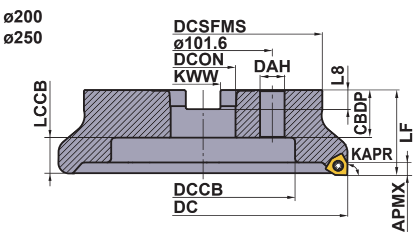


Fig.4



Metric Standard

■Arbor Type

Right hand tool holder only.

DCON = inch size (mm)

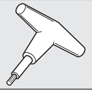
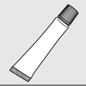
DC	Order Number	Stock	∗1 Coolant Hole	∗2 No.T	Pitch	LF	DCON	WT	APMX	RMPX	RPMX	Fig.
		R						(kg)			(min^{-1})	
80	**WWX400R08004CA**	★	Y	4	Coarse	50	25.4	1.0	8.2	0.16°	12200	1
80	**WWX400R08005CA**	★	Y	5	Fine	50	25.4	1.0	8.2	0.16°	12200	1
80	**WWX400R08007CA**	★	Y	7	Extra Fine	50	25.4	0.9	8.2	0.16°	12200	1
100	**WWX400R10005DA**	★	Y	5	Coarse	50	31.75	1.4	8.2	—	10700	2
100	**WWX400R10007DA**	★	Y	7	Fine	50	31.75	1.4	8.2	—	10700	2
100	**WWX400R10009DA**	★	Y	9	Extra Fine	50	31.75	1.3	8.2	—	10700	2
125	**WWX400R12506EA**	★	Y	6	Coarse	63	38.1	2.8	8.2	—	9500	2
125	**WWX400R12508EA**	★	Y	8	Fine	63	38.1	2.8	8.2	—	9500	2
125	**WWX400R12512EA**	★	Y	12	Extra Fine	63	38.1	2.7	8.2	—	9500	2
160	**WWX400R16008FA**	★	Y	8	Coarse	63	50.8	4.5	8.2	—	8300	2
160	**WWX400R16010FA**	★	Y	10	Fine	63	50.8	4.4	8.2	—	8300	2
160	**WWX400R16014FA**	★	Y	14	Extra Fine	63	50.8	4.3	8.2	—	8300	2
200	**WWX400R20010KN**	★	N	10	Coarse	63	47.625	8.1	8.2	—	7300	4
200	**WWX400R20012KN**	★	N	12	Fine	63	47.625	8.1	8.2	—	7300	4
200	**WWX400R20016KN**	★	N	16	Extra Fine	63	47.625	8.0	8.2	—	7300	4
250	**WWX400R25012KN**	★	N	12	Coarse	63	47.625	12.1	8.2	—	6400	4
250	**WWX400R25014KN**	★	N	14	Fine	63	47.625	12.1	8.2	—	6400	4
250	**WWX400R25018KN**	★	N	18	Extra Fine	63	47.625	12.0	8.2	—	6400	4

∗1 Y=Yes, N=No
∗2 Number of Teeth

Note1) A set bolt to the arbor is not supplied with the body. Please refer to page 415, when ordering.
Note2) Please use a set bolt of the FMA type on the cutter body from 80 to 250 in diameter(DC).

Spare Parts

(mm)

Tool Holder Type	 ∗		
	Clamp Screw	Wrench (Insert)	Anti-seize Lubricant
WWX400	TS5R	TKY20T	MK1KS

∗ Clamp Torque (lbf-in) : TS5R = 44

★ : **Stocked in Japan**

Metric Standard

Arbor Type

DCON=mm size (mm)

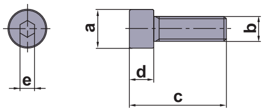
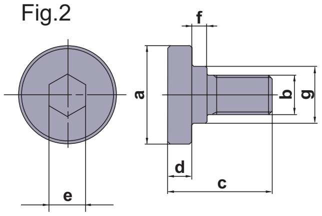
DC	Order Number	Stock	*1 Coolant Hole	*2 No.T	Pitch	LF	DCON	WT (kg)	APMX	RMPX	RPMX (min^{-1})	Fig.
		R										
63	**WWX400-063A03AR**	★	Y	3	Coarse	40	22	0.5	8.2	0.26°	14100	1
63	**WWX400-063A04AR**	★	Y	4	Fine	40	22	0.5	8.2	0.26°	14100	1
63	**WWX400-063A05AR**	★	Y	5	Extra Fine	40	22	0.5	8.2	0.26°	14100	1
80	**WWX400-080A04AR**	★	Y	4	Coarse	50	27	1.0	8.2	0.16°	12200	1
80	**WWX400-080A05AR**	★	Y	5	Fine	50	27	1.0	8.2	0.16°	12200	1
80	**WWX400-080A07AR**	★	Y	7	Extra Fine	50	27	0.9	8.2	0.16°	12200	1
100	**WWX400-100B05AR**	★	Y	5	Coarse	50	32	1.6	8.2	—	10700	2
100	**WWX400-100B07AR**	★	Y	7	Fine	50	32	1.5	8.2	—	10700	2
100	**WWX400-100B09AR**	★	Y	9	Extra Fine	50	32	1.5	8.2	—	10700	2
125	**WWX400-125B06AR**	★	Y	6	Coarse	63	40	3.0	8.2	—	9500	2
125	**WWX400-125B08AR**	★	Y	8	Fine	63	40	3.0	8.2	—	9500	2
125	**WWX400-125B12AR**	★	Y	12	Extra Fine	63	40	2.9	8.2	—	9500	2
160	**WWX400-160C08NR**	★	N	8	Coarse	63	40	4.5	8.2	—	8300	3
160	**WWX400-160C10NR**	★	N	10	Fine	63	40	4.4	8.2	—	8300	3
160	**WWX400-160C14NR**	★	N	14	Extra Fine	63	40	4.4	8.2	—	8300	3
200	**WWX400-200C10NR**	★	N	10	Coarse	63	60	6.7	8.2	—	7300	4
200	**WWX400-200C12NR**	★	N	12	Fine	63	60	6.7	8.2	—	7300	4
200	**WWX400-200C16NR**	★	N	16	Extra Fine	63	60	6.6	8.2	—	7300	4
250	**WWX400-250C12NR**	★	N	12	Coarse	63	60	11.5	8.2	—	6400	4
250	**WWX400-250C14NR**	★	N	14	Fine	63	60	11.5	8.2	—	6400	4
250	**WWX400-250C18NR**	★	N	18	Extra Fine	63	60	11.4	8.2	—	6400	4

*1 Y=Yes, N=No
*2 Number of Teeth

Note1) A set bolt to the arbor is not supplied with the body. Please refer to page 415, when ordering.
Note2) Please use a set bolt of the FMC type on the cutter body from 63 to 100 in diameter(DC).
Note3) Please use a set bolt of the FMA type on the cutter body from 125 to 250 in diameter(DC).

Parts Sold Separately
Set Bolt

(mm)

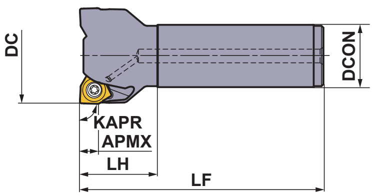
Tool Holder Type	Set Bolt		Fig.	Reference Dimensions							Geometry
	With Coolant Hole	Without Coolant Hole									
	Order Number	Order Number		a	b	c	d	e	f	g	
WWX400R080◌◌CA	HSC12035H	HSC12035	1	18	M12×1.75	47	12	10	–	–	Fig.1 
WWX400R100◌◌DA	MBA16033H	–	2	40	M16×2	43	10	14	6	23	
WWX400R125◌◌EA	MBA20040H	–	2	50	M20×2.5	54	14	17	6	27	
WWX400R160◌◌FA	MBA24045H	–	2	65	M24×3	59	14	17	10	37	
WWX400R200◌◌KN	–	–	1	24	M16×2	61-	16	14	–	–	
WWX400R250◌◌KN	–	–	1	24	M16×2	61-	16	14	–	–	
WWX400-063A◌◌AR	HSC10030H	HSC10035	1	16	M10×1.5	40	10	6	–	–	Fig.2 
WWX400-080A◌◌AR	HSC12035H	HSC12035	1	18	M12×1.75	47	12	10	–	–	
WWX400-100B◌◌AR	MBA16033H	–	2	40	M16×2	43	10	14	6	23	
WWX400-125B◌◌AR	MBA20040H	–	2	50	M20×2.5	54	14	17	6	27	
WWX400-160C◌◌NR	–	–	2	50	M20×2.5	54	14	17	6	27	
WWX400-200C◌◌NR	–	–	1	24	M16×2	61-	16	14	–	–	
WWX400-250C◌◌NR	–	–	1	24	M16×2	61-	16	14	–	–	

Note 1) Internal coolant is necessary with the set bolt.

Mounting Dimensions

(mm)

DC	Order Number	DCON	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8	Fig.
63	**WWX400-063A03AR**	22	20	11	17	11.2	50	10.4	6.3	1
63	**WWX400-063A04AR**	22	20	11	17	11.2	50	10.4	6.3	1
63	**WWX400-063A05AR**	22	20	11	17	11.2	50	10.4	6.3	1
80	**WWX400R08004CA**	25.4	26	13	20	14.2	56	9.5	6	1
80	**WWX400R08005CA**	25.4	26	13	20	14.2	56	9.5	6	1
80	**WWX400R08007CA**	25.4	26	13	20	14.2	56	9.5	6	1
80	**WWX400-080A04AR**	27	23	13	20	14.2	56	12.4	7	1
80	**WWX400-080A05AR**	27	23	13	20	14.2	56	12.4	7	1
80	**WWX400-080A07AR**	27	23	13	20	14.2	56	12.4	7	1
100	**WWX400R10005DA**	31.75	37	31.75	45	11.2	70	12.7	8	2
100	**WWX400R10007DA**	31.75	37	31.75	45	11.2	70	12.7	8	2
100	**WWX400R10009DA**	31.75	37	31.75	45	11.2	70	12.7	8	2
100	**WWX400-100B05AR**	32	32	32	45	16.2	78	14.4	8	2
100	**WWX400-100B07AR**	32	32	32	45	16.2	78	14.4	8	2
100	**WWX400-100B09AR**	32	32	32	45	16.2	78	14.4	8	2
125	**WWX400R12506EA**	38.1	42	38.1	56	19.2	80	15.9	10	2
125	**WWX400R12508EA**	38.1	42	38.1	56	19.2	80	15.9	10	2
125	**WWX400R12512EA**	38.1	42	38.1	56	19.2	80	15.9	10	2
125	**WWX400-125B06AR**	40	40	40	56	21.2	89	16.4	9	2
125	**WWX400-125B08AR**	40	40	40	56	21.2	89	16.4	9	2
125	**WWX400-125B12AR**	40	40	40	56	21.2	89	16.4	9	2
160	**WWX400-160C08NR**	40	40	14	56	21.2	100	16.4	9	3
160	**WWX400-160C10NR**	40	40	14	56	21.2	100	16.4	9	3
160	**WWX400-160C14NR**	40	40	14	56	21.2	100	16.4	9	3
160	**WWX400R16008FA**	50.8	45	50.8	72	16.2	100	19.1	11	2
160	**WWX400R16010FA**	50.8	45	50.8	72	16.2	100	19.1	11	2
160	**WWX400R16014FA**	50.8	45	50.8	72	16.2	100	19.1	11	2
200	**WWX400R20010KN**	47.625	35	18	135	26.2	175	25.4	14.22	4
200	**WWX400R20012KN**	47.625	35	18	135	26.2	175	25.4	14.22	4
200	**WWX400R20016KN**	47.625	35	18	135	26.2	175	25.4	14.22	4
200	**WWX400-200C10NR**	60	32	18	135	29.2	160	25.7	14.22	4
200	**WWX400-200C12NR**	60	32	18	135	29.2	160	25.7	14.22	4
200	**WWX400-200C16NR**	60	32	18	135	29.2	160	25.7	14.22	4
250	**WWX400R25012KN**	47.625	35	18	180	26.2	210	25.4	14.22	4
250	**WWX400R25014KN**	47.625	35	18	180	26.2	210	25.4	14.22	4
250	**WWX400R25018KN**	47.625	35	18	180	26.2	210	25.4	14.22	4
250	**WWX400-250C12NR**	60	32	18	180	29.2	210	25.7	14.22	4
250	**WWX400-250C14NR**	60	32	18	180	29.2	210	25.7	14.22	4
250	**WWX400-250C18NR**	60	32	18	180	29.2	210	25.7	14.22	4



Right hand tool holder only.

Metric Standard

■Shank Type

With Coolant Hole

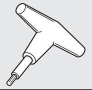
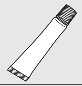
(mm)

DC	Order Number	Stock R	* No.T	Pitch	LF	DCON	LH	WT (kg)	APMX	RMPX	RPMX (min^{-1})
50	**WWX400R5003SA32M**	★	3	Coarse	125	32	40	0.8	8.2	0.4°	16000
50	**WWX400R5004SA32M**	★	4	Fine	125	32	40	0.8	8.2	0.4°	16000
63	**WWX400R6303SA32M**	★	3	Coarse	125	32	40	1.0	8.2	0.26°	14100
63	**WWX400R6304SA32M**	★	4	Fine	125	32	40	1.0	8.2	0.26°	14100
63	**WWX400R6305SA32M**	★	5	Extra Fine	125	32	40	1.0	8.2	0.26°	14100
80	**WWX400R8004SA32M**	★	4	Coarse	125	32	40	1.3	8.2	0.16°	12200
80	**WWX400R8005SA32M**	★	5	Fine	125	32	40	1.3	8.2	0.16°	12200
80	**WWX400R8007SA32M**	★	7	Extra Fine	125	32	40	1.2	8.2	0.16°	12200

* Number of Teeth

Spare Parts

(mm)

Tool Holder Type	 *		
	Clamp Screw	Wrench (Insert)	Anti-seize Lubricant
WWX400	TS5R	TKY20T	MK1KS

* Clamp Torque (lbf-in) : TS5R = 44

★ : Stocked in Japan

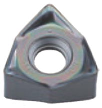
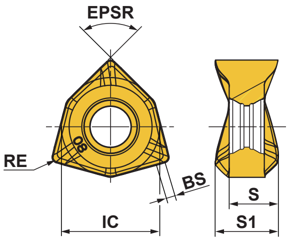
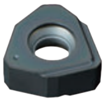
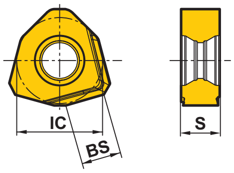
Inserts

(inch)

Workpiece Material			MC5020	MP6120	MP6130	MP7130	MP9120	MP9130	VP15TF		TF15	
	P	Steels		◆	◆				◆			
	M	Stainless Steels				◆			◆			
	K	Cast Irons	◆						◆			
	N	Non-ferrous Metals									◆	
	S	Heat Resistant Alloys, Titanium Alloys					◆	◆				
	H	Hardened Steels							◆			

This is the selection guideline for WWX400.
Please note that the cutting conditions differ depending on multiple factors, for more details refer to the Recommended Cutting Conditions.

Edge Preparation :
E : Round **F :** Sharp

Shape	Order Number	Class	Edge Preparation	Coated								Carbide		IC	S	S1	BS	RE	Geometry
				MC5020	MP6120	MP6130	MP7130	MP9120	MP9130	VP15TF		TF15							
	**6NGU1409040PNER-L**	G	E	●	●	●	●	●	●	●				.551	.276	.354	.067	.016	
	6NGU1409080PNER-L	G	E	●	●	●	●	●	●	●				.551	.276	.354	.051	.031	
	6NGU1409040PNFR-L	G	F									●		.551	.276	.354	.067	.016	
	6NGU1409080PNFR-L	G	F									●		.551	.276	.354	.051	.031	
	6NGU1409040PNER-M	G	E	●	●	●	●	●	●	●				.551	.276	.354	.067	.016	
	6NGU1409080PNER-M	G	E	●	●	●	●	●	●	●				.551	.276	.354	.051	.031	
	6NMU1409040PNER-M	M	E	●	●	●	●	●	●	●				.551	.276	.354	.067	.016	
	6NMU1409080PNER-M	M	E	●	●	●	●	●	●	●				.551	.276	.354	.051	.031	
	6NMU1409080PNER-R	M	E	●	●	●		●	●	●				.551	.276	.354	.051	.031	
 Wiper	**2NGU1406ZNER6C-M**	G	E	●	●					●				.551	.248	—	.256	—	

Instructions for Use of Wiper Inserts

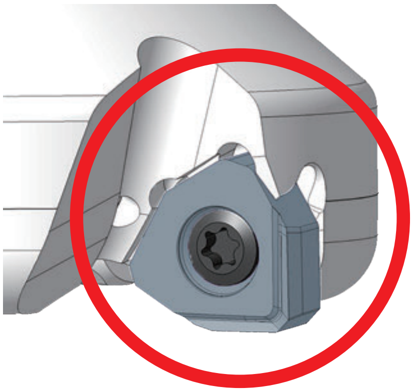


Fig.1

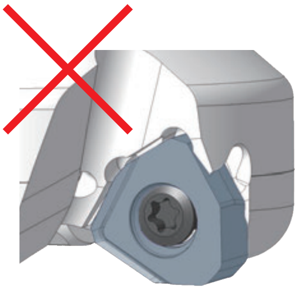


Fig.2

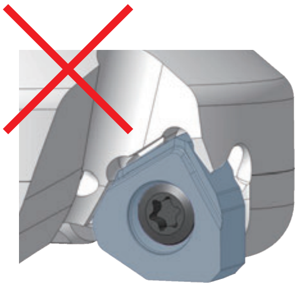


Fig.3

Wiper inserts for WWX400 are two-cornered. Please set as shown in Fig.1.
Excellent surface finish can be achieved with one wiper.
Set more than 2 wiper inserts, equally spaced, when the feed per revolution is larger than 6.5mm/rev.
When choosing a wiper insert select a general grade that is similar to the ideal cutting conditions.

● : USA Stock ★ : Stocked in Japan (10 inserts in one case)

Memo

Recommended Cutting Conditions

■ Dry Cutting

Cutting Speed

(inch)

	Workpiece Material	Properties	Cutting Conditions	Grade	Width of Cut **ae**		
					.5DC≥	.8DC≥	DC(Slot)
					Cutting Speed **vc** (SFM)		
P	Mild Steels	Hardness ≤180HB	●	MP6120	785(655–920)	720(590–850)	655(525–785)
			◕	MP6130	755(620–885)	690(560–820)	620(490–755)
			✤	MP6130,VP15TF	690(560–820)	620(490–755)	560(425–690)
	Carbon Steels Alloy Steels	Hardness 180–280HB	●	MP6120	690(560–820)	620(490–755)	560(425–690)
			◕	MP6130	655(525–785)	590(460–720)	525(395–655)
			✤	MP6130,VP15TF	590(460–720)	525(395–655)	460(330–590)
	Carbon Steels Alloy Steels Alloy Tool Steels	Hardness 280–350HB ≤350HB (Annealing)	●	MP6120	655(525–785)	590(460–720)	525(395–655)
			◕	MP6130	620(490–755)	560(425–690)	490(360–620)
			✤	MP6130,VP15TF	560(425–690)	490(360–620)	425(295–560)
	Pre-hardened Steels	Hardness 35–45HRC	●	MP6120	460(395–525)	–	–
			◕	MP6130	395(330–460)	–	–
			✤	MP6130,VP15TF	360(295–425)	–	–
M	Austenitic Stainless Steels	Hardness ≤200HB	●	MP7130	590(525–655)	525(460–590)	–
			◕	MP7130,VP15TF	560(490–620)	490(425–560)	–
			✤	MP7130,VP15TF	490(425–560)	425(360–490)	–
	Austenitic Stainless Steels	Hardness >200HB	●	MP7130	560(490–620)	490(425–560)	–
			◕	MP7130,VP15TF	525(460–590)	460(395–525)	–
			✤	MP7130,VP15TF	460(395–525)	395(330–460)	–
	Ferritic and Martensitic Stainless Steels	Hardness ≤200HB	●	MP7130	590(525–655)	525(460–590)	–
			◕	MP7130,VP15TF	560(490–620)	490(425–560)	–
			✤	MP7130,VP15TF	490(425–560)	425(360–490)	–
	Duplex Stainless Steels	Hardness ≤280HB	●	MP7130	525(460–590)	460(395–525)	–
			◕	MP7130,VP15TF	490(425–560)	425(360–490)	–
			✤	MP7130,VP15TF	425(360–490)	360(295–425)	–
	Precipitation Hardening Stainless Steels	Hardness <450HB	●	MP7130	460(395–525)	–	–
			◕	MP7130,VP15TF	425(360–490)	–	–
			✤	MP7130,VP15TF	360(295–425)	–	–
K	Gray Cast Irons	Tensile Strength ≤350MPa	●	MC5020	820(690–950)	755(620–885)	690(560–820)
			◕	MC5020	785(655–920)	720(590–850)	655(525–785)
			◕	VP15TF	785(655–920)	720(590–850)	–
			✤	MC5020,VP15TF	720(590–850)	655(525–785)	590(460–720)
	Ductile Cast Irons	Tensile Strength ≤450MPa	●	MC5020	720(590–850)	655(525–785)	590(460–720)
			◕	MC5020	690(560–820)	620(490–755)	560(425–690)
			◕	VP15TF	690(560–820)	620(490–755)	–
			✤	MC5020,VP15TF	620(490–755)	560(425–690)	490(360–620)
	Ductile Cast Irons	Tensile Strength ≤800MPa	●	MC5020	590(460–720)	525(395–655)	460(330–590)
			◕	MC5020	560(425–690)	490(360–620)	425(295–560)
			◕	VP15TF	560(425–690)	490(360–620)	–
			✤	MC5020,VP15TF	490(360–620)	425(295–560)	360(230–490)
H	Hardened Steels	Hardness 40–55HRC	●	VP15TF	165(100–230)	–	–
			◕	VP15TF	165(100–230)	–	–

Note 1) The recommended cutting speed has been calculated for a depth of cut .079 inch. Please reduce the cutting speed by an appropriate amount corresponding to the increase in cutting depth.

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✤ : Unstable Cutting

■ Wet Cutting
Cutting Speed

(inch)

	Workpiece Material	Properties	Cutting Conditions	Grade	Width of Cut **ae**		
					.5DC≥	.8DC≥	DC(Slot)
					Cutting Speed **vc** (SFM)		
P	Mild Steels	Hardness ≤180HB	●	MP6120	490(460–525)	425(395–460)	395(360–425)
			◐	MP6130	460(425–490)	395(360–425)	360(330–395)
			✤	MP6130,VP15TF	395(360–425)	330(295–360)	295(260–330)
	Carbon Steels Alloy Steels	Hardness 180–280HB	●	MP6120	490(460–525)	425(395–460)	395(360–425)
			◐	MP6130	460(425–490)	395(360–425)	360(330–395)
			✤	MP6130,VP15TF	395(360–425)	330(295–360)	295(260–330)
	Carbon Steels Alloy Steels Alloy Tool Steels	Hardness 280–350HB ≤350HB (Annealing)	●	MP6120	460(425–490)	395(360–425)	360(330–395)
			◐	MP6130	425(395–460)	360(330–395)	330(295–360)
			✤	MP6130,VP15TF	360(330–395)	295(260–330)	260(230–295)
	Pre-hardened Steels	Hardness 35–45HRC	●	MP6120	360(330–395)	—	—
			◐	MP6130	330(295–360)	—	—
			✤	MP6130,VP15TF	260(230–295)	—	—
M	Austenitic Stainless Steels	Hardness ≤200HB	●	MP7130	425(395–460)	360(330–395)	—
			◐	MP7130,VP15TF	395(360–425)	330(295–360)	—
			✤	MP7130,VP15TF	330(295–360)	260(230–295)	—
	Austenitic Stainless Steels	Hardness >200HB	●	MP7130	425(395–460)	360(330–395)	—
			◐	MP7130,VP15TF	395(360–425)	330(295–360)	—
			✤	MP7130,VP15TF	330(295–360)	260(230–295)	—
	Ferritic and Martensitic Stainless Steels	Hardness ≤200HB	●	MP7130	425(395–460)	360(330–395)	—
			◐	MP7130,VP15TF	395(360–425)	330(295–360)	—
			✤	MP7130,VP15TF	330(295–360)	260(230–295)	—
	Duplex Stainless Steels	Hardness ≤280HB	●	MP7130	395(360–425)	330(295–360)	—
			◐	MP7130,VP15TF	360(330–395)	295(260–330)	—
			✤	MP7130,VP15TF	295(260–330)	230(195–260)	—
	Precipitation Hardening Stainless Steels	Hardness <450HB	●	MP7130	395(360–425)	—	—
			◐	MP7130,VP15TF	360(330–395)	—	—
			✤	MP7130,VP15TF	295(260–330)	—	—
K	Gray Cast Irons	Tensile Strength ≤350MPa	●	MC5020	560(490–620)	490(425–560)	425(360–490)
			◐	MC5020	525(460–590)	460(395–525)	395(330–460)
			◐	VP15TF	525(460–590)	460(395–525)	—
			✤	MC5020,VP15TF	460(395–525)	395(330–460)	330(260–395)
	Ductile Cast Irons	Tensile Strength ≤450MPa	●	MC5020	560(490–620)	490(425–560)	425(360–490)
			◐	MC5020	525(460–590)	460(395–525)	395(330–460)
			◐	VP15TF	525(460–590)	460(395–525)	—
			✤	MC5020,VP15TF	460(395–525)	395(330–460)	330(260–395)
	Ductile Cast Irons	Tensile Strength ≤800MPa	●	MC5020	525(490–560)	460(425–490)	395(360–425)
			◐	MC5020	490(460–525)	425(395–460)	360(330–395)
			◐	VP15TF	490(460–525)	425(395–460)	—
			✤	MC5020,VP15TF	425(395–460)	360(330–395)	295(260–330)
N	Aluminum Alloys	Content Si<5%	●	TF15	1640(985–2950)	1640(985–2950)	1640(985–2950)
			◐	TF15	1640(985–2950)	1640(985–2950)	1640(985–2950)
			✤	TF15	1310(655–2625)	1310(655–2625)	1310(655–2625)
S	Titanium Alloys	—	●	MP9120	260(195–330)	—	—
			◐	MP9120	230(165–295)	—	—
			✤	MP9130	195(130–260)	—	—
	Heat Resistant Alloys	—	●	MP9120	195(165–230)	—	—
			◐	MP9120	165(100–195)	—	—
			✤	MP9130	130(65–130)	—	—
H	Hardened Steels	Hardness 40–55HRC	●	VP15TF	165(100–230)	—	—
			◐	VP15TF	165(100–230)	—	—

Note 1) Refer to the above table and set up cutting conditions according to cutting applications.

Recommended Cutting Conditions

Depth of Cut / Feed per Tooth

	Workpiece Material	Properties	Cutting Conditions	Grade	Width of Cut ae		
					.5DC≥		
					Breaker	Depth of Cut **ap**	Feed per Tooth **fz** (IPT)
P	Mild Steels	Hardness ≤180HB	●	MP6120	L,M	≤.157	.005(.004–.006)
			◐	MP6130	L,M	≤.157	.005(.004–.006)
			◐		M,R	≤.157	.006(.004–.008)
			✣	MP6130,VP15TF	M,R	≤.157	.005(.004–.006)
	Carbon Steels Alloy Steels	Hardness 180–280HB	●	MP6120	L,M	≤.157	.005(.004–.006)
			◐	MP6130	L,M	≤.157	.005(.004–.006)
			◐		M,R	≤.157	.006(.004–.008)
			✣	MP6130,VP15TF	M,R	≤.157	.005(.004–.006)
	Carbon Steels Alloy Steels Alloy Tool Steels	Hardness 280–350HB ≤350HB (Annealing)	●	MP6120	L,M	≤.118	.005(.004–.006)
			◐	MP6130	L,M	≤.118	.005(.004–.006)
			◐		M,R	≤.118	.006(.004–.008)
			✣	MP6130,VP15TF	M,R	≤.118	.005(.004–.006)
	Pre-hardened Steels	Hardness 35–45HRC	●	MP6120	L,M	≤.079	.005(.004–.006)
			◐	MP6130	L,M	≤.079	.005(.004–.006)
			◐		M,R	≤.079	.006(.004–.008)
			✣	MP6130,VP15TF	M,R	≤.079	.005(.004–.006)
M	Austenitic Stainless Steels	Hardness ≤200HB	● ◐	MP7130	L,M	≤.157	.005(.004–.006)
			◐	VP15TF	M	≤.157	.006(.004–.008)
			✣	MP7130,VP15TF	M	≤.157	.005(.004–.006)
	Austenitic Stainless Steels	Hardness >200HB	●	MP7130	L,M	≤.157	.005(.004–.006)
			◐	MP7130	L,M	≤.118	.005(.004–.006)
			◐	VP15TF	M	≤.118	.006(.004–.008)
			✣	MP7130,VP15TF	M	≤.118	.005(.004–.006)
	Ferritic and Martensitic Stainless Steels	Hardness ≤200HB	● ◐	MP7130	L,M	≤.157	.005(.004–.006)
			◐	VP15TF	M	≤.157	.006(.004–.008)
			✣	MP7130,VP15TF	M	≤.118	.005(.004–.006)
	Duplex Stainless Steels	Hardness ≤280HB	● ◐	MP7130	L,M	≤.118	.005(.004–.006)
			● ◐	MP7130	L,M	≤.157	.005(.004–.006)
			◐	VP15TF	M	≤.118	.006(.004–.008)
			◐	VP15TF	M	≤.157	.006(.004–.008)
			✣	MP7130,VP15TF	M	≤.118	.005(.004–.006)
			✣	MP7130,VP15TF	M	≤.157	.005(.004–.006)
	Precipitation Hardening Stainless Steels	Hardness <450HB	●	MP7130	L,M	≤.079	.005(.004–.006)
			◐	MP7130	L,M	≤.079	.005(.004–.006)
			◐	VP15TF	M	≤.079	.006(.004–.008)
			✣	MP7130,VP15TF	M	≤.079	.005(.004–.006)
K	Gray Cast Irons	Tensile Strength ≤350MPa	● ◐	MC5020	L,M	≤.157	.005(.004–.006)
			◐	VP15TF	M,R	≤.157	.006(.004–.008)
			✣	MC5020,VP15TF	M,R	≤.157	.005(.004–.006)
	Ductile Cast Irons	Tensile Strength ≤800MPa	● ◐	MC5020	L,M	≤.157	.005(.004–.006)
			◐	VP15TF	M,R	≤.157	.006(.004–.008)
			✣	MC5020,VP15TF	M,R	≤.157	.005(.004–.006)
N	Aluminum Alloys	Content Si<5%	● ◐ ✣	TF15	L	≤.157	.005(.004–.006)
S	Titanium Alloys	–	● ◐	MP9120	L,M	≤.079	.004(.002–.005)
			✣	MP9130	L,M	≤.079	.004(.002–.005)
	Heat Resistant Alloys	–	● ◐	MP9120	L,M	≤.079	.004(.002–.005)
			✣	MP9130	L,M	≤.079	.004(.002–.005)
H	Hardened Steels	Hardness 40–55HRC	●	VP15TF	M	≤.079	.002(.002–.004)
			◐	VP15TF	M,R	≤.079	.002(.002–.004)

Note 1) Refer to the above table and set up cutting conditions according to cutting applications.

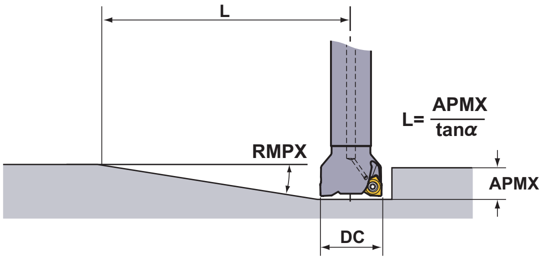
Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✣ : Unstable Cutting

(inch)

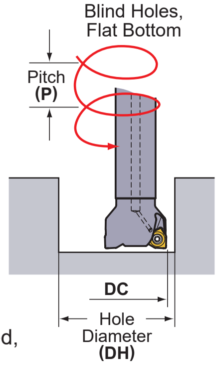
Width of Cut **ae**						Cutting Mode
.8DC≥			DC(Slot)			
Breaker	Depth of Cut **ap**	Feed per Tooth **fz** (IPT)	Breaker	Depth of Cut **ap**	Feed per Tooth **fz** (IPT)	
L,M	≤.118	.005(.004–.006)	L,M	≤.079	.005(.004–.006)	Dry, Wet
L,M	≤.118	.005(.004–.006)	L,M	≤.079	.005(.004–.006)	Dry, Wet
M,R	≤.118	.006(.004–.008)	—	—	—	Dry, Wet
M,R	≤.118	.005(.004–.006)	M	≤.079	.005(.004–.006)	Dry, Wet
L,M	≤.118	.005(.004–.006)	L,M	≤.079	.005(.004–.006)	Dry, Wet
L,M	≤.118	.005(.004–.006)	L,M	≤.079	.005(.004–.006)	Dry, Wet
M,R	≤.118	.006(.004–.008)	—	—	—	Dry, Wet
M,R	≤.118	.005(.004–.006)	M	≤.079	.005(.004–.006)	Dry, Wet
L,M	≤.118	.005(.004–.006)	L,M	≤.118	.005(.004–.006)	Dry, Wet
L,M	≤.118	.005(.004–.006)	L,M	≤.079	.005(.004–.006)	Dry, Wet
M,R	≤.118	.006(.004–.008)	—	—	—	Dry, Wet
M,R	≤.118	.005(.004–.006)	M	≤.079	.005(.004–.006)	Dry, Wet
—	—	—	—	—	—	Dry, Wet
—	—	—	—	—	—	Dry, Wet
—	—	—	—	—	—	Dry, Wet
—	—	—	—	—	—	Dry, Wet
L,M	≤.118	.005(.004–.006)	—	—	—	Dry, Wet
M	≤.118	.006(.004–.008)	—	—	—	Dry, Wet
M	≤.118	.005(.004–.006)	—	—	—	Dry, Wet
L,M	≤.118	.005(.004–.006)	—	—	—	Dry, Wet
L,M	≤.118	.005(.004–.006)	—	—	—	Dry, Wet
M	≤.118	.006(.004–.008)	—	—	—	Dry, Wet
M	≤.118	.005(.004–.006)	—	—	—	Dry, Wet
L,M	≤.118	.005(.004–.006)	—	—	—	Dry, Wet
M	≤.118	.006(.004–.008)	—	—	—	Dry, Wet
M	≤.118	.005(.004–.006)	—	—	—	Dry, Wet
L,M	≤.118	.005(.004–.006)	—	—	—	Dry
L,M	≤.118	.005(.004–.006)	—	—	—	Wet
M	≤.118	.006(.004–.008)	—	—	—	Dry
M	≤.118	.006(.004–.008)	—	—	—	Wet
M	≤.118	.006(.004–.008)	—	—	—	Dry
M	≤.118	.005(.004–.006)	—	—	—	Wet
—	—	—	—	—	—	Dry, Wet
—	—	—	—	—	—	Dry, Wet
—	—	—	—	—	—	Dry, Wet
—	—	—	—	—	—	Dry, Wet
L,M	≤.118	.005(.004–.006)	L,M	≤.079	.005(.004–.006)	Dry, Wet
M,R	≤.118	.006(.004–.008)	—	—	—	Dry, Wet
M,R	≤.118	.005(.004–.006)	M,R	≤.079	.005(.004–.006)	Dry, Wet
L,M	≤.118	.005(.004–.006)	L,M	≤.079	.005(.004–.006)	Dry, Wet
M,R	≤.118	.006(.004–.008)	—	—	—	Dry, Wet
M,R	≤.118	.005(.004–.006)	M,R	≤.079	.005(.004–.006)	Dry, Wet
L	≤.118	.005(.004–.006)	L	≤.079	.005(.004–.006)	Wet
—	—	—	—	—	—	Wet
—	—	—	—	—	—	Wet
—	—	—	—	—	—	Wet
—	—	—	—	—	—	Wet
—	—	—	—	—	—	Dry, Wet
—	—	—	—	—	—	Dry, Wet

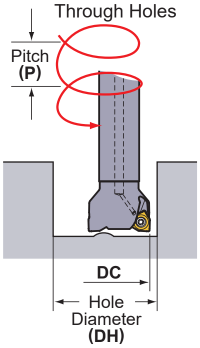
Ramping / Helical Milling

● Ramping



● Helical Milling





Refer to the table below for cutting conditions. For feed per tooth and cutting speed, follow the cutting conditions for slot milling.

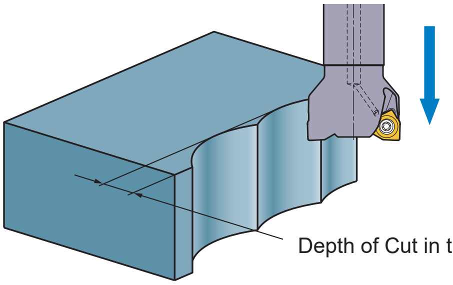
(inch)

DC		RE	APMX	Ramping		Helical Milling (Blind Hole, Flat Bottom)				Helical Milling (Through Hole)	
inch	mm			Maximum Ramping Angle RMPX	Minimum Distance * L	Maximum Hole Diameter DH max.	Maximum Pitch P max.	Minimum Hole Diameter DH min.	Maximum Pitch P max.	Minimum Hole Diameter DH min.	Maximum Pitch P max.
1.969	50	.016	.315	.40°	46.260	3.878	.042	3.748	.039	3.248	.028
1.969	50	.031	.315	.40°	46.260	3.846	.041	3.748	.039	3.248	.028
2.000	—	.016	.315	.40°	46.260	3.929	.042	3.811	.040	3.295	.028
2.000	—	.031	.315	.40°	46.260	3.898	.042	3.811	.040	3.295	.028
2.480	63	.016	.315	.26°	71.142	4.902	.035	4.772	.033	4.276	.024
2.480	63	.031	.315	.26°	71.142	4.870	.034	4.772	.033	4.276	.024
2.500	—	.016	.315	.26°	71.142	4.929	.035	4.811	.033	4.299	.026
2.500	—	.031	.315	.26°	71.142	4.898	.034	4.811	.033	4.299	.026
3.000	—	.016	.315	.16°	115.591	5.929	.026	5.811	.025	5.299	.020
3.000	—	.031	.315	.16°	115.591	5.898	.026	5.811	.025	5.299	.020
3.150	80	.016	.315	.16°	115.591	6.240	.027	6.110	.026	5.614	.020
3.150	80	.031	.315	.16°	115.591	6.209	.027	6.114	.026	5.614	.020

*Shows the distance until a maximum depth of cut of .315” is achieved at the maximum ramping angle L (= .315”/tan α).
Note 1) When ramping and helical milling, it is recommended to reduce the feed per tooth.
Note 2) When ramping and helical milling, long continuous chips may be scattered so please be careful.

<Helical Milling>
To obtain a flat bottom surface when helical millimg, it requires to remove “the uncut part” in the center of the workpiece material at a final pass.
When helical milling, make sure that the depth of cut per helical pass doesn’t exceed the maximum depth of cut (**APMX**).

● Plunging


Depth of Cut in the Radius Direction : **ae** = .315 inch

DIAEDGE

TOOL NEWS

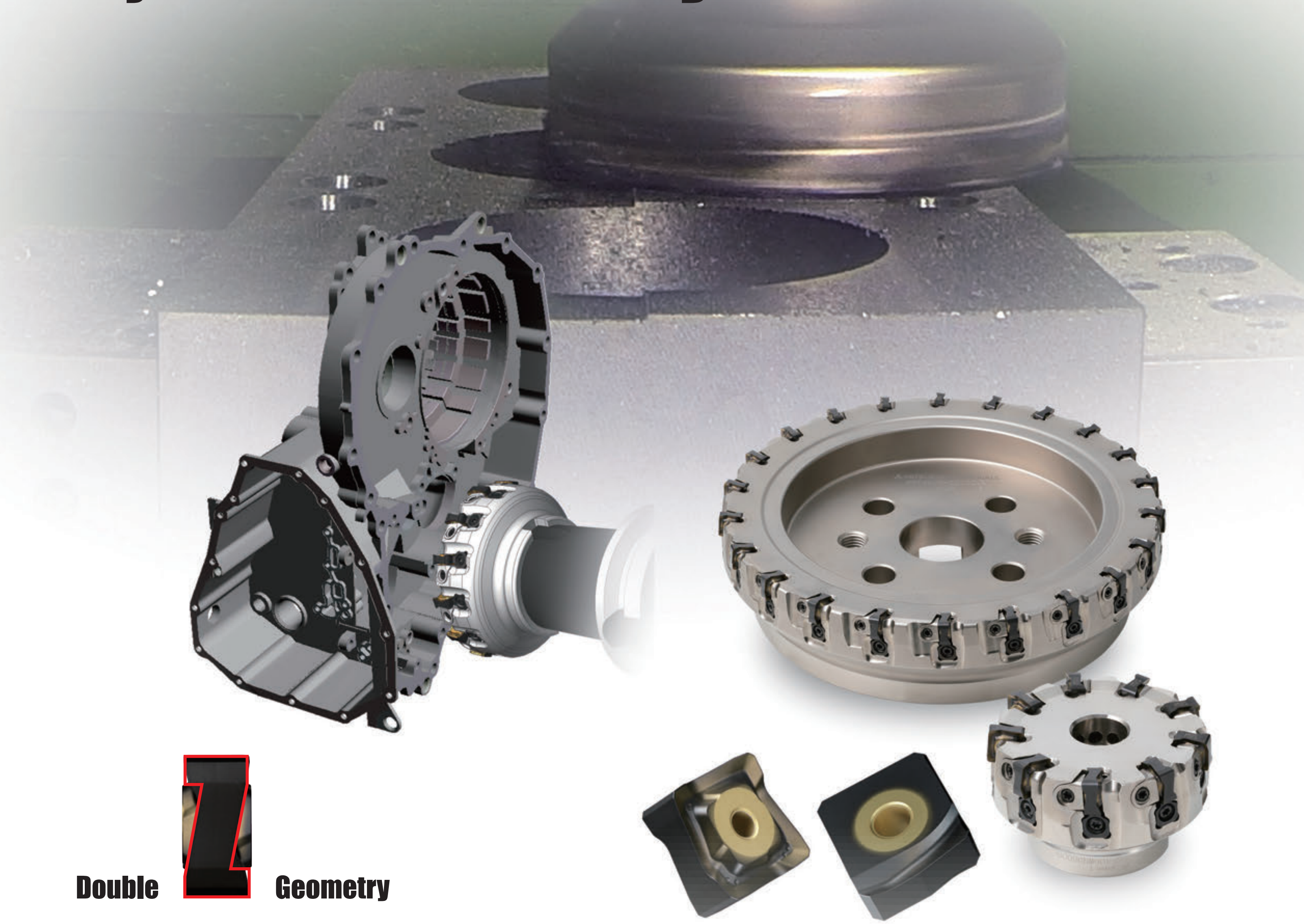
B265A

Face Milling Cutter for Cast Iron Machining with an Adjustable Run-Out System

WSF406W

New Products

A New Generation of High Efficiency Cast Iron Machining is Achieved with Low Cutting Resistance and an Adjustable Run-Out System



Double Z Geometry

MITSUBISHI MATERIALS CORPORATION

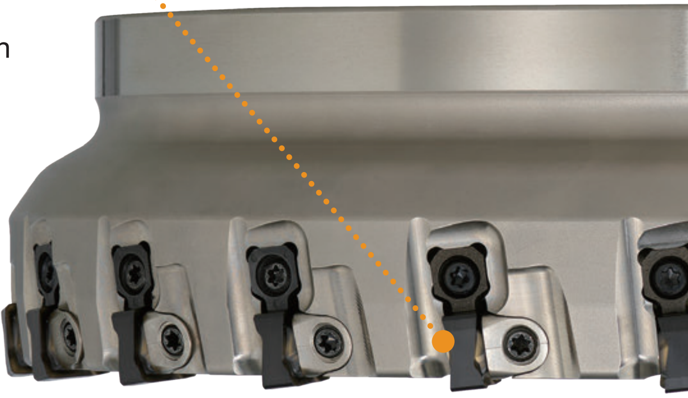
Face Milling Cutter for Cast Iron Machining with an Adjustable Run-Out System

WSF406W

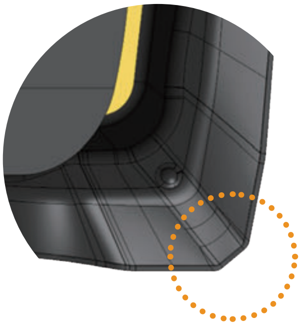
Low Cutting Resistance Insert and Adjustable Cutting Edge Run-Out Produce an Improved Surface Finish and Increased Productivity

Tough and Sharp Inserts for Low Cutting Resistance

MITSUBISHI MATERIAL's uniquely developed proprietary "Double Sided, Z Geometry" insert combines the features of conventional positive and negative rake inserts to achieve low resistance and sharpness. In addition, the chamfer geometry suppresses edge chipping that tends to occur during cast iron machining.

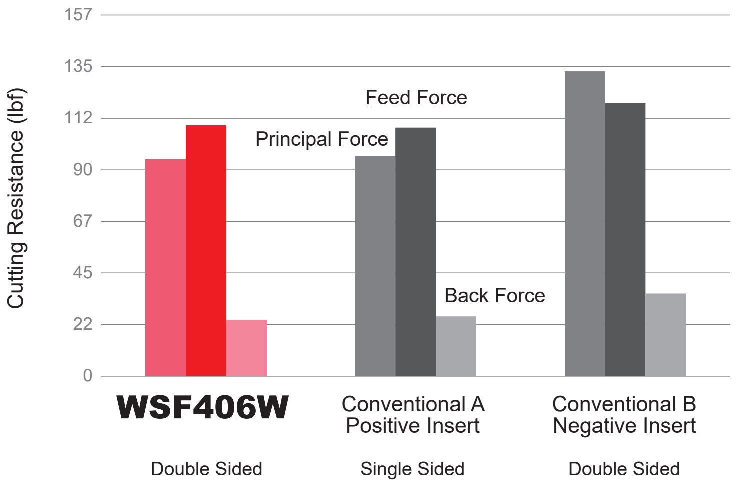


Double Sided, Z Geometry



Chamfer Geometry

Double sided insert with positive insert cutting resistance



Reduces negative insert cutting resistance by 23%

<Cutting Conditions>
Workpiece Material : AISI No. 45 B
Tool : WSF406WR12516EN
Insert : SNMU1206C05ZNER-M (MC520)
Cutting Speed : vc=525 SFM
Feed per Tooth : fz=.004 IPT
Depth of Cut : ap=.118 inch
Width of Cut : ae=3.937 inch
Cutting Mode : Dry Cutting

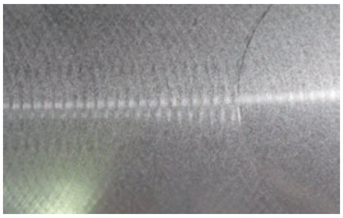
Easy-to-use Adjustable Run-out System

The M-Class insert gives a great cost performance ratio and allows for axial cutting edge adjustments of 0.01 mm or less. This helps to achieve surface finishes of Ra 1.6 μm or less over a wide range of feeds and speeds.

High precision machining is possible over a wide range of cutting conditions.

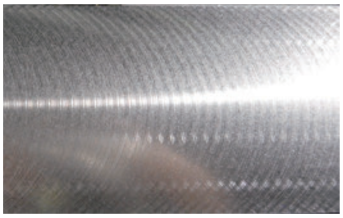
Finish Cutting Conditions

Ra : .024 μ-inch



fz=.004 IPT , ap=.012 inch

Ra : .053 μ-inch



fz=.012 IPT , ap=.059 inch

<Cutting Conditions>

Workpiece Material : AISI No. 45 B

Tool : WSF406WR12516EN (Minur Cutting Edge Run-out Accuracy : .118 μ-inch)

Insert : SNMU1206C05ZNER-M (MC520)

Cutting Speed : vc=820 SFM

Cutting Mode : Dry Cutting

Achieves High Accuracy with a Simple Operation

Cutting edge run-out is easily altered by turning the adjustment screw.

①Loosen the adjustment screw.

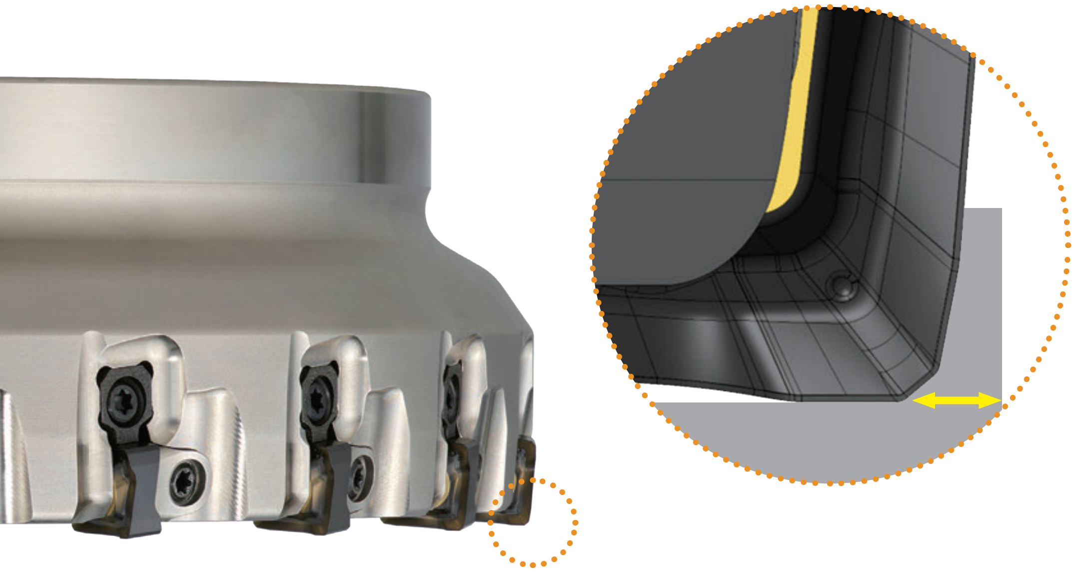
②Locate the insert and tighten so accurate adjustment can be made.

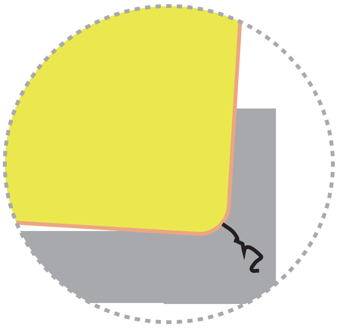
③Turn the adjustment screw until the insert is in the required position.

④Fully tighten the insert clamp.

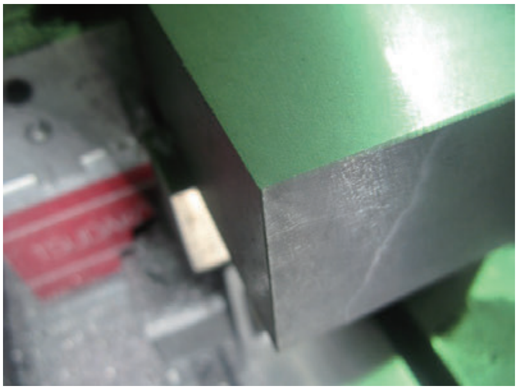
Chamfer Geometry Prevents Chipping of the Workpiece Material

The insert corner is chamfered to provide extra material thickness at the corner to prevent workpiece material cracking.

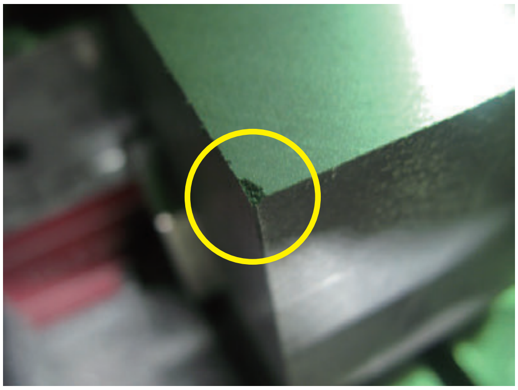




A thin edge is prone to cracks.



WSF406W



Conventional

<Cutting Conditions>
Workpiece Material : AISI No. 45 B
Tool : WSF406WR12516EN
Insert : SNMU1206C05ZNER-M (MC520)
Cutting Speed : vc=525 SFM
Feed per Tooth : fz=.004 IPT
Depth of Cut : ap=.118 inch
Width of Cut : ae=3.937 inch
Cutting Mode : Dry Cutting

Cutting Performance

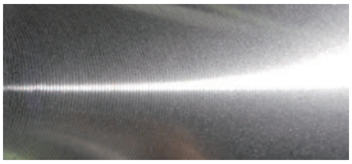
Comparison of Surface Finishes for Each Depth of Cut and Feed: AISI No. 45 B

Achieves an Ra of .063 μ-inch or less for a wide range of feeds and depth of cut.

<Cutting Conditions>
Workpiece Material : AISI No. 45 B
Tool : WSF406WR12516EN
Insert : SNMU1206C05ZNER-M (MC520)
Cutting Speed : vc=820 SFM
Width of Cut : ae=3.937 inch
Cutting Mode : Dry Cutting
Minur Cutting Edge
Run-out Accuracy=.118 μ-inch

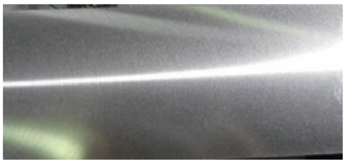
Depth of Cut : ap

.118 inch

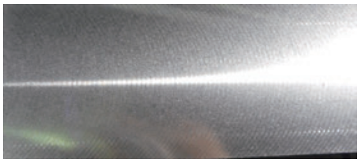


Ra : .032 μ-inch

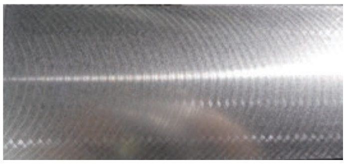
.059 inch



Ra : .033 μ-inch

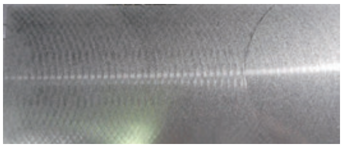


Ra : .041 μ-inch



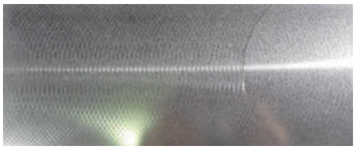
Ra : .053 μ-inch

.012 inch



Ra : .024 μ-inch

Ra : .035 μ-inch



Ra : .049 μ-inch

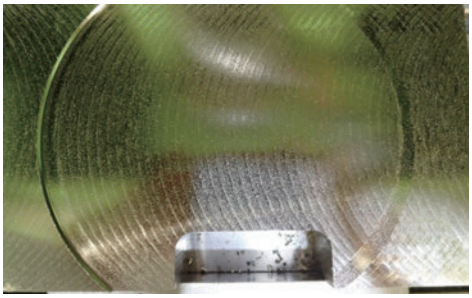
.004 IPT **.008 IPT** **.012 IPT**

Feed per Tooth : IPT

Comparison of Surface Finish for Wiper Insert : AISI No. 35 B

Achieves excellent finished surface accuracy compared to conventional wiper inserts.

Conventional Ra .048 μ-inch



WSF406W Ra .033 μ-inch

<Cutting Conditions>
Workpiece Material : AISI No. 35 B
Tool : WSF406WR12516EN
Insert : SNMU1206C05ZNER-M(MC520) 15 teeth
WNGU1206ZNER5C-M(MC520) 1 teeth
Cutting Speed : vc=820 SFM
Feed per Tooth : fz=.008 IPT
Depth of Cut : ap=.039 inch
Width of Cut : ae=3.937 inch

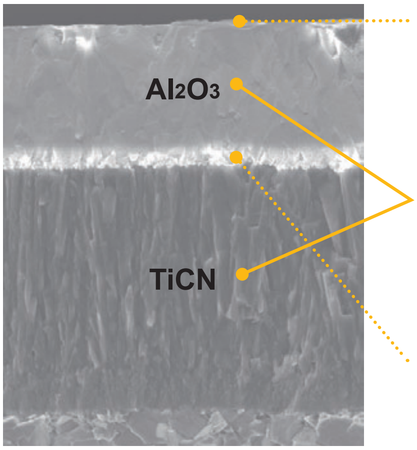
CVD Coated Carbide Grade for Cast Iron Milling

MC520 NEW

Ideal for machining grey cast iron due to the improved peeling resistance of the coating layer.

Improved Peeling Resistance

By optimizing the coating layer and improving the adhesion with the cemented carbide base material, the plastic deformation of the cutting edge is suppressed. The coating layer has an excellent resistance to peeling, thereby providing longer tool life.



All Black Super-Even Coating

The new, smoother than standard surface coating prevents welding and edge chipping to allow reliable and stable cutting.

Nano-texture Coating Technology

The optimized crystal growth, and the Nano-texture coating technology provide outstanding wear and chipping resistance.

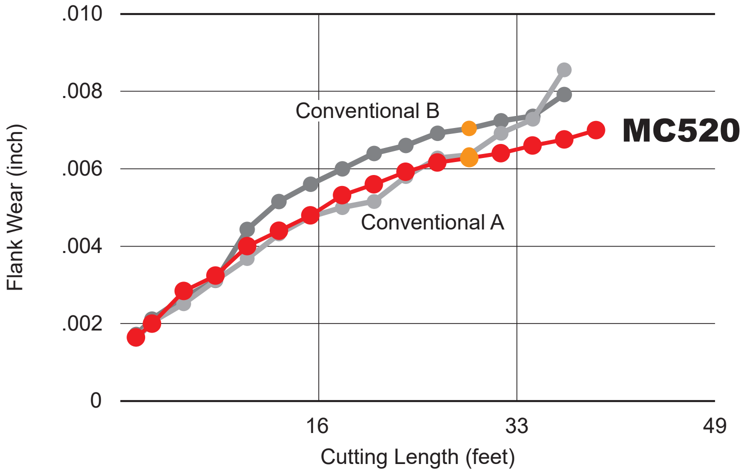
TOUGH-grip Coating Technology

The degree of adhesion between the coating layers has been improved exponentially allowing for greater strength and toughness.

Machining Performance

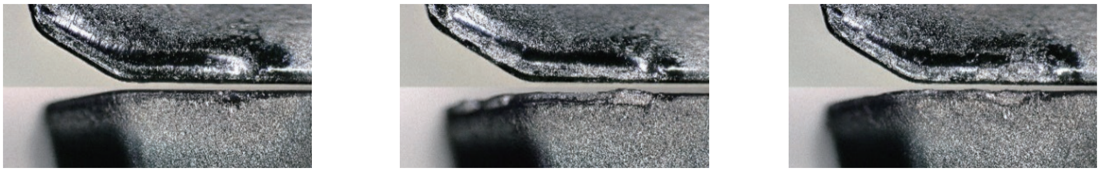
Comparison of Wear Resistance ; AISI No. 45 B

The MC520 provides excellent wear resistance when machining gray cast iron.



<Cutting Conditions>
Workpiece Material : AISI No. 45 B
Tool : WSF406WR12516EN
Insert : SNMU1206C05ZNER-M
Cutting Speed : vc=985 SFM
Feed per Tooth : fz=.008 IPT
Depth of Cut : ap=.079 inch
Cutting Mode : Dry Cutting, Single Insert
Center Cut

After Machining Cutting Length 26 feet



MC520　Conventional A　Conventional B

FACE MILLING

<HIGH EFFICIENCY CUTTING FOR CAST IRON>

84° KAPR F R

WSF406W

NEW

P M **K** N S H

Metric Standard

Fig.1

ø80

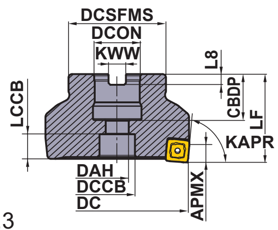


Fig.2

ø100
ø125
ø160

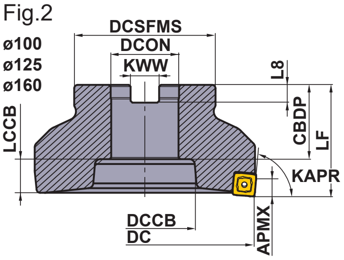
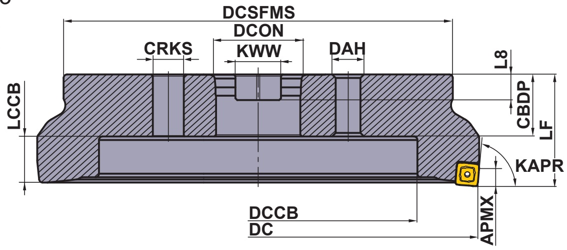


Fig.3

ø200
ø250



Right hand tool holder only.

■Arbor Type

KAPR : 84°
DCON = inch size

(mm)

DC	Order Number	Stock R	*1 Coolant Hole	*2 No.T	LF	DCON	WT (kg)	APMX	RPMX (min^{-1})	Fig.
80	**WSF406WR08006CN**	★	N	6	50	25.4	1.2	7.0	7,800	1
80	**WSF406WR08009CN**	★	N	9	50	25.4	1.2	7.0	7,800	1
100	**WSF406WR10008DN**	★	N	8	50	31.75	1.7	7.0	7,000	2
100	**WSF406WR10012DN**	★	N	12	50	31.75	1.7	7.0	7,000	2
125	**WSF406WR12510EN**	★	N	10	63	38.1	3.3	7.0	6,250	2
125	**WSF406WR12516EN**	★	N	16	63	38.1	3.2	7.0	6,250	2
160	**WSF406WR16014FN**	★	N	14	63	50.8	5	7.0	5,500	2
160	**WSF406WR16020FN**	★	N	20	63	50.8	4.9	7.0	5,500	2
200	**WSF406WR20016KN**	★	N	16	63	47.625	8.6	7.0	4,900	3
200	**WSF406WR20024KN**	★	N	24	63	47.625	8.5	7.0	4,900	3
250	**WSF406WR25022KN**	★	N	22	63	47.625	14	7.0	4,400	3
250	**WSF406WR25032KN**	★	N	32	63	47.625	13.9	7.0	4,400	3

*1 Y=Yes, N=No
*2 Number of Teeth
Note1) A set bolt for the arbor is not supplied with the body. Please refer to page 433 to find the correct type of set bolt to order.

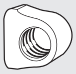
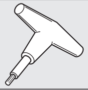
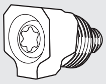
Mounting Dimensions

(mm)

DC	Order Number	DCON	CBDP	DAH	DCCB	CRKS	LCCB	DCSFMS	KWW	L8	Fig.
80	**WSF406WR080**	25.4	34	13	20	—	14	55	9.5	6	1
100	**WSF406WR100**	31.75	32	—	46	—	16	70	12.7	8	2
125	**WSF406WR125**	38.1	42	—	56	—	19	80	15.9	10	2
160	**WSF406WR160**	50.8	45	—	80	—	16	100	19.1	11	2
200	**WSF406WR200**	47.625	35	18	140	M16	26	175	25.4	14.22	3
250	**WSF406WR250**	47.625	35	18	180	M16	26	220	25.4	14.22	3

★ : Stocked in Japan

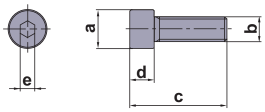
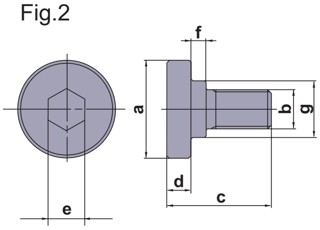
Spare Parts

Tool Holder Type	 Wedge	 * Clamp Screw	 Wrench	 Adjustable Run-Out System
WSF406W	CWSF406N	LS0622T	TKY15T	ADW04

* Clamp Torque (lbf-in) : LS0622T = 53

■ Parts Sold Separately
Set Bolt

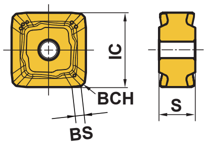
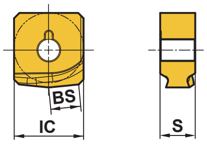
(mm)

Tool Holder Type	Set Bolt	Fig.	Reference Dimensions							Geometry
	Order Number		a	b	c	d	e	f	g	
WSF406WR080	HSC12035	1	18	M12x1.75	47	12	10	–	–	Fig.1  Fig.2 
WSF406WR100	–	2	40	M16x2	43	10	14	6	23	
WSF406WR125	–	2	50	M20x2.5	54	14	17	6	27	
WSF406WR160	–	2	65	M24x3	59	14	17	10	37	
WSF406WR200	–	1	24	M16x2	61-	16	14	–	–	
WSF406WR250	–	1	24	M16x2	61-	16	14	–	–	

Note 1) Please purchase the appropriate set bolt after confirming the reference dimensions. The items with an order number listed under the Set Bolt columns are also sold by MITSUBISHI MATERIALS.

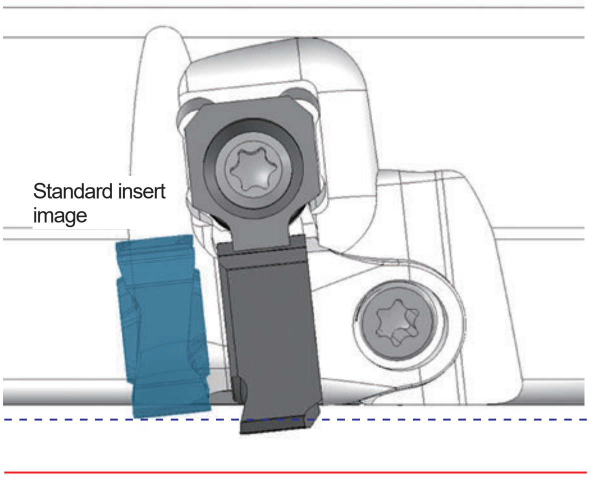
Inserts

(inch)

Workpiece Material	K Cast Irons			◆				This is the selection guideline for WSF406W. Please note that the cutting conditions differ depending on multiple factors, for more details refer to the Recommended Cutting Conditions **Edge Preparation :** **E :** Round				
Shape	Order Number	Class	Edge Preparation	Coated **MC520**				**IC**	**S**	**BS**	**BCH**	Geometry
NEW 	**SNMU1206C05ZNER-M**	M	E	★				.500	.244	.063	.020	
NEW  Wiper	**WNGU1206ZNER5C-M**	G	E	★				.484	.244	.205	–	

How to Use Wiper Insert for Best Results

- The WSF406W can obtain a good surface finish when using a standard insert due to the adjustable run-out system, but by using a wiper insert an excellent surface finish can be achieved without having to set a high accuracy face run out.
  When a wiper insert is mounted, aim to set the standard insert run out accuracy to within .0016 inch.
- Just one wiper insert is enough to achieve excellent finished surfaces.
  However, if the feed per revolution is greater than .197 IPR, attach two or more wiper inserts so that they are evenly spaced in the cutter body and set the run out accuracy between multiple wiper inserts to within .0001 inch before use.



By figure image

Please set the wiper insert to protrude by up to .0028 inch

★ : Stocked in Japan (10 inserts in one case)

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✤ : Unstable Cutting

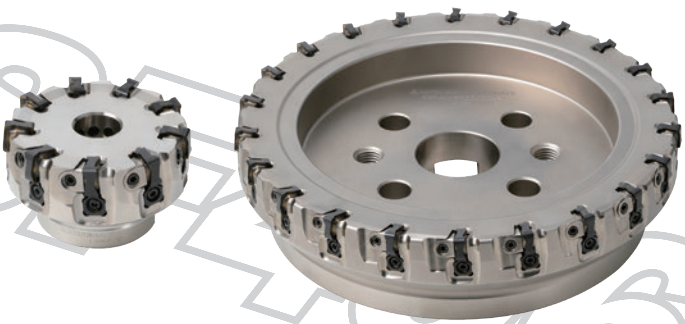
Recommended Cutting Conditions

■ Dry Cutting

(inch)

	Workpiece Material	Properties	Cutting Conditions	Depth of Cut **ap**	Cutting Speed **vc** (SFM)	Feed per Tooth **fz** (IPT)	Width of Cut **ae**
K	Gray Cast Irons	Tensile Strength ≤350MPa	●	ap≤.020 inch	985(820–1150)	.005(.003–.008)	≤.8DC
				ap≤.079 inch	820(690–985)	.006(.004–.010)	≤.8DC
				.079 inch <ap≤.157 inch	720(620–850)	.005(.004–.008)	≤.8DC
				.157 inch <ap≤.298 inch	655(590–755)	.004(.003–.006)	≤.8DC
			◐	ap≤.020 inch	820(690–985)	.005(.003–.008)	≤.8DC
				ap≤.079 inch	720(620–850)	.006(.004–.010)	≤.8DC
				.079 inch <ap≤.157 inch	655(590–755)	.005(.004–.008)	≤.8DC
				.157 inch <ap≤.298 inch	590(525–690)	.004(.003–.006)	≤.8DC
			✤	ap≤.020 inch	720(620–850)	.005(.003–.008)	≤.8DC
				ap≤.079 inch	655(590–755)	.006(.004–.010)	≤.8DC
				.079 inch <ap≤.157 inch	590(525–690)	.005(.004–.008)	≤.8DC
				.157 inch <ap≤.298 inch	490(330–590)	.004(.003–.006)	≤.8DC
	Ductile Cast Irons	Tensile Strength ≤450MPa	●	ap≤.020 inch	755(655–820)	.005(.003–.008)	≤.8DC
				ap≤.079 inch	655(560–755)	.006(.004–.010)	≤.8DC
				.079 inch <ap≤.157 inch	590(490–690)	.005(.004–.008)	≤.8DC
				.157 inch <ap≤.298 inch	525(425–620)	.004(.003–.006)	≤.8DC
			◐	ap≤.020 inch	655(560–755)	.005(.003–.008)	≤.8DC
				ap≤.079 inch	590(490–690)	.006(.004–.010)	≤.8DC
				.079 inch <ap≤.157 inch	525(425–620)	.005(.004–.008)	≤.8DC
				.157 inch <ap≤.298 inch	460(360–560)	.004(.003–.006)	≤.8DC
			✤	ap≤.020 inch	590(490–655)	.005(.003–.008)	≤.8DC
				ap≤.079 inch	525(425–620)	.006(.004–.010)	≤.8DC
				.079 inch <ap≤.157 inch	460(360–560)	.005(.004–.008)	≤.8DC
				.157 inch <ap≤.298 inch	395(295–490)	.004(.003–.006)	≤.8DC
	Ductile Cast Irons	Tensile Strength ≤800MPa	●	ap≤.020 inch	755(655–820)	.005(.003–.008)	≤.8DC
				ap≤.079 inch	655(560–755)	.006(.004–.010)	≤.8DC
				.079 inch <ap≤.157 inch	590(490–690)	.005(.004–.008)	≤.8DC
				.157 inch <ap≤.298 inch	525(425–620)	.004(.003–.006)	≤.8DC
			◐	ap≤.020 inch	655(560–755)	.005(.003–.008)	≤.8DC
				ap≤.079 inch	590(490–690)	.006(.004–.010)	≤.8DC
				.079 inch <ap≤.157 inch	525(425–620)	.005(.004–.008)	≤.8DC
				.157 inch <ap≤.298 inch	460(360–560)	.004(.003–.006)	≤.8DC
			✤	ap≤.020 inch	590(490–690)	.005(.003–.008)	≤.8DC
				ap≤.079 inch	525(425–620)	.006(.004–.010)	≤.8DC
				.079 inch <ap≤.157 inch	460(360–560)	.005(.004–.008)	≤.8DC
				.157 inch <ap≤.298 inch	395(295–490)	.004(.003–.006)	≤.8DC

Note 1) Refer to the table above for more details on how to set the cutting conditions according the usage.
Note 2) When using a wiper insert, the cutting conditions for the finishing area are ap≤.020 inch.



Face Milling Cutter for Cast Iron Machining with an Adjustable Run-Out System

WSF406W

For your safety
●Don't touch breakers and chips without gloves. ●Please machine within recommended application range, and exchange expired tools with new parts in advance. ●Please use safety cover and wear safety glasses. ●When using compounded cutting oils, please take fire prevention. ●When attaching inserts or spare parts, please use the attached wrench or driver. ●When using tools in revolution machining, please make a trial run to check run-out, vibration, abnormal sounds etc.

DIAEDGE

TOOL NEWS

2020.4 Update
B220A

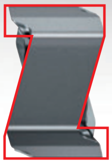
General Purpose Double-sided Insert Type Face Mill Features Low Cutting Resistance

WSX445

Item Expansion

Unique Double Z Insert Geometry

Double



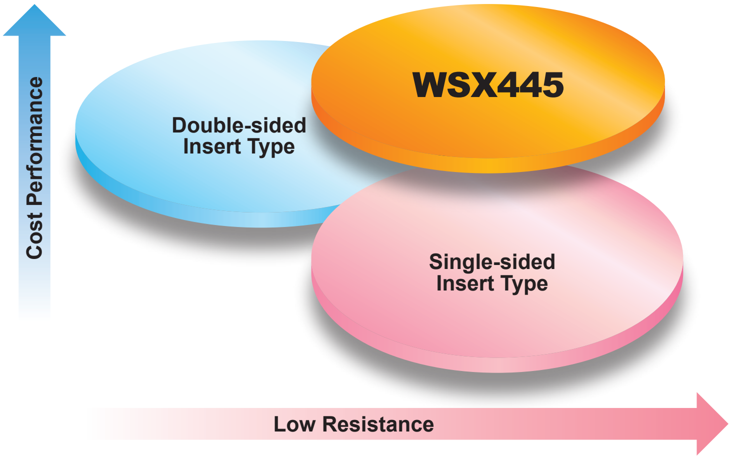
Geometry

MITSUBISHI MATERIALS CORPORATION

General Purpose Double-sided Insert Type Face Mill Features Low Cutting Resistance

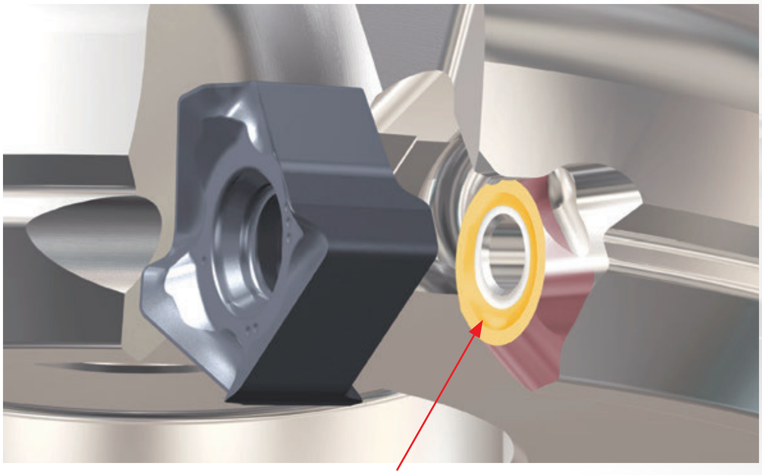
WSX445

New double-sided insert type face milling cutter with innovative cutting edge!
Perfect balance between convenience and high efficiency!



Designed to control abnormal insert breakage and body damage

The unique conical insert pocket seating and Anti Fly Insert mechanism (A.F.I.) combine to securely hold the insert. Since the outer edge of the insert is not in contact with the cutter body damage from sudden fracturing is unlikely to cause damage to the cutter body.
Shims are not needed due to the high rigidity of the very thick insert.



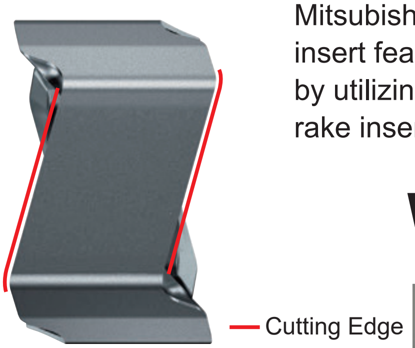
Anti Fly Insert Mechanism (A.F.I.)

Through Coolant Holes

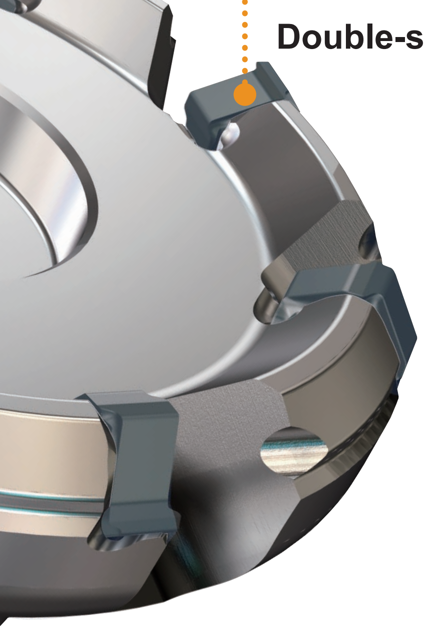
Improves chip discharge and prevents chip welding.

Unique Double Z Insert Geometry

Mitsubishi Materials' proprietary "Double-sided, Z Geometry" insert features sharp cutting edges with low cutting resistance by utilizing features of conventional positive and negative rake inserts.



Double-sided, Z Geometry

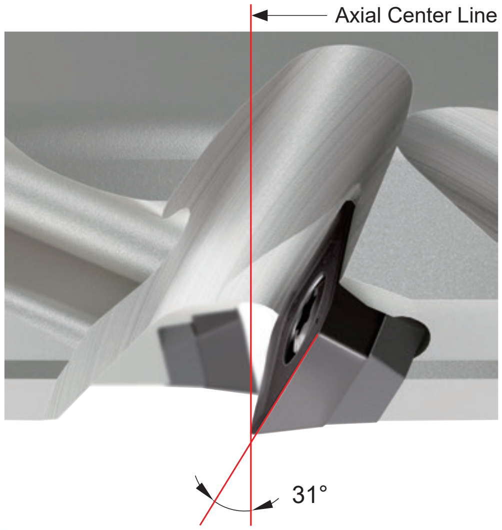


WSX445

For Sharper Cutting Edge

Double-sided Insert

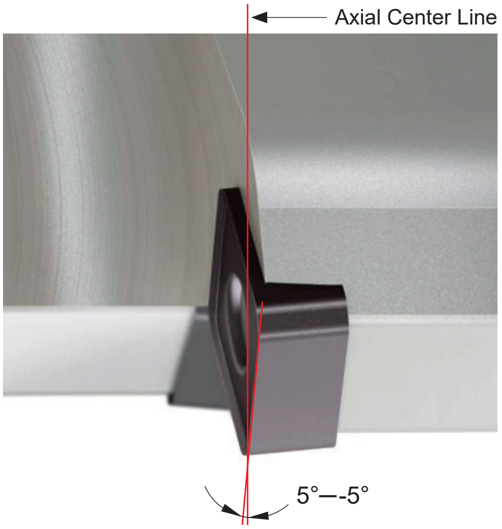
Conventional Positive Insert



For Sharper Cutting Edge

Single-sided Insert

Conventional Negative Insert



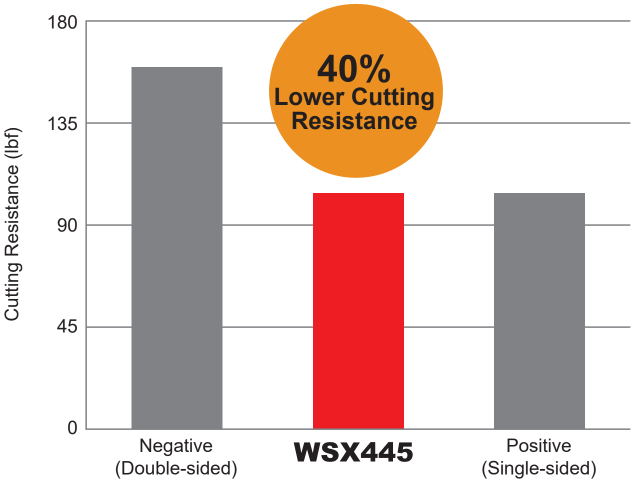
For Higher Edge Strength

Double-sided Insert

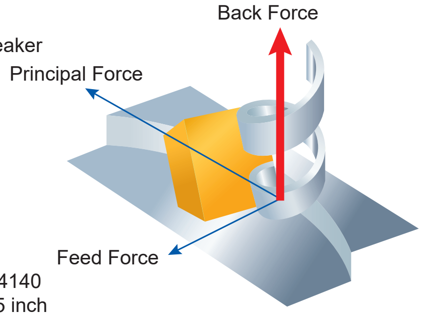
Cutting Resistance

WSX445's low cutting resistance equals that of single-sided insert cutters.
The low axial and radial forces reduce vibrations to a minimum.

[Comparison of the Back Force]



🟥 **WSX445** M Breaker
⬛ Conventional Insert



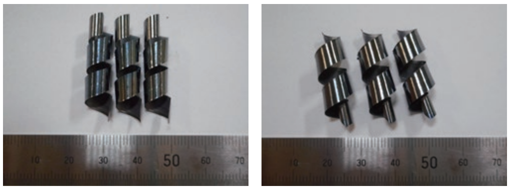
<Cutting Conditions>
Workpiece Material : AISI 4140
Cutter Dia. : DC=5 inch
Cutting Speed : vc=655 SFM
Feed per Tooth : fz=.008 IPT
Depth of Cut : ap=.157 inch
Width of Cut : ae=4 inch
Cutting Mode : Dry Cutting
Single Insert

<Back Force>
Cutting force in the axial direction. Back force can cause inaccuracy and vibration, resulting in deflection of the work material as well as cutting tools.

Chip Discharge Effect

Chips are discharged outwardly because of the negative / positive edge design.
This helps prevent jamming of continuous chips and damage of coolant hole.

Conventional Positive Insert **WSX445**



Chips generated are cylindrical
and are discharged away from the cutter.

Conventional Negative Insert A Conventional Negative Insert B

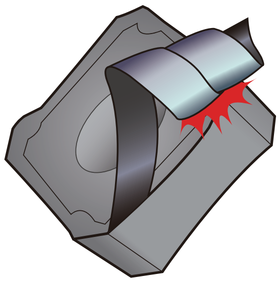
Chips enter the inside of the cutter
and cause machining problems.

<Cutting Conditions>
Workpiece Material : AISI 4140
Cutting Speed : vc=490 SFM
Feed per Tooth : fz=.008 IPT
Depth of Cut : ap=.157 inch
Width of Cut : ae=4 inch
Cutting Mode : Dry Cutting

Abrasive Damage from Chips

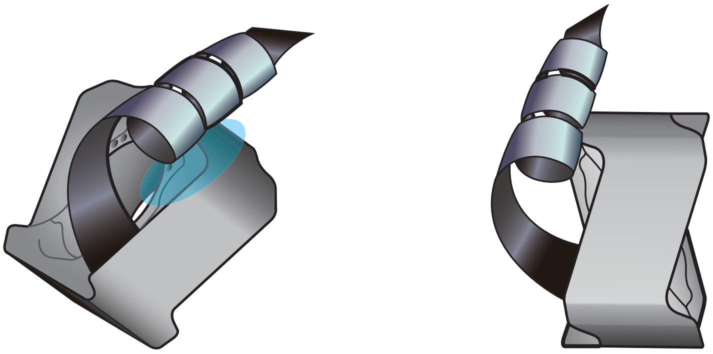
Depth of cut can be set without regard to the unused corner.

Conventional Double-sided Insert



Chips can contact
the unused corner.

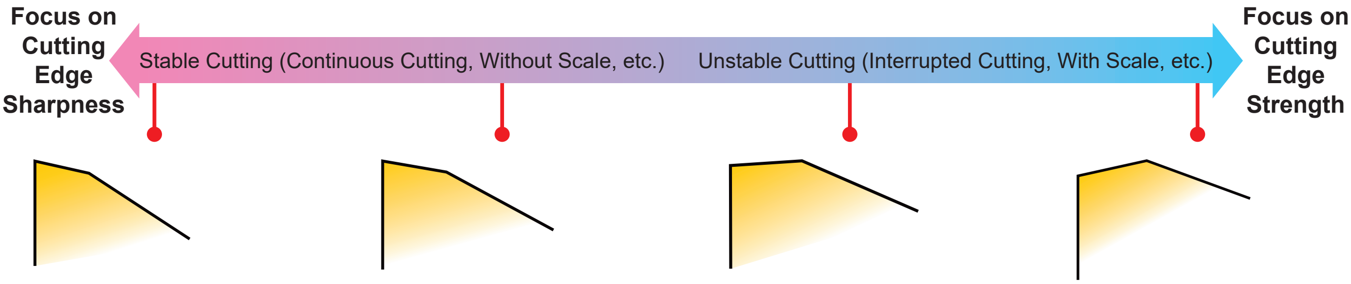
WSX445



The chips generated do not contact the unused corner.

Chip Breaker System

Chip breaker series for varied cutting condition.

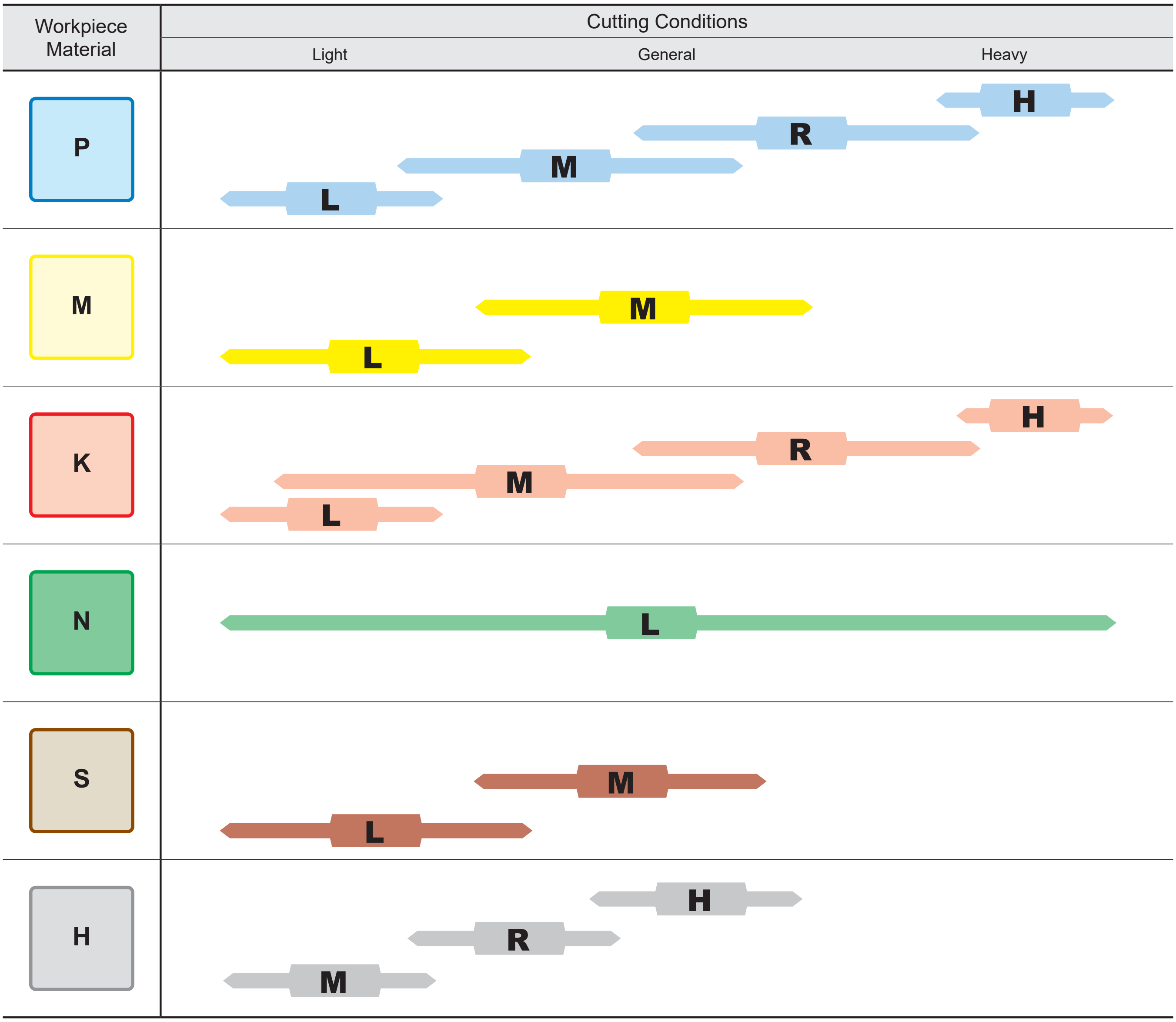


L Breaker
The high rake angle boosts cutting performance. Positive land retains strength and provides low cutting resistance.

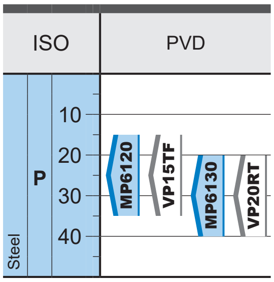
M Breaker
First recommendation for general applications. A good balance of edge strength and sharpness is provided by the optimized positive land and rake angle.

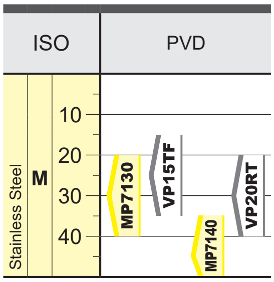
R Breaker
For unstable applications. Enhanced edge strength and retention of sharpness is provided by the negative land and positive rake angle respectively.

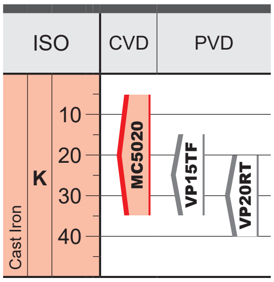
H Breaker
For demanding applications. A stronger land and reduced positive rake angle provides maximum edge strength.

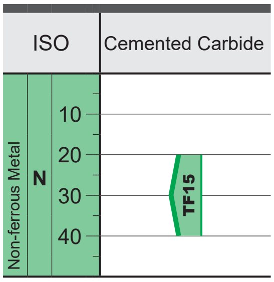


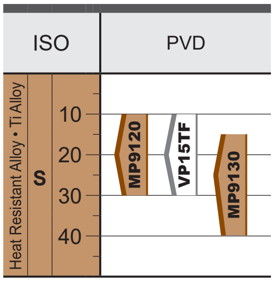
Insert Grades for a Wide Range of Workpiece Materials

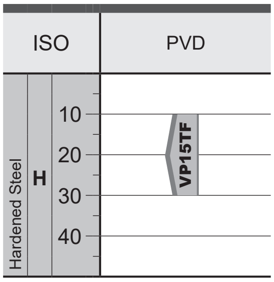








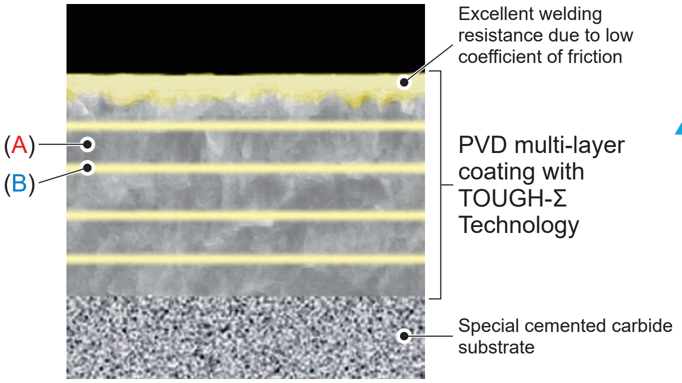




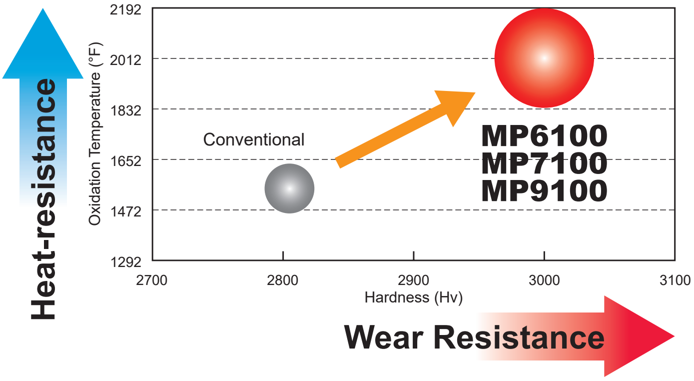
MP6100, MP7100, MP9100 - With Accumulated Al-Ti-Cr-N Based PVD Coating

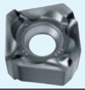
TOUGH-Σ Technology

A fusion of the separate coating technologies; PVD and multi-layering provides extra toughness.



Dramatically Improving the Heat and Wear Resistance!

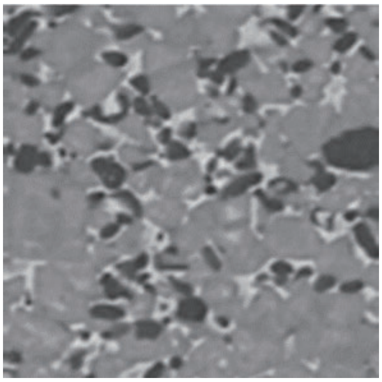


	Workpiece Material	Grade	Coating		Coefficient of Friction		
			Base Layer (A)	Optimized Layer for Work Material (B)	Measured at 1112° F		
					AISI 1055	AISI 304	Ti-6Al-4V
P	Carbon Steels, Alloy Steels	**MP6100** 	**High Al-(Al, Ti)N** The new technology Al-(Al, Ti)N provides stability of the high hardness phase and succeeds in dramatically improving wear, crater and welding resistance.	(Al, Cr) N Based Tough! Resists Chipping	.4		
M	Stainless Steels	**MP7100** 		TiN Based Tough! Resists Notching		.5	
S	Titanium Alloys, Heat Resistant Alloys	**MP9100** 		CrN Based Tough! Resists Thermal Cracking			.3
				Conventional	.7	.7	.7

The grade for finishing and light cutting is excellent for welding resistance and is suitable for machining that requires a shiny surface.

MX3020

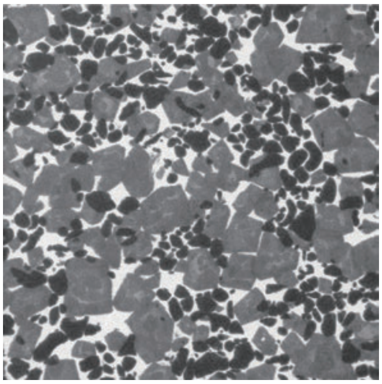
MX3020 is a cermet grade with excellent wear resistance for wiper inserts.



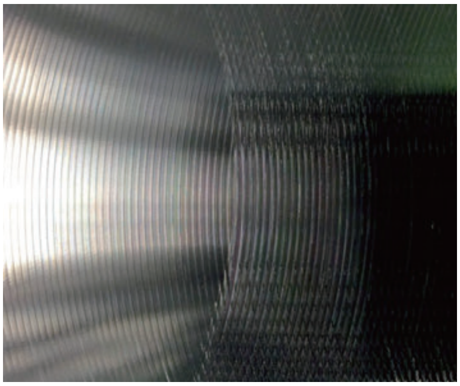
MX3020

MX3030

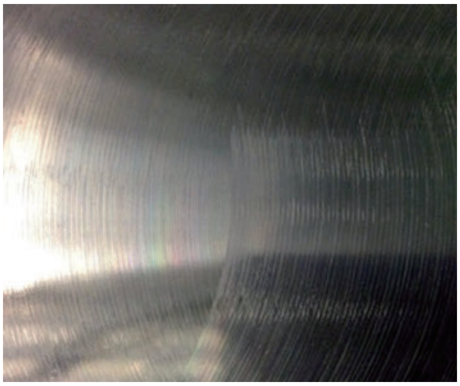
MX3030 is a cermet grade with excellent fracture resistance and is suitable for finish and light cutting.



MX3030



Conventional



MX3030

<Cutting Conditions>
Workpiece Material : ASTM A36M
Cutter Dia. : DC=5 inch
Cutting Speed : vc=655 SFM
Feed per Tooth : fz=.004 IPT
Depth of Cut : ap=.079 inch
Width of Cut : ae=3.937 inch
Cutting Mode : Dry Cutting
8 Inserts
Center Cut
After 26 feet Cutting Work

FACE MILLING
<GENERAL CUTTING>

45° KAPR F R

WSX445

P M K N S H

- ● Double-sided Z Geometry.
- ● Smooth chip discharge.

Fig.1

ø1.5"
ø2"
ø2.5"
ø3"

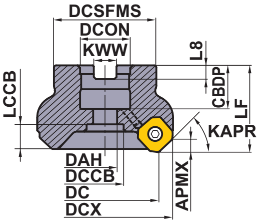
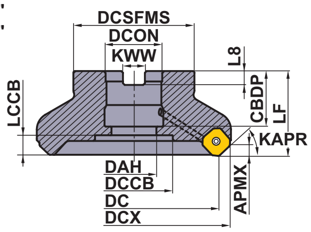


Fig.2

ø4"
ø5"
ø6"



Right hand tool holder only.

■ Arbor Type
Right Hand Tool Holder

DC = inch size, DCON = Inch size (inch)

DC	Order Number	Stock	＊1 Coolant Thru	＊2 No.T	Pitch	DCX	LF	DCON	WT(lbs)	APMX	Fig.
1.500	**WSX445UR1503SA**	●	Y	3	Coarse	2.005	1.750	.500	.8	.197	1
1.500	**WSX445UR1504SA**	●	Y	4	Fine	2.005	1.750	.500	.7	.197	1
2.000	**WSX445UR0203AA**	●	Y	3	Coarse	2.506	1.750	.750	1.2	.197	1
2.000	**WSX445UR0204AA**	●	Y	4	Fine	2.506	1.750	.750	1.1	.197	1
2.000	**WSX445UR0205AA**	●	Y	5	Extra Fine	2.506	1.750	.750	1.1	.197	1
2.500	**WSX445UR2504CA**	●	Y	4	Coarse	3.006	2.000	1.000	2.0	.197	1
2.500	**WSX445UR2505CA**	●	Y	5	Fine	3.006	2.000	1.000	2.0	.197	1
2.500	**WSX445UR2506CA**	●	Y	6	Extra Fine	3.006	2.000	1.000	1.9	.197	1
3.000	**WSX445UR0304CA**	●	Y	4	Coarse	3.506	2.000	1.000	2.6	.197	1
3.000	**WSX445UR0306CA**	●	Y	6	Fine	3.506	2.000	1.000	2.5	.197	1
3.000	**WSX445UR0308CA**	●	Y	8	Extra Fine	3.506	2.000	1.000	2.4	.197	1
4.000	**WSX445UR0405EA**	●	Y	5	Coarse	4.506	2.500	1.500	5.9	.197	2
4.000	**WSX445UR0407EA**	●	Y	7	Fine	4.506	2.500	1.500	5.8	.197	2
4.000	**WSX445UR0410EA**	●	Y	10	Extra Fine	4.506	2.500	1.500	5.6	.197	2
5.000	**WSX445UR0506EA**	●	Y	6	Coarse	5.506	2.500	1.500	8.5	.197	2
5.000	**WSX445UR0508EA**	●	Y	8	Fine	5.506	2.500	1.500	8.3	.197	2
5.000	**WSX445UR0512EA**	●	Y	12	Extra Fine	5.506	2.500	1.500	8.0	.197	2
6.000	**WSX445UR0607EA**	●	Y	7	Coarse	6.506	2.500	1.500	10.6	.197	2
6.000	**WSX445UR0610EA**	●	Y	10	Fine	6.506	2.500	1.500	10.4	.197	2
6.000	**WSX445UR0616EA**	●	Y	16	Extra Fine	6.506	2.500	1.500	9.9	.197	2
8.000	**WSX445UR0808MN**	●	N	8	Coarse	8.506	2.500	2.500	19.1	.197	3
8.000	**WSX445UR0812MN**	●	N	12	Fine	8.506	2.500	2.500	18.8	.197	3
8.000	**WSX445UR0820MN**	●	N	20	Extra Fine	8.506	2.500	2.500	18.3	.197	3
NEW 10.000	**WSX445UR1010MN**	●	N	10	Coarse	10.493	2.500	2.500	28.5	.197	3
NEW 10.000	**WSX445UR1014MN**	●	N	14	Fine	10.493	2.500	2.500	29.2	.197	3
NEW 12.000	**WSX445UR1214MN**	●	N	14	Coarse	12.493	2.500	2.500	48.1	.197	4

＊1 Y=Yes, N=No
＊2 Number of Teeth
(Note1) The cutter body includes a set bolt for an arbor.

● : USA Stock

Fig.3

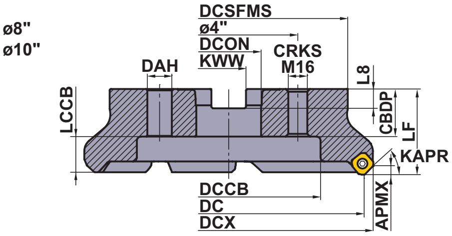
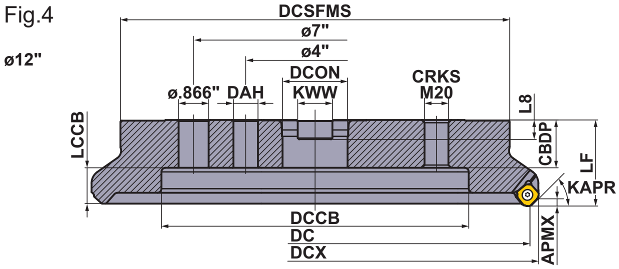
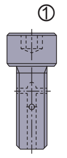
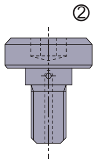


Fig.4



Right hand tool holder only.

DC	Set Bolt	Geometry	
1.500	HSCU25011H	①	①  ② 
2.000	HSCU37513H		
2.500	HSCU50014H		
3.000	HSCU50014H		
4.000	MBAU75016H	②	
5.000	MBAU75016H		
6.000	MBAU75016H		
8.000	–	–	
10.000	–		
12.000	–		

Arbor Type Mounting Dimensions

(inch)

DCON	DC	Order Number	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8	Fig.
.500	1.500	**WSX445UR1503SA**	.630	.276	.433	.581	1.437	.250	.156	1
.500	1.500	**WSX445UR1504SA**	.630	.276	.433	.581	1.437	.250	.156	1
.750	2.000	**WSX445UR0203AA**	.748	.413	.630	.620	1.750	.313	.187	1
.750	2.000	**WSX445UR0204AA**	.748	.413	.630	.620	1.750	.313	.187	1
.750	2.000	**WSX445UR0205AA**	.748	.413	.630	.620	1.750	.313	.187	1
1.000	2.500	**WSX445UR2504CA**	.945	.539	.827	.671	2.190	.375	.219	1
1.000	2.500	**WSX445UR2505CA**	.945	.539	.827	.671	2.190	.375	.219	1
1.000	2.500	**WSX445UR2506CA**	.945	.539	.827	.671	2.190	.375	.219	1
1.000	3.000	**WSX445UR0304CA**	.945	.539	.827	.671	2.190	.375	.219	1
1.000	3.000	**WSX445UR0306CA**	.945	.539	.827	.671	2.190	.375	.219	1
1.000	3.000	**WSX445UR0308CA**	.945	.539	.827	.671	2.190	.375	.219	1
1.500	4.000	**WSX445UR0405EA**	1.417	1.181	2.205	.778	3.500	.625	.375	2
1.500	4.000	**WSX445UR0407EA**	1.417	1.181	2.205	.778	3.500	.625	.375	2
1.500	4.000	**WSX445UR0410EA**	1.417	1.181	2.205	.778	3.500	.625	.375	2
1.500	5.000	**WSX445UR0506EA**	1.417	1.181	2.205	.778	3.813	.625	.375	2
1.500	5.000	**WSX445UR0508EA**	1.417	1.181	2.205	.778	3.813	.625	.375	2
1.500	5.000	**WSX445UR0512EA**	1.417	1.181	2.205	.778	3.813	.625	.375	2
1.500	6.000	**WSX445UR0607EA**	1.417	1.181	2.205	.778	3.813	.625	.375	2
1.500	6.000	**WSX445UR0610EA**	1.417	1.181	2.205	.778	3.813	.625	.375	2
1.500	6.000	**WSX445UR0616EA**	1.417	1.181	2.205	.778	3.813	.625	.375	2
2.500	8.000	**WSX445UR0808MN**	1.378	.709	5.512	1.053	6.890	1.000	.560	3
2.500	8.000	**WSX445UR0812MN**	1.378	.709	5.512	1.053	6.890	1.000	.560	3
2.500	8.000	**WSX445UR0820MN**	1.378	.709	5.512	1.053	6.890	1.000	.560	3
NEW 2.500	10.000	**WSX445UR1010MN**	1.378	.709	7.087	1.053	8.661	1.000	.560	3
NEW 2.500	10.000	**WSX445UR1014MN**	1.378	.709	7.087	1.053	8.661	1.000	.560	3
NEW 2.500	12.000	**WSX445UR1214MN**	1.575	.709	8.858	.856	11.220	1.000	.560	4

General Purpose Double-sided Insert Type Face Mill Features Low Cutting Resistance

Metric Standard

For inch arbors

Fig.1

ø80

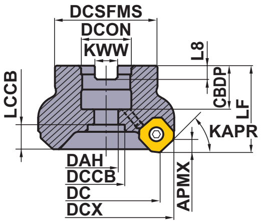
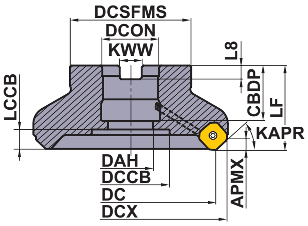


Fig.2

ø100
ø125
ø160



Right hand tool holder shown.

■Arbor Type
Right Hand Tool Holder

DC = mm size, DCON = Inch size (mm)

DC	Order Number	Stock	*1 Coolant Thru	*2 No.T	Pitch	DCX	LF	DCON	WT(kg)	APMX	Fig.
80	**WSX445R08004CA**	★	Y	4	Coarse	92.9	50	25.4 [1.00"]	1.3	5	1
80	**WSX445R08006CA**	★	Y	6	Fine	92.9	50	25.4 [1.00"]	1.2	5	1
80	**WSX445R08008CA**	★	Y	8	Extra Fine	92.9	50	25.4 [1.00"]	1.1	5	1
100	**WSX445R10005DA**	★	Y	5	Coarse	112.9	50	31.75 [1.25"]	1.8	5	2
100	**WSX445R10007DA**	★	Y	7	Fine	112.9	50	31.75 [1.25"]	1.7	5	2
100	**WSX445R10010DA**	★	Y	10	Extra Fine	112.9	50	31.75 [1.25"]	1.6	5	2
125	**WSX445R12506EA**	★	Y	6	Coarse	137.9	63	38.1 [1.50"]	3.2	5	2
125	**WSX445R12508EA**	★	Y	8	Fine	137.9	63	38.1 [1.50"]	3.1	5	2
125	**WSX445R12512EA**	★	Y	12	Extra Fine	137.9	63	38.1 [1.50"]	3.0	5	2
160	**WSX445R16007FA**	★	Y	7	Coarse	172.9	63	50.8 [2.00"]	4.9	5	2
160	**WSX445R16010FA**	★	Y	10	Fine	172.9	63	50.8 [2.00"]	4.8	5	2
160	**WSX445R16016FA**	★	Y	16	Extra Fine	172.8	63	50.8 [2.00"]	4.6	5	2
200	**WSX445R20008KN**	★	N	8	Coarse	212.9	63	47.625 [1.85"]	8.7	5	3
200	**WSX445R20012KN**	★	N	12	Fine	212.9	63	47.625 [1.85"]	8.6	5	3
200	**WSX445R20020KN**	★	N	20	Extra Fine	212.8	63	47.625 [1.85"]	8.4	5	3
250	**WSX445R25010KN**	★	N	10	Coarse	262.9	63	47.625 [1.85"]	13.1	5	3
250	**WSX445R25014KN**	★	N	14	Fine	262.9	63	47.625 [1.85"]	13.2	5	3
315	**WSX445R31514PN**	★	N	14	Coarse	327.9	63	47.625 [1.85"]	21.5	5	4

■Arbor Type
Left Hand Tool Holder

DC = mm size, DCON = Inch size (mm)

DC	Order Number	Stock	*1 Coolant Thru	*2 No.T	Pitch	DCX	LF	DCON	WT(kg)	APMX	Fig.
80	**WSX445L08004CA**	★	Y	4	Coarse	92.9	50	25.4 [1.00"]	1.3	5	1
100	**WSX445L10005DA**	★	Y	5	Coarse	112.9	50	31.75 [1.25"]	1.8	5	2
125	**WSX445L12506EA**	★	Y	6	Coarse	137.9	63	38.1 [1.50"]	3.2	5	2
160	**WSX445L16007FA**	★	Y	7	Coarse	172.9	63	50.8 [2.00"]	4.9	5	2
200	**WSX445L20008KN**	★	N	8	Coarse	212.9	63	47.625 [1.85"]	8.7	5	3
250	**WSX445L25010KN**	★	N	10	Coarse	262.9	63	47.625 [1.85"]	13.1	5	3

*1 Y=Yes, N=No
*2 Number of Teeth
(Note1) Set bolt not included.

★ : Stocked in Japan

Fig.3

ø200
ø250

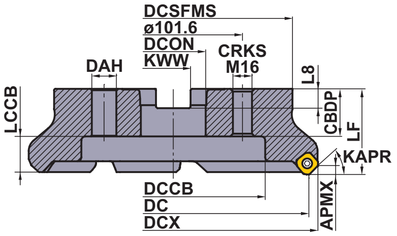
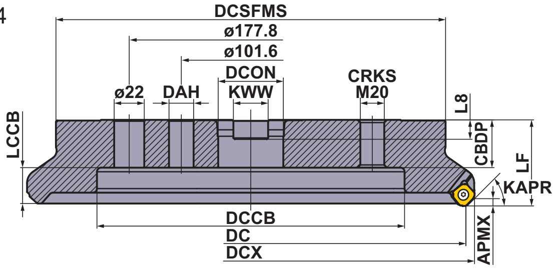
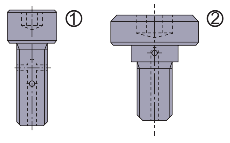


Fig.4

ø315



Right hand tool holder shown.

DC	Set Bolt	Geometry	
ϕ80	HSC12035H	①	
ϕ100	MBA16033H	②	
ϕ125	MBA20040H		
ϕ160	MBA24045H		
ϕ200	–	–	
ϕ250	–		
ϕ315	–		

Arbor Type Mounting Dimensions

(mm)

DCON	DC	Order Number	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8	Fig.
25.4	80	**WSX445R08004CA**	26	13	20	34	56	9.5	6	1
25.4	80	**WSX445R08006CA**	26	13	20	34	56	9.5	6	1
25.4	80	**WSX445R08008CA**	26	13	20	34	56	9.5	6	1
31.75	100	**WSX445R10005DA**	32	26	45	37	70	12.7	8	2
31.75	100	**WSX445R10007DA**	32	26	45	37	70	12.7	8	2
31.75	100	**WSX445R10010DA**	32	26	45	37	70	12.7	8	2
38.1	125	**WSX445R12506EA**	36	30	56	42	80	15.9	10	2
38.1	125	**WSX445R12508EA**	36	30	56	42	80	15.9	10	2
38.1	125	**WSX445R12512EA**	36	30	56	42	80	15.9	10	2
50.8	160	**WSX445R16007FA**	38	40	72	45	100	19.1	11	2
50.8	160	**WSX445R16010FA**	38	40	72	45	100	19.1	11	2
50.8	160	**WSX445R16016FA**	38	40	72	45	100	19.1	11	2
47.625	200	**WSX445R20008KN**	35	18	135	26.3	175	25.4	14.22	3
47.625	200	**WSX445R20012KN**	35	18	135	26.3	175	25.4	14.22	3
47.625	200	**WSX445R20020KN**	35	18	135	26.3	175	25.4	14.22	3
47.625	250	**WSX445R25010KN**	35	18	180	26.3	220	25.4	14.22	3
47.625	250	**WSX445R25014KN**	35	18	180	26.3	220	25.4	14.22	3
47.625	315	**WSX445R31514PN**	35	18	225	26.3	285	25.4	14.22	4

(mm)

DCON	DC	Order Number	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8	Fig.
25.4	80	**WSX445L08004CA**	26	13	20	34	56	9.5	6	1
31.75	100	**WSX445L10005DA**	32	26	45	37	70	12.7	8	2
38.1	125	**WSX445L12506EA**	36	30	56	42	80	15.9	10	2
50.8	160	**WSX445L16007FA**	38	40	72	45	100	19.1	11	2
47.625	200	**WSX445L20008KN**	35	18	135	26.3	175	25.4	14.22	3
47.625	250	**WSX445L25010KN**	35	18	180	26.3	220	25.4	14.22	3

General Purpose Double-sided Insert Type Face Mill Features Low Cutting Resistance

Metric Standard

For metric arbors

Fig.1

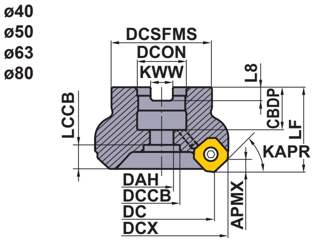
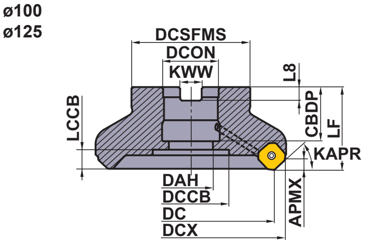


Fig.2



Right hand tool holder shown.

■Arbor Type Right Hand Tool Holder

DC = mm size, DCON = mm size (mm)

DC	Order Number	Stock	*1 Coolant Thru	*2 No.T	Pitch	DCX	LF	DCON	WT(kg)	APMX	Fig.
40	**WSX445-040A03AR**	★	Y	3	Coarse	52.8	40	16	0.3	5	1
40	**WSX445-040A04AR**	★	Y	4	Fine	52.8	40	16	0.3	5	1
50	**WSX445-050A03AR**	★	Y	3	Coarse	62.9	40	22	0.5	5	1
50	**WSX445-050A04AR**	★	Y	4	Fine	62.9	40	22	0.4	5	1
50	**WSX445-050A05AR**	★	Y	5	Extra Fine	62.9	40	22	0.4	5	1
63	**WSX445-063A04AR**	★	Y	4	Coarse	75.9	40	22	0.6	5	1
63	**WSX445-063A05AR**	★	Y	5	Fine	75.9	40	22	0.6	5	1
63	**WSX445-063A06AR**	★	Y	6	Extra Fine	75.9	40	22	0.6	5	1
80	**WSX445-080A04AR**	★	Y	4	Coarse	92.9	50	27	1.3	5	1
80	**WSX445-080A06AR**	★	Y	6	Fine	92.9	50	27	1.2	5	1
80	**WSX445-080A08AR**	★	Y	8	Extra Fine	92.9	50	27	1.1	5	1
100	**WSX445-100B05AR**	★	Y	5	Coarse	112.9	50	32	1.9	5	2
100	**WSX445-100B07AR**	★	Y	7	Fine	112.9	50	32	1.9	5	2
100	**WSX445-100B10AR**	★	Y	10	Extra Fine	112.9	50	32	1.8	5	2
125	**WSX445-125B06AR**	★	Y	6	Coarse	137.9	63	40	3.4	5	2
125	**WSX445-125B08AR**	★	Y	8	Fine	137.9	63	40	3.4	5	2
125	**WSX445-125B12AR**	★	Y	12	Extra Fine	137.9	63	40	3.2	5	2
160	**WSX445-160C07NR**	★	N	7	Coarse	172.9	63	40	4.9	5	3
160	**WSX445-160C10NR**	★	N	10	Fine	172.9	63	40	4.8	5	3
160	**WSX445-160C16NR**	★	N	16	Extra Fine	172.8	63	40	4.6	5	3
200	**WSX445-200C08NR**	★	N	8	Coarse	212.9	63	60	7.5	5	4
200	**WSX445-200C12NR**	★	N	12	Fine	212.9	63	60	7.4	5	4
200	**WSX445-200C20NR**	★	N	20	Extra Fine	212.8	63	60	7.2	5	4

■Arbor Type Left Hand Tool Holder

DC = mm size, DCON = mm size (mm)

DC	Order Number	Stock	*1 Coolant Thru	*2 No.T	Pitch	DCX	LF	DCON	WT(kg)	APMX	Fig.
80	**WSX445-080A04AL**	★	Y	4	Coarse	92.9	50	27	1.3	5	1
100	**WSX445-100B05AL**	★	Y	5	Coarse	112.9	50	32	1.9	5	2
125	**WSX445-125B06AL**	★	Y	6	Coarse	137.9	63	40	3.4	5	2
160	**WSX445-160C07NL**	★	N	7	Coarse	172.9	63	40	4.9	5	3

*1 Y=Yes, N=No　*2 Number of Teeth
(Note1) Set bolt not included.

★ : Stocked in Japan

Fig.3

ø160

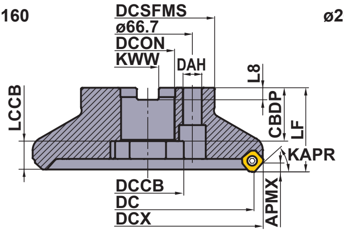
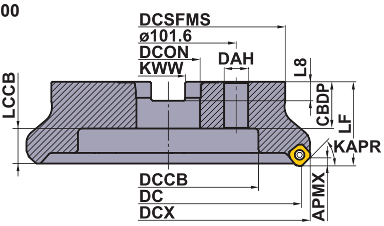
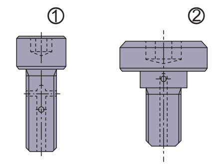


Fig.4

ø200



Right hand tool holder shown.

DC	Set Bolt	Geometry	
ϕ40	HSC08025H	①	
ϕ50	HSC10030H		
ϕ63	HSC10030H		
ϕ80	HSC12035H		
ϕ100	MBA16033H	②	
ϕ125	MBA20040H		
ϕ160	–	–	
ϕ200	–		

Arbor Type Mounting Dimensions

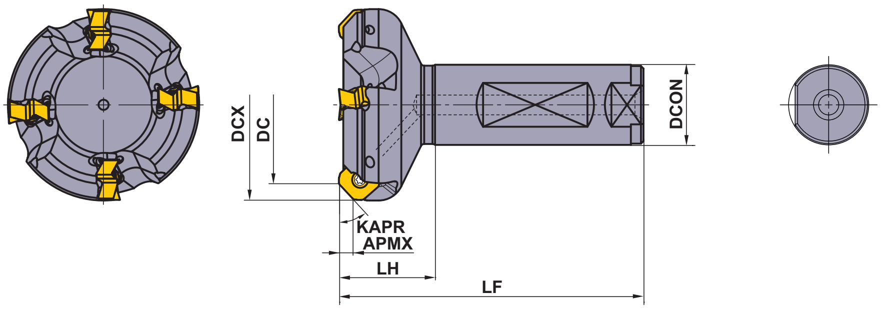
(mm)

DCON	DC	Order Number	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8	Fig.
16	40	**WSX445-040A03AR**	18	9	14	25	37	8.4	5.6	1
16	40	**WSX445-040A04AR**	18	9	14	25	37	8.4	5.6	1
22	50	**WSX445-050A03AR**	20	11	17	27	47	10.4	6.3	1
22	50	**WSX445-050A04AR**	20	11	17	27	47	10.4	6.3	1
22	50	**WSX445-050A05AR**	20	11	17	27	47	10.4	6.3	1
22	63	**WSX445-063A04AR**	20	11	17	27	50	10.4	6.3	1
22	63	**WSX445-063A05AR**	20	11	17	27	50	10.4	6.3	1
22	63	**WSX445-063A06AR**	20	11	17	27	50	10.4	6.3	1
27	80	**WSX445-080A04AR**	23	13	20	34	56	12.4	7	1
27	80	**WSX445-080A06AR**	23	13	13	34	56	12.4	7	1
27	80	**WSX445-080A08AR**	23	13	20	34	56	12.4	7	1
32	100	**WSX445-100B05AR**	26	26	45	32	78	14.4	8	2
32	100	**WSX445-100B07AR**	26	26	45	32	78	14.4	8	2
32	100	**WSX445-100B10AR**	26	26	45	32	78	14.4	8	2
40	125	**WSX445-125B06AR**	28	30	56	40	89	16.4	9	2
40	125	**WSX445-125B08AR**	28	30	56	40	89	16.4	9	2
40	125	**WSX445-125B12AR**	28	30	56	40	89	16.4	9	2
40	160	**WSX445-160C07NR**	40	–	56	–	100	16.4	9	3
40	160	**WSX445-160C10NR**	40	–	56	–	100	16.4	9	3
40	160	**WSX445-160C16NR**	40	–	56	–	100	16.4	9	3
60	200	**WSX445-200C08NR**	32	–	135	–	160	25.7	14.22	4
60	200	**WSX445-200C12NR**	32	–	135	–	160	25.7	14.22	4
60	200	**WSX445-200C20NR**	32	–	135	–	160	25.7	14.22	4

(mm)

DCON	DC	Order Number	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8	Fig.
27	80	**WSX445-080A04AL**	23	13	20	34	56	12.4	7	1
32	100	**WSX445-100B05AL**	26	26	45	32	78	14.4	8	2
40	125	**WSX445-125B06AL**	28	30	56	40	89	16.4	9	2
40	160	**WSX445-160C07NL**	40	–	56	–	100	16.4	9	3

General Purpose Double-sided Insert Type Face Mill Features Low Cutting Resistance



Right hand tool holder only.

■Shank Type

(inch)

Type	Order Number	Stock	*1 Coolant Thru	*2 No.T	DC	DCX	LF	DCON	LH	WT (lbs)	APMX
		R									
Coarse Pitch	**WSX445UR2403FA20M**	●	Y	3	1.500	2.005	4.750	1.250	1.500	1.698	.197
	WSX445UR3203FA20M	●	Y	3	2.000	2.506	4.750	1.250	1.500	2.050	.197
	WSX445UR4004FA20M	●	Y	4	2.500	3.006	4.750	1.250	1.500	2.469	.197
	WSX445UR4804FA20M	●	Y	4	3.000	3.506	4.750	1.250	1.500	2.976	.197
Fine Pitch	**WSX445UR2404FA20M**	●	Y	4	1.500	2.005	4.750	1.250	1.500	1.631	.197
	WSX445UR3204FA20M	●	Y	4	2.000	2.506	4.750	1.250	1.500	1.984	.197
	WSX445UR4005FA20M	●	Y	5	2.500	3.006	4.750	1.250	1.500	2.381	.197
	WSX445UR4806FA20M	●	Y	6	3.000	3.506	4.750	1.250	1.500	2.844	.197

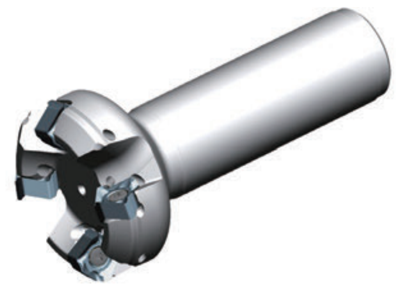
*1 Y=Yes, N=No
*2 Number of Teeth

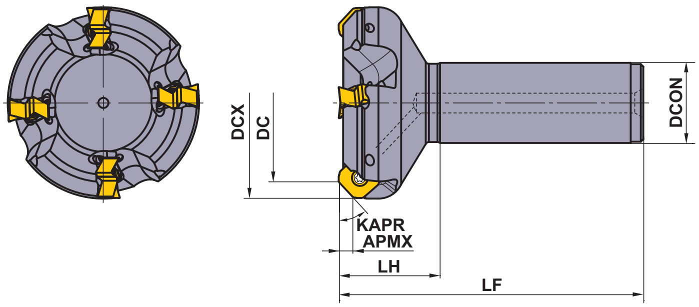
Spare Parts

Tool Holder Type	 *	
	Clamp Screw	Wrench (Insert)
WSX445	TPS4R	TIP15W

* Clamp Torque (lbf-in) : TPS4R=31

● : USA Stock ★ : Stocked in Japan





Right hand tool holder only.

Metric Standard

■Straight Shank Type

(mm)

Type	Order Number	Stock	*1 Coolant Thru	*2 No.T	DC	DCX	LF	DCON	LH	WT (kg)	APMX
		R									
Coarse Pitch	**WSX445R4003SA32M**	★	Y	3	40	52.8	125	32	40	0.84	5
	WSX445R5003SA32M	★	Y	3	50	62.9	125	32	40	0.98	5
	WSX445R6304SA32M	★	Y	4	63	75.9	125	32	40	1.18	5
	WSX445R8004SA32M	★	Y	4	80	92.9	125	32	40	1.51	5
Fine Pitch	**WSX445R4004SA32M**	★	Y	4	40	52.8	125	32	40	0.81	5
	WSX445R5004SA32M	★	Y	4	50	62.9	125	32	40	0.95	5
	WSX445R6305SA32M	★	Y	5	63	75.9	125	32	40	1.15	5
	WSX445R8006SA32M	★	Y	6	80	92.9	125	32	40	1.45	5

*1 Y=Yes, N=No
*2 Number of Teeth

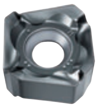
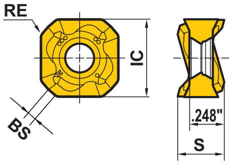
Inserts with Breaker

(inch)

Workpiece Material			MC5020	MP6120	MP6130	MP7130	MP7140	MP9120	MP9130	VP15TF	VP20RT	MX3030		TF15	
Workpiece Material	**P**	Steels		◐	✤					◐	◐	◐			
	M	Stainless Steels				◐	✤			◐	◐	◐			
	K	Cast Irons	◐							✤	✤	◐			
	N	Non-ferrous Metals												◐	
	S	Heat Resistant Alloys, Titanium Alloys						◐	✤	◐	◐				
	H	Hardened Steels								◐					

Cutting Conditions :
● : Stable Cutting ◐ : General Cutting
✤ : Unstable Cutting

Edge Preparation (Honing) :
E : Round F : Sharp

Shape	Order Number	Class	Hand	Edge Preparation	Coated									Cermet		Carbide		IC	S	BS	RE	Geometry
					MC5020	**MP6120**	**MP6130**	**MP7130**	**MP7140**	**MP9120**	**MP9130**	**VP15TF**	**VP20RT**	**MX3030**		**TF15**						
	**SNGU140812ANFR-L**	G	R	F												●		.551	.331	.059	.047	
	SNGU140812ANER-L	G	R	E	●	●	●	●	●	●	●	●	●	●				.551	.331	.059	.047	
	SNGU140812ANER-M	G	R	E	●	●	●	●	●	●	●	●	●	●				.551	.331	.059	.047	
	SNMU140812ANER-M	M	R	E	●	●	●	●	●	●	●	●	●	●				.551	.331	.059	.047	
	SNMU140812ANER-R	M	R	E	●	●	●					●	●					.551	.331	.059	.047	
	SNMU140812ANER-H	M	R	E	●	●	●					●	●					.551	.331	.059	.047	
	SNGU140812ANFL-L	G	L	F												●		.551	.331	.059	.047	
	SNGU140812ANEL-L	G	L	E	●	●	●					●		●				.551	.331	.059	.047	
	SNGU140812ANEL-M	G	L	E	●	●	●					●		●				.551	.331	.059	.047	
	SNMU140812ANEL-M	M	L	E	●	●	●					●		●				.551	.331	.059	.047	
	SNMU140812ANEL-R	M	L	E	●	●	●					●						.551	.331	.059	.047	Right hand insert shown.

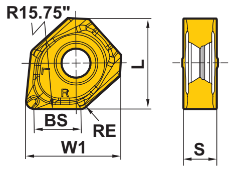
● : USA Stock
(10 inserts in one case)

Wiper Inserts

(inch)

Workpiece Material			MC5020	MP6120	VP15TF	MX3020
	P	Steels		◐	◐	●
	M	Stainless Steels			◐	●
	K	Cast Irons	◐		✤	●
	S	Heat Resistant Alloys, Titanium Alloys			◐	
	H	Hardened Steels			◐	

Cutting Conditions :
● : Stable Cutting ◐ : General Cutting
✤ : Unstable Cutting
Edge Preparation (Honing) :
E : Round

Shape	Order Number	Class	Edge Preparation	Coated MC5020	Coated MP6120	Coated VP15TF	Cermet MX3020	L	W1	S	BS	RE	Geometry
	**WNGU1406ANEN8C-M**	G	E	●	●	●	●	.664	.664	.236	.315	.039	

Instructions for Use of Wiper Inserts

Fig.1

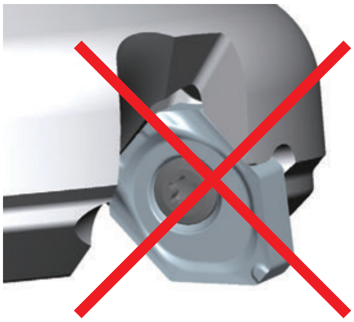


Fig.2

Wiper inserts for WSX445 are two-cornered. Please set as shown in Fig.1.
Excellent surface finish can be achieved with one wiper.
Set more than 2 wiper inserts, equally spaced, when the feed per revolution is larger than .315 IPR.

Recommended Cutting Conditions

■ Dry Cutting

	Workpiece Material	Properties	Grade		vc (SFM)	Finish Cutting	
						fz (IPT)	**ap**
P						L Breaker	
	Mild Steels	Hardness ≤180HB	MP6120	VP15TF	820 (655—985)	.006 (.004—.008)	≤.039
			MP6130	VP20RT	785 (620—950)	.006 (.004—.008)	≤.039
			MX3030	—	590 (425—755)	.006 (.004—.008)	≤.039
	Carbon Steels Alloy Steels	Hardness 180—350HB	MP6120	VP15TF	720 (560—885)	.006 (.004—.008)	≤.039
			MP6130	VP20RT	655 (490—820)	.006 (.004—.008)	≤.039
			MX3030	—	490 (395—590)	.006 (.004—.008)	≤.039
	Alloy Tool Steels	Hardness ≤ 350HB (Annealing)	MP6120	VP15TF	720 (560—885)	.006 (.004—.008)	≤.039
			MP6130	VP20RT	655 (490—820)	.006 (.004—.008)	≤.039
			MX3030	—	490 (395—590)	.006 (.004—.008)	≤.039
	Pre-hardened Steels	Hardness 35—45HRC	MP6120	VP15TF	460 (330—590)	.006 (.004—.008)	≤.039
			MP6130	VP20RT	395 (295—490)	.006 (.004—.008)	≤.039
M						L Breaker	
	Austenitic Stainless Steels	Hardness ≤200HB	MP7130	VP15TF	655 (490—820)	.006 (.004—.008)	≤.039
			MP7140	VP20RT	655 (490—820)	.006 (.004—.008)	≤.039
			MX3030	—	425 (330—590)	.006 (.004—.008)	≤.039
	Austenitic Stainless Steels	Hardness >200HB	MP7130	VP15TF	560 (395—720)	.006 (.004—.008)	≤.039
			MP7140	VP20RT	560 (395—720)	.006 (.004—.008)	≤.039
	Duplex Stainless Steels	Hardness ≤ 280HB	MP7130	VP15TF	525 (360—690)	.006 (.004—.008)	≤.039
			MP7140	VP20RT	525 (360—690)	.006 (.004—.008)	≤.039
	Precipitation Hardening Stainless Steels	Hardness < 450HB	MP7130	VP15TF	490 (330—655)	.006 (.004—.008)	≤.039
			MP7140	VP20RT	490 (330—655)	.006 (.004—.008)	≤.039
K						L Breaker	
	Gray Cast Irons	Tensile Strength ≤350MPa	MC5020	—	220 (200—270)	.006 (.004—.008)	≤.039
			VP15TF	—	180 (130—250)	.006 (.004—.008)	≤.039
			VP20RT	—	170 (120—240)	.006 (.004—.008)	≤.039
			MX3030	—	150 (120—180)	.006 (.004—.008)	≤.039
	Ductile Cast Irons	Tensile Strength ≤450MPa	MC5020	—	200 (180—250)	.006 (.004—.008)	≤.039
			VP15TF	VP20RT	160 (110—240)	.006 (.004—.008)	≤.039
	Ductile Cast Irons	Tensile Strength ≤800MPa	MC5020	—	200 (180—250)	.006 (.004—.008)	≤.039
			VP15TF	—	160 (110—240)	.006 (.004—.008)	≤.039
			VP20RT	—	150 (100—200)	.006 (.004—.008)	≤.039
H						M Breaker	
	Hardened Steels	Hardness 40—55HRC	VP15TF	—	50 (30—70)	.002 (.002—.004)	≤.039
	Hardened Steels	Hardness 55—62HRC	VP15TF	—	40 (20—50)	.002 (.002—.004)	≤.039

(inch)

Light Cutting		Medium Cutting		Rough Cutting		Heavy Cutting	
fz (IPT)	**ap**	**fz** (IPT)	**ap**	**fz** (IPT)	**ap**	**fz** (IPT)	**ap**
L,M Breaker		M Breaker		M,R Breaker		R,H Breaker	
.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	.008 (.006–.010)	≤.157	.010 (.008–.012)	≤.197
.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	.008 (.006–.010)	≤.157	.010 (.008–.012)	≤.197
.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	—	—	—	—
.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	.008 (.006–.010)	≤.157	.010 (.008–.012)	≤.197
.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	.008 (.006–.010)	≤.157	.010 (.008–.012)	≤.197
.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	—	—	—	—
.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	.008 (.006–.010)	≤.157	.010 (.008–.012)	≤.197
.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	.008 (.006–.010)	≤.157	.010 (.008–.012)	≤.197
.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	—	—	—	—
.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	.008 (.006–.010)	≤.157	.010 (.008–.012)	≤.197
.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	.008 (.006–.010)	≤.157	.010 (.008–.012)	≤.197
L,M Breaker		M Breaker					
.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	—	—	—	—
.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	—	—	—	—
.006 (.004–.008)	≤.079	—	—	—	—	—	—
.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	—	—	—	—
.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	—	—	—	—
.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	—	—	—	—
.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	—	—	—	—
.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	—	—	—	—
.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	—	—	—	—
L,M Breaker		M Breaker		M,R Breaker		R,H Breaker	
.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	.008 (.006–.010)	≤.157	.010 (.008–.012)	≤.197
.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	.008 (.006–.010)	≤.157	.010 (.008–.012)	≤.197
.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	.008 (.006–.010)	≤.157	.010 (.008–.012)	≤.197
.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	—	—	—	—
.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	.008 (.006–.010)	≤.157	.010 (.008–.012)	≤.197
.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	.008 (.006–.010)	≤.157	.010 (.008–.012)	≤.197
.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	.008 (.006–.010)	≤.157	.010 (.008–.012)	≤.197
.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	.008 (.006–.010)	≤.157	.010 (.008–.012)	≤.197
.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	.008 (.006–.010)	≤.157	.010 (.008–.012)	≤.197
M,R Breaker		R,H Breaker					
.002 (.002–.004)	≤.059	.004 (.002–.006)	≤.079	—	—	—	—
.002 (.002–.004)	≤.059	.004 (.002–.006)	≤.079	—	—	—	—

Recommended Cutting Conditions

Wet Cutting

	Workpiece Material	Properties	Grade		vc (SFM)	Finish Cutting	
						fz (IPT)	**ap**
P						L Breaker	
	Mild Steels	Hardness ≤ 180HB	MP6120	VP15TF	490 (330—655)	.006 (.004—.008)	≤.039
			MP6130	VP20RT	490 (330—655)	.006 (.004—.008)	≤.039
	Carbon Steels Alloy Steels	Hardness 180—350HB	MP6120	VP15TF	395 (260—525)	.006 (.004—.008)	≤.039
			MP6130	VP20RT	395 (260—525)	.006 (.004—.008)	≤.039
	Alloy Tool Steels	Hardness ≤ 350HB (Annealing)	MP6120	VP15TF	395 (260—525)	.006 (.004—.008)	≤.039
			MP6130	VP20RT	395 (260—525)	.006 (.004—.008)	≤.039
	Pre-hardened Steels	Hardness 35—45HRC	MP6120	VP15TF	330 (260—395)	.006 (.004—.008)	≤.039
			MP6130	VP20RT	330 (260—395)	.006 (.004—.008)	≤.039
M						L Breaker	
	Austenitic Stainless Steels	Hardness ≤ 200HB	MP7130	VP15TF	425 (260—590)	.006 (.004—.008)	≤.039
			MP7140	VP20RT	425 (260—590)	.006 (.004—.008)	≤.039
	Austenitic Stainless Steels	Hardness > 200HB	MP7130	VP15TF	330 (260—490)	.006 (.004—.008)	≤.039
			MP7140	VP20RT	330 (260—490)	.006 (.004—.008)	≤.039
	Duplex Stainless Steels	Hardness ≤ 280HB	MP7130	VP15TF	330 (260—490)	.006 (.004—.008)	≤.039
			MP7140	VP20RT	330 (260—490)	.006 (.004—.008)	≤.039
	Precipitation Hardening Stainless Steels	Hardness < 450HB	MP7130	VP15TF	295 (165—460)	.006 (.004—.008)	≤.039
			MP7140	VP20RT	295 (165—460)	.006 (.004—.008)	≤.039
K						L Breaker	
	Gray Cast Irons	Tensile Strength ≤350MPa	MC5020	—	590 (525—655)	.006 (.004—.008)	≤.039
			VP15TF	VP20RT	425 (330—525)	.006 (.004—.008)	≤.039
	Ductile Cast Irons	Tensile Strength ≤450MPa	MC5020	—	590 (525—655)	.006 (.004—.008)	≤.039
			VP15TF	VP20RT	425 (330—525)	.006 (.004—.008)	≤.039
	Ductile Cast Irons	Tensile Strength ≤ 800MPa	MC5020	—	590 (525—655)	.006 (.004—.008)	≤.039
			VP15TF	VP20RT	360 (260—460)	.006 (.004—.008)	≤.039
N						L Breaker	
	Aluminum Alloys	—	TF15	—	1640 (655—3280)	.006 (.004—.008)	≤.039
S						L Breaker	
	Titanium Alloys	—	MP9120	VP15TF	165 (130—195)	.002 (.002—.004)	≤.039
			MP9130	VP20RT	165 (130—195)	.002 (.002—.004)	≤.039
	Heat Resistant Alloys	—	MP9120	VP15TF	130 (65—165)	.002 (.002—.004)	≤.039
			MP9130	VP20RT	130 (65—165)	.002 (.002—.004)	≤.039

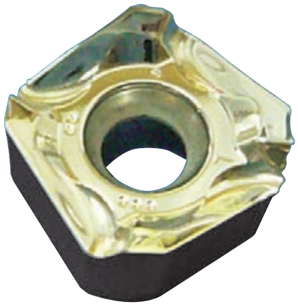
(inch)

	Light Cutting		Medium Cutting		Rough Cutting		Heavy Cutting	
	fz (IPT)	**ap**	**fz** (IPT)	**ap**	**fz** (IPT)	**ap**	**fz** (IPT)	**ap**
	L,M Breaker		M Breaker		M,R Breaker		R,H Breaker	
	.006 (.004—.008)	≦.079	.008 (.006—.010)	≦.118	.008 (.006—.010)	≦.157	.010 (.008—.012)	≦.197
	.006 (.004—.008)	≦.079	.008 (.006—.010)	≦.118	.008 (.006—.010)	≦.157	.010 (.008—.012)	≦.197
	.006 (.004—.008)	≦.079	.008 (.006—.010)	≦.118	.008 (.006—.010)	≦.157	.010 (.008—.012)	≦.197
	.006 (.004—.008)	≦.079	.008 (.006—.010)	≦.118	.008 (.006—.010)	≦.157	.010 (.008—.012)	≦.197
	.006 (.004—.008)	≦.079	.008 (.006—.010)	≦.118	.008 (.006—.010)	≦.157	.010 (.008—.012)	≦.197
	.006 (.004—.008)	≦.079	.008 (.006—.010)	≦.118	.008 (.006—.010)	≦.157	.010 (.008—.012)	≦.197
	.006 (.004—.008)	≦.079	.008 (.006—.010)	≦.118	.008 (.006—.010)	≦.157	.010 (.008—.012)	≦.197
	.006 (.004—.008)	≦.079	.008 (.006—.010)	≦.118	.008 (.006—.010)	≦.157	.010 (.008—.012)	≦.197
	L,M Breaker		M Breaker					
	.006 (.004—.008)	≦.079	.008 (.006—.010)	≦.118	—	—	—	—
	.006 (.004—.008)	≦.079	.008 (.006—.010)	≦.118	—	—	—	—
	.006 (.004—.008)	≦.079	.008 (.006—.010)	≦.118	—	—	—	—
	.006 (.004—.008)	≦.079	.008 (.006—.010)	≦.118	—	—	—	—
	.006 (.004—.008)	≦.079	.008 (.006—.010)	≦.118	—	—	—	—
	.006 (.004—.008)	≦.079	.008 (.006—.010)	≦.118	—	—	—	—
	.006 (.004—.008)	≦.079	.008 (.006—.010)	≦.118	—	—	—	—
	.006 (.004—.008)	≦.079	.008 (.006—.010)	≦.118	—	—	—	—
	L,M Breaker		M Breaker		M,R Breaker		R,H Breaker	
	.006 (.004—.008)	≦.079	.006 (.004—.008)	≦.079	.008 (.006—.010)	≦.157	.010 (.008—.012)	≦.197
	.006 (.004—.008)	≦.079	.006 (.004—.008)	≦.079	.008 (.006—.010)	≦.157	.010 (.008—.012)	≦.197
	.006 (.004—.008)	≦.079	.006 (.004—.008)	≦.079	.008 (.006—.010)	≦.157	.010 (.008—.012)	≦.197
	.006 (.004—.008)	≦.079	.006 (.004—.008)	≦.079	.008 (.006—.010)	≦.157	.010 (.008—.012)	≦.197
	.006 (.004—.008)	≦.079	.006 (.004—.008)	≦.079	.008 (.006—.010)	≦.157	.010 (.008—.012)	≦.197
	.006 (.004—.008)	≦.079	.006 (.004—.008)	≦.079	.008 (.006—.010)	≦.157	.010 (.008—.012)	≦.197
	L Breaker		L Breaker		L Breaker		L Breaker	
	.006 (.004—.008)	≦.079	.008 (.006—.010)	≦.118	.008 (.006—.010)	≦.157	.010 (.008—.012)	≦.197
	L,M Breaker		M Breaker					
	.002 (.002—.004)	≦.059	.004 (.002—.006)	≦.079	—	—	—	—
	.002 (.002—.004)	≦.059	.004 (.002—.006)	≦.079	—	—	—	—
	.002 (.002—.004)	≦.059	.004 (.002—.006)	≦.079	—	—	—	—
	.002 (.002—.004)	≦.059	.004 (.002—.006)	≦.079	—	—	—	—

Cutting Performance

Comparison of Finished Surface - Aluminum Alloy (AISI 6061)

Chip Breaker for Aluminum Alloy

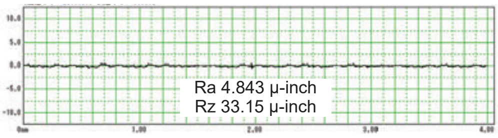
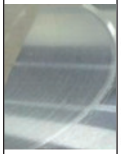
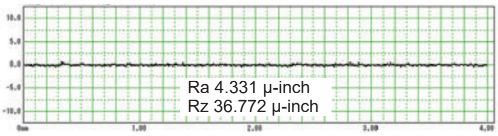
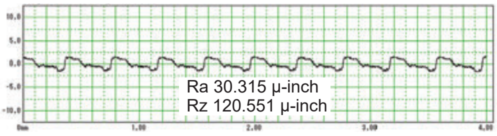


Polished Rake Face

→Improved Welding Resistance

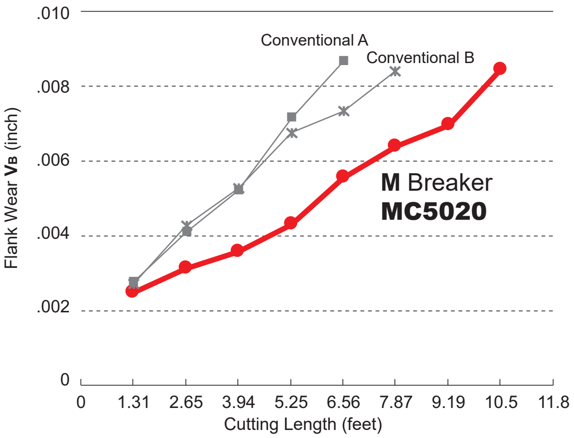
Sharp Edge

→Provides Smooth Cutting

Insert	Surface	Measured Value	Surface Roughness	Surface Quality
L Breaker **TF15**		(μ-inch) Roughness Profile Axial Magnification:x2000 Transverse Magnification:x50)  Ra 4.843 μ-inch Rz 33.15 μ-inch	○	○
Conventional A		(μ-inch) Roughness Profile Axial Magnification:x2000 Transverse Magnification:x50)  Ra 4.331 μ-inch Rz 36.772 μ-inch	○	× Cloudiness
Conventional B		(μ-inch) Roughness Profile Axial Magnification:x2000 Transverse Magnification:x50)  Ra 30.315 μ-inch Rz 120.551 μ-inch	× Rough	○

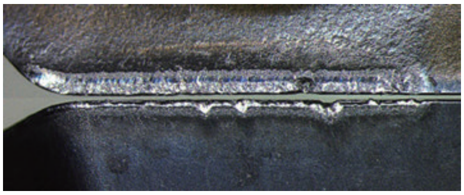
<Cutting Conditions>
Cutter Dia. : DC=5 inch
Cutting Speed : vc=1640 SFM
Feed per Tooth : fz=.004 IPT
Depth of Cut : ap=.079 inch
Width of Cut ae=3.937 inch
Cutting Mode : Dry Cutting
4 inserts
Center Cut

Tool Life Comparison when Cutting Ductile Cast Iron

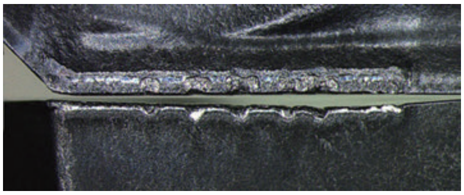


<Cutting Conditions>
Cutter Dia. : DC=5 inch
Cutting Speed : vc=655 SFM
Feed per Tooth : fz=.008 IPT
Depth of Cut : ap=.118 inch
Width of Cut : ae=3.937 inch
Cutting Mode : Dry Cutting
Single insert
Center Cut

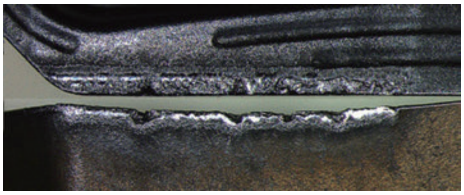
M Breaker
MC5020



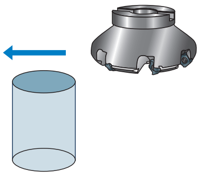
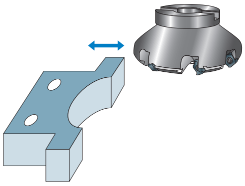
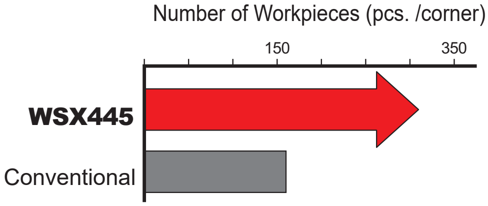
Conventional A

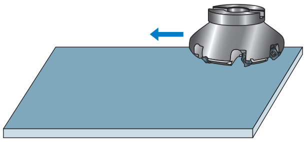
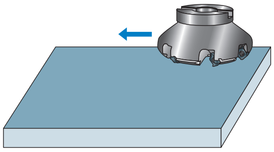
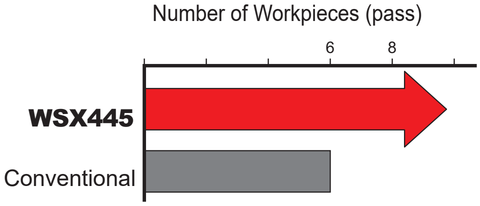


Conventional B



Application Examples

	Cutter Body	WSX445-050A04AR	WSX445-080A08AR
	Insert (Grade)	**SNMU140812ANER-R(MP6120)**	**SNGU140812ANER-M (MP6120)**
	Workpiece	Carbon Steel 	Ductile Cast Iron 
	Component	Round Bar	Automotive Component
Cutting Conditions	Cutting Speed **vc** (SFM)	620	655
	Feed per Tooth **fz** (IPT)	.008	.016
	Depth of Cut (inch)	ap=.079, ae=.984	ap=.079, ae=2.36
	Cutting Mode	Dry Cutting	Dry Cutting
	Results	The low cutting resistance enabled WSX445 double-sided inserts to be used with smaller BT30 arbors. Previously, only positive type single-sided inserts could be used, therefore doubling the number of cutting edges available.	 WSX445 achieved double tool life compared to conventional product without insert fracturing in interrupted machining.

	Cutter Body	WSX445R12508EA	WSX445R10007DA
	Insert (Grade)	**SNGU140812ANER-M (MP6120)**	**SNGU140812ANER-L (MP9120)**
	Workpiece	Carbon Steel 	Precipitation Hardening Stainless Steel 
	Component	Thin Plate	Aerospace Component
Cutting Conditions	Cutting Speed **vc** (SFM)	710	150
	Feed per Tooth **fz** (IPT)	.012	.012
	Depth of Cut (inch)	ap=.059 – .098, ae=4.72	ap=.079 – .118, ae=3.15
	Cutting Mode	Dry Cutting	Wet Cutting
	Results	Spindle load could be reduced to 80% of conventional product, as WSX445 offers improved chip discharge performance resulting in smooth and silent machining.	 Number of workpieces increased by 1.5 times or more since WSX445 prevents thermal cracking.

The above application examples are customer’s applications, so it can be different from the recommended conditions.

General Purpose Double-sided Insert Type Face Mill Features Low Cutting Resistance

WSX445

For your safety
●Don't touch breakers and chips without gloves. ●Please machine within recommended application range, and exchange expired tools with new parts in advance. ●Please use safety cover and wear safety glasses. ●When using compounded cutting oils, please take fire prevention. ●When attaching inserts or spare parts, please use the attached wrench or driver. ●When using tools in revolution machining, please make a trial run to check run-out, vibration, abnormal sounds etc.

DIAEDGE

TOOL NEWS

2020.7 Update
B235A

Double-Sided Insert Type, High Feed Radius Milling Cutter

WJX Series

Series Expansion

Sharpness and Stability for Highly Efficient Machining

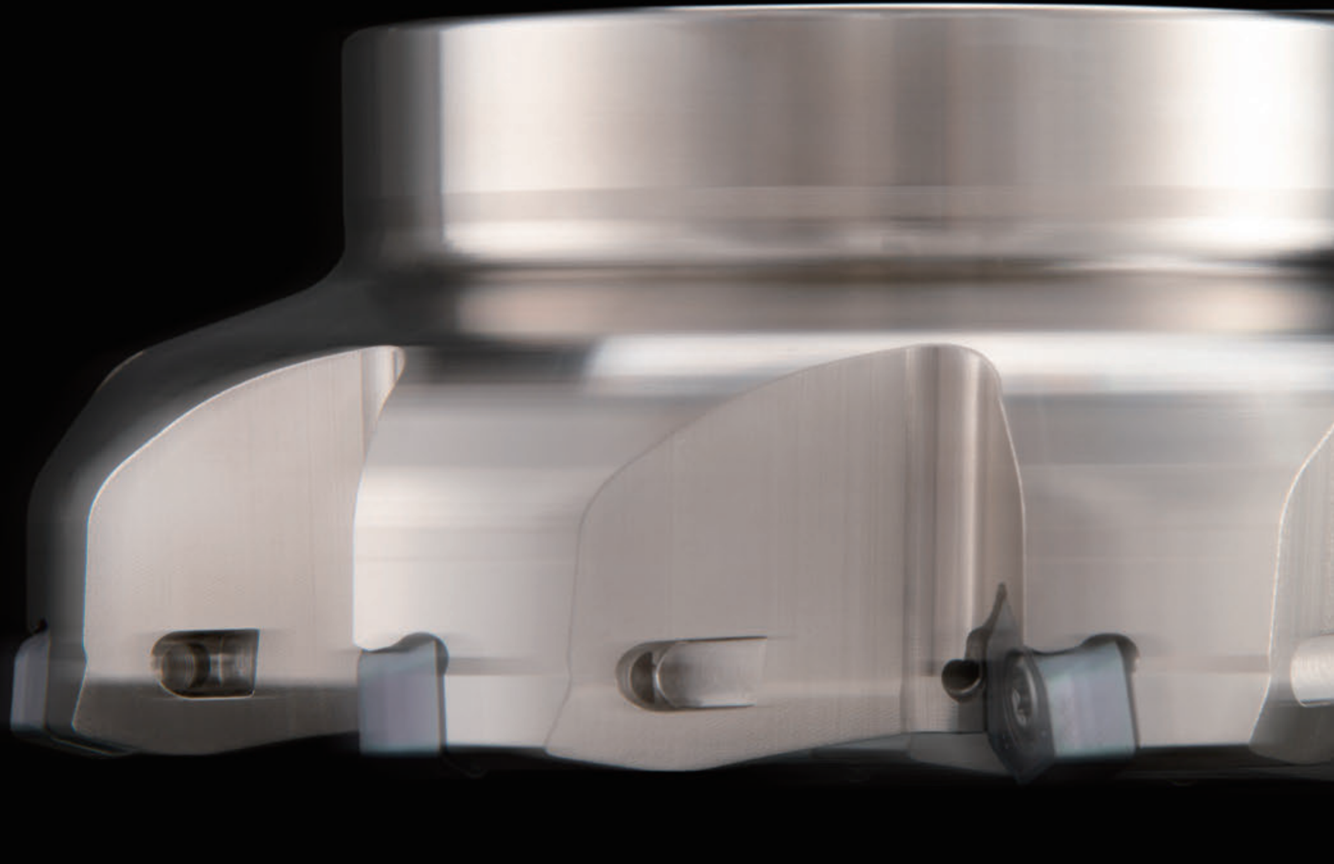
Now available with the new WJX09 smaller insert type.

MITSUBISHI MATERIALS CORPORATION

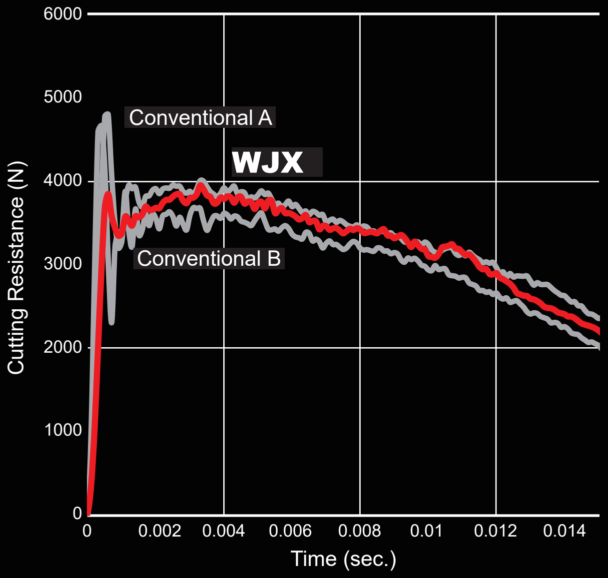
Fast Sha

WJX
Series

High feed radius milling cutter, with stronger double-sided insert type. Experiences low cutting resistance on start up, maintains stable machining even during interrupted machining and large depth of cut.



rp Strong



<Cutting Conditions>
Workpiece Material : AISI 4140
Cutter Dia. : DCX=ø2.48"
Cutting Speed : vc=490 SFM
Feed per Tooth : fz=.059 IPT
Depth of Cut : ap=.059"
Width of Cut : ae=1.24"
Cutting Mode : Single Insert

WJX produces low cutting resistance when entering the cut.

Reliability Even in High Efficiency Cutting Conditions

Provides excellent sharpness and tool life as well as reducing cutting noise.
The WJX series was developed for reliability and economy even during high efficiency machining.

Unconventional Cutting Edge Design for Stable Milling

Wiper Cutting Edge

The wiper edge enables surface finishes that are more than sufficient for rough machining.

Straight Cutting Edge

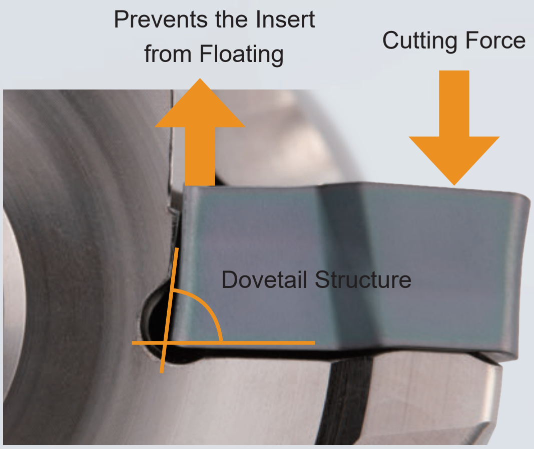
The straight cutting edge extending to the maximum depth of cut (APMX) allows for high feed machining even at large depths of cut.

Minor Cutting Edge

Stable chip formation, even at high ramping angles, is made possible with the straight cutting edge.

Highly-Reliable Clamping System

The dovetail pocket geometry prevents the insert from lifting and provides stable clamping without the use of a clamp bridge.



Complex Shape Flank Face Suitable for Ramping

The flank shape combines the strength and economy of negative inserts, with the sharpness and multi-functionality of positive inserts.

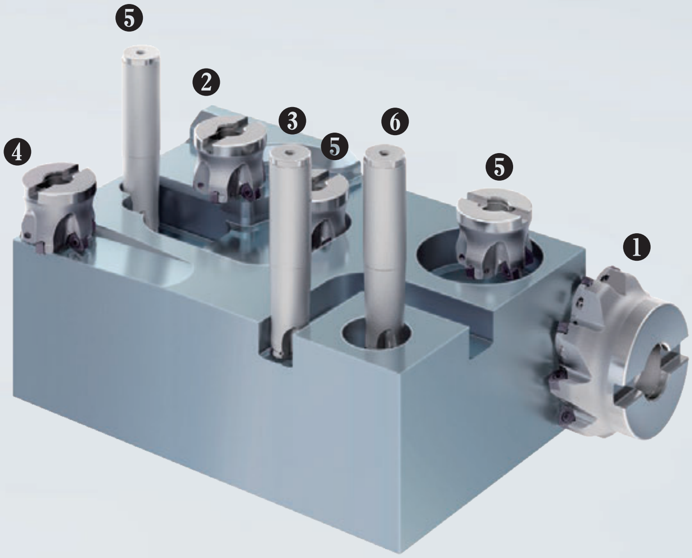
Single-sided : Positive Insert
Ramping Performance
Sharpness

+

Double-sided : Negative Insert
Cost Efficiency
Insert Strength
Fracture Resistance

Multi-functional Application Range

- ❶ Face Milling
- ❷ Shoulder Milling
- ❸ Flute Milling
- ❹ Ramping
- ❺ Pocket Milling
- ❻ Helical Milling



Increased Insert Thickness Provides Higher Strength

Increased thickness prevents the inserts from fracturing and makes the cutter body resistant to breakage.

WJX

Conventional

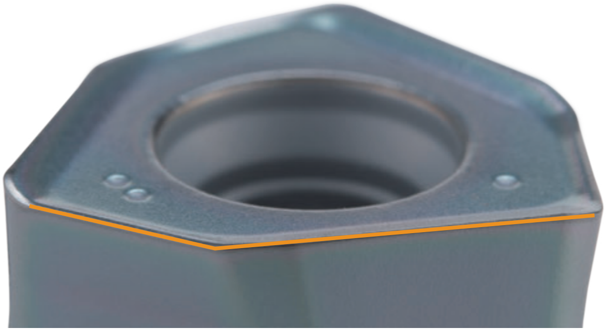
Cutting Length
15.748 feet

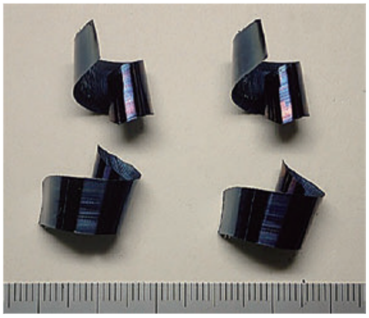
Cutting Length
11.811 feet

<Cutting Conditions>
Workpiece Material : AISI 4140
Cutter Dia. : DCX=ø2.48"
Cutting Speed : vc=490 SFM
Feed per Tooth : fz=.079 IPT
Depth of Cut : ap=.079"
Width of Cut : ae=1.772"
Cutting Mode : Dry Cutting
Single Insert

Good Chip Formation

The cutting edge forms short chips that prevents chip jamming and tangling, as well as facilitating easy removal of the chips after machining.





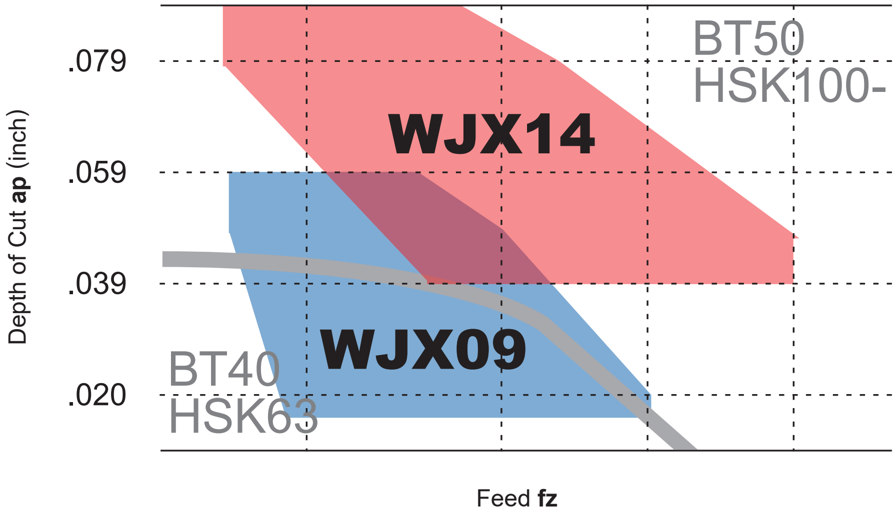
WJX

Conventional

<Cutting Conditions>
Workpiece Material : AISI 4140
Cutter Dia. : DCX=ø2.48"
Cutting Speed : vc=490 SFM
Feed per Tooth : fz=.079 IPT
Depth of Cut : ap=.079"
Width of Cut : ae=1.772"
Cutting Mode : Dry Cutting
Single Insert

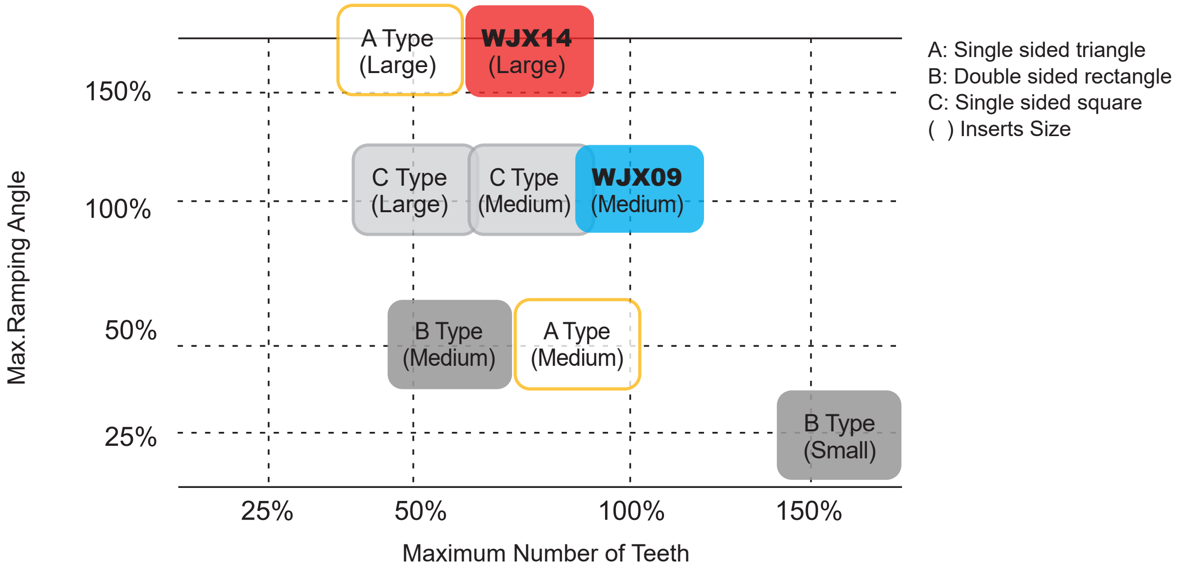
Using the WJX

The conditions for cutting at high feed will depend on rigidity of machine and workpiece and output of machine used.
Please adjust the cutting conditions accordingly (refer to the table of recommended cutting conditions).
Select a WJX series according to the figure below.



Multiple Cutting Edges and Multi-functionality

The WJX has achieved an excellent balance between cutting edge count and maximum ramping angle, making multi-functionality and high-efficiency cutting possible.



* Performance of the WJX09 is treated as standard (100%).

PVD Coated Grade for Milling

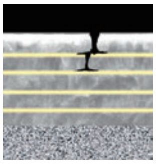
MP6100/MP7100/MP9100 Series

TOUGH-Σ Technology

A fusion of the separate coating technologies; PVD and multi-layering provides extra toughness.

Base Layer
High Al-(Al, Ti)N

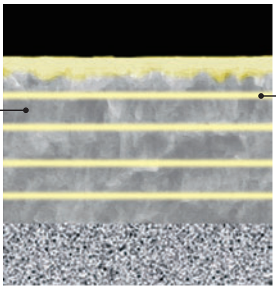
The new technology Al-(Al, Ti)N coating provides stabilisation of the high hardness phase and succeeds in dramatically improving wear, crater and welding resistance.



Multi-layering of the coating prevents any cracks penetrating through to the substrate.

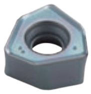
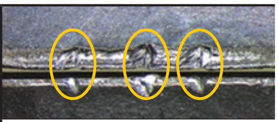
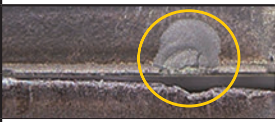
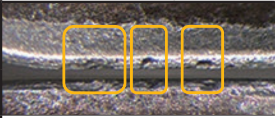
*Graphical Representation.

Al-Ti-Cr-N Based PVD Coating



*Graphical Representation.

Best Layer of Each Workpiece Material

P 	**(Al,Cr)N** **Tough! Thermal Cracks**	 Thermal Cracks
M 	**TiN** **Tough! Notching**	 Notching
S 	**CrN** **Tough! Resistant Chipping**	 Welding by Chipping

VP15TF

Stable machining properties are enabled when the coating is combined with a high wear and fracture resistant carbide substrate.

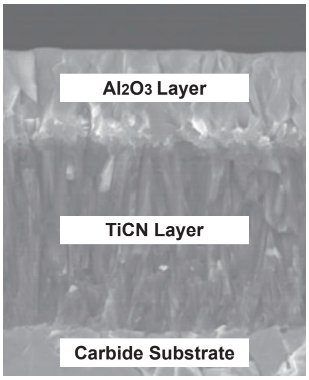
VP30RT

Ideal for heavy interrupted cutting of stainless and general steels because of the excellent fracture resistance properties.

CVD Coated Grade for Milling of Steels and Stainless Steels

MC7020

MC7020 suppresses crater wear that can occur during high speed cutting and also achieves stability when high efficiency machining.



Structure of **MC7020**

Improved Wear Resistance

The micro-grain wear resistant Al_2O_3 and fibrous TiCN layers deliver excellent wear resistance in high speed cutting.

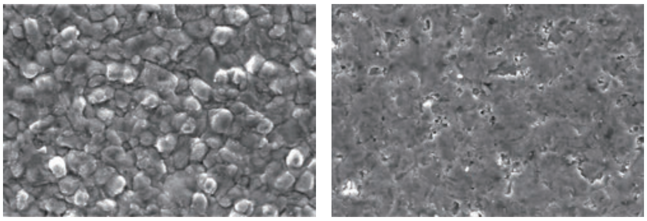
Improved Fracture Resistance

Use of a specially developed cemented carbide that provides superior resistance to fracture and thermal cracking prevents the cutting edge from sudden fracturing.

Reduced Abnormal Damage

An extremely smooth black super-smooth coating prevents abnormal damage such as chip welding.

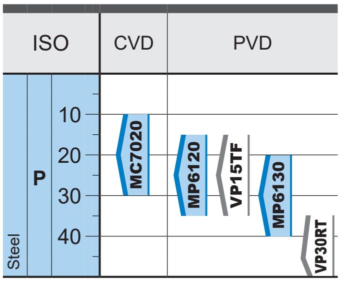
Comparison of Coating Surface

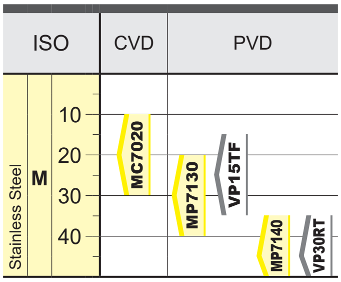


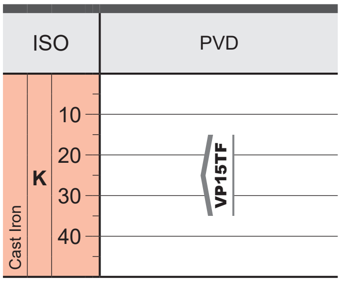
Conventional Coating

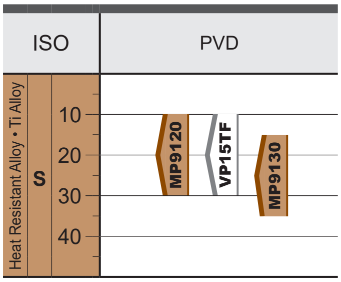
All Black Super-smooth Coating

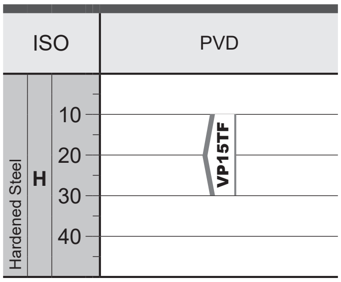
Insert Grades for a Wide Range of Materials



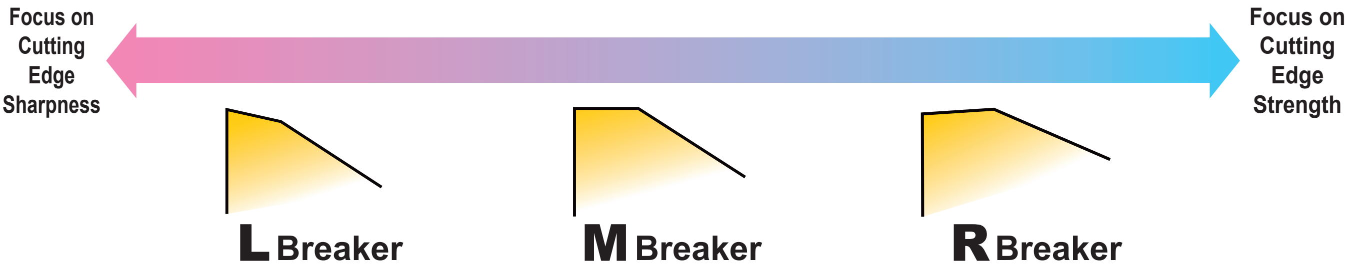


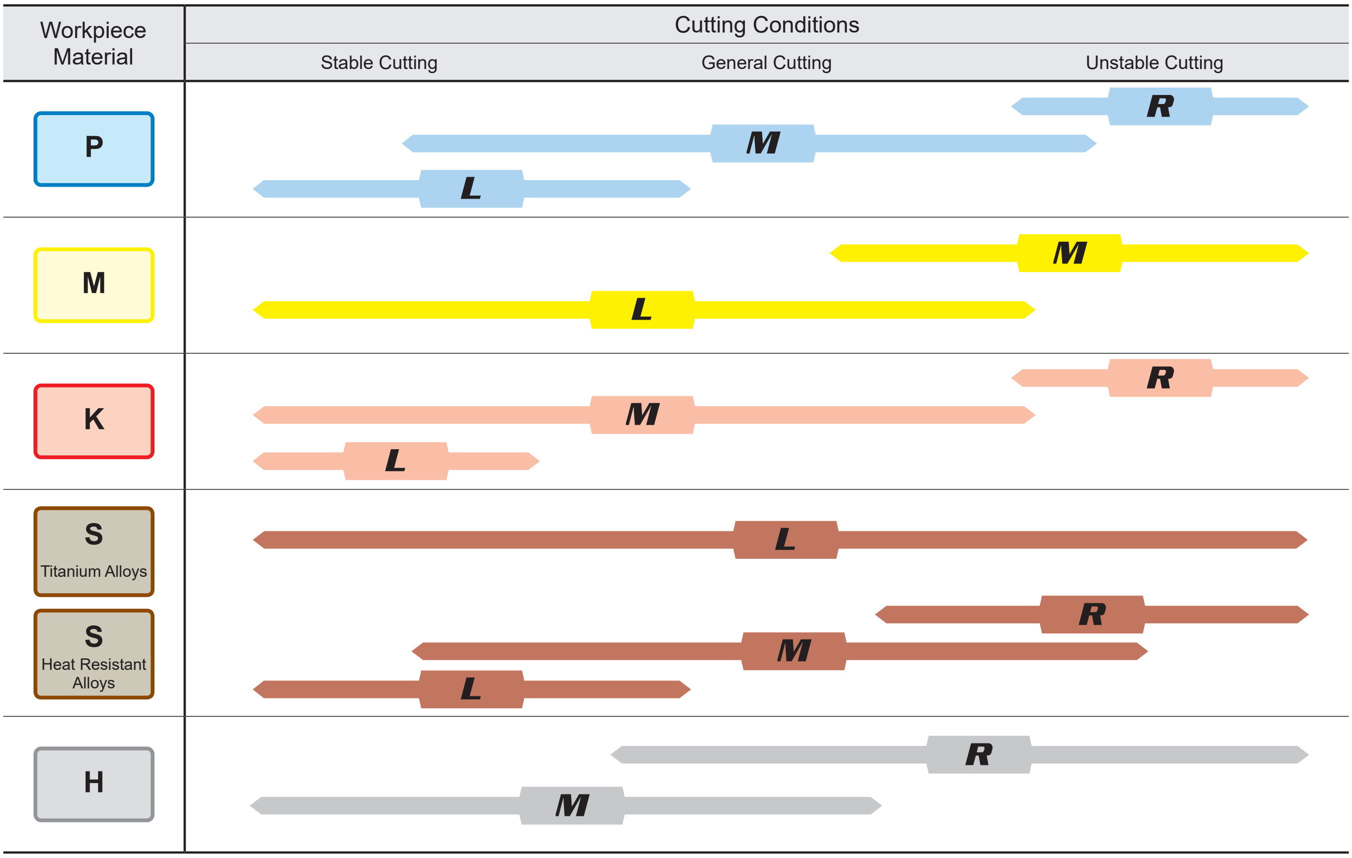






Chip Breaker System





WJX09

NEW

P M K N S H

Fig.1
ø1.500"

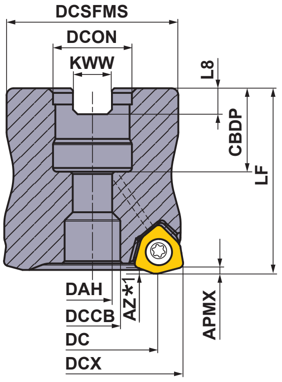
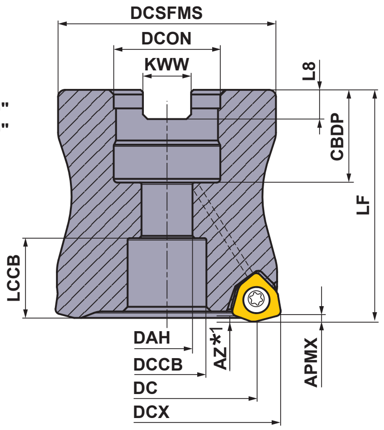
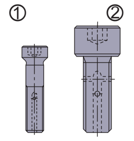


Fig.2
ø2.000"
ø2.500"



Right hand tool holder only.

(mm)

DCON	Set Bolt	Geometry	
.500	HSCU25011H	①	① ② 
.750	HSCU37513H	②	
1.000	HSCU50014H		

Arbor Type

With Coolant Hole

DCON = inch size

(inch)

DCX	Order Number	Stock	*2 No.T	DC	LF	DCON	WT (lbs)	APMX	RPMX (min^{-1})	Fig.	Insert Type
		R									
1.500	**WJX09UR1.5004SA**	●	4	1.060	1.750	.500	0.5	.047	24000	1	JOMU0905
2.000	**WJX09UR2.0004AA**	●	4	1.557	2.000	.750	0.9	.047	19800	2	JOMU0905
2.000	**WJX09UR2.0006AA**	●	6	1.557	2.000	.750	0.9	.047	19800	2	JOMU0905
2.500	**WJX09UR2.5005CA**	●	5	2.057	2.000	1.000	1.7	.047	17200	2	JOMU0905
2.500	**WJX09UR2.5007CA**	●	7	2.057	2.000	1.000	1.7	.047	17200	2	JOMU0905

*1 Refer to page 488, for the maximum drilling depth (**AZ**).
*2 Number of Teeth
Note 1) The maximum spindle speeds **RPMX** are set to ensure tool and insert stability.
Note 2) When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.

CUTTING CONDITIONS PG.486—488

Mounting Dimensions

(inch)

DCX	Order Number	DCON	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8	Fig.
1.500	**WJX09UR1.5004SA**	.500	.630	.276	.433	.695	1.438	.250	.156	1
2.000	**WJX09UR2.0004AA**	.750	.748	.413	.630	.827	1.750	.313	.187	2
2.000	**WJX09UR2.0006AA**	.750	.748	.413	.630	.827	1.750	.313	.187	2
2.500	**WJX09UR2.5005CA**	1.000	.945	.539	.787	.709	2.375	.375	.219	2
2.500	**WJX09UR2.5007CA**	1.000	.945	.539	.787	.709	2.375	.375	.219	2

● : Inventory maintained.

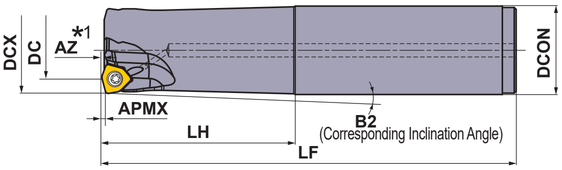


Fig.1

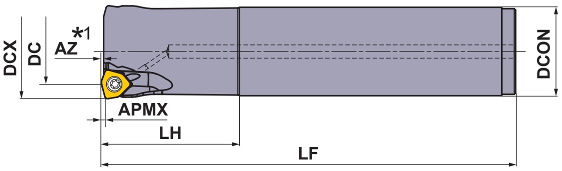


Fig.2

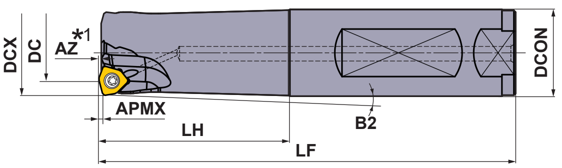


Fig.3

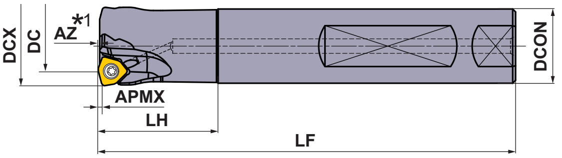


Fig.4

Right hand tool holder only.

■Shank Type

With Coolant Hole

(inch)

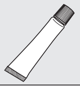
DCX	Order Number	Stock	*2 No.T	DC	LF	LH	DCON	B2	APMX	RPMX (min^{-1})	Fig.	Insert Type
		R										
1.000	**WJX09UR1602FA16S**	●	2	.565	5.625	2.375	1.000	1.09°	.047	33000	3	JOMU0905
1.000	**WJX09UR1603FA16S**	●	3	.565	5.625	2.375	1.000	1.09°	.047	33000	3	JOMU0905
1.000	**WJX09UR1602SA16L**	●	2	.565	8.000	4.750	1.000	0.53°	.047	33000	1	JOMU0905
1.000	**WJX09UR1603SA16L**	●	3	.565	8.000	4.750	1.000	0.53°	.047	33000	1	JOMU0905
1.125	**WJX09UR1802FA16S**	●	2	.687	5.625	1.625	1.000	—	.047	29800	4	JOMU0905
1.125	**WJX09UR1803FA16S**	●	3	.687	5.625	1.625	1.000	—	.047	29800	4	JOMU0905
1.125	**WJX09UR1802SA16L**	●	2	.687	8.000	1.625	1.000	—	.047	29800	2	JOMU0905
1.125	**WJX09UR1803SA16L**	●	3	.687	8.000	1.625	1.000	—	.047	29800	2	JOMU0905
1.250	**WJX09UR2002FA20S**	●	2	.811	6.000	2.750	1.250	0.93°	.047	27500	3	JOMU0905
1.250	**WJX09UR2003FA20S**	●	3	.811	6.000	2.750	1.250	0.93°	.047	27500	3	JOMU0905
1.250	**WJX09UR2002SA20L**	●	2	.811	8.000	4.750	1.250	0.53°	.047	27500	1	JOMU0905
1.250	**WJX09UR2003SA20L**	●	3	.811	8.000	4.750	1.250	0.53°	.047	27500	1	JOMU0905
1.500	**WJX09UR2403FA20S**	●	3	1.060	6.000	2.000	1.250	—	.047	24000	4	JOMU0905
1.500	**WJX09UR2404FA20S**	●	4	1.060	6.000	2.000	1.250	—	.047	24000	4	JOMU0905
1.500	**WJX09UR2403SA20L**	●	3	1.060	10.000	2.000	1.250	—	.047	24000	2	JOMU0905
1.500	**WJX09UR2404SA20L**	●	4	1.060	10.000	2.000	1.250	—	.047	24000	2	JOMU0905

*1 Refer to page 488, for the maximum drilling depth (**AZ**).
*2 Number of Teeth

CUTTING CONDITIONS PG.486—488

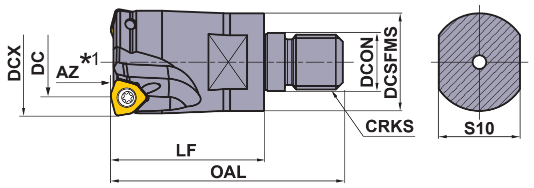
Spare Parts

(inch)

Tool Holder Type	 * Clamp Screw	 Wrench (Insert)	 Anti-seize Lubricant
WJX09	TPS3R	TIP10D	MK1KS

* Clamp Torque (lbf-in) : TS3R = 17.7

Double-Sided Insert Type, High Feed Radius Milling Cutter



Right hand tool holder only.

■ Screw-in Type

With Coolant Hole

(inch)

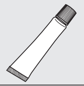
DCX	Order Number	Stock	*2 No.T	DC	LF	OAL	DCON	DCSFMS	S10	CRKS	WT (lbs)	APMX	RPMX (min^{-1})	Insert Type
		R												
1.000	**WJX09UR1602AM1235**	●	2	.565	1.378	2.244	.492	.925	.748	M12	.2	.047	33000	JOMU0905
1.000	**WJX09UR1603AM1235**	●	3	.565	1.378	2.244	.492	.925	.748	M12	.2	.047	33000	JOMU0905
1.125	**WJX09UR1802AM1235**	●	2	.687	1.378	2.244	.492	.925	.748	M12	.3	.047	29800	JOMU0905
1.125	**WJX09UR1803AM1235**	●	3	.687	1.378	2.244	.492	.925	.748	M12	.2	.047	29800	JOMU0905
1.250	**WJX09UR2002AM1645**	●	2	.811	1.772	2.677	.669	1.122	.945	M16	.5	.047	27500	JOMU0905
1.250	**WJX09UR2003AM1645**	●	3	.811	1.772	2.677	.669	1.122	.945	M16	.5	.047	27500	JOMU0905
1.375	**WJX09UR2202AM1645**	●	2	.936	1.772	2.677	.669	1.122	.945	M16	.6	.047	25600	JOMU0905
1.375	**WJX09UR2203AM1645**	●	3	.936	1.772	2.677	.669	1.122	.945	M16	.5	.047	25600	JOMU0905
1.375	**WJX09UR2204AM1645**	●	4	.936	1.772	2.677	.669	1.122	.945	M16	.5	.047	25600	JOMU0905

*1 Refer to page 488, for the maximum drilling depth (**AZ**).
*2 Number of Teeth

CUTTING CONDITIONS PG.486−488

Spare Parts

(inch)

Tool Holder Type	 *		
	Clamp Screw	Wrench (Insert)	Anti-seize Lubricant
WJX09	TPS3R	TIP10D	MK1KS

* Clamp Torque (lbf-in) : TS3R = 17.7

WJX09

NEW

P M K N S H

Fig.1
ø40

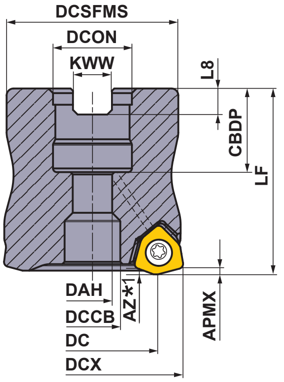
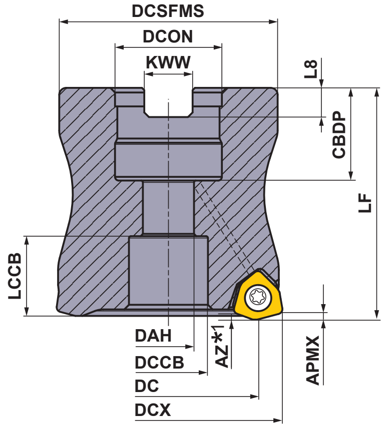
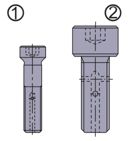


Fig.2
ø50
ø52
ø63
ø66



Right hand tool holder only.

(mm)

DCON		Set Bolt		Geometry
inch size	mm size			
	ϕ16	HFF08033H	①	① ② 
ϕ22.225	ϕ22	HSC10030H	②	
	ϕ27	HSC12035H		

Metric Standard

■Arbor Type

With Coolant Hole

DCON = inch size

(mm)

DCX	Order Number	Stock R	*2 No.T	DC	LF	DCON	WT (kg)	APMX	RPMX (min^{-1})	Fig.	Insert Type
50	**WJX09R05004BA**	★	4	38.8	50	22.225	0.4	1.2	20000	2	JOMU0905
50	**WJX09R05006BA**	★	6	38.8	50	22.225	0.4	1.2	20000	2	JOMU0905
63	**WJX09R06305BA**	★	5	51.8	50	22.225	0.8	1.2	17300	2	JOMU0905
63	**WJX09R06307BA**	★	7	51.8	50	22.225	0.8	1.2	17300	2	JOMU0905

DCON = mm size

(mm)

DCX	Order Number	Stock R	*2 No.T	DC	LF	DCON	WT (kg)	APMX	RPMX (min^{-1})	Fig.	Insert Type
40	**WJX09-040A04AR**	★	4	28.8	40	16	0.2	1.2	23200	1	JOMU0905
40	**WJX09-040A05AR**	★	5	28.8	40	16	0.2	1.2	23200	1	JOMU0905
50	**WJX09-050A04AR**	★	4	38.8	50	22	0.4	1.2	20000	2	JOMU0905
50	**WJX09-050A06AR**	★	6	38.8	50	22	0.4	1.2	20000	2	JOMU0905
52	**WJX09-052A06AR**	★	6	40.8	50	22	0.5	1.2	19500	2	JOMU0905
63	**WJX09-063A05AR**	★	5	51.8	50	22	0.8	1.2	17300	2	JOMU0905
63	**WJX09-063A07AR**	★	7	51.8	50	22	0.8	1.2	17300	2	JOMU0905
63	**WJX09-063X07AR**	★	7	51.8	50	27	0.7	1.2	17300	2	JOMU0905
66	**WJX09-066X07AR**	★	7	54.8	50	27	0.8	1.2	16800	2	JOMU0905

*1 Refer to page 488, for the maximum drilling depth (**AZ**).
*2 Number of Teeth
Note 1) The maximum spindle speeds **RPMX** are set to ensure tool and insert stability.
Note 2) When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.

CUTTING CONDITIONS PG.486—488

Double-Sided Insert Type, High Feed Radius Milling Cutter

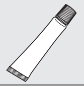
Mounting Dimensions

(mm)

DCX	Order Number	DCON	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8	Fig.
40	**WJX09-040A04AR**	16	18	8.5	12	—	37	8.4	5.6	1
40	**WJX09-040A05AR**	16	18	8.5	12	—	37	8.4	5.6	1
50	**WJX09-050A04AR**	22	20	11	17	17.2	47	10.4	6.3	2
50	**WJX09-050A06AR**	22	20	11	17	17.2	47	10.4	6.3	2
50	**WJX09R05004BA**	22.225	19	11	17	18.2	47	8.4	5	2
50	**WJX09R05006BA**	22.225	19	11	17	18.2	47	8.4	5	2
52	**WJX09-052A06AR**	22	20	11	17	17.2	47	10.4	6.3	2
63	**WJX09-063A05AR**	22	20	11	17	17.2	60	10.4	6.3	2
63	**WJX09-063A07AR**	22	20	11	17	17.2	60	10.4	6.3	2
63	**WJX09R06305BA**	22.225	19	11	17	18.2	60	8.4	5	2
63	**WJX09R06307BA**	22.225	19	11	17	18.2	60	8.4	5	2
63	**WJX09-063X07AR**	27	23	13	20	16.2	60	12.4	7	2
66	**WJX09-066X07AR**	27	23	13	20	16.2	60	12.4	7	2

Spare Parts

(mm)

Tool Holder Type	 *		
	Clamp Screw	Wrench (Insert)	Anti-seize Lubricant
WJX09	TPS3R	TIP10D	MK1KS

* Clamp Torque (N • m) : TPS3R = 2.0

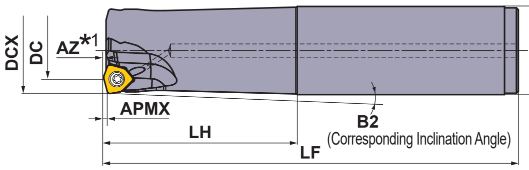


Fig.1

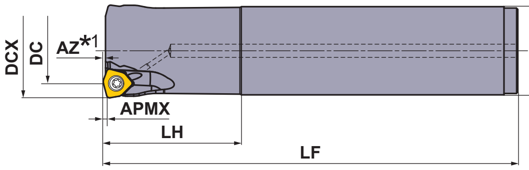


Fig.2

Metric Standard

Shank Type

With Coolant Hole

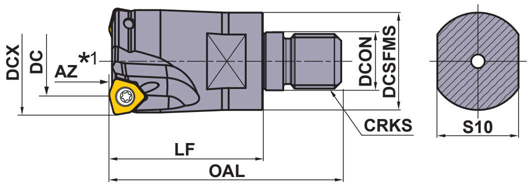
Right hand tool holder only.

(mm)

DCX	Order Number	Stock R	*2 No.T	DC	LF	LH	DCON	B2	APMX	RPMX (min^{-1})	Fig.	Insert Type
25	**WJX09R2502SA25S**	★	2	14	140	60	25	1.09°	1.2	33500	1	JOMU0905
25	**WJX09R2503SA25S**	★	3	14	140	60	25	1.09°	1.2	33500	1	JOMU0905
25	**WJX09R2502SA25L**	★	2	14	200	120	25	0.54°	1.2	33500	1	JOMU0905
25	**WJX09R2503SA25L**	★	3	14	200	120	25	0.54°	1.2	33500	1	JOMU0905
25	**WJX09R2502SA25EL**	★	2	14	300	180	25	0.35°	1.2	33500	1	JOMU0905
28	**WJX09R2802SA25S**	★	2	16.9	140	40	25	—	1.2	30300	2	JOMU0905
28	**WJX09R2803SA25S**	★	3	16.9	140	40	25	—	1.2	30300	2	JOMU0905
28	**WJX09R2802SA25L**	★	2	16.9	200	40	25	—	1.2	30300	2	JOMU0905
28	**WJX09R2803SA25L**	★	3	16.9	200	40	25	—	1.2	30300	2	JOMU0905
28	**WJX09R2802SA25EL**	★	2	16.9	300	40	25	—	1.2	30300	2	JOMU0905
32	**WJX09R3202SA32S**	★	2	20.9	150	70	32	0.93°	1.2	27300	1	JOMU0905
32	**WJX09R3203SA32S**	★	3	20.9	150	70	32	0.93°	1.2	27300	1	JOMU0905
32	**WJX09R3202SA32L**	★	2	20.9	200	120	32	0.54°	1.2	27300	1	JOMU0905
32	**WJX09R3203SA32L**	★	3	20.9	200	120	32	0.54°	1.2	27300	1	JOMU0905
32	**WJX09R3202SA32EL**	★	2	20.9	300	180	32	0.35°	1.2	27300	1	JOMU0905
35	**WJX09R3503SA32S**	★	3	23.8	150	50	32	—	1.2	25500	2	JOMU0905
35	**WJX09R3504SA32S**	★	4	23.8	150	50	32	—	1.2	25500	2	JOMU0905
35	**WJX09R3503SA32L**	★	3	23.8	200	50	32	—	1.2	25500	2	JOMU0905
35	**WJX09R3504SA32L**	★	4	23.8	200	50	32	—	1.2	25500	2	JOMU0905
35	**WJX09R3502SA32EL**	★	2	23.8	300	50	32	—	1.2	25500	2	JOMU0905
40	**WJX09R4003SA32S**	★	3	28.8	150	50	32	—	1.2	23200	2	JOMU0905
40	**WJX09R4004SA32S**	★	4	28.8	150	50	32	—	1.2	23200	2	JOMU0905
40	**WJX09R4003SA32L**	★	3	28.8	250	50	32	—	1.2	23200	2	JOMU0905
40	**WJX09R4004SA32L**	★	4	28.8	250	50	32	—	1.2	23200	2	JOMU0905
40	**WJX09R4003SA32EL**	★	3	28.8	300	50	32	—	1.2	23200	2	JOMU0905

*1 Refer to page 488, for the maximum drilling depth (**AZ**).
*2 Number of Teeth

CUTTING CONDITIONS PG.486−488



Metric Standard

Screw-in Type

With Coolant Hole

Right hand tool holder only.

(mm)

DCX	Order Number	Stock R	*2 No.T	DC	LF	OAL	DCON	DCSFMS	S10	CRKS	WT (kg)	APMX	RPMX (min^{-1})	Insert Type
25	**WJX09R2502AM1235**	★	2	14	35	57	12.5	23.5	19	M12	0.1	1.2	33500	JOMU0905
25	**WJX09R2503AM1235**	★	3	14	35	57	12.5	23.5	19	M12	0.1	1.2	33500	JOMU0905
28	**WJX09R2802AM1235**	★	2	16.9	35	57	12.5	23.5	19	M12	0.1	1.2	30300	JOMU0905
28	**WJX09R2803AM1235**	★	3	16.9	35	57	12.5	23.5	19	M12	0.1	1.2	30300	JOMU0905
32	**WJX09R3202AM1645**	★	2	20.9	45	68	17.0	28.5	24	M16	0.2	1.2	27300	JOMU0905
32	**WJX09R3203AM1645**	★	3	20.9	45	68	17.0	28.5	24	M16	0.2	1.2	27300	JOMU0905
35	**WJX09R3502AM1645**	★	2	23.8	45	68	17.0	28.5	24	M16	0.3	1.2	25500	JOMU0905
35	**WJX09R3503AM1645**	★	3	23.8	45	68	17.0	28.5	24	M16	0.2	1.2	25500	JOMU0905
35	**WJX09R3504AM1645**	★	4	23.8	35	68	17.0	28.5	24	M16	0.2	1.2	25500	JOMU0905
40	**WJX09R4003AM1645**	★	3	28.8	45	68	17.0	28.5	24	M16	0.3	1.2	23200	JOMU0905
40	**WJX09R4004AM1645**	★	4	28.8	45	68	17.0	28.5	24	M16	0.3	1.2	23200	JOMU0905
40	**WJX09R4005AM1645**	★	5	28.8	45	68	17.0	28.5	24	M16	0.3	1.2	23200	JOMU0905

*1 Refer to page 488, for the maximum drilling depth (**AZ**).
*2 Number of Teeth

Double-Sided Insert Type, High Feed Radius Milling Cutter

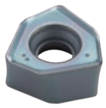
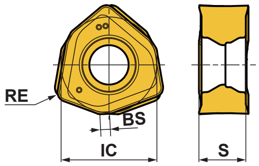
Inserts

(mm)

Workpiece Material			MC7020	MP6120	MP6130	MP7130	MP7140	MP9120	MP9130	VP15TF	VP30RT
	P	Steels	◐	◐	✣					◐	✣
	M	Stainless Steels	◐			◐	✣			◐	✣
	K	Cast Irons								✣	
	S	Heat Resistant Alloys, Titanium Alloys						◐	✣	◐	
	H	Hardened Steels								◐	

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✣ : Unstable Cutting

Edge Preparation (Honing) :
E : Round

Shape		Order Number	Class	Edge Preparation	Coated									IC	S	BS	RE	Geometry
					MC7020	MP6120	MP6130	MP7130	MP7140	MP9120	MP9130	VP15TF	VP30RT					
	NEW	**JOMU090512ZZER-L**	M	E	●	●	●	●	●	●	●	●	●	.375	.186	.035	.047	 Right hand insert only.
	NEW	**JOMU090512ZZER-M**	M	E	●	●	●	●	●	●	●	●	●	.375	.187	.035	.047	
	NEW	**JOMU090512ZZER-R**	M	E	●	●	●					●	●	.375	.190	.035	.047	

Cutter Diameter and Flat Surface Milling

The maximum cutting diameter (DCX) shown in the WJX items table is not the same as the possible dimensions for plane cutting.
The possible dimensions for plane cutting are given as the cutting axle DC value. Please note that this is smaller than the DCX value.

● : Inventory maintained. (10 inserts in one case)

WJX14

P M K N S H

Fig.1

ø2.000"

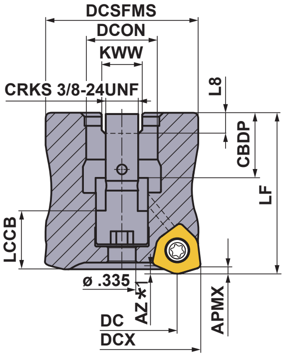


Fig.2

ø2.500"
ø3.000"
ø4.000"

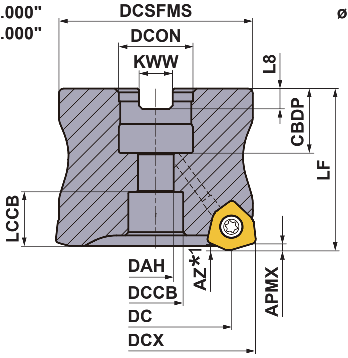
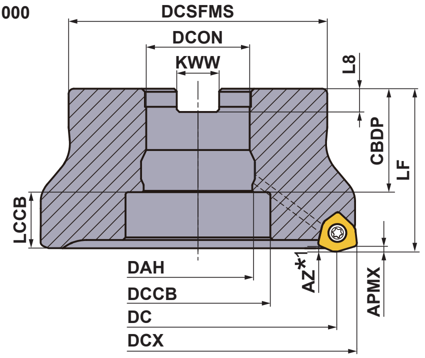


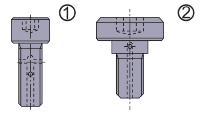
Fig.3

ø5.000
ø6.000



Right hand tool holder only.

(inch)

DCX	DCON	Set Bolt	Geometry	
ϕ2.500", ϕ3.000"	ϕ1.000"	HSCU50014H	①	
ϕ3.000"	ϕ1.250"	HSCU62516H		
ϕ4.000"	ϕ1.500"	HSCU75016H		
ϕ5.000"	ϕ1.500"	MBAU75016H	②	
ϕ6.000"	ϕ2.000"	MBAU100016H		

Note 1) The milling cutter with cutting diameter maximum DCX = 2.000 inch has a built in set bolt.
Please use ϕ.276 Allen wrench to tighten/loosen the set bolt.

■Arbor Type

With Coolant Hole

DCON = inch size

(inch)

DCX	Order Number	Stock	*2 No.T	DC	LF	DCON	WT	APMX	RMPX	RPMX	Fig.
		R					(lbs)			(min^{-1})	
2.000	**WJX14UR2.0003AA**	●	3	1.388	2.000	.750	.882	.079	4.3°	5000	1
2.000	**WJX14UR2.0004AA**	●	4	1.388	2.000	.750	.882	.079	4.3°	5000	1
2.500	**WJX14UR2.5004CA**	●	4	1.887	2.000	1.000	1.5	.079	3°	18100	2
2.500	**WJX14UR2.5005CA**	●	5	1.887	2.000	1.000	1.5	.079	3°	18100	2
3.000	**WJX14UR3.0005CA**	●	5	2.387	2.000	1.000	2.3	.079	2.2°	16100	2
3.000	**WJX14UR3.0006CA**	●	6	2.387	2.000	1.000	2.3	.079	2.2°	16100	2
3.000	**WJX14UR3.0005DA**	●	5	2.387	2.500	1.250	2.7	.079	2.2°	16100	2
3.000	**WJX14UR3.0006DA**	●	6	2.387	2.500	1.250	2.7	.079	2.2°	16100	2
4.000	**WJX14UR4.0006EA**	●	6	3.386	2.500	1.500	5.4	.079	1.5°	13300	2
4.000	**WJX14UR4.0007EA**	●	7	3.386	2.500	1.500	5.5	.079	1.5°	13300	2
5.000	**WJX14UR5.0007EA**	●	7	4.386	2.500	1.500	7.0	.079	1.1°	11500	3
5.000	**WJX14UR5.0009EA**	●	9	4.386	2.500	1.500	7.0	.079	1.1°	11500	3
6.000	**WJX14UR6.0009FA**	●	9	5.386	2.500	2.000	10.3	.079	0.9°	9900	3

*1 Refer to page 493, for the maximum drilling depth (**AZ**).
*2 Number of Teeth
Note 1) The maximum spindle speeds **RPMX** are set to ensure tool and insert stability.
Note 2) When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.

CUTTING CONDITIONS PG.490—493

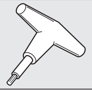
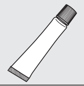
Mounting Dimensions

(inch)

DCX	Order Number	DCON	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8	Fig.
2.000	**WJX14UR2.0003AA**	.750	.858	—	—	.689	1.750	.313	.187	1
2.000	**WJX14UR2.0004AA**	.750	.858	—	—	.689	1.750	.313	.187	1
2.500	**WJX14UR2.5004CA**	1.000	.945	.539	.787	.689	2.375	.375	.219	2
2.500	**WJX14UR2.5005CA**	1.000	.945	.539	.787	.689	2.375	.375	.219	2
3.000	**WJX14UR3.0005CA**	1.000	.945	.539	.787	.689	2.750	.375	.219	2
3.000	**WJX14UR3.0006CA**	1.000	.945	.539	.787	.689	2.750	.375	.219	2
3.000	**WJX14UR3.0005DA**	1.250	1.260	.669	1.024	.874	2.875	.500	.281	2
3.000	**WJX14UR3.0006DA**	1.250	1.260	.669	1.024	.874	2.875	.500	.281	2
4.000	**WJX14UR4.0006EA**	1.500	1.181	.787	1.181	.953	3.813	.625	.375	2
4.000	**WJX14UR4.0007EA**	1.500	1.181	.787	1.181	.953	3.813	.625	.375	2
5.000	**WJX14UR5.0007EA**	1.500	1.654	1.575	2.205	.795	3.813	.625	.375	3
5.000	**WJX14UR5.0009EA**	1.500	1.654	1.575	2.205	.795	3.813	.625	.375	3
6.000	**WJX14UR6.0009FA**	2.000	1.693	2.087	3.228	.756	4.875	.750	.437	3

Spare Parts

(inch)

Tool Holder Type	 *		
	Clamp Screw	Wrench (Insert)	Anti-seize Lubricant
WJX14	TS5R	TKY20T	MK1KS

* Clamp Torque (lbf-in) : TS5R = 44

WJX14

P M K N S H

Fig.1

ø50
ø52

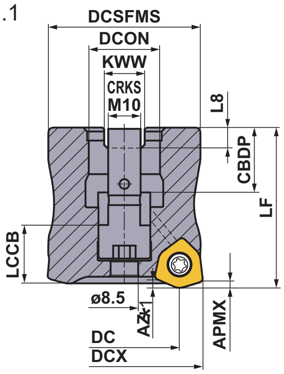


Fig.2

ø63
ø66
ø80
ø100

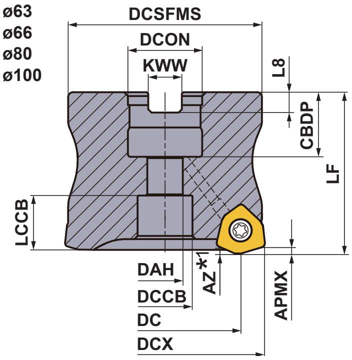
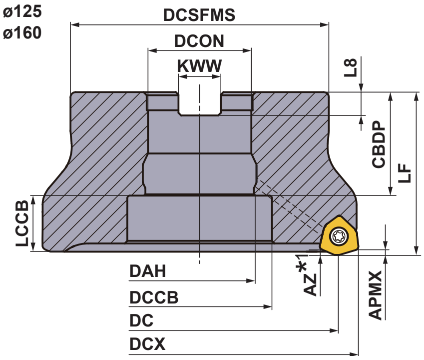


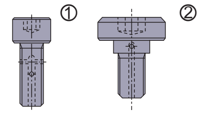
Fig.3

ø125
ø160



Right hand tool holder only.

(mm)

DCON		Set Bolt		Geometry
inch size	mm size			
ϕ22.225	ϕ22	HSC10030H	①	 ① ②
ϕ31.75	ϕ27	HSC12035H		
ϕ38.1	ϕ32	HSC16040H		
ϕ50.8	ϕ40	MBA20040H	②	
		MBA24045H		

Note 1) The milling cutter with cutting diameter maximum DCX = 50mm and 52mm has a built in set bolt.
Please use 7mm Allen wrench to tighten/loosen the set bolt.

Metric Standard

■Arbor Type

With Coolant Hole
DCON = inch size

(mm)

DCX	Order Number	Stock R	*2 No.T	DC	LF	DCON	WT (kg)	APMX	RPMX (min^{-1})	Fig.	Insert Type
50	**WJX14R05003BA**	★	3	34.5	50	22.225	0.4	2	5000	1	JOMU1407
50	**WJX14R05004BA**	★	4	34.5	50	22.225	0.4	2	5000	1	JOMU1407
63	**WJX14R06304BA**	★	4	47.5	50	22.225	0.7	2	18200	2	JOMU1407
63	**WJX14R06305BA**	★	5	47.5	50	22.225	0.7	2	18200	2	JOMU1407
80	**WJX14R08005DA**	★	5	64.4	63	31.75	1.4	2	15600	2	JOMU1407
80	**WJX14R08006DA**	★	6	64.4	63	31.75	1.4	2	15600	2	JOMU1407
100	**WJX14R10006DA**	★	6	84.4	63	31.75	2.5	2	13500	2	JOMU1407
100	**WJX14R10007DA**	★	7	84.4	63	31.75	2.5	2	13500	2	JOMU1407
125	**WJX14R12507EA**	★	7	109.4	63	38.1	3.2	2	11600	3	JOMU1407
125	**WJX14R12509EA**	★	9	109.4	63	38.1	3.1	2	11600	3	JOMU1407
160	**WJX14R16009FA**	★	9	144.4	63	50.8	4.5	2	9900	3	JOMU1407

DCON = mm size

(mm)

DCX	Order Number	Stock R	*2 No.T	DC	LF	DCON	WT (kg)	APMX	RPMX (min^{-1})	Fig.	Insert Type
50	**WJX14-050A03AR**	★	3	34.5	50	22	0.4	2	5000	1	JOMU1407
50	**WJX14-050A04AR**	★	4	34.5	50	22	0.4	2	5000	1	JOMU1407
52	**WJX14-052A04AR**	★	4	36.5	50	22	0.4	2	5000	1	JOMU1407
63	**WJX14-063A04AR**	★	4	47.5	50	22	0.7	2	18200	2	JOMU1407
63	**WJX14-063A05AR**	★	5	47.5	50	22	0.7	2	18200	2	JOMU1407
63	**WJX14-063X05AR**	★	5	47.5	50	27	0.6	2	18200	2	JOMU1407
66	**WJX14-066X05AR**	★	5	50.4	50	27	0.7	2	17700	2	JOMU1407
80	**WJX14-080A05AR**	★	5	64.4	50	27	1.2	2	15600	2	JOMU1407
80	**WJX14-080A06AR**	★	6	64.4	50	27	1.2	2	15600	2	JOMU1407
100	**WJX14-100A06AR**	★	6	84.4	63	32	2.5	2	13500	2	JOMU1407
100	**WJX14-100A07AR**	★	7	84.4	63	32	2.5	2	13500	2	JOMU1407
125	**WJX14-125B07AR**	★	7	109.4	63	40	3.2	2	11600	3	JOMU1407
125	**WJX14-125B09AR**	★	9	109.4	63	40	3.1	2	11600	3	JOMU1407
160	**WJX14-160B09AR**	★	9	144.4	63	40	4.9	2	9900	3	JOMU1407

*1 Refer to page 493, for the maximum drilling depth (**AZ**).
*2 Number of Teeth
Note 1) The maximum spindle speeds **RPMX** are set to ensure tool and insert stability.

★ : Inventory maintained in Japan.

CUTTING CONDITIONS PG.490–493

Mounting Dimensions

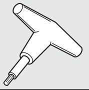
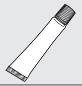
(mm)

DCX	Order Number	DCON	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8	Fig.
50	**WJX14-050A03AR**	22	20	—	—	18.3	47	10.4	6.3	1
50	**WJX14-050A04AR**	22	20	—	—	18.3	47	10.4	6.3	1
50	**WJX14R05003BA**	22.225	20	—	—	18.3	47	8.4	5	1
50	**WJX14R05004BA**	22.225	20	—	—	18.3	47	8.4	5	1
52	**WJX14-052A04AR**	22	20	—	—	18.3	47	10.4	6.3	1
63	**WJX14-063A04AR**	22	20	11	17	16.7	60	10.4	6.3	2
63	**WJX14-063A05AR**	22	20	11	17	16.7	60	10.4	6.3	2
63	**WJX14R06304BA**	22.225	19	11	17	17.7	60	8.4	5	2
63	**WJX14R06305BA**	22.225	19	11	17	17.7	60	8.4	5	2
63	**WJX14-063X05AR**	27	23	13	20	15.7	60	12.4	7	2
66	**WJX14-066X05AR**	27	23	13	20	15.7	60	12.4	7	2
80	**WJX14-080A05AR**	27	23	13	20	15.7	76	12.4	7	2
80	**WJX14-080A06AR**	27	23	13	20	15.7	76	12.4	7	2
80	**WJX14R08005DA**	31.75	32	17	26	19.7	76	12.7	8	2
80	**WJX14R08006DA**	31.75	32	17	26	19.7	76	12.7	8	2
100	**WJX14R10006DA**	31.75	32	17	26	19.7	96	12.7	8	2
100	**WJX14R10007DA**	31.75	32	17	26	19.7	96	12.7	8	2
100	**WJX14-100A06AR**	32	26	17	26	25.7	96	14.4	8	2
100	**WJX14-100A07AR**	32	26	17	26	25.7	96	14.4	8	2
125	**WJX14R12507EA**	38.1	40	40	56	21.7	100	15.9	10	3
125	**WJX14R12509EA**	38.1	40	40	56	21.7	100	15.9	10	3
125	**WJX14-125B07AR**	40	40	42	56	21.7	100	16.4	9	3
125	**WJX14-125B09AR**	40	40	42	56	21.7	100	16.4	9	3
160	**WJX14-160B09AR**	40	40	42	56	21.7	100	16.4	9	3
160	**WJX14R16009FA**	50.8	43	53	72	18.7	100	19.1	11	3

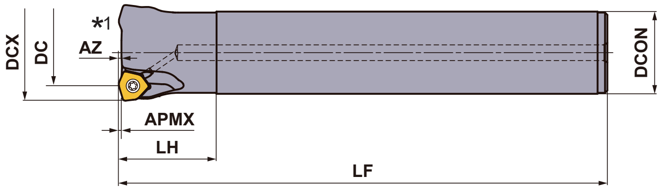
∗1 Refer to page 493, for the maximum drilling depth (**AZ**).
∗2 Number of Teeth
Note 1) The milling cutter with cutting diameter DC = 50 mm and 52 mm has a built-in set bolt cannot be replaced.
Therefore, absolutely do not disassemble the milling cutter.
Note 2) When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.

Spare Parts

(mm)

Tool Holder Type	 ∗		
	Clamp Screw	Wrench (Insert)	Anti-seize Lubricant
WJX14	TS5R	TKY20T	MK1KS

∗ Clamp Torque (N • m) : TS5R = 5.0



Right hand tool holder only.

Shank Type

With Coolant Hole

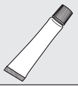
(mm)

DCX	Order Number	Stock R	*2 No.T	DC	LF	LH	DCON	APMX	RPMX (min^{-1})	Insert Type
50	**WJX14R5003SA42S**	★	3	34.5	150	50	42	2	21200	JOMU1407
50	**WJX14R5003SA42L**	★	3	34.5	250	50	42	2	21200	JOMU1407

*1 Refer to page 493, for the maximum drilling depth (**AZ**).
*2 Number of Teeth

CUTTING CONDITIONS PG.490—493

Spare Parts

Tool Holder Type	 * Clamp Screw	 Wrench (Insert)	 Anti-seize Lubricant
WJX14	TS5R	TKY20D	MK1KS

* Clamp Torque (N • m) : TS5R = 5.0

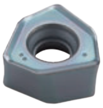
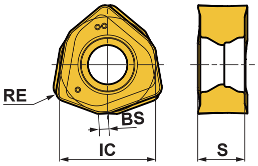
Inserts

(inch)

Workpiece Material			MC7020	MP6120	MP6130	MP7130	MP7140	MP9120	MP9130	VP15TF	VP30RT
Workpiece Material	P	Steels	◐	◐	✣					◐	✣
	M	Stainless Steels	◐			◐	✣			◐	✣
	K	Cast Irons								✣	
	S	Heat Resistant Alloys, Titanium Alloys						◐	✣	◐	
	H	Hardened Steels								◐	

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✣ : Unstable Cutting

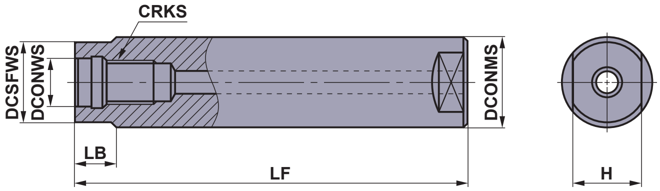
Edge Preparation (Honing) :
E : Round

Shape	Order Number	Class	Edge Preparation	Coated MC7020	 MP6120	 MP6130	 MP7130	 MP7140	 MP9120	 MP9130	 VP15TF	 VP30RT	IC	S	BS	RE	Geometry
	**JOMU140715ZZER-L**	M	E	●	●	●	●	●	●	●	●	●	.551	.259	.051	.059	 RE BS IC S Right hand insert only.
	JOMU140715ZZER-M	M	E	●	●	●	●	●	●	●	●	●	.551	.261	.051	.059	
	JOMU140715ZZER-R	M	E	●	●	●					●	●	.551	.266	.051	.059	

● : **Inventory maintained. (10 inserts in one case)** ★ : **Inventory maintained in Japan.**

SCREW-IN HOLDERS

STRAIGHT SHANK TYPE



■ Steel Shank Type

(inch)

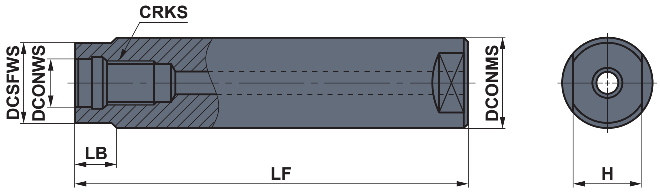
CRKS	Order Number	Stock	DCONMS	LF	DCONWS	DCSFWS	LB	H	WT (lbs)
M8	**SCU10M08S100S**	●	.625	3.937	.335	.571	.394	.394	.2
M8	**SCU10M08S200L**	●	.625	7.874	.335	.571	.394	.394	.7
M10	**SCU12M10S120S**	●	.750	4.724	.413	.728	.394	.551	.4
M10	**SCU12M10S220L**	●	.750	8.661	.413	.728	.394	.551	.9
M12	**SCU16M12S125S**	●	1.000	4.921	.492	.925	.394	.748	.9
M12	**SCU16M12S245L**	●	1.000	9.646	.492	.925	.394	.748	2.0
M16	**SCU20M16S140S**	●	1.250	5.512	.669	1.122	.591	.945	1.8
M16	**SCU20M16S280L**	●	1.250	11.024	.669	1.122	.591	.945	3.5

Metric Standard

(mm)

CRKS	Order Number	Stock	DCONMS	LF	DCONWS	DCSFWS	LB	H	WT (kg)
M8	**SC16M08S100S**	★	16	100	8.5	14.5	10	10	0.1
M8	**SC16M08S200L**	★	16	200	8.5	14.5	10	10	0.3
M10	**SC20M10S120S**	★	20	120	10.5	18.5	10	14	0.3
M10	**SC20M10S220L**	★	20	220	10.5	18.5	10	14	0.5
M12	**SC25M12S125S**	★	25	125	12.5	23.5	10	19	0.4
M12	**SC25M12S245L**	★	25	245	12.5	23.5	10	19	0.8
M16	**SC32M16S140S**	★	32	140	17	28.5	15	24	0.8
M16	**SC32M16S280L**	★	32	280	17	28.5	15	24	1.6

● : Inventory maintained. ★ : Inventory maintained in Japan.



■ Carbide Shank Type

(inch)

CRKS	Order Number	Stock	DCONMS	LF	DCONWS	DCSFWS	LB	H	WT (lbs)
M8	**SCU10M08S100SW**	●	.625	3.937	.335	.571	.394	.394	.4
M8	**SCU10M08S200LW**	●	.625	7.874	.335	.571	.394	.394	1.1
M10	**SCU12M10S120SW**	●	.750	4.724	.413	.728	.394	.551	.9
M10	**SCU12M10S220LW**	●	.750	8.661	.413	.728	.394	.551	1.8
M12	**SCU16M12S125SW**	●	1.000	4.921	.492	.925	.394	.748	1.8
M12	**SCU16M12S245LW**	●	1.000	9.646	.492	.925	.394	.748	3.5
M16	**SCU20M16S140SW**	●	1.250	5.512	.669	1.122	.591	.945	3.1
M16	**SCU20M16S280LW**	●	1.250	11.024	1.250	1.122	.591	.945	6.4

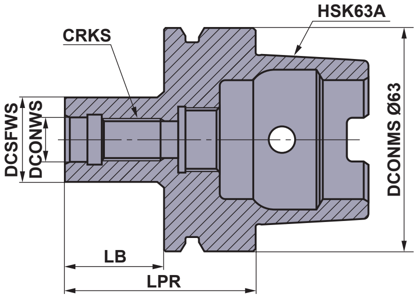
Metric Standard

(mm)

CRKS	Order Number	Stock	DCONMS	LF	DCONWS	DCSFWS	LB	H	WT (kg)
M8	**SC16M08S100SW**	★	16	100	8.5	14.5	10	10	0.2
M8	**SC16M08S200LW**	★	16	200	8.5	14.5	10	10	0.5
M10	**SC20M10S120SW**	★	20	120	10.5	18.5	10	14	0.5
M10	**SC20M10S220LW**	★	20	220	10.5	18.5	10	14	0.9
M12	**SC25M12S125SW**	★	25	125	12.5	23.5	10	19	0.8
M12	**SC25M12S245LW**	★	25	245	12.5	23.5	10	19	1.5
M16	**SC32M16S140SW**	★	32	140	17	28.5	15	24	1.4
M16	**SC32M16S280LW**	★	32	280	17	28.5	15	24	2.8

SCREW-IN HOLDERS

■HSK63A Shank Arbor

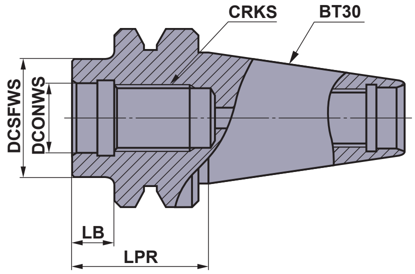


Metric Standard

(mm)

CRKS	Order Number	Stock	DCONWS	DCSFWS	LPR	LB	WT (kg)
M8	**SC16M08S22-HSK63A**	★	8.5	14.5	48	22	0.7
M10	**SC20M10S24-HSK63A**	★	10.5	18.5	50	24	0.7
M12	**SC25M12S27-HSK63A**	★	12.5	23.5	53	27	0.7
M16	**SC32M16S28-HSK63A**	★	17	28.5	54	28	0.8

■BT30 Shank Arbor

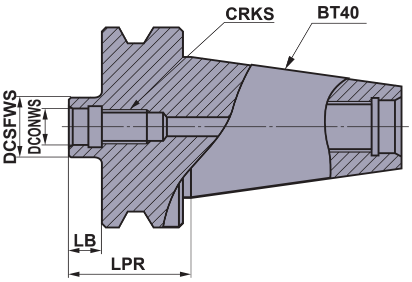


Metric Standard

(mm)

CRKS	Order Number	Stock	DCONWS	DCSFWS	LPR	LB	WT (kg)
M8	**SC16M08S10-BT30**	★	8.5	14.5	32	10	0.4
M10	**SC20M10S10-BT30**	★	10.5	18.5	32	10	0.4
M12	**SC25M12S10-BT30**	★	12.5	23.5	32	10	0.4
M16	**SC32M16S10-BT30**	★	17	28.5	32	10	0.4

■BT40 Shank Arbor



Metric Standard

(mm)

CRKS	Order Number	Stock	DCONWS	DCSFWS	LPR	LB	WT (kg)
M8	**SC16M08S10-BT40**	★	8.5	14.5	37	10	1
M10	**SC20M10S10-BT40**	★	10.5	18.5	37	10	1
M12	**SC25M12S10-BT40**	★	12.5	23.5	37	10	1
M16	**SC32M16S10-BT40**	★	17	28.5	37	10	1

★ : Inventory maintained in Japan.

How To Install the Screw-in Head

①Thoroughly clean the clamp section of the head and the arbor with an air blower or brush before installation.

②Tighten the head at the recommended torque and ensure that there is no gap between the head and arbor.

Screw Size	Recommended Torque (lbf-ft)	Wrench Size (inch)
M8	17.0	.394
M10	33.9	.551
M12	59.0	.748
M16	66.4	.945

- Cutting tools become extremely hot during cutting. Never touch them with bare hands after operation as this may produce risk of injuries or burns.
- Do not handle the cutting tools with bare hands as this may cause injuries.

Double-Sided Insert Type, High Feed Radius Milling Cutter

WJX09

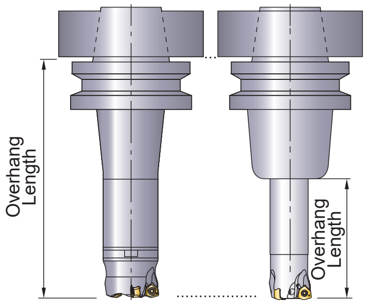
Recommended Cutting Conditions

Correction Value According to Overhang Length

Multiply the recommended cutting conditions by the corrections factor x overhang length.

(inch)

Type	Cutting Dia. Max. **DCX**	Overhang Length	Correction Value According		
			Cutting Speed **vc** (SFM)	Depth of Cut **ap**	Feed **fz**(IPT)
Shank Type Screw-in Type	.984-1.575	< 2.5×DCON	100%	100%	100%
		3.0×DCON	90%	100%	90%
		4.0×DCON	85%	90%	85%
		5.0×DCON	80%	85%	80%
		7.5×DCON	70%	75%	75%
Arbor Type	1.500-2.598	< 2.5×DCX	100%	100%	100%
		3.0×DCX	85%	100%	90%
		4.0×DCX	80%	80%	80%
		5.0×DCX	75%	75%	60%
		6.0×DCX	70%	70%	40%



DCON=Connection Dia.

Cutting Speed (Dry Cutting)

(inch)

	Workpiece Material	Properties	Cutting Speed **vc** (SFM)				
P			MP6130	MP6120	VP15TF	MC7020	VP30RT
	Mild Steels	≤180HB	525(360–655)	560(395–720)	560(395–720)	755(590–920)	460(330–590)
	Carbon Steels Alloy Steels	180−280HB	460(295–655)	525(330–720)	525(330–720)	720(560–885)	395(260–560)
	Carbon Steels Alloy Steels	280−350HB	460(295–655)	525(330–720)	525(330–720)	720(560–885)	395(260–560)
	Alloy Tool Steels	≤350HB (Annealing)	460(295–655)	525(330–720)	525(330–720)	720(560–885)	395(260–560)
	Pre-hardened Steels	35−45HRC	330(195–460)	395(260–525)	395(260–525)	–	295(165–425)
M			MP7130	MP7140	MC7020	VP30RT	
	Austenitic Stainless Steels	≤200HB	525(425–655)	490(395–590)	720(560–885)	490(395–590)	
	Austenitic Stainless Steels	>200HB	460(330–655)	425(260–590)	620(460–785)	425(260–590)	
	Ferritic and Martensitic Stainless Steels	≤200HB	490(330–655)	425(260–590)	720(560–885)	425(260–590)	
	Duplex Stainless Steels	≤280HB	425(260–590)	360(195–525)	590(425–755)	360(195–525)	
	Precipitation Hardening Stainless Steels	<450HB	360(195–525)	295(165–425)	560(395–720)	295(165–425)	
K			VP15TF				
	Gray Cast Irons	≤350MPa	590(460–720)				
	Ductile Cast Irons	≤450MPa	525(395–690)				
	Ductile Cast Irons	≤800MPa	425(295–560)				
S			MP9130	MP9120	VP15TF		
	Titanium Alloys	–	130(100–195)	165(100–210)	165(100–210)		
	Heat Resistant Alloys	–	100(65–130)	130(65–165)	130(65–165)		
H			VP15TF				
	Hardened Steels	40−55HRC	230(130–330)				

Note 1) To discharge chips effectively, use an air blow when machining. When the air blow is less effective at discharging chips, we recommend wet cutting.
Note 2) When wet cutting, tool life may become shorter than dry cutting. When carrying out wet cutting for the applications recommended with dry cutting, reduce the cutting speed by 25%.
Note 3) When large vibration occurs, reduce the cutting conditions.
Note 4) For interrupted cutting, reduce the cutting speed and feed rate by 20%.

Depth of Cut / Feed per Tooth

(inch)

	Workpiece Material	Properties	Depth of Cut **ap**	Breaker	DCX=1.000", 1.125", 25mm, 28mm Number of Teeth=2	DCX=1.000", 1.125", 25mm, 28mm Number of Teeth=3	DCX≥1.250", 32mm	Cutting Mode
					Feed **fz**(IPT)	Feed **fz**(IPT)	Feed **fz**(IPT)	
P	Mild Steels	Hardness ≤180HB	≤.020	M,R	.051(.016–.079)	.051(.016–.079)	.059(.020–.079)	Dry
				L	.047(.016–.063)	.047(.016–.063)	.047(.016–.063)	
			≤.039	M,R	.039(.012–.051)	.031(.012–.039)	.047(.016–.059)	
				L	.031(.012–.047)	.031(.012–.039)	.031(.012–.047)	
			≤.059	M,R	.024(.012–.039)	–	.031(.016–.047)	
	Carbon Steels Alloy Steels	Hardness 180–280HB	≤.020	M,R	.051(.016–.067)	.051(.016–.067)	.059(.016–.079)	Dry
				L	.047(.012–.059)	.047(.012–.059)	.047(.012–.059)	
			≤.039	M,R	.031(.012–.039)	.028(.012–.035)	.039(.012–.051)	
				L	.028(.008–.039)	.028(.008–.035)	.028(.008–.039)	
			≤.059	M,R	.020(.012–.028)	–	.028(.012–.039)	
	Carbon Steels Alloy Steels Alloy Tool Steels	Hardness 280–350HB ≤350HB (Annealing)	≤.020	M,R	.051(.016–.067)	.051(.016–.067)	.059(.016–.079)	Dry
				L	.047(.012–.059)	.047(.012–.059)	.047(.012–.059)	
			≤.039	M,R	.031(.012–.039)	.028(.012–.035)	.039(.012–.051)	
				L	.028(.008–.039)	.028(.008–.035)	.028(.008–.039)	
			≤.059	M,R	.020(.012–.028)	–	.028(.012–.039)	
	Pre-hardened Steels	Hardness 35–45HRC	≤.020	M,R	.039(.012–.051)	.039(.012–.051)	.047(.012–.059)	Dry
				L	.031(.012–.047)	.031(.012–.047)	.031(.012–.047)	
			≤.039	M,R	.024(.008–.031)	.024(.008–.031)	.031(.008–.039)	
				L	.020(.008–.031)	.020(.008–.031)	.020(.008–.031)	
M	Austenitic Stainless Steels	–	≤.020	L	.031(.012–.039)	.031(.012–.039)	.031(.012–.039)	Dry
				M	.039(.016–.047)	.039(.016–.047)	.039(.016–.047)	
			≤.039	L	.024(.008–.031)	.024(.008–.031)	.024(.008–.031)	
				M	.031(.012–.039)	.031(.012–.039)	.031(.012–.039)	
	Ferritic and Martensitic Stainless Steels	Hardness ≤200HB	≤.020	L	.031(.012–.039)	.031(.012–.039)	.031(.012–.039)	Dry
				M	.039(.016–.047)	.039(.016–.047)	.039(.016–.047)	
			≤.039	L	.024(.008–.031)	.024(.008–.031)	.024(.008–.031)	
				M	.031(.012–.039)	.031(.012–.039)	.031(.012–.039)	
	Duplex Stainless Steels	Hardness ≤280HB	≤.020	L	.024(.012–.031)	.024(.012–.031)	.024(.012–.031)	Dry
				M	.028(.012–.039)	.028(.012–.039)	.028(.012–.039)	
			≤.039	L	.020(.008–.028)	.020(.008–.028)	.020(.008–.028)	
				M	.024(.012–.028)	.024(.012–.028)	.024(.012–.028)	
	Precipitation Hardening Stainless Steels	Hardness <450HB	≤.020	L	.024(.012–.031)	.024(.012–.031)	.024(.012–.031)	Dry
				M	.028(.012–.039)	.028(.012–.039)	.028(.012–.039)	
			≤.039	L	.020(.008–.028)	.020(.008–.028)	.020(.008–.028)	
				M	.024(.012–.028)	.024(.012–.028)	.024(.012–.028)	
K	Gray Cast Irons	Tensile Strength ≤350MPa	≤.020	M,R	.051(.016–.079)	.051(.016–.079)	.059(.020–.079)	Dry
				L	.047(.016–.063)	.047(.016–.063)	.047(.016–.063)	
			≤.039	M,R	.039(.012–.051)	.031(.012–.039)	.047(.016–.059)	
				L	.039(.012–.051)	.031(.012–.039)	.039(.012–.051)	
			≤.059	M,R	.024(.012–.039)	–	.031(.016–.047)	
	Ductile Cast Irons	Tensile Strength ≤450MPa	≤.020	M,R	.051(.016–.067)	.051(.016–.067)	.059(.016–.079)	Dry
				L	.039(.012–.051)	.039(.012–.051)	.039(.012–.051)	
			≤.039	M,R	.031(.012–.039)	.028(.012–.035)	.039(.012–.051)	
				L	.031(.008–.039)	.028(.008–.035)	.031(.008–.047)	
			≤.059	M,R	.020(.012–.028)	–	.028(.012–.039)	
	Ductile Cast Irons	Tensile Strength ≤800MPa	≤.020	M,R	.039(.008–.059)	.039(.008–.059)	.051(.012–.067)	Dry
				L	.031(.012–.047)	.031(.012–.047)	.031(.012–.047)	
			≤.039	M,R	.031(.008–.039)	.024(.008–.031)	.039(.012–.047)	
				L	.020(.008–.031)	.020(.008–.031)	.020(.008–.031)	
S	Titanium Alloys	–	≤.020	L	.012(.008–.024)	.012(.008–.024)	.012(.008–.024)	Wet
			≤.039	L	.012(.008–.016)	.012(.008–.016)	.012(.008–.016)	
	Heat Resistant Alloys	–	≤.020	L,M,R	.031(.012–.047)	.031(.012–.047)	.031(.012–.047)	Wet
			≤.039	L,M,R	.028(.012–.039)	.028(.012–.039)	.028(.012–.039)	
H	Hardened Steels	Hardness 40–55HRC	≤.020	R,M	.024(.012–.039)	.024(.012–.039)	.024(.012–.039)	Dry
			≤.039	R,M	.020(.012–.031)	.016(.012–.024)	.020(.012–.031)	

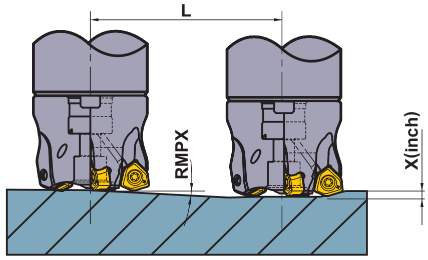
Note 1) To discharge chips effectively, use an air blow when machining. When the air blow is less effective at discharging chips, we recommend wet cutting.
Note 2) When large vibration occurs, reduce the cutting conditions.
Note 3) For interrupted cutting, reduce the cutting speed and feed rate by 20%.
Note 4) If ap is set at 2mm or more, avoid machining on the walls or ramping.

Double-Sided Insert Type, High Feed Radius Milling Cutter

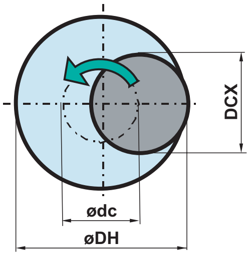
WJX09

Maximum Capacities by Mode

■Ramping



■Helical Milling



● How to derive a locus of the center of the tool.

ødc = øDH - DCX

- ødc: Locus of the Center of the Tool
- øDH: Desired Hole Diameter
- DCX: Cutting Diameter Maximum

(inch)

Tool Holder Type	DCX	DC	APMX	Ramping		Helical Milling (Blind Hole, Flat Bottom)		Helical Milling (Through Hole)		AZ
				RMPX	L : Required Distance for X : Depth	DH		DH	P max.	
					x=.039	Min.	Max.	Min.		
WJX09UR16	1.000	.565	.047	4.5	.496	1.510	1.914	1.343	.047	.035
WJX09UR18	1.125	.687	.047	5.3	.420	1.756	2.164	1.516	.047	.047
WJX09UR20	1.250	.811	.047	4.3	.519	2.005	2.413	1.760	.047	.047
WJX09UR22	1.375	.936	.047	3.6	.620	2.255	2.664	2.006	.047	.047
WJX09UR24	1.500	1.060	.047	3.1	.720	2.504	2.913	2.254	.047	.047
WJX09UR1.50	1.500	1.060	.047	3.1	.720	2.504	2.913	2.254	.047	.047
WJX09UR2.00	2.000	1.557	.047	2	1.117	3.501	3.913	3.244	.047	.047
WJX09UR2.50	2.500	2.057	.047	1.4	1.596	4.500	4.913	4.243	.047	.047
WJX09R25	.984	.551	.047	4.7	.474	1.496	1.850	1.339	.047	.047
WJX09R28	1.102	.665	.047	5.6	.398	1.732	2.087	1.496	.047	.047
WJX09R32	1.260	.823	.047	4.2	.531	2.047	2.402	1.811	.047	.047
WJX09R35	1.378	.937	.047	3.6	.620	2.283	2.638	2.047	.047	.047
WJX09R40	1.575	1.134	.047	2.9	.770	2.677	3.031	2.402	.047	.047
WJX09-040	1.575	1.134	.047	2.9	.770	2.677	3.031	2.402	.047	.047
WJX09-050	1.969	1.528	.047	2	1.117	3.465	3.819	3.189	.047	.047
WJX09R050	1.969	1.528	.047	2	1.117	3.465	3.819	3.189	.047	.047
WJX09-052	2.047	1.606	.047	1.9	1.176	3.622	3.976	3.346	.047	.047
WJX09-063	2.480	2.039	.047	1.4	1.596	4.488	4.843	4.213	.047	.047
WJX09R063	2.480	2.039	.047	1.4	1.596	4.488	4.843	4.213	.047	.047
WJX09-066	2.598	2.157	.047	1.4	1.596	4.724	5.079	4.449	.047	.047

DCX = Cutting Dia. Max.
APMX = Depth of Cut Max.
DC = Cutting Dia.
RMPX = Ramping Angle Max.
DH = Desired Hole Dia.
AZ = Plunge Depth Max.

Note 1) When ramping and helical milling, it is recommended to reduce the feed per tooth.
Note 2) When ramping, helical milling and drilling, long continuous chips may be scattered so please be careful.

<Helical Milling>
To obtain a flat bottom surface when helical milling, it requires to remove “the uncut part” in the center of the workpiece material at a final pass.
When helical milling, make sure that the depth of cut per helical pass doesn’t exceed the maximum depth of cut (APMX).
<Drilling>
When drilling, set the axial feed per revolution at .008 IPR or less.

Memo

Recommended Cutting Conditions

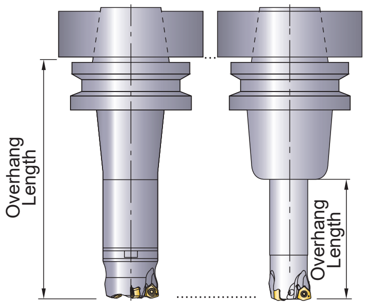
Correction Value According to Overhang Length

Multiply the recommended cutting conditions by the corrections factor x overhang length.

(inch)

Type	Cutting Dia. Max. **DCX**	Overhang Length	Correction Value According		
			Cutting Speed **vc** (SFM)	Depth of Cut **ap**	Feed **fz** (IPT)
Shank Type	1.969	< 2.5×DCON	100%	100%	100%
		3.0×DCON	90%	100%	90%
		4.0×DCON	80%	80%	90%
Arbor Type	2.000–3.150	< 2.5×DCX	100%	100%	100%
		3.0×DCX	85%	100%	90%
		4.0×DCX	80%	80%	80%
		5.0×DCX	75%	75%	60%
		6.0×DCX	70%	70%	40%
	≥3.937	8.0	100%	100%	100%
		12.0	85%	100%	90%
		16.0	80%	80%	80%

DCON=Connection Dia.



Cutting Speed (Dry Cutting)

(inch)

Workpiece Material		Properties	Cutting Speed **vc** (SFM)				
P			MP6130	MP6120	MC7020	VP15TF	VP30RT
	Mild Steels	Hardness ≤180HB	460 (295–590)	490 (330–655)	720 (560–885)	490 (330–655)	395 (260–525)
	Carbon Steels Alloy Steels	Hardness 180–280HB	395 (230–590)	460 (260–655)	655 (490–820)	460 (260–655)	330 (195–490)
	Carbon Steels Alloy Steels	Hardness 280–350HB	395 (230–590)	460 (260–655)	655 (490–820)	460 (260–655)	330 (195–490)
	Alloy Tool Steels	Hardness ≤350HB (Annealing)	395 (230–590)	460 (260–655)	655 (490–820)	460 (260–655)	330 (195–490)
	Pre-hardened Steels	Hardness 35–45HRC	295 (165–425)	360 (230–490)	–	360 (230–490)	260 (130–395)
M			MP7130	MP7140	MC7020	VP30RT	
	Austenitic Stainless Steels	Hardness ≤200HB	525 (425–655)	490 (395–590)	720 (560–885)	490 (395–590)	
	Austenitic Stainless Steels	Hardness >200HB	460 (330–655)	425 (260–590)	620 (460–785)	425 (260–590)	
	Ferritic and Martensitic Stainless Steels	Hardness ≤200HB	490 (330–655)	425 (260–590)	720 (560–885)	425 (260–590)	
	Duplex Stainless Steels	Hardness ≤280HB	425 (260–590)	360 (195–525)	590 (425–755)	360 (195–525)	
	Precipitation Hardening Stainless Steels	Hardness <450HB	360 (195–525)	295 (165–425)	560 (395–720)	295 (165–425)	
K			VP15TF				
	Gray Cast Irons	Tensile Strength ≤350MPa	525 (395–655)				
	Ductile Cast Irons	Tensile Strength ≤450MPa	490 (330–655)				
	Ductile Cast Irons	Tensile Strength ≤800MPa	395 (260–525)				
S			MP9130	MP9120	VP15TF		
	Titanium Alloys	–	130 (100–195)	165 (100–210)	165 (100–210)		
	Heat Resistant Alloys	–	100 (65–130)	130 (65–165)	130 (65–165)		
H			VP15TF				
	Hardened Steels	Hardness 40–55HRC	230 (130–330)				

Note 1) To discharge chips effectively, use an air blow when machining. When the air blow is less effective at discharging chips, we recommend wet cutting.

Note 2) When wet cutting, tool life may become shorter than dry cutting. When carrying out wet cutting for the applications recommended with dry cutting, reduce the cutting speed by 25%.

Note 3) When large vibration occurs, reduce the cutting conditions.

Note 4) For interrupted cutting, reduce the cutting speed and feed rate by 20%.

Depth of Cut / Feed per Tooth

(inch)

	Workpiece Material	Properties	Depth of Cut **ap**	Breaker	Cutting Dia. Max. DCX=2.000", 50mm, 52mm	Cutting Dia. Max. DCX≥2.500", 63mm	Cutting Mode
					Feed **fz** (IPT)	Feed **fz** (IPT)	
P	Mild Steels	Hardness ≤180HB	≤.040	M,R *	.059 (.024—.098)	.067 (.024—.110)	Dry
				L	.047 (.016—.079)	.047 (.016—.079)	Dry
			≤.060	M,R *	.051 (.024—.079)	.059 (.024—.098)	Dry
				L	.039 (.016—.071)	.039 (.016—.071)	Dry
			≤.080	M,R *	.047 (.024—.079)	.051 (.024—.098)	Dry
				L	.031 (.016—.067)	.031 (.016—.067)	Dry
			≤.100	M,R	.031 (.012—.059)	.039 (.012—.063)	Dry
			≤.120	M,R	.016 (.008—.039)	.020 (.008—.047)	Dry
	Carbon Steels Alloy Steels	Hardness 180-280HB	≤.040	M,R *	.059 (.020—.079)	.067 (.020—.098)	Dry
				L	.039 (.012—.067)	.039 (.012—.067)	Dry
			≤.060	M,R *	.047 (.020—.067)	.051 (.020—.098)	Dry
				L	.031 (.012—.059)	.031 (.012—.059)	Dry
			≤.080	M,R *	.039 (.020—.059)	.047 (.020—.079)	Dry
				L	.028 (.012—.047)	.028 (.012—.047)	Dry
			≤.100	M,R	.028 (.012—.047)	.035 (.012—.059)	Dry
			≤.120	M,R	.012 (.008—.031)	.016 (.008—.039)	Dry
	Carbon Steels Alloy Steels Alloy Tool Steels	Hardness 280-350HB ≤350HB (Annealing)	≤.040	M,R *	.059 (.020—.079)	.067 (.020—.098)	Dry
				L	.039 (.012—.067)	.039 (.012—.067)	Dry
			≤.060	M,R *	.047 (.020—.067)	.051 (.020—.087)	Dry
				L	.031 (.012—.059)	.031 (.012—.059)	Dry
			≤.080	M,R *	.039 (.020—.059)	.047 (.020—.079)	Dry
				L	.028 (.012—.047)	.028 (.012—.047)	Dry
			≤.100	M,R	.028 (.012—.047)	.035 (.012—.059)	Dry
			≤.120	M,R	.012 (.008—.031)	.016 (.008—.039)	Dry
	Pre-hardened Steels	Hardness 35-45HRC	≤.040	M,R *	.051 (.016—.067)	.059 (.016—.079)	Dry
				L	.028 (.012—.047)	.028 (.012—.047)	Dry
			≤.060	M,R *	.039 (.016—.059)	.047 (.016—.059)	Dry
				L	.024 (.012—.039)	.024 (.012—.039)	Dry
			≤.080	M,R *	.031 (.016—.047)	.039 (.016—.051)	Dry
				L	.020 (.012—.031)	.020 (.012—.031)	Dry
M	Austenitic Stainless Steels	—	≤.040	L *	.031 (.012—.047)	.031 (.012—.047)	Dry
				M	.039 (.020—.047)	.039 (.020—.047)	Dry
			≤.060	L *	.031 (.012—.039)	.031 (.012—.039)	Dry
				M	.039 (.020—.039)	.039 (.020—.039)	Dry
	Ferritic and Martensitic Stainless Steels	Hardness ≤200HB	≤.040	L *	.031 (.012—.047)	.031 (.012—.047)	Dry
				M	.039 (.020—.047)	.039 (.020—.047)	Dry
			≤.060	L *	.031 (.012—.039)	.031 (.012—.039)	Dry
				M	.039 (.020—.039)	.039 (.020—.039)	Dry
	Duplex Stainless Steels	Hardness ≤280HB	≤.040	L *	.024 (.012—.039)	.024 (.012—.039)	Dry
				M	.031 (.016—.039)	.031 (.016—.039)	Dry
			≤.060	L *	.024 (.012—.031)	.024 (.012—.031)	Dry
				M	.031 (.016—.031)	.031 (.016—.031)	Dry
	Precipitation Hardening Stainless Steels	Hardness <450HB	≤.040	L *	.024 (.012—.039)	.024 (.012—.039)	Dry
				M	.031 (.016—.039)	.031 (.016—.039)	Dry
			≤.060	L *	.024 (.012—.031)	.024 (.012—.031)	Dry
				M	.031 (.016—.031)	.031 (.016—.031)	Dry

* The 1st recommend chip breaker for each depth of cut (**ap**).

Note 1) To discharge chips effectively, use an air blow when machining. When the air blow is less effective at discharging chips, we recommend wet cutting.

Note 2) When large vibration occurs, reduce the cutting conditions.

Note 3) For interrupted cutting, reduce the cutting speed and feed rate by 20%.

Note 4) If ap is set at .079" or more, avoid machining on the walls or ramping.

Double-Sided Insert Type, High Feed Radius Milling Cutter

(inch)

	Workpiece Material	Properties	Depth of Cut **ap**	Breaker	Cutting Dia. Max. DCX=2.000", 50mm, 52mm	Cutting Dia. Max. DCX≥2.500", 63mm	Cutting Mode
					Feed **fz** (IPT)	Feed **fz** (IPT)	
K	Gray Cast Irons	Tensile Strength ≤350MPa	≤.040	M,R *	.067 (.024—.098)	.071 (.024—.110)	Dry
				L	.051 (.016—.079)	.051 (.016—.079)	Dry
			≤.060	M,R *	.059 (.024—.079)	.067 (.024—.098)	Dry
				L	.047 (.016—.071)	.047 (.016—.071)	Dry
			≤.080	M,R *	.051 (.024—.079)	.059 (.024—.098)	Dry
				L	.039 (.016—.059)	.039 (.016—.059)	Dry
			≤.100	M,R	.031 (.012—.059)	.039 (.012—.063)	Dry
			≤.120	M,R	.016 (.008—.039)	.020 (.008—.047)	Dry
	Ductile Cast Irons	Tensile Strength ≤450MPa	≤.040	M,R *	.059 (.020—.079)	.067 (.020—.098)	Dry
				L	.047 (.012—.079)	.047 (.012—.079)	Dry
			≤.060	M,R *	.051 (.020—.071)	.059 (.020—.079)	Dry
				L	.039 (.012—.067)	.039 (.012—.067)	Dry
			≤.080	M,R *	.047 (.020—.071)	.051 (.020—.079)	Dry
				L	.031 (.012—.059)	.031 (.012—.059)	Dry
			≤.100	M,R	.028 (.012—.047)	.035 (.012—.059)	Dry
			≤.120	M,R	.012 (.008—.031)	.016 (.008—.039)	Dry
	Ductile Cast Irons	Tensile Strength ≤800MPa	≤.040	M,R *	.051 (.016—.071)	.059 (.016—.079)	Dry
				L	.039 (.012—.067)	.039 (.012—.067)	Dry
			≤.060	M,R *	.047 (.016—.059)	.051 (.016—.071)	Dry
				L	.031 (.012—.059)	.031 (.012—.059)	Dry
			≤.080	M,R *	.039 (.016—.059)	.047 (.016—.071)	Dry
				L	.028 (.012—.047)	.028 (.012—.047)	Dry
S	Titanium Alloys	—	≤.040	L	.012 (.008—.024)	.012 (.008—.024)	Wet
			≤.060	L	.012 (.008—.020)	.012 (.008—.020)	Wet
			≤.080	L	.012 (.008—.016)	.012 (.008—.016)	Wet
	Heat Resistant Alloys	—	≤.040	L,M,R	.039 (.012—.051)	.039 (.012—.051)	Wet
			≤.060	L,M,R	.031 (.012—.047)	.031 (.012—.047)	Wet
			≤.080	L,M,R	.028 (.012—.047)	.028 (.012—.047)	Wet
H	Hardened Steels	Hardness 40-55HRC	≤.040	R,M	.031 (.012—.047)	.031 (.012—.047)	Dry
			≤.060	R,M	.024 (.012—.039)	.024 (.012—.039)	Dry
			≤.080	R,M	.020 (.012—.031)	.020 (.012—.031)	Dry

* The 1st recommend chip breaker for each depth of cut (**ap**).

Note 1) To discharge chips effectively, use an air blow when machining. When the air blow is less effective at discharging chips, we recommend wet cutting.

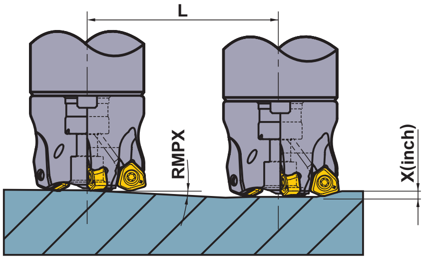
Note 2) When large vibration occurs, reduce the cutting conditions.

Note 3) For interrupted cutting, reduce the cutting speed and feed rate by 20%.

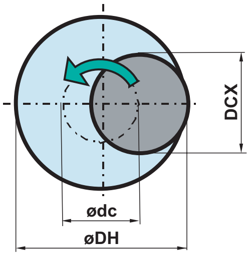
Note 4) If ap is set at .079" or more, avoid machining on the walls or ramping.

Maximum Capacities by Mode

■Ramping



■Helical Milling



● How to derive a locus of the center of the tool.

ødc = øDH - DCX

Locus of the Center of the Tool · Desired Hole Diameter · Cutting Diameter Maximum

(inch)

Tool Holder Type	DCX	DC	APMX	Ramping			Helical Milling (Blind Hole, Flat Bottom)		Helical Milling (Through Hole)	AZ
				RMPX	L : Required Distance for X : Depth		DH		DH	
					x=.039	x=.079	Min.	Max.	Min.	
WJX14UR2.000	2.000	1.338	.079	4.3	.524	1.048	3.285	3.901	2.919	.082
WJX14UR2.500	2.500	1.887	.079	3°	.752	1.503	4.283	4.901	3.912	.082
WJX14UR3.000	3.000	2.387	.079	2.2°	1.025	2.050	5.283	5.901	4.909	.082
WJX14UR4.000	4.000	3.386	.079	1.5°	1.504	3.007	7.282	7.901	6.906	.082
WJX14UR5.000	5.000	4.386	.079	1.1°	2.051	4.101	9.281	9.901	8.904	.082
WJX14UR6.000	6.000	5.386	.079	0.9°	2.507	5.013	11.281	11.901	10.903	.082
WJX14R50	1.969	1.358	.079	4.4°	.512	1.024	3.228	3.819	2.874	.082
WJX14-050	1.969	1.358	.079	4.4	.512	1.024	3.228	3.819	2.874	.082
WJX14R050	1.969	1.358	.079	4.4	.512	1.024	3.228	3.819	2.874	.082
WJX14-052	2.047	1.437	.079	4.1	.551	1.102	3.386	3.976	3.031	.082
WJX14-063	2.480	1.870	.079	3°	.752	1.504	4.252	4.843	3.898	.082
WJX14R063	2.480	1.870	.079	3°	.752	1.504	4.252	4.843	3.898	.082
WJX14-066	2.598	1.984	.079	2.8°	.807	1.610	4.488	5.079	4.134	.082
WJX14-080	3.150	2.535	.079	2.1°	1.075	2.150	5.591	6.181	5.236	.082
WJX14R080	3.150	2.535	.079	2.1°	1.075	2.150	5.591	6.181	5.236	.082
WJX14-100	3.937	3.323	.079	1.5°	1.504	3.008	7.165	7.756	6.811	.082
WJX14R100	3.937	3.323	.079	1.5°	1.504	3.008	7.165	7.756	6.811	.082
WJX14-125	4.921	4.307	.079	1.2°	1.882	3.760	9.134	9.724	8.780	.082
WJX14R125	4.921	4.307	.079	1.2°	1.882	3.760	9.134	9.724	8.780	.082
WJX14-160	6.299	5.685	.079	0.8°	2.823	5.642	11.890	12.480	11.535	.082
WJX14R160	6.299	5.685	.079	0.8°	2.823	5.642	11.890	12.480	11.535	.082

DCX = Cutting Dia. Max.
APMX = Depth of Cut Max.
DC = Cutting Dia.
RMPX = Ramping Angle Max.
DH = Desired Hole Dia.
AZ = Plunge Depth Max.

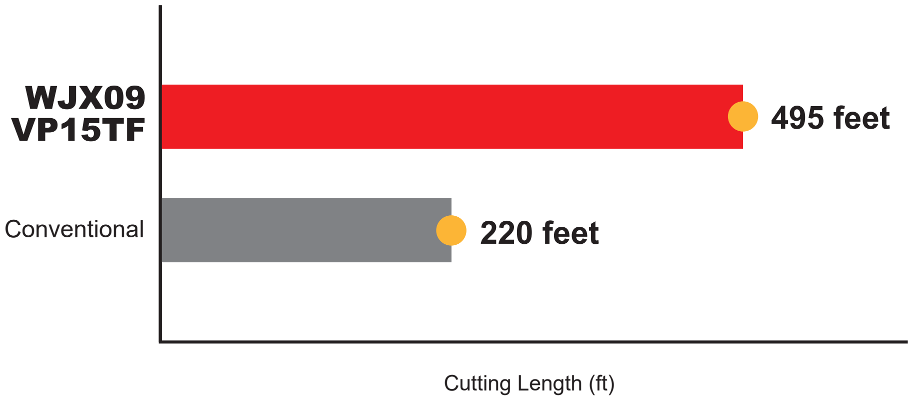
Note 1) When ramping and helical milling, it is recommended to reduce the feed per tooth.
Note 2) When ramping, helical milling and drilling, long continuous chips may be scattered so please be careful.

<Helical Milling>
To obtain a flat bottom surface when helical milling, it requires to remove “the uncut part” in the center of the workpiece material at a final pass. When helical milling, make sure that the depth of cut per helical pass doesn’t exceed the maximum depth of cut (APMX).
<Drilling>
When drilling, set the axial feed per revolution at .008 IPR or less.

Cutting Performance

AISI 100-70-03 Wear Resistance Comparison

The excellent wear resistance can extend tool life significantly.



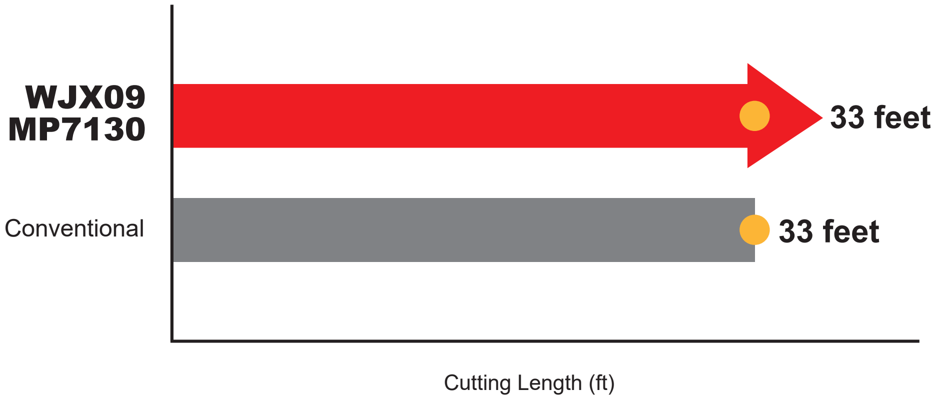
<Cutting Conditions>
Workpiece Material : AISI 100-70-03
Cutter Dia. : DCX=ø1.250 inch
Inserts : JOMU090512ZZER-M
Cutting Speed : vc=655 SFM
Feed per Tooth : fz=.031 IPT
Depth of Cut : ap=.047 inch
Width of Cut : ae=.591 inch
Cutting Mode : Dry Cutting
Single Insert


VP15TF (495 feet)

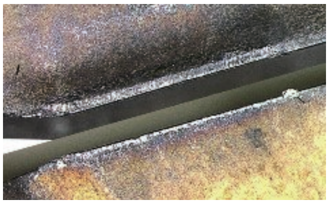

Conventional

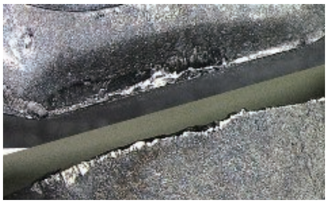
AISI 304 Wear Resistance Comparison

Suppresses notch wear and therefore provides a stable tool life.



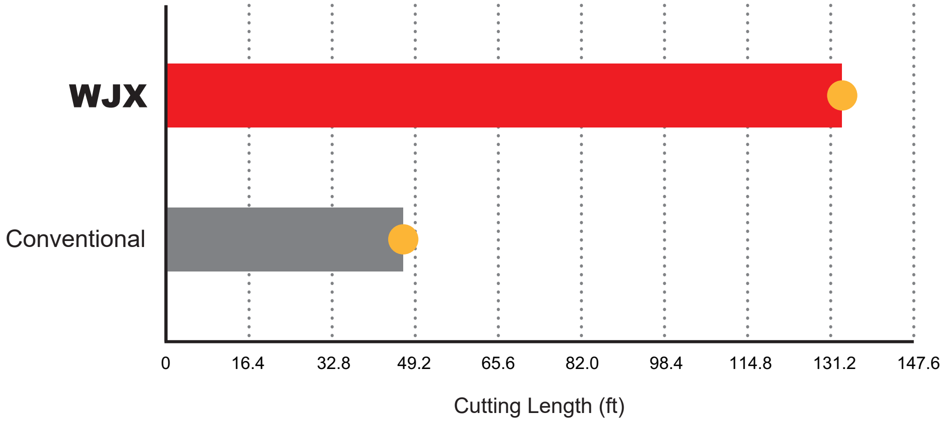
<Cutting Conditions>
Workpiece Material : AISI 304
Cutter Dia. : DCX=ø2.000 inch
Inserts : JOMU090512ZZER-L
Cutting Speed : vc=490 SFM
Feed per Tooth : fz=.024 IPT
Depth of Cut : ap=.035 inch
Width of Cut : ae=1.378 inch
Cutting Mode : Dry Cutting
Single Insert


MP7130 (33 feet)

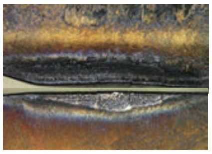

Conventional (33 feet)

AISI 4140 Wear Resistance Comparison

MC7020 has excellent crater wear resistance in high speed cutting.



WJX 133.9 feet

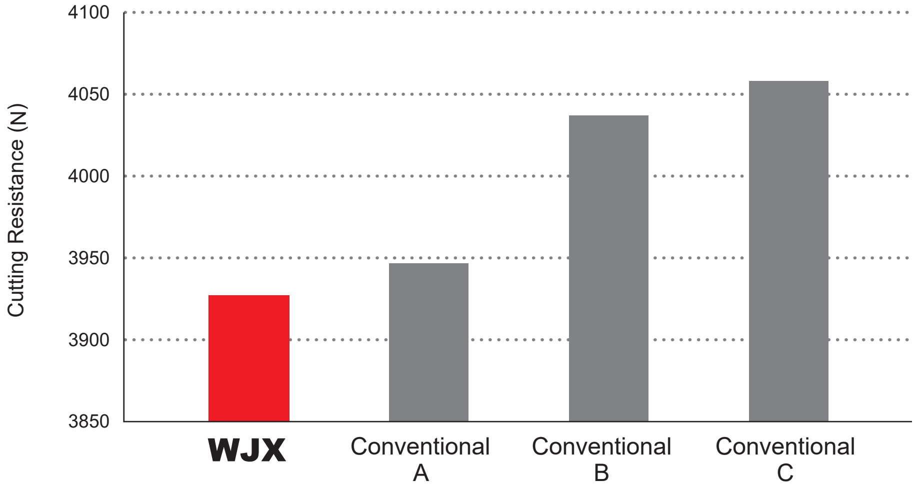


Conventional
47.2 feet

<Cutting Conditions>
Workpiece Material : AISI 4140
Cutter Dia. : DCX=ø2.48 inch
Inserts : JOMU140715ZZER-M
Grade : MC7020
Cutting Speed : vc=755 SFM
Feed per Tooth : fz=.059 IPT
Depth of Cut : ap=.059 inch
Width of Cut : ae=1.772 inch
Cutting Mode : Dry Cutting
Single Insert

AISI 4140 Cutting Resistance Comparison

WJX reduces the spindle load for low cutting resistance.

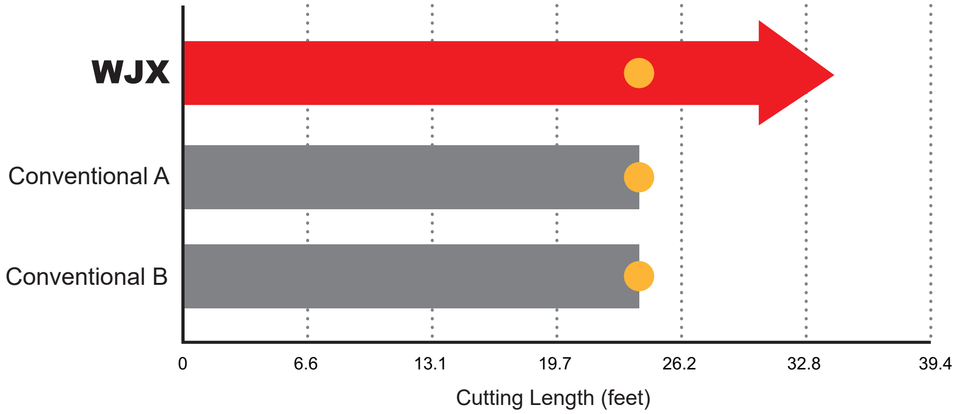


<Cutting Conditions>
Workpiece Material : AISI 4140
Cutter Dia. : DCX=ø2.48 inch
Inserts : JOMU140715ZZER-M
Grade : VP15TF
Cutting Speed : vc=490 SFM
Feed per Tooth : fz=.039 IPT
Depth of Cut : ap=.079 inch
Width of Cut : ae=1.772 inch
Cutting Mode : Dry Cutting
Single Insert

Cutting Performance

AISI 304 Wear Resistance Comparison

Excellent result in welding and wear resistance.



<Cutting Conditions>
Workpiece Material : AISI 304
Cutter Dia. : DCX=ø2.48 inch
Inserts : JOMU140715ZZER-L
Grade : MP7130
Cutting Speed : vc=490 SFM
Feed per Tooth : fz=.024 IPT
Depth of Cut : ap=.059 inch
Width of Cut : ae=1.772 inch
Cutting Mode : Dry Cutting
Single Insert

WJX L Breaker

Conventional A
Large Wear

Conventional B
Large Welding and Wear

AISI 4140 Fracture Resistance Comparison

Suitable for strong interrupted cutting due to high edge strength.

Testing under high load cutting conditions

(inch)

		Feed per Tooth **fz** (IPT)			
		.059	**.079**	**.098**	**.118**
Depth of Cut **ap**	**.059**	**OK**	**OK**	**OK**	**OK**
	.079	**OK**	**OK**	**OK**	**OK**

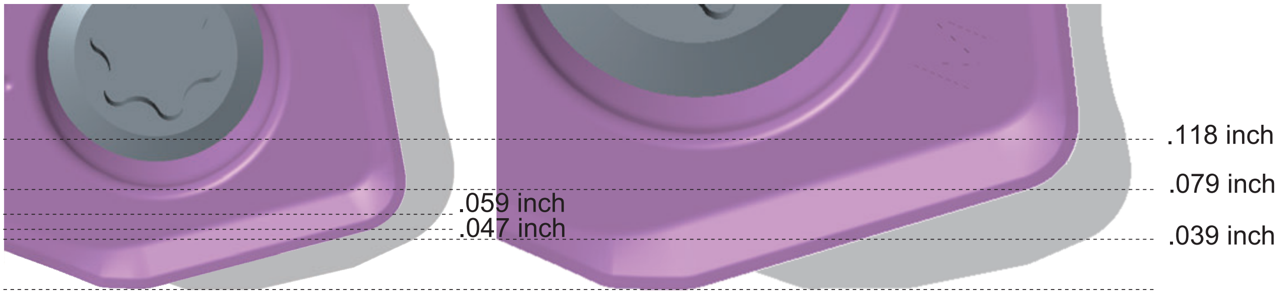
<Cutting Conditions>
Workpiece Material : AISI 4140
Cutter Dia. : DCX=ø2.48 inch
Inserts : JOMU140715ZZER-R
Grade : VP15TF
Cutting Speed : vc=330 SFM
Width of Cut : ae=.787 inch
Cutting Mode : Dry Cutting
Center Cut Milling
Single Insert

Operational Guidance

Depth of Cut

Refer to the following table for the maximum depth of cut of the WJX.
The straight cutting edge extending to the maximum depth of cut (APMX) allows for stable machining even at high depths of cut.
For face milling, lowering the feed rate will allow to exceed the APMX, up to depths of cut shown in the following table (when using the corner R).
For details on the feed rate, refer to the recommended cutting conditions on pg.487, 491 and 492.

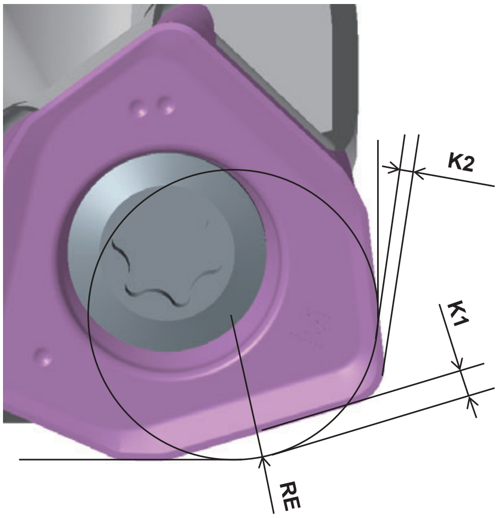
	WJX09	**WJX14**
High feed and multi-function machining (APMX)	ap=.047 inch	ap=.079 inch
Low feed and Face machining	ap=.059 inch	ap=.118 inch



WJX09 Conventional Size 09 **WJX14** Conventional Size 14

Remaining Stock

For CAM, use CAD data (from online catalogs), or use a definition as a radius milling cutter with reference to the following table.
The approximate radius RE, remaining stock K1, and over cutting amount K2 are as shown in the following table.



WJX09

RE	Remaining Stock **K1**	Over Cut **K2**
R.079 (Recommendation)	.037	.000
R.091	.034	.000
R.118	.028	.005

WJX14

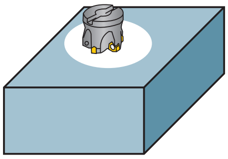
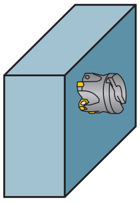
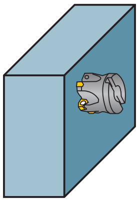
RE	Remaining Stock **K1**	Over Cut **K2**
R.118 (Recommendation)	.056	.000
R.126	.054	.000
R.157	.046	.004
R.197	.036	.015

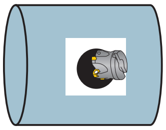
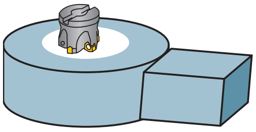
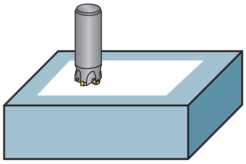
(mm)

Depth of Cut **ap**	Remaining Stock **H**	
	WJX09	**WJX14**
.020	.001	–
.039	.003	.002
.059	–	.003
.079	–	.005

Double-Sided Insert Type, High Feed Radius Milling Cutter

Application Examples

Holder		**WJX14-063A05AR**	**WJX14-063A05AR**	**WJX14-063A04AR**
Insert (Grade)		**JOMU140715ZZER-M(VP15TF)**	**JOMU140715ZZER-M(MP6120)**	**JOMU140715ZZER-M(VP15TF)**
Workpiece		Welded Structural Steel 	Tool Steel 	AISI H13 Mild Steel 
Component		Machined Parts	Machined Parts	Mold
Cutting Conditions	Cutting Speed **vc** (SFM)	590	395	590
	Feed per Tooth **fz** (IPT)	.039	.055	.063
	Depth of Cut (inch)	ap = .039, ae = 1.496	ap = .039, ae = 1.575	ap = .051 ae = 1.614
Cutting Mode		Wet Cutting, Helical Milling	Dry Cutting, Copy Milling	Dry Cutting, Contouring Milling
Results		Spinde load decreased by 10%. Cleaning has become easier because chip shape was suitable.	Cutting vibration was suppressed by WJX;therefore,it was able to increase feed rate, and also tool life has become 3 times.	Spindle load has decreased by about 30%, and also cutting efficiency has become double by WJX.

Holder		**WJX14-063A05AR**	**WJX09-050A06AR**	**WJX09R2502SA25L**
Insert (Grade)		**JOMU140715ZZER-L(MP6130)**	**JOMU090512ZZER-M(MP6130)**	**JOMU090512ZZER-M(VP15TF)**
Workpiece		Alloy Steel 	Tool Steel 	AISI 1050 
Component		Machined Parts	Machined Parts	Mold
Cutting Conditions	Cutting Speed **vc** (SFM)	620	985	640
	Feed per Tooth **fz** (IPT)	.055	.043	.014
	Depth of Cut (inch)	ap = .039	ap = .039, ae = 1.181	ap = .020, ae = .591
Cutting Mode		Wet Cutting, Helical Milling	Dry Cutting, Helical Milling	Dry Cutting, Pocket Milling
Results		WJX achieved 2 holes machining when conventional tool processed only one hole due to the tool life, and also WJX insert damage was smaller.	WJX cutting sound was better than conventional. Cutting efficiency has increased by 1.5times due to both higher depth of cut and higher feed rate.	Cutting vibration at the pocket corner area was smaller than conventional; therefore, the spindle load reduced and the tool life improved.

The above application examples are customer’s applications, so it can be different from the recommended conditions.

DIAEDGE
TOOL NEWS
2022.1 Update
B250A

Multi-Functional Cutter for High Efficiency Machining

VPX Series

Series Expansion

Boost Your Milling with a Tough Tangential Insert !

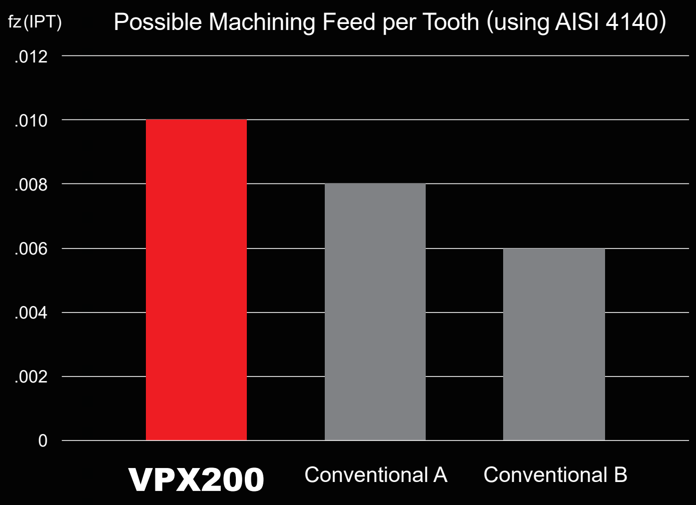
MITSUBISHI MATERIALS CORPORATION

TOUGH &

VERSATILE

VPX
Series

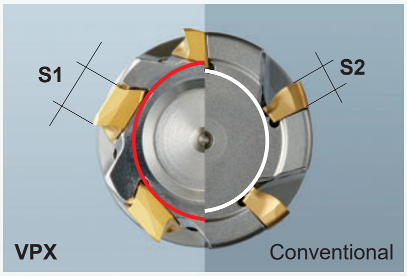
Our thoroughly tested design will completely change how you see the tangential cutter.



About

TOUGH

The tangential mount cutter--reinvented!



Wider seating surface for less insert movement in the pocket.

The tangentially mounted insert makes the cutter body core larger for more rigidity (S1>S2). This means stability in cut =

- longer insert tool life,
- longer cutter body tool life,
- better surface finish and
- higher feed rates.

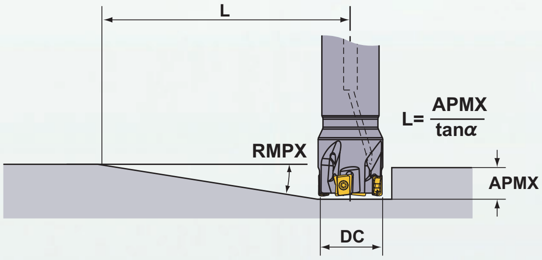
Comments from developers

Durability born through repeated destructive tests.

In order to improve durability, we began development by first applying a load to the cutter until it broke. After analyzing the reasons it broke, we produced an improved version then broke that as well. We repeated this process until we were satisfied with the results. As a result of this pursuit of durability through thorough destructive tests, we were able to come up with a cutter that is ideal for unmanned operation and high efficiency machining.

About
VERSATILE

Solving problems as a multi-functional cutter.

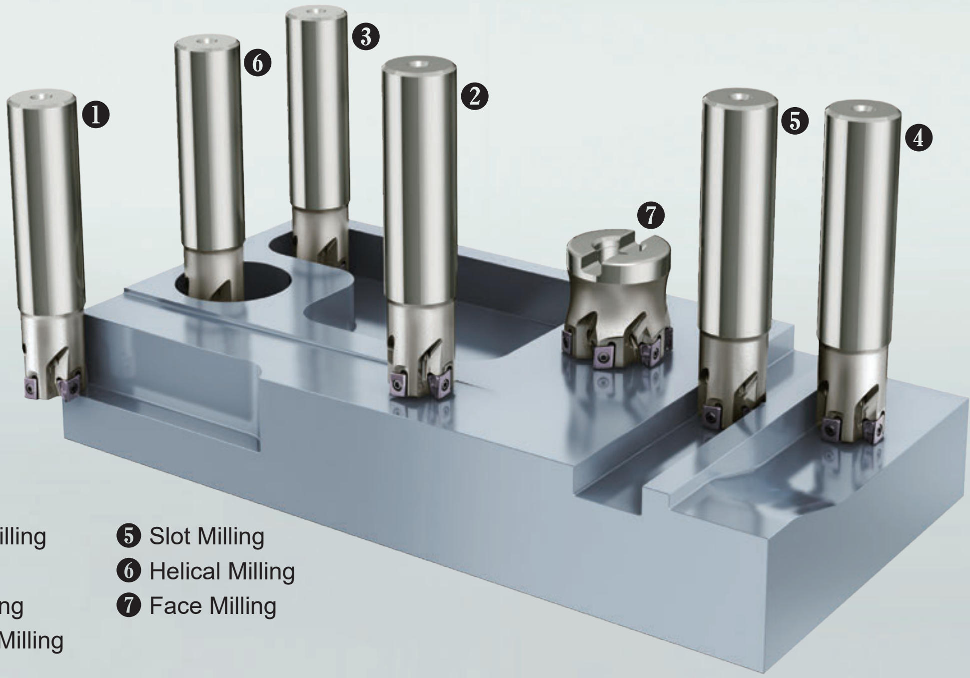


Comments from developers

Through trial and error, we've solved machining problems.

Most tangential mount cutters must be changed out with dedicated inserts for ramping. We made it a priority to unify these two styles of inserts, so as to avoid the trouble of managing two sets of inserts, and prevent installation mistakes.
By focusing on the surface design of these new inserts, and through repeated trial and error, we were able to resolve one of the major issues in the industry.

VPX series covers most milling applications.

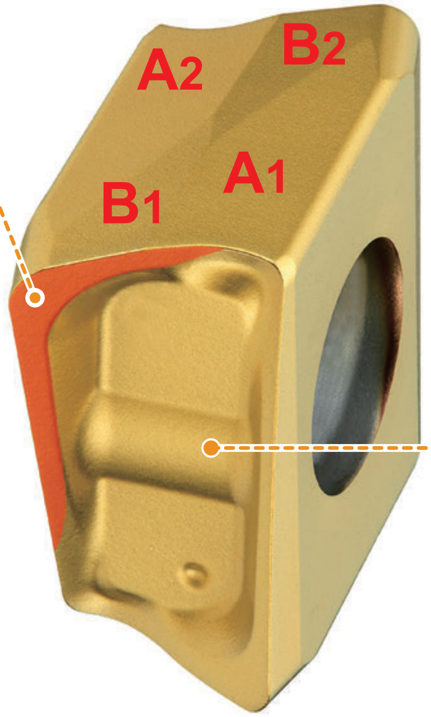


❶ Shoulder Milling
❷ Ramping
❸ Pocket Milling
❹ 3-D Profile Milling
❺ Slot Milling
❻ Helical Milling
❼ Face Milling

Inserts

Double-sided insert that has revolutionized tangential insert machining.

Single Flat Surface Improves Chip Evacuation and Protects Cutter Body



Two-sided Structure Supports Insert Performance

- A Makes Possible Ramping
- B Wiper Flats for Good Finish Surface

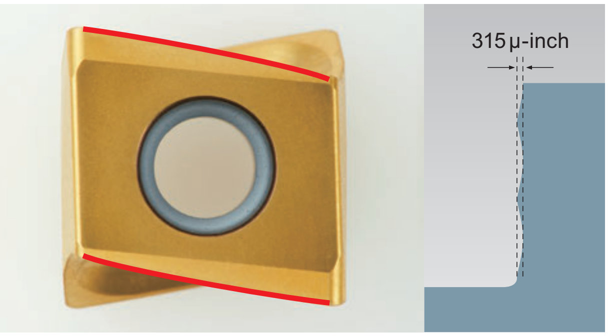
Convex Shaped Insert for Improved Chip Evacuation

Comments from developers

An insert shape that was possible to design, but difficult to commercialize.

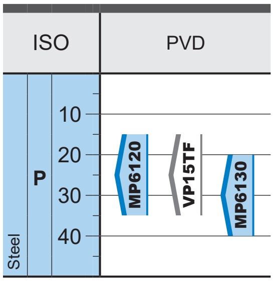
The shape of the insert makes it tough while still enabling versatility. We have conquered many challenges from prototype to production--a testimony to Mitsubishi Materials commitment to precision.

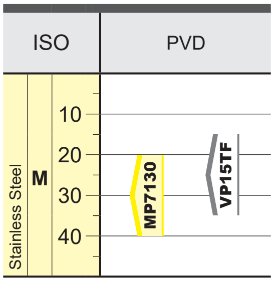
Good Wall Surface Finish

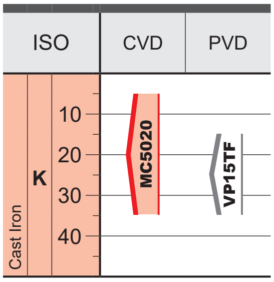


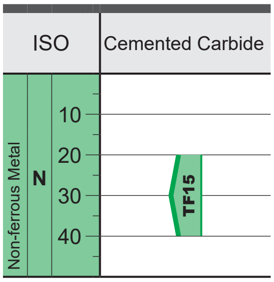
Large Wiper Flats Achieve a Better Finish Surface

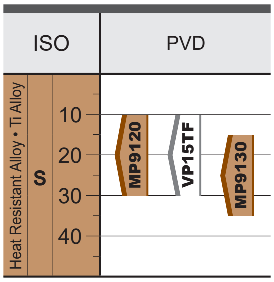
Insert Grades for a Wide Range of Materials

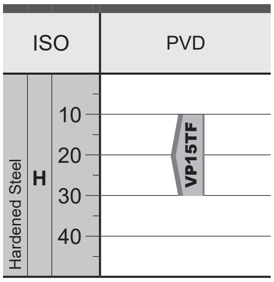












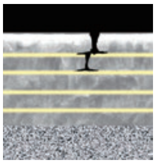
MP6100/MP7100/MP9100 Series

TOUGH-∑ Technology

A fusion of the separate coating technologies; PVD and multilayering provides extra toughness.

Base Layer
High Al-(Al, Ti)N

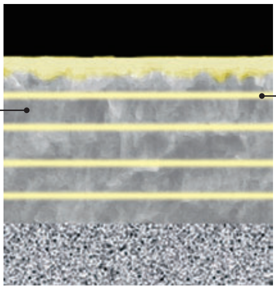
The new technology Al-(Al, Ti)N coating provides stabilisation of the high hardness phase and succeeds in dramatically improving wear, crater and welding resistance.



Multilayering of the coating prevents any cracks penetrating through to the substrate.

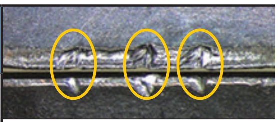
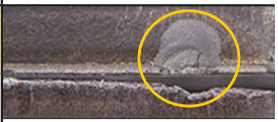
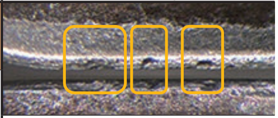
*Graphical Representation.

Al-Ti-Cr-N Based PVD Coating



*Graphical Representation.

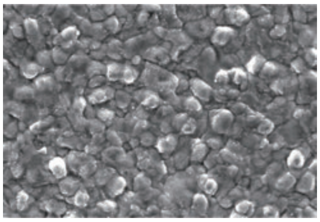
Best Layer of Each Workpiece Material

P 	**(Al,Cr)N** **Tough! Thermal Cracks**	 Thermal Cracks
M 	**TiN** **Tough! Notching**	 Notching
S 	**CrN** **Tough! Resistant Chipping**	 Welding by Chipping

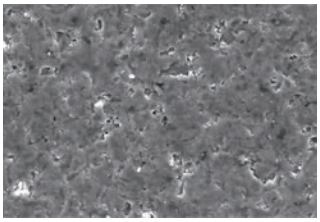
CVD Coating MC5020

First recommendation for cast irons milling.
MC5020 has excellent wear resistance and also controls thermal cracking and chipping that are common when machining ductile cast irons.

Comparison of Coating Surface



Conventional Coating



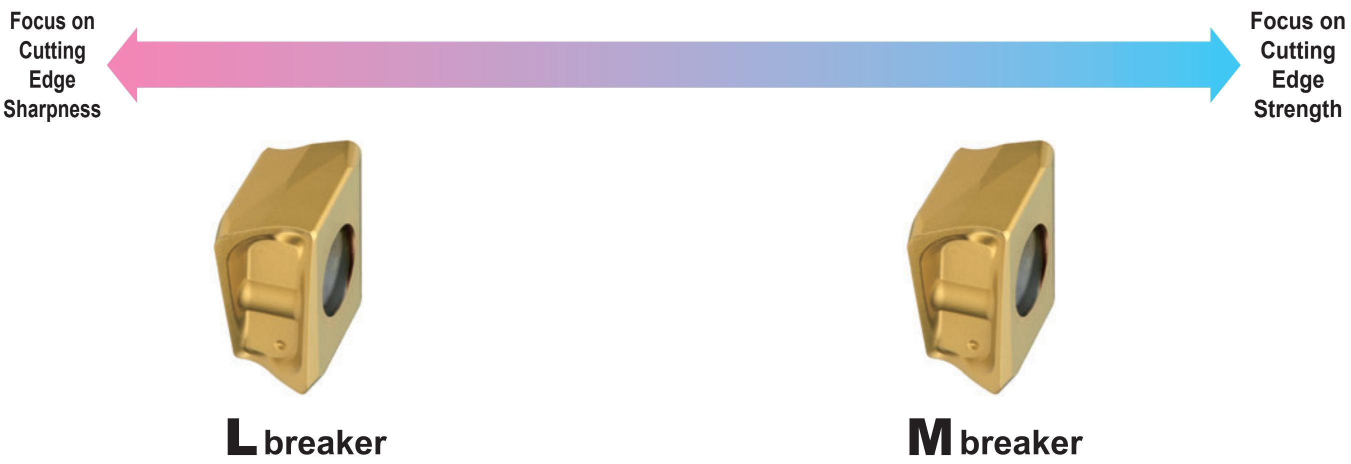
Black Super-smooth Coating

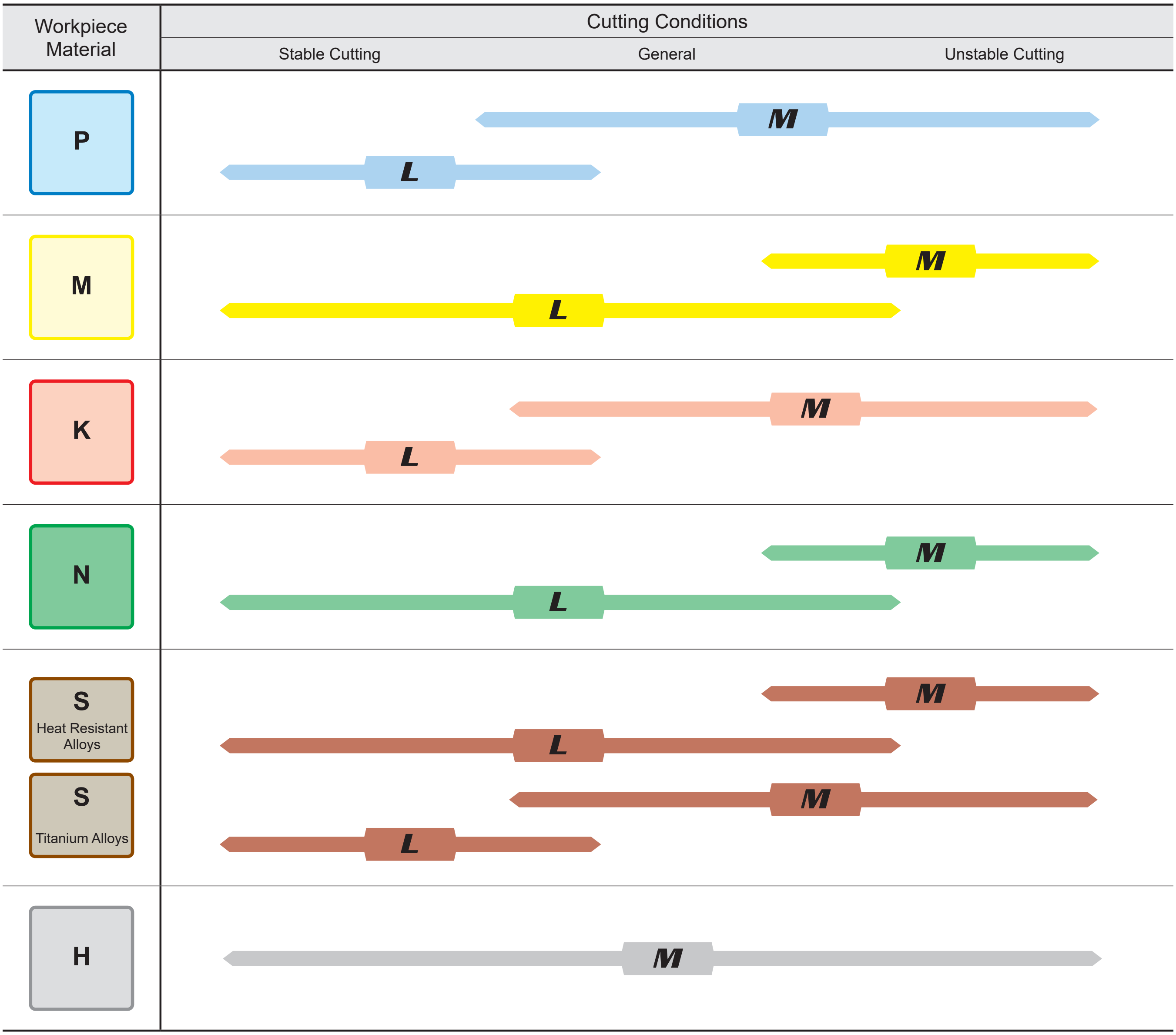
Black Super-smooth Coating

Black super-smooth coating prevents abnormal damage such as weld chipping.

Chip Breaker System

New L breaker with low cutting resistance has been added.





Refer to page 533, for chip breaker selection table.

VPX200

P M K N S H

Fig.1

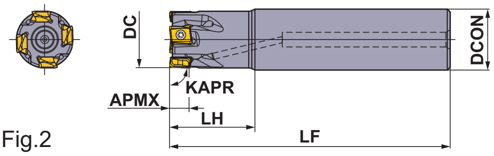


Fig.2

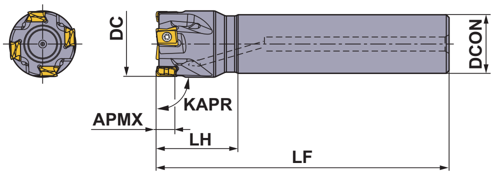


Fig.3

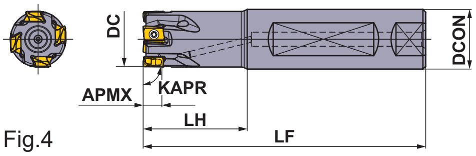
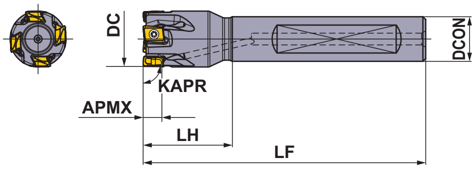


Fig.4



Shank Type

With Coolant Hole

Right hand tool holder only.

(inch)

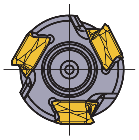
DC	Order Number	Stock R	* No.T	DCON	LF	LH	APMX	RMPX	RPMX (min^{-1})	WT (lbs)	Fig.	Insert Type
.625	**VPX200UR1002FA10S**	●	2	.625	3.625	1.250	.315	1.87°	38100	.3	3	LOGU09
.625	**VPX200UR1002SA10S**	●	2	.625	3.625	1.250	.315	1.87°	38100	.3	1	LOGU09
.625	**VPX200UR1002SA10L**	●	2	.625	6.000	1.500	.315	1.87°	38100	.5	1	LOGU09
.750	**VPX200UR1202FA10S**	●	2	.625	4.375	1.250	.315	1.43°	34200	.3	4	LOGU09
.750	**VPX200UR1202SA10S**	●	2	.625	4.375	1.250	.315	1.43°	34200	.4	2	LOGU09
.750	**VPX200UR1203FA10S**	●	3	.625	4.375	1.250	.315	1.43°	34200	.3	4	LOGU09
.750	**VPX200UR1203SA10S**	●	3	.625	4.375	1.250	.315	1.43°	34200	.3	2	LOGU09
.750	**VPX200UR1202FA12S**	●	2	.750	4.375	1.500	.315	1.43°	34200	.4	3	LOGU09
.750	**VPX200UR1202SA12S**	●	2	.750	4.375	1.500	.315	1.43°	34200	.5	1	LOGU09
.750	**VPX200UR1203FA12S**	●	3	.750	4.375	1.500	.315	1.43°	34200	.4	3	LOGU09
.750	**VPX200UR1203SA12S**	●	3	.750	4.375	1.500	.315	1.43°	34200	.5	1	LOGU09
.750	**VPX200UR1202SA12L**	●	2	.750	7.250	2.000	.315	1.43°	34200	.8	1	LOGU09
.875	**VPX200UR1402SA12L**	●	2	.750	7.250	1.500	.315	1.14°	31200	.8	2	LOGU09
1.000	**VPX200UR1603FA12S**	●	3	.750	4.750	1.500	.315	0.95°	28800	.6	4	LOGU09
1.000	**VPX200UR1603SA12S**	●	3	.750	4.750	1.500	.315	0.95°	28800	.6	2	LOGU09
1.000	**VPX200UR1604FA12S**	●	4	.750	4.750	1.500	.315	0.95°	28800	.6	4	LOGU09
1.000	**VPX200UR1604SA12S**	●	4	.750	4.750	1.500	.315	0.95°	28800	.6	2	LOGU09
1.000	**VPX200UR1603SA12L**	●	3	.750	8.500	1.500	.315	0.95°	28800	1.0	2	LOGU09
1.000	**VPX200UR1603FA16S**	●	3	1.000	4.750	1.750	.315	0.95°	28800	.9	3	LOGU09
1.000	**VPX200UR1603SA16S**	●	3	1.000	4.750	1.750	.315	0.95°	28800	.9	1	LOGU09
1.000	**VPX200UR1604FA16S**	●	4	1.000	4.750	1.750	.315	0.95°	28800	.9	3	LOGU09
1.000	**VPX200UR1604SA16S**	●	4	1.000	4.750	1.750	.315	0.95°	28800	.9	1	LOGU09
1.000	**VPX200UR1603SA16L**	●	3	1.000	8.500	2.500	.315	0.95°	28800	1.7	1	LOGU09
1.125	**VPX200UR1803SA16L**	●	3	1.000	8.500	1.750	.315	0.82°	26800	1.8	2	LOGU09
1.250	**VPX200UR2003FA16S**	●	3	1.000	5.125	1.750	.315	0.71°	25200	1.1	4	LOGU09
1.250	**VPX200UR2003SA16S**	●	3	1.000	5.125	1.750	.315	0.71°	25200	1.1	2	LOGU09
1.250	**VPX200UR2005FA16S**	●	5	1.000	5.125	1.750	.315	0.71°	25200	1.1	4	LOGU09
1.250	**VPX200UR2005SA16S**	●	5	1.000	5.125	1.750	.315	0.71°	25200	1.1	2	LOGU09
1.250	**VPX200UR2003SA16L**	●	3	1.000	9.000	1.750	.315	0.71°	25200	1.9	2	LOGU09
1.250	**VPX200UR2003FA20S**	●	3	1.250	5.125	2.000	.315	0.71°	25200	1.5	3	LOGU09
1.250	**VPX200UR2003SA20S**	●	3	1.250	5.125	2.000	.315	0.71°	25200	1.6	1	LOGU09
1.250	**VPX200UR2004FA20S**	●	4	1.250	5.125	2.000	.315	0.71°	25200	1.5	3	LOGU09
1.250	**VPX200UR2004SA20S**	●	4	1.250	5.125	2.000	.315	0.71°	25200	1.6	1	LOGU09
1.250	**VPX200UR2005FA20S**	●	5	1.250	5.125	2.000	.315	0.71°	25200	1.5	3	LOGU09
1.250	**VPX200UR2005SA20S**	●	5	1.250	5.125	2.000	.315	0.71°	25200	1.6	1	LOGU09
1.250	**VPX200UR2003SA20L**	●	3	1.250	9.000	3.000	.315	0.71°	25200	2.8	1	LOGU09
1.500	**VPX200UR2404FA20S**	●	4	1.250	5.125	2.000	.315	0.57°	22600	1.7	4	LOGU09
1.500	**VPX200UR2404SA20S**	●	4	1.250	5.125	2.000	.315	0.57°	22600	1.8	2	LOGU09
1.500	**VPX200UR2406FA20S**	●	6	1.250	5.125	2.000	.315	0.57°	22600	1.7	4	LOGU09
1.500	**VPX200UR2406SA20S**	●	6	1.250	5.125	2.000	.315	0.57°	22600	1.7	2	LOGU09
1.500	**VPX200UR2404SA20L**	●	4	1.250	9.000	2.000	.315	0.57°	22600	3.1	2	LOGU09

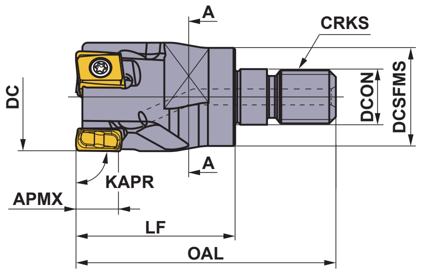
Note 1) The maximum spindle speeds **RPMX** are set to ensure tool and insert stability.
Note 2) When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.
* Number of Teeth

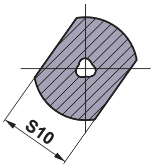
CUTTING CONDITIONS PG.533

● : USA Stock

Multi-Functional Cutter for High Efficiency Machining







A-A Section

Right hand tool holder only.

Screw-in Type

With Coolant Hole

(inch)

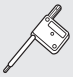
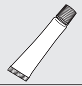
DC	Order Number	Stock	*1 No.T	DCON	DCSFMS	OAL	LF	S10	CRKS	WT (lbs)	APMX	RMPX	Insert Type
		R											
.625	**VPX200UR1002AM0830**	●	2	.335	.571	1.890	1.181	.394	M08	.1	.315	1.87°	LOGU09
.750	**VPX200UR1202AM1030**	●	2	.413	.728	1.929	1.181	.551	M10	.1	.315	1.43°	LOGU09
.750	**VPX200UR1203AM1030**	●	3	.413	.728	1.929	1.181	.551	M10	.1	.315	1.43°	LOGU09
.875	**VPX200UR1402AM1030**	●	2	.413	.728	1.929	1.181	.551	M10	.2	.315	1.14°	LOGU09
.875	**VPX200UR1403AM1030**	●	3	.413	.728	1.929	1.181	.551	M10	.1	.315	1.14°	LOGU09
1.000	**VPX200UR1603AM1235**	●	3	.492	.925	2.244	1.378	.748	M12	.2	.315	0.95°	LOGU09
1.000	**VPX200UR1604AM1235**	●	4	.492	.925	2.244	1.378	.748	M12	.2	.315	0.95°	LOGU09
1.125	**VPX200UR1803AM1235**	●	3	.492	.925	2.244	1.378	.748	M12	.3	.315	0.82°	LOGU09
1.125	**VPX200UR1804AM1235**	●	4	.492	.925	2.244	1.378	.748	M12	.3	.315	0.82°	LOGU09
1.250	**VPX200UR2003AM1640**	●	3	.669	1.122	2.480	1.575	.945	M16	.5	.315	0.71°	LOGU09
1.250	**VPX200UR2004AM1640**	●	4	.669	1.122	2.480	1.575	.945	M16	.5	.315	0.71°	LOGU09
1.250	**VPX200UR2005AM1640**	●	5	.669	1.122	2.480	1.575	.945	M16	.5	.315	0.71°	LOGU09
1.375	**VPX200UR2203AM1640**	●	3	.669	1.122	2.480	1.575	.945	M16	.5	.315	0.64°	LOGU09
1.375	**VPX200UR2205AM1640**	●	5	.669	1.122	2.480	1.575	.945	M16	.5	.315	0.64°	LOGU09
1.500	**VPX200UR2404AM1640**	●	4	.669	1.122	2.480	1.575	.945	M16	.6	.315	0.57°	LOGU09
1.500	**VPX200UR2406AM1640**	●	6	.669	1.122	2.480	1.575	.945	M16	.6	.315	0.57°	LOGU09

Note 1) For screw-in type arbors, refer to page 529—531.
*1 Number of Teeth

CUTTING CONDITIONS PG.533

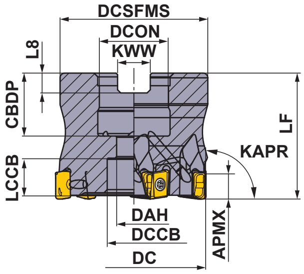
Spare Parts

(inch)

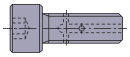
DC	Tool Holder Type	 *		
		Clamp Screw	Wrench	Anti-seize Lubricant
.625	**VPX200UR10**	TPS27F1	TIP07F	MK1KS
.750	**VPX200UR12**	TPS27F1	TIP07F	MK1KS
.875	**VPX200UR14**	TPS27F2	TIP07F	MK1KS
1.000	**VPX200UR16**	TPS27F2	TIP07F	MK1KS
1.125	**VPX200UR18**	TPS27F2	TIP07F	MK1KS
1.250	**VPX200UR20**	TPS27F2	TIP07F	MK1KS
1.375	**VPX200UR22**	TPS27F2	TIP07F	MK1KS
1.500	**VPX200UR24**	TPS27F2	TIP07F	MK1KS

* Clamp Torque (lbf-in) : TPS27F1 = 8.9,TPS27F2 = 8.9

● : USA Stock



Right hand tool holder only.

DCON	Set Bolt	Geometry
ϕ.500"	HSCU25011H	
ϕ.750"	HSCU37513H	
ϕ1.000"	HSCU50014H	

Arbor Type

DCON = inch size, With Coolant Hole

(inch)

DC	Order Number	Stock	* No.T	LF	DCON	WT (lbs)	APMX	RMPX	RPMX (min^{-1})	Insert Type
		R								
1.250	**VPX200UR1.2503SA**	●	3	1.375	.500	.120	.315	0.72°	25200	LOGU09
1.250	**VPX200UR1.2505SA**	●	5	1.375	.500	.120	.315	0.72°	25200	LOGU09
1.500	**VPX200UR1.5004SA**	●	4	1.750	.500	.260	.315	0.57°	22600	LOGU09
1.500	**VPX200UR1.5006SA**	●	6	1.750	.500	.250	.315	0.57°	22600	LOGU09
1.500	**VPX200UR1.5004AA**	●	4	1.750	.750	.220	.315	0.57°	22600	LOGU09
1.500	**VPX200UR1.5006AA**	●	6	1.750	.750	.210	.315	0.57°	22600	LOGU09
2.000	**VPX200UR2.0005AA**	●	5	1.750	.750	.410	.315	0.41°	19000	LOGU09
2.000	**VPX200UR2.0007AA**	●	7	1.750	.750	.410	.315	0.41°	19000	LOGU09
2.500	**VPX200UR2.5006CA**	●	6	2.000	1.000	.740	.315	0.32°	16700	LOGU09
2.500	**VPX200UR2.5009CA**	●	9	2.000	1.000	.740	.315	0.32°	16700	LOGU09

Note 1) The maximum spindle speeds **RPMX** are set to ensure tool and insert stability.
Note 2) When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.
* Number of Teeth

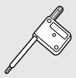
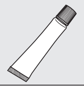
CUTTING CONDITIONS PG.533

Mounting Dimensions

(inch)

DC	Order Number	DCON	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8
1.250	**VPX200UR1.2503SA**	.500	.630	.276	.433	.304	1.125	.250	.156
1.250	**VPX200UR1.2505SA**	.500	.630	.276	.433	.304	1.125	.250	.156
1.500	**VPX200UR1.5004SA**	.500	.630	.276	.433	.679	1.438	.250	.156
1.500	**VPX200UR1.5006SA**	.500	.630	.276	.433	.679	1.438	.250	.156
1.500	**VPX200UR1.5004AA**	.750	.748	.413	.630	.561	1.438	.313	.187
1.500	**VPX200UR1.5006AA**	.750	.748	.413	.630	.561	1.438	.313	.187
2.000	**VPX200UR2.0005AA**	.750	.748	.413	.630	.561	1.750	.313	.187
2.000	**VPX200UR2.0007AA**	.750	.748	.413	.630	.561	1.750	.313	.187
2.500	**VPX200UR2.5006CA**	1.000	.945	.539	.787	.693	2.188	.375	.219
2.500	**VPX200UR2.5009CA**	1.000	.945	.539	.787	.693	2.188	.375	.219

Spare Parts

Tool Holder Type	 *		
	Clamp Screw	Wrench	Anti-seize Lubricant
VPX200	TPS27F2	TIP07F	MK1KS

* Clamp Torque (lbf-in) : TPS27F2 = 8.9

DEEP SHOULDER MILLING

90° KAPR

VPX200

NEW

LONG CUTTING EDGE

P M K N S H

Fig.1

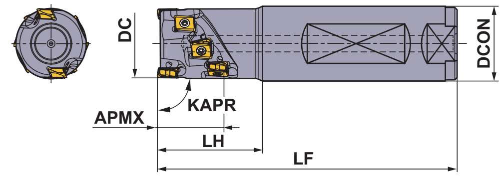
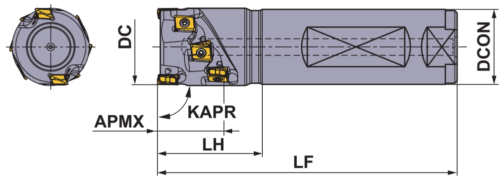


Fig.2



Right hand tool holder only.

Shank Type

With Coolant Hole

(inch)

DC	Order Number	Stock	*1 No.T	Total	DCON	LF	LH	APMX	RMPX	WT	Fig.	*2 Insert Type
		R								(lbs)		
.875	**VPX200UR142FA12S0504**	●	2	4	.750	4.375	1.250	.551	1.14°	.485	2	LOGU09
1.000	**VPX200UR162FA16S0806**	●	2	6	1.000	4.750	1.500	.827	0.95°	.904	1	LOGU09
1.000	**VPX200UR162FA16S1108**	●	2	8	1.000	5.000	1.750	1.102	0.95°	.926	1	LOGU09
1.125	**VPX200UR182FA16S0806**	●	2	6	1.000	4.750	1.500	.827	0.82°	.948	2	LOGU09
1.125	**VPX200UR182FA16S1108**	●	2	8	1.000	5.000	1.750	1.102	0.82°	.992	2	LOGU09
1.250	**VPX200UR202FA20S1108**	●	2	8	1.250	5.000	1.750	1.102	0.71°	1.455	1	LOGU09
1.250	**VPX200UR203FA20S1112**	●	3	12	1.250	5.000	1.750	1.102	0.71°	1.433	1	LOGU09
1.250	**VPX200UR202FA20S1310**	●	2	10	1.250	5.250	2.000	1.378	0.71°	1.499	1	LOGU09
1.250	**VPX200UR203FA20S1315**	●	3	15	1.250	5.250	2.000	1.378	0.71°	1.477	1	LOGU09
1.375	**VPX200UR222FA20S1108**	●	2	8	1.250	5.000	1.750	1.102	0.64°	1.543	2	LOGU09
1.375	**VPX200UR223FA20S1112**	●	3	12	1.250	5.000	1.750	1.102	0.64°	1.587	2	LOGU09
1.375	**VPX200UR222FA20S1310**	●	2	10	1.250	5.250	2.000	1.378	0.64°	1.543	2	LOGU09
1.375	**VPX200UR223FA20S1315**	●	3	15	1.250	5.250	2.000	1.378	0.64°	1.587	2	LOGU09
1.500	**VPX200UR243FA20S1315**	●	3	15	1.250	5.250	2.000	1.378	0.57°	1.676	2	LOGU09
1.500	**VPX200UR244FA20S1320**	●	4	20	1.250	5.250	2.000	1.378	0.57°	1.676	2	LOGU09
1.500	**VPX200UR243FA20S1618**	●	3	18	1.250	5.500	2.250	1.654	0.57°	1.764	2	LOGU09
1.500	**VPX200UR244FA20S1624**	●	4	24	1.250	5.500	2.250	1.654	0.57°	1.742	2	LOGU09

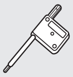
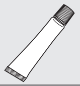
*1 Number of Teeth

*2 Corner radius RE .031 inch is recommended for the peripheral cutting edges except the bottom cutting edge (end cutting).
Insert RE .008 inch and .016 inch can also be used for the peripheral cutting edges.

CUTTING CONDITIONS PG.547

Spare Parts

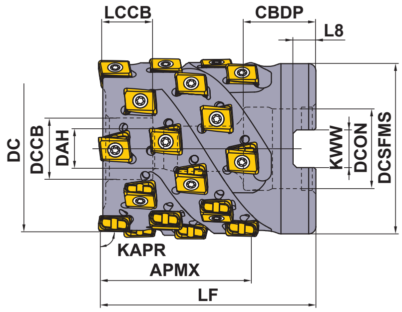
(inch)

DC	Tool Holder Type	 *		
		Clamp Screw	Wrench	Anti-seize Lubricant
.875	**VPX200UR14**	TPS27F2	TIP07F	MK1KS
1.000	**VPX200UR16**	TPS27F2	TIP07F	MK1KS
1.125	**VPX200UR16**	TPS27F2	TIP07F	MK1KS
1.250	**VPX200UR20**	TPS27F2	TIP07F	MK1KS
1.375	**VPX200UR22**	TPS27F2	TIP07F	MK1KS
1.500	**VPX200UR24**	TPS27F2	TIP07F	MK1KS

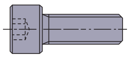
* Clamp Torque (lbf-in) : TPS27F2 = 8.9

● : USA Stock

VPX200
DEEP SHOULDER MILLING



Right hand tool holder only.

DC	APMX	Set Bolt	Geometry
1.250	1.378	HSCUF25020	
1.500	1.654	HSCUF25020	
2.000	1.654	HSCUF37520	

Arbor Type

DCON = inch size, With Coolant Hole

(inch)

DC	Order Number	Stock	*1 No.T	Total	LF	DCON	WT (kg)	APMX	RMPX	*2 Insert Type
		R								
1.250	**VPX200UR1.2502AA1310**	●	2	10	2.250	.500	.529	1.378	0.72°	LOGU09
1.250	**VPX200UR1.2503AA1315**	●	3	15	2.250	.500	.485	1.378	0.72°	LOGU09
1.500	**VPX200UR1.5003AA1618**	●	3	18	2.375	.500	.728	1.654	0.57°	LOGU09
1.500	**VPX200UR1.5004AA1624**	●	4	24	2.375	.500	.705	1.654	0.57°	LOGU09
2.000	**VPX200UR2.0004AA1624**	●	4	24	2.375	.750	1.279	1.654	0.41°	LOGU09
2.000	**VPX200UR2.0005AA1630**	●	5	30	2.375	.750	1.257	1.654	0.41°	LOGU09

*1 Number of Teeth

*2 Corner radius RE .031 inch is recommended for the peripheral cutting edges except the bottom cutting edge (end cutting).
Insert RE .008 inch and .016 inch can also be used for the peripheral cutting edges.

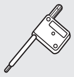
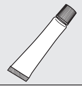
CUTTING CONDITIONS PG.547

Mounting Dimensions

(inch)

DC	Order Number	DCON	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8
1.250	**VPX200UR1.2502AA1310**	.500	.630	.276	.433	.313	1.438	.250	.156
1.250	**VPX200UR1.2503AA1315**	.500	.630	.276	.433	.313	1.438	.250	.156
1.500	**VPX200UR1.5003AA1618**	.500	.630	.276	.433	.320	1.438	.250	.156
1.500	**VPX200UR1.5004AA1624**	.500	.630	.276	.433	.320	1.438	.250	.156
2.000	**VPX200UR2.0004AA1624**	.750	.748	.413	.630	.438	1.750	.313	.187
2.000	**VPX200UR2.0005AA1630**	.750	.748	.413	.630	.438	1.750	.313	.187

Spare Parts

Tool Holder Type	 *		
	Clamp Screw	Wrench	Anti-seize Lubricant
VPX200	TPS27F2	TIP07F	MK1KS

* Clamp Torque (lbf-in) : TPS27F2 = 8.9

Multi-Functional Cutter for High Efficiency Machining

Fig.1

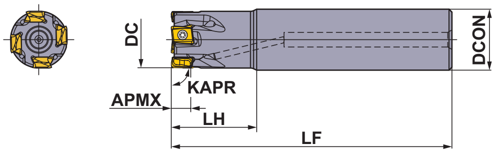
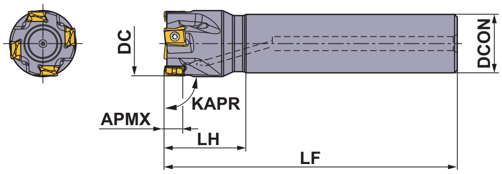


Fig.2



Right hand tool holder only.

Metric Standard

■Shank Type

With Coolant Hole

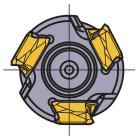
(mm)

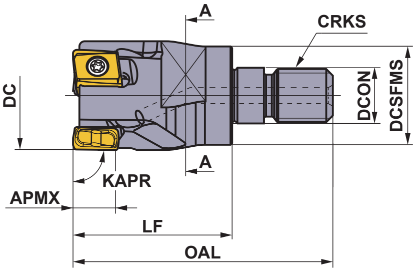
DC	Order Number	Stock	* No.T	DCON	LF	LH	APMX	RMPX	RPMX (min^{-1})	WT (kg)	Fig.	Insert Type
		R										
16	**VPX200R1602SA16S**	★	2	16	85	25	8	1.85°	37900	0.11	1	LOGU09
18	**VPX200R1802SA16S**	★	2	16	85	25	8	1.56°	35300	0.12	2	LOGU09
18	**VPX200R1802SA16L**	★	2	16	120	25	8	1.56°	35300	0.17	2	LOGU09
20	**VPX200R2002SA16S**	★	2	16	100	25	8	1.35°	33200	0.14	2	LOGU09
20	**VPX200R2003SA16S**	★	3	16	100	25	8	1.35°	33200	0.14	2	LOGU09
20	**VPX200R2002SA20S**	★	2	20	100	30	8	1.35°	33200	0.21	1	LOGU09
20	**VPX200R2003SA20S**	★	3	20	100	30	8	1.35°	33200	0.21	1	LOGU09
20	**VPX200R2002SA20L**	★	2	20	150	60	8	1.35°	33200	0.32	1	LOGU09
22	**VPX200R2202SA20S**	★	2	20	115	30	8	1.16°	31400	0.26	2	LOGU09
22	**VPX200R2203SA20S**	★	3	20	115	30	8	1.16°	31400	0.25	2	LOGU09
22	**VPX200R2202SA20L**	★	2	20	150	30	8	1.16°	31400	0.34	2	LOGU09
25	**VPX200R2503SA20S**	★	3	20	115	30	8	0.97°	29000	0.26	2	LOGU09
25	**VPX200R2504SA20S**	★	4	20	115	30	8	0.97°	29000	0.26	2	LOGU09
25	**VPX200R2503SA25S**	★	3	25	115	35	8	0.97°	29000	0.39	1	LOGU09
25	**VPX200R2504SA25S**	★	4	25	115	35	8	0.97°	29000	0.39	1	LOGU09
25	**VPX200R2503SA25L**	★	3	25	170	70	8	0.97°	29000	0.57	1	LOGU09
28	**VPX200R2803SA25S**	★	3	25	115	35	8	0.84°	27200	0.41	2	LOGU09
28	**VPX200R2804SA25S**	★	4	25	115	35	8	0.84°	27200	0.41	2	LOGU09
28	**VPX200R2803SA25L**	★	3	25	170	35	8	0.84°	27200	0.61	2	LOGU09
30	**VPX200R3003SA25S**	★	3	25	125	35	8	0.77°	26000	0.46	2	LOGU09
30	**VPX200R3004SA25S**	★	4	25	125	35	8	0.77°	26000	0.46	2	LOGU09
32	**VPX200R3203SA32S**	★	3	32	125	45	8	0.71°	25100	0.70	1	LOGU09
32	**VPX200R3204SA32S**	★	4	32	125	45	8	0.71°	25100	0.70	1	LOGU09
32	**VPX200R3205SA32S**	★	5	32	125	45	8	0.71°	25100	0.70	1	LOGU09
32	**VPX200R3203SA32L**	★	3	32	190	90	8	0.71°	25100	1.06	1	LOGU09
35	**VPX200R3503SA32L**	★	3	32	190	45	8	0.63°	23800	1.14	2	LOGU09
40	**VPX200R4004SA32S**	★	4	32	125	45	8	0.54°	22000	0.81	2	LOGU09
40	**VPX200R4006SA32S**	★	6	32	125	45	8	0.54°	22000	0.80	2	LOGU09
50	**VPX200R5005SA32S**	★	5	32	125	45	8	0.42°	19200	0.91	2	LOGU09
50	**VPX200R5007SA32S**	★	7	32	125	45	8	0.42°	19200	0.91	2	LOGU09

Note 1) The maximum spindle speeds **RPMX** are set to ensure tool and insert stability.
Note 2) When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.
* Number of Teeth

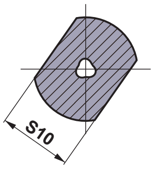
CUTTING CONDITIONS PG.533

★ : **Stocked in Japan**





Right hand tool holder only.



A-A Section

Metric Standard

Screw-in Type

With Coolant Hole

(mm)

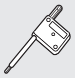
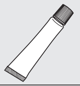
DC	Order Number	Stock R	*1 No.T	DCON	DCSFMS	OAL	LF	S10	CRKS	WT (kg)	APMX	RMPX	Insert Type
16	**VPX200R1602AM0830**	★	2	8.5	14.5	48	30	10	M08	0.03	8	1.85°	LOGU09
18	**VPX200R1802AM0830**	★	2	8.5	14.5	48	30	10	M08	0.04	8	1.56°	LOGU09
20	**VPX200R2002AM1030**	★	2	10.5	18.5	49	30	14	M10	0.06	8	1.35°	LOGU09
20	**VPX200R2003AM1030**	★	3	10.5	18.5	49	30	14	M10	0.06	8	1.35°	LOGU09
22	**VPX200R2202AM1030**	★	2	10.5	18.5	49	30	14	M10	0.06	8	1.16°	LOGU09
22	**VPX200R2203AM1030**	★	3	10.5	18.5	49	30	14	M10	0.06	8	1.16°	LOGU09
25	**VPX200R2503AM1235**	★	3	12.5	23.5	57	35	19	M12	0.11	8	0.97°	LOGU09
25	**VPX200R2504AM1235**	★	4	12.5	23.5	57	35	19	M12	0.11	8	0.97°	LOGU09
32	**VPX200R3203AM1640**	★	3	17.0	28.5	63	40	24	M16	0.21	8	0.71°	LOGU09
32	**VPX200R3204AM1640**	★	4	17.0	28.5	63	40	24	M16	0.21	8	0.71°	LOGU09
32	**VPX200R3205AM1640**	★	5	17.0	28.5	63	40	24	M16	0.21	8	0.71°	LOGU09
35	**VPX200R3503AM1640**	★	3	17.0	28.5	63	40	24	M16	0.24	8	0.63°	LOGU09
35	**VPX200R3505AM1640**	★	5	17.0	28.5	63	40	24	M16	0.23	8	0.63°	LOGU09
40	**VPX200R4004AM1640**	★	4	17.0	28.5	63	40	24	M16	0.26	8	0.54°	LOGU09
40	**VPX200R4006AM1640**	★	6	17.0	28.5	63	40	24	M16	0.26	8	0.54°	LOGU09

Note 1) For screw-in type arbors, refer to page 529—531.
*1 Number of Teeth

CUTTING CONDITIONS PG.533

Spare Parts

(mm)

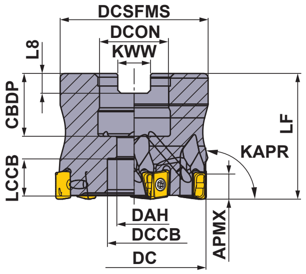
DC	Tool Holder Type	 *		
		Clamp Screw	Wrench	Anti-seize Lubricant
16	**VPX200R16**	TPS27F1	TIP07F	MK1KS
18	**VPX200R18**	TPS27F1	TIP07F	MK1KS
20	**VPX200R20**	TPS27F1	TIP07F	MK1KS
22	**VPX200R22**	TPS27F2	TIP07F	MK1KS
25	**VPX200R25**	TPS27F2	TIP07F	MK1KS
28	**VPX200R28**	TPS27F2	TIP07F	MK1KS
30	**VPX200R30**	TPS27F2	TIP07F	MK1KS
32	**VPX200R32**	TPS27F2	TIP07F	MK1KS
35	**VPX200R35**	TPS27F2	TIP07F	MK1KS
40	**VPX200R40**	TPS27F2	TIP07F	MK1KS
50	**VPX200R50**	TPS27F2	TIP07F	MK1KS

* Clamp Torque (lbf-in) : TPS27F1 = 8.9,TPS27F2 = 8.9

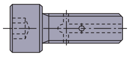
Multi-Functional Cutter for High Efficiency Machining

Metric Standard

For Metric Arbors



Right hand tool holder only.

DC	Set Bolt	Geometry
ϕ32, ϕ40	HSC08025H	
ϕ50, ϕ63	HSC10030H	

Arbor Type

DCON=mm size, With Coolant Hole

(mm)

DC	Order Number	Stock	* No.T	LF	DCON	WT (kg)	APMX	RMPX	RPMX (min^{-1})	Insert Type
		R								
32	**VPX200-032A03AR**	★	3	35	16	0.11	8	0.71°	25100	LOGU09
32	**VPX200-032A05AR**	★	5	35	16	0.11	8	0.71°	25100	LOGU09
40	**VPX200-040A04AR**	★	4	40	16	0.23	8	0.54°	22000	LOGU09
40	**VPX200-040A06AR**	★	6	40	16	0.22	8	0.54°	22000	LOGU09
50	**VPX200-050A05AR**	★	5	40	22	0.36	8	0.42°	19200	LOGU09
50	**VPX200-050A07AR**	★	7	40	22	0.36	8	0.42°	19200	LOGU09
63	**VPX200-063A06AR**	★	6	40	22	0.66	8	0.32°	16700	LOGU09
63	**VPX200-063A09AR**	★	9	40	22	0.66	8	0.32°	16700	LOGU09

Note 1) The maximum spindle speeds **RPMX** are set to ensure tool and insert stability.
Note 2) When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.
* Number of Teeth

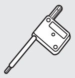
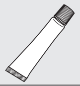
CUTTING CONDITIONS PG.533

Mounting Dimensions

(mm)

DC	Order Number	DCON	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8
32	**VPX200-032A03AR**	16	18	9	14	8	30	8.4	5.6
32	**VPX200-032A05AR**	16	18	9	14	8	30	8.4	5.6
40	**VPX200-040A04AR**	16	18	9	14	13	37	8.4	5.6
40	**VPX200-040A06AR**	16	18	9	14	13	37	8.4	5.6
50	**VPX200-050A05AR**	22	20	11	17	11	47	10.4	6.3
50	**VPX200-050A07AR**	22	20	11	17	11	47	10.4	6.3
63	**VPX200-063A06AR**	22	20	11	17	11	60	10.4	6.3
63	**VPX200-063A09AR**	22	20	11	17	11	60	10.4	6.3

Spare Parts

Tool Holder Type	 *		
	Clamp Screw	Wrench	Anti-seize Lubricant
VPX200	TPS27F2	TIP07F	MK1KS

* Clamp Torque (lbf-in) : TPS27F2 = 8.9

★ : Stocked in Japan

DEEP SHOULDER MILLING

90° KAPR

VPX200

NEW

LONG CUTTING EDGE

P | M | K | N | S | H

Metric Standard

Fig.1

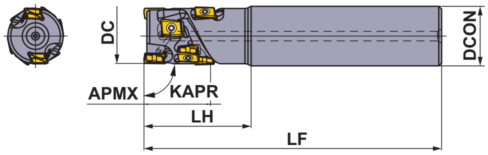
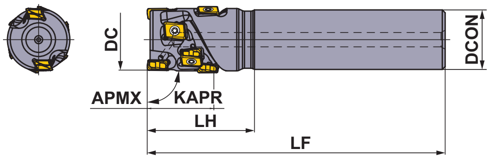


Fig.2



Right hand tool holder only.

■Shank Type

With Coolant Hole

(mm)

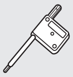
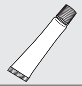
DC	Order Number	Stock	*1 No.T	Total	DCON	LF	LH	APMX	RMPX	WT (kg)	Fig.	Insert Type
		R										
20	**VPX200R202SA20S01404**	★	2	4	20	100	30	14	1.35°	0.21	1	LOGU09
22	**VPX200R222SA20S01404**	★	2	4	20	115	30	14	1.16°	0.26	2	LOGU09
25	**VPX200R252SA25S02106**	★	2	6	25	115	35	21	0.97°	0.39	1	LOGU09
25	**VPX200R252SA25S02808**	★	2	8	25	125	45	28	0.97°	0.41	1	LOGU09
28	**VPX200R282SA25S02106**	★	2	6	25	115	35	21	0.84°	0.40	2	LOGU09
28	**VPX200R282SA25S02808**	★	2	8	25	125	45	28	0.84°	0.43	2	LOGU09
32	**VPX200R322SA32S02808**	★	2	8	32	125	45	28	0.71°	0.68	1	LOGU09
32	**VPX200R323SA32S02812**	★	3	12	32	125	45	28	0.71°	0.67	1	LOGU09
32	**VPX200R322SA32S03510**	★	2	10	32	130	50	35	0.71°	0.70	1	LOGU09
32	**VPX200R323SA32S03515**	★	3	15	32	130	50	35	0.71°	0.68	1	LOGU09
35	**VPX200R352SA32S02808**	★	2	8	32	125	45	28	0.63°	0.72	2	LOGU09
35	**VPX200R353SA32S02812**	★	3	12	32	125	45	28	0.63°	0.71	2	LOGU09
35	**VPX200R352SA32S03510**	★	2	10	32	130	50	35	0.63°	0.74	2	LOGU09
35	**VPX200R353SA32S03515**	★	3	15	32	130	50	35	0.63°	0.73	2	LOGU09
40	**VPX200R403SA32S03515**	★	3	15	32	130	50	35	0.54°	0.81	2	LOGU09
40	**VPX200R404SA32S03520**	★	4	20	32	130	50	35	0.54°	0.80	2	LOGU09
40	**VPX200R403SA32S04218**	★	3	18	32	140	60	42	0.54°	0.88	2	LOGU09
40	**VPX200R404SA32S04224**	★	4	24	32	140	60	42	0.54°	0.86	2	LOGU09

*1 Number of Teeth

CUTTING CONDITIONS PG.547

Spare Parts

(mm)

DC	Tool Holder Type	 * Clamp Screw	 Wrench	 Anti-seize Lubricant
20	**VPX200R20**	TPS27F1	TIP07F	MK1KS
22	**VPX200R22**	TPS27F2	TIP07F	MK1KS
25	**VPX200R25**	TPS27F2	TIP07F	MK1KS
28	**VPX200R28**	TPS27F2	TIP07F	MK1KS
32	**VPX200R32**	TPS27F2	TIP07F	MK1KS
35	**VPX200R35**	TPS27F2	TIP07F	MK1KS
40	**VPX200R40**	TPS27F2	TIP07F	MK1KS

* Clamp Torque (lbf-in) : TPS27F1 = 8.9,TPS27F2 = 8.9

VPX200
DEEP SHOULDER MILLING

Fig.1

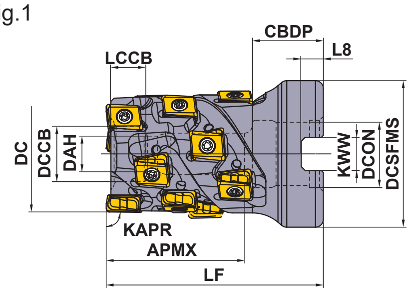
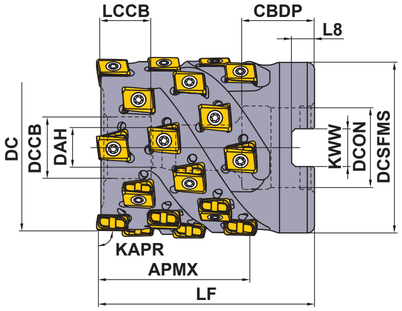
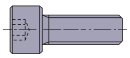


Fig.2



Right hand tool holder only.

DC	APMX	Set Bolt	Geometry
ϕ32	35	HSC08045	
ϕ40	42	HSC08050	
ϕ50	42	HSC10045	

Metric Standard

■Arbor Type

DCON = mm size, With Coolant Hole

(mm)

DC	Order Number	Stock R	*1 No.T	Total	LF	DCON	WT (kg)	APMX	RMPX	Fig.	*2 Insert Type
32	**VPX200-032A02A035R10**	★	2	10	55	16	0.22	35	0.71°	1	LOGU09
32	**VPX200-032A03A035R15**	★	3	15	55	16	0.20	35	0.71°	1	LOGU09
40	**VPX200-040A03A042R18**	★	3	18	60	16	0.34	42	0.54°	2	LOGU09
40	**VPX200-040A04A042R24**	★	4	24	60	16	0.33	42	0.54°	2	LOGU09
50	**VPX200-050A04A042R24**	★	4	24	60	22	0.55	42	0.42°	2	LOGU09
50	**VPX200-050A05A042R30**	★	5	30	60	22	0.54	42	0.42°	2	LOGU09

*1 Number of Teeth
*2 Corner radius RE .031 inch is recommended for the peripheral cutting edges except the bottom cutting edge (end cutting).
Insert RE .008 inch and .016 inch can also be used for the peripheral cutting edges.

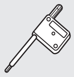
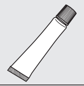
CUTTING CONDITIONS PG.547

Mounting Dimensions

(mm)

DC	Order Number	DCON	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8
32	**VPX200-032A02A035R10**	16	18	9	14	8	37	8.4	5.6
32	**VPX200-032A03A035R15**	16	18	9	14	8	37	8.4	5.6
40	**VPX200-040A03A042R18**	16	18	9	14	8	37	8.4	5.6
40	**VPX200-040A04A042R24**	16	18	9	14	8	37	8.4	5.6
50	**VPX200-050A04A042R24**	22	20	11	17	13	47	10.4	6.3
50	**VPX200-050A05A042R30**	22	20	11	17	13	47	10.4	6.3

Spare Parts

Tool Holder Type	 *		
	Clamp Screw	Wrench	Anti-seize Lubricant
VPX200	TPS27F2	TIP07F	MK1KS

* Clamp Torque (lbf-in) : TPS27F2 = 8.9

● : USA Stock ★ : Stocked in Japan (10 inserts in one case)

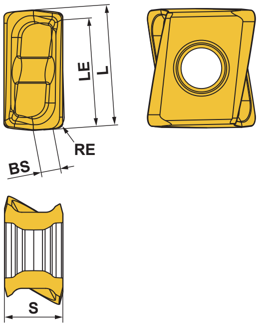
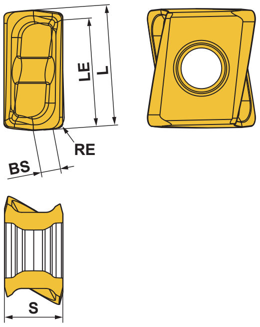
Inserts

(inch)

Workpiece Material	P	Steels		◐	✤				◐			
	M	Stainless Steels				◐			◐			
	K	Cast Irons	◐						✤			
	N	Non-ferrous Metals									◐	
	S	Heat Resistant Alloys, Titanium Alloys					◐	✤	◐			
	H	Hardened Steels							◐			

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✤ : Unstable Cutting

Edge Preparation :
E : Round **F :** Sharp Edge

Shape	Order Number	Class	Edge Preparation	Coated								Carbide		L	RE	LE	S	BS	Geometry
				MC5020	MP6120	MP6130	MP7130	MP9120	MP9130	VP15TF		TF15							
Low Cutting Resistance L Breaker 	**LOGU0904020PNER-L**	G	E	●	●	●	●	●	●	●				.343	.008	.299	.169	.067	
	LOGU0904040PNER-L	G	E	●	●	●	●	●	●	●				.343	.016	.299	.169	.063	
	LOGU0904080PNER-L	G	E	●	●	●	●	●	●	●				.343	.031	.299	.169	.047	
	LOGU0904100PNER-L	G	E	●	●	●	●	●	●	●				.343	.039	.299	.169	.039	
	LOGU0904120PNER-L	G	E	●	●	●	●	●	●	●				.343	.047	.299	.169	.035	
	LOGU0904160PNER-L	G	E	●	●	●	●	●	●	●				.343	.063	.299	.169	.020	
	LOGU0904020PNFR-L	G	F									●		.343	.008	.299	.169	.067	
	LOGU0904040PNFR-L	G	F									●		.343	.016	.299	.169	.063	
	LOGU0904080PNFR-L	G	F									●		.343	.031	.299	.169	.047	
	LOGU0904100PNFR-L	G	F									●		.343	.039	.299	.169	.039	
	LOGU0904120PNFR-L	G	F									●		.343	.047	.299	.169	.035	
	LOGU0904160PNFR-L	G	F									●		.343	.063	.299	.169	.020	Right hand insert only.
General Use M Breaker 	**LOGU0904020PNER-M**	G	E	●	●	●	●	●	●	●				.343	.008	.299	.169	.067	
	LOGU0904040PNER-M	G	E	●	●	●	●	●	●	●				.343	.016	.299	.169	.063	
	LOGU0904080PNER-M	G	E	●	●	●	●	●	●	●				.343	.031	.299	.169	.047	
	LOGU0904100PNER-M	G	E	●	●	●	●	●	●	●				.343	.039	.299	.169	.039	
	LOGU0904120PNER-M	G	E	●	●	●	●	●	●	●				.343	.047	.299	.169	.035	
	LOGU0904160PNER-M	G	E	●	●	●	●	●	●	●				.343	.063	.299	.169	.020	
	LOGU0904020PNFR-M	G	F									●		.343	.008	.299	.169	.067	
	LOGU0904040PNFR-M	G	F									●		.343	.016	.299	.169	.063	
	LOGU0904080PNFR-M	G	F									●		.343	.031	.299	.169	.047	
	LOGU0904100PNFR-M	G	F									●		.343	.039	.299	.169	.039	
	LOGU0904120PNFR-M	G	F									●		.343	.047	.299	.169	.035	
	LOGU0904160PNFR-M	G	F									●		.343	.063	.299	.169	.020	Right hand insert only.

MULTI-FUNCTIONAL MILLING

90° KAPR

VPX300

P M K N S H

Fig.1

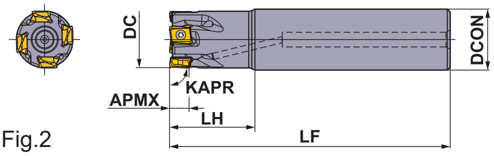


Fig.2

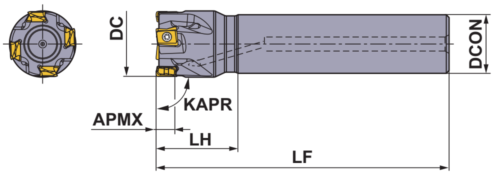


Fig.3

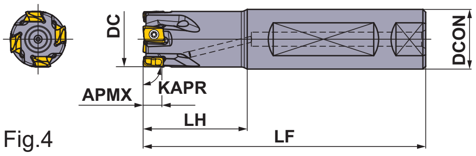
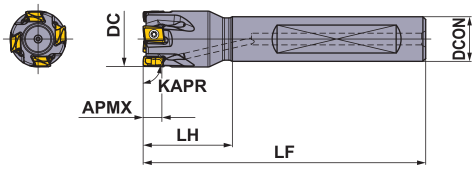


Fig.4



Shank Type

Right hand tool holder only.

With Coolant Hole

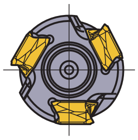
(inch)

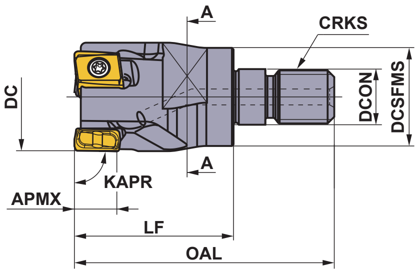
DC	Order Number	Stock R	* No.T	DCON	LF	LH	APMX	RMPX	RPMX (min^{-1})	WT (lbs)	Fig.	Insert Type
1.000	**VPX300UR1602FA16S**	●	2	1.000	4.750	1.750	.433	2.07°	23900	.8	3	LOGU12
1.000	**VPX300UR1602SA16S**	●	2	1.000	4.750	1.750	.433	2.07°	23900	.9	1	LOGU12
1.000	**VPX300UR1602SA16L**	●	2	1.000	8.500	2.500	.433	2.07°	23900	1.7	1	LOGU12
1.125	**VPX300UR1802SA16L**	●	2	1.000	8.500	1.750	.433	1.73°	22200	1.9	2	LOGU12
1.250	**VPX300UR2002FA16S**	●	2	1.000	5.125	1.750	.433	1.49°	20700	1.1	4	LOGU12
1.250	**VPX300UR2002SA16S**	●	2	1.000	5.125	1.750	.433	1.49°	20700	1.1	2	LOGU12
1.250	**VPX300UR2003FA16S**	●	3	1.000	5.125	1.750	.433	1.49°	20700	1.1	4	LOGU12
1.250	**VPX300UR2003SA16S**	●	3	1.000	5.125	1.750	.433	1.49°	20700	1.1	2	LOGU12
1.250	**VPX300UR2003SA16L**	●	3	1.000	9.000	1.750	.433	1.49°	20700	1.9	2	LOGU12
1.250	**VPX300UR2002FA20S**	●	2	1.250	5.125	2.000	.433	1.49°	20700	1.5	3	LOGU12
1.250	**VPX300UR2002SA20S**	●	2	1.250	5.125	2.000	.433	1.49°	20700	1.5	1	LOGU12
1.250	**VPX300UR2003FA20S**	●	3	1.250	5.125	2.000	.433	1.49°	20700	1.5	3	LOGU12
1.250	**VPX300UR2003SA20S**	●	3	1.250	5.125	2.000	.433	1.49°	20700	1.5	1	LOGU12
1.250	**VPX300UR2003SA20L**	●	3	1.250	9.000	3.000	.433	1.49°	20700	2.8	1	LOGU12
1.500	**VPX300UR2402FA20S**	●	2	1.250	5.125	2.000	.433	1.13°	18500	1.7	4	LOGU12
1.500	**VPX300UR2402SA20S**	●	2	1.250	5.125	2.000	.433	1.13°	18500	1.7	2	LOGU12
1.500	**VPX300UR2403FA20S**	●	3	1.250	5.125	2.000	.433	1.13°	18500	1.7	4	LOGU12
1.500	**VPX300UR2403SA20S**	●	3	1.250	5.125	2.000	.433	1.13°	18500	1.7	2	LOGU12
1.500	**VPX300UR2403SA20L**	●	3	1.250	9.000	2.000	.433	1.13°	18500	3.0	2	LOGU12

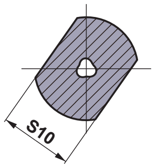
Note 1) The maximum spindle speeds **RPMX** are set to ensure tool and insert stability.
Note 2) When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.
* Number of Teeth

CUTTING CONDITIONS PG.533

● : **USA Stock**







A-A Section

Right hand tool holder only.

Screw-in Type

With Coolant Hole

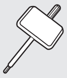
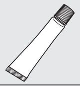
(inch)

DC	Order Number	Stock	*1 No.T	DCON	DCSFMS	OAL	LF	S10	CRKS	WT (lbs)	APMX	RMPX	Insert Type
		R											
1.000	**VPX300UR1602AM1235**	●	2	.492	.925	2.244	1.378	.748	M12	.2	.433	2.07°	LOGU12
1.125	**VPX300UR1802AM1235**	●	2	.492	.925	2.244	1.378	.748	M12	.3	.433	1.73°	LOGU12
1.250	**VPX300UR2002AM1640**	●	2	.669	1.122	2.480	1.575	.945	M16	.4	.433	1.49°	LOGU12
1.250	**VPX300UR2003AM1640**	●	3	.669	1.122	2.480	1.575	.945	M16	.4	.433	1.49°	LOGU12
1.375	**VPX300UR2202AM1640**	●	2	.669	1.122	2.480	1.575	.945	M16	.5	.433	1.28°	LOGU12
1.375	**VPX300UR2203AM1640**	●	3	.669	1.122	2.480	1.575	.945	M16	.5	.433	1.28°	LOGU12
1.500	**VPX300UR2403AM1640**	●	3	.669	1.122	2.480	1.575	.945	M16	.5	.433	1.13°	LOGU12
1.500	**VPX300UR2404AM1640**	●	4	.669	1.122	2.480	1.575	.945	M16	.5	.433	1.13°	LOGU12

Note 1) For screw-in type arbors, refer to page 529−531.
*1 Number of Teeth

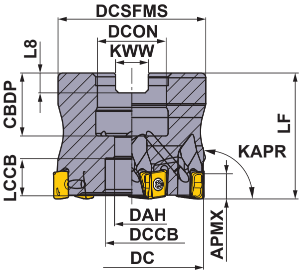
CUTTING CONDITIONS PG.533

Spare Parts

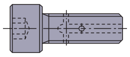
Tool Holder Type	 *		
	Clamp Screw	Wrench	Anti-seize Lubricant
VPX300	TPS40F1	TIP15W	MK1KS

* Clamp Torque (lbf-in) : TPS40F1 = 26.6

Multi-Functional Cutter for High Efficiency Machining



Right hand tool holder only.

DCON	Set Bolt	Geometry
ϕ.500"	HSCU25011H	
ϕ.750"	HSCU37513H	
ϕ1.000"	HSCU50014H	

■Arbor Type

DCON=inch size, With Coolant Hole

(inch)

DC	Order Number	Stock	* No.T	LF	DCON	WT (lbs)	APMX	RMPX	RPMX (min^{-1})	Insert Type
		R								
1.500	**VPX300UR1.5003SA**	●	3	1.750	.500	.240	.433	1.13°	18500	LOGU12
1.500	**VPX300UR1.5004SA**	●	4	1.750	.500	.240	.433	1.13°	18500	LOGU12
2.000	**VPX300UR2.0004AA**	●	4	1.750	.750	.400	.433	0.78°	15400	LOGU12
2.000	**VPX300UR2.0006AA**	●	6	1.750	.750	.390	.433	0.78°	15400	LOGU12
2.500	**VPX300UR2.5006CA**	●	6	2.000	1.000	.700	.433	0.59°	13400	LOGU12
2.500	**VPX300UR2.5008CA**	●	8	2.000	1.000	.720	.433	0.59°	13400	LOGU12
3.000	**VPX300UR3.0007CA**	●	7	2.000	1.000	.940	.433	0.48°	11900	LOGU12
3.000	**VPX300UR3.0010CA**	●	10	2.000	1.000	.950	.433	0.48°	11900	LOGU12

Note 1) The maximum spindle speeds **RPMX** are set to ensure tool and insert stability.
Note 2) When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.
* Number of Teeth

CUTTING CONDITIONS PG.533

Mounting Dimensions

(inch)

DC	Order Number	DCON	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8
1.500	**VPX300UR1.5003SA**	.500	.630	.276	.433	.663	1.438	.250	.156
1.500	**VPX300UR1.5004SA**	.500	.630	.276	.433	.663	1.438	.250	.156
2.000	**VPX300UR2.0004AA**	.750	.748	.413	.630	.545	1.750	.313	.187
2.000	**VPX300UR2.0006AA**	.750	.748	.413	.630	.545	1.750	.313	.187
2.500	**VPX300UR2.5006CA**	1.000	.945	.539	.787	.677	2.188	.375	.219
2.500	**VPX300UR2.5008CA**	1.000	.945	.539	.787	.677	2.188	.375	.219
3.000	**VPX300UR3.0007CA**	1.000	.945	.539	.787	.677	2.188	.375	.219
3.000	**VPX300UR3.0010CA**	1.000	.945	.539	.787	.677	2.188	.375	.219

DEEP SHOULDER MILLING

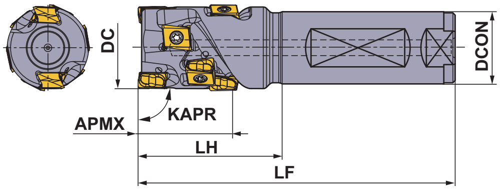
90° KAPR

VPX300

NEW

LONG CUTTING EDGE

P M K N S H



Right hand tool holder only.

Shank Type

With Coolant Hole

(inch)

DC	Order Number	Stock	*1 No.T	Total	DCON	LF	LH	APMX	RMPX	WT (lbs)	*2 Insert Type
		R									
1.500	**VPX300UR242FA20S0804**	●	2	4	1.250	5.000	1.750	.827	1.13°	1.609	LOGU12
1.500	**VPX300UR242FA20S1206**	●	2	6	1.250	5.250	2.000	1.220	1.13°	1.653	LOGU12
1.500	**VPX300UR242FA20S1608**	●	2	8	1.250	5.500	2.500	1.654	1.13°	1.698	LOGU12

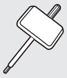
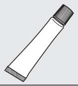
*1 Number of Teeth

*2 Corner radius RE .031 inch is recommended for the peripheral cutting edges except the bottom cutting edge (end cutting).
Insert RE .008 inch and .016 inch can also be used for the peripheral cutting edges.

CUTTING CONDITIONS PG.547

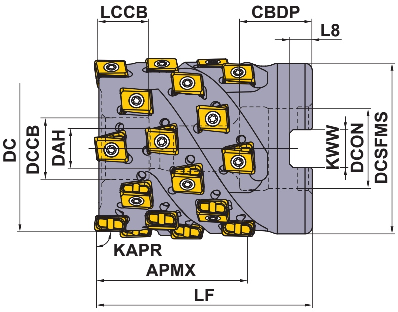
Spare Parts

(inch)

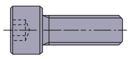
DC	Tool Holder Type	 *		
		Clamp Screw	Wrench	Anti-seize Lubricant
1.500	**VPX200UR24**	TPS40F1	TIP15W	MK1KS

* Clamp Torque (lbf-in) : TPS40F1 = 26.6

Multi-Functional Cutter for High Efficiency Machining



Right hand tool holder only.

Order Number	APMX	Set Bolt	Geometry
VPX300UR1.5002AA1206	1.220	HSCUF25015	
VPX300UR1.5002AA1608	1.654	HSCUF25020	
VPX300UR2.0003AA1209	1.220	HSCUF37518	
VPX300UR2.0003AA1612	1.654	HSCUF37520	
VPX300UR2.0003AA2015	2.047	HSCUF37525	
VPX300UR2.5004AA1616	1.654	HSCUF50020	
VPX300UR2.5004AA2020	2.047	HSCUF50023	
VPX300UR3.0005AA2025	2.047	HSCUF62525	
VPX300UR3.0005AA2835	2.874	HSCUF62530	

■Arbor Type

DCON=inch size, With Coolant Hole

(inch)

DC	Order Number	Stock	*1 No.T	Total	LF	DCON	WT (lbs)	APMX	RMPX	*2 Insert Type
		R								
1.500	**VPX300UR1.5002AA1206**	●	2	6	2.000	.500	.573	1.220	1.13°	LOGU12
1.500	**VPX300UR1.5002AA1608**	●	2	8	2.375	.500	.661	1.654	1.13°	LOGU12
2.000	**VPX300UR2.0003AA1209**	●	3	9	2.250	.750	1.146	1.220	0.78°	LOGU12
2.000	**VPX300UR2.0003AA1612**	●	3	12	2.500	.750	1.213	1.654	0.78°	LOGU12
2.000	**VPX300UR2.0003AA2015**	●	3	15	3.000	.750	1.477	2.047	0.78°	LOGU12
2.500	**VPX300UR2.5004AA1616**	●	4	16	2.750	1.000	2.337	1.654	0.59°	LOGU12
2.500	**VPX300UR2.5004AA2020**	●	4	20	3.000	1.000	2.513	2.047	0.59°	LOGU12
3.000	**VPX300UR3.0005AA2025**	●	5	25	3.250	1.250	4.034	2.047	0.48°	LOGU12
3.000	**VPX300UR3.0005AA2835**	●	5	35	3.750	1.250	4.497	2.874	0.48°	LOGU12

*1 Number of Teeth
*2 Corner radius RE .031 inch is recommended for the peripheral cutting edges except the bottom cutting edge (end cutting).
Insert RE .008 inch and .016 inch can also be used for the peripheral cutting edges.

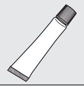
CUTTING CONDITIONS PG.547

Mounting Dimensions

(inch)

DC	Order Number	DCON	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8
1.500	**VPX300UR1.5002AA1206**	.500	.630	.276	.433	.362	1.438	.250	.156
1.500	**VPX300UR1.5002AA1608**	.500	.630	.276	.433	.344	1.438	.250	.156
2.000	**VPX300UR2.0003AA1209**	.750	.748	.413	.630	.455	1.750	.313	.187
2.000	**VPX300UR2.0003AA1612**	.750	.748	.413	.630	.469	1.750	.313	.187
2.000	**VPX300UR2.0003AA2015**	.750	.748	.413	.630	.457	1.750	.313	.187
2.500	**VPX300UR2.5004AA1616**	1.000	.945	.539	.787	.600	2.375	.375	.219
2.500	**VPX300UR2.5004AA2020**	1.000	.945	.539	.787	.614	2.375	.375	.219
3.000	**VPX300UR3.0005AA2025**	1.250	1.260	.669	1.024	.707	2.875	.500	.281
3.000	**VPX300UR3.0005AA2835**	1.250	1.260	.669	1.024	.695	2.875	.500	.281

Spare Parts

Tool Holder Type	* 		
	Clamp Screw	Wrench	Anti-seize Lubricant
VPX300	TPS40F1	TIP15W	MK1KS

* Clamp Torque (lbf-in) : TPS40F1 = 26.6

● : USA Stock ★ : Stocked in Japan

Fig.1

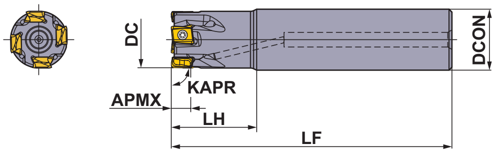
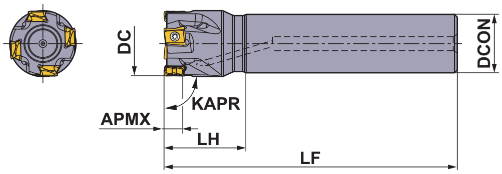


Fig.2



Right hand tool holder only.

Metric Standard

■Shank Type

With Coolant Hole

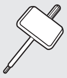
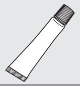
(mm)

DC	Order Number	Stock R	* No.T	DCON	LF	LH	APMX	RMPX	RPMX (min^{-1})	WT (kg)	Fig.	Insert Type
25	**VPX300R2502SA25S**	★	2	25	115	35	11	2.13°	24100	0.38	1	LOGU12
25	**VPX300R2502SA25L**	★	2	25	170	70	11	2.13°	24100	0.56	1	LOGU12
28	**VPX300R2802SA25S**	★	2	25	115	35	11	1.77°	22500	0.40	2	LOGU12
28	**VPX300R2802SA25L**	★	2	25	170	35	11	1.77°	22500	0.60	2	LOGU12
30	**VPX300R3002SA25S**	★	2	25	125	35	11	1.61°	21500	0.45	2	LOGU12
30	**VPX300R3003SA25S**	★	3	25	125	35	11	1.61°	21500	0.44	2	LOGU12
32	**VPX300R3202SA32S**	★	2	32	125	45	11	1.47°	20600	0.69	1	LOGU12
32	**VPX300R3203SA32S**	★	3	32	125	45	11	1.47°	20600	0.68	1	LOGU12
32	**VPX300R3203SA32L**	★	3	32	190	90	11	1.47°	20600	1.04	1	LOGU12
35	**VPX300R3503SA32L**	★	3	32	190	45	11	1.28°	19500	1.10	2	LOGU12
40	**VPX300R4003SA32S**	★	3	32	125	45	11	1.06°	17900	0.76	2	LOGU12
40	**VPX300R4004SA32S**	★	4	32	125	45	11	1.06°	17900	0.76	2	LOGU12
50	**VPX300R5004SA32S**	★	4	32	125	45	11	0.79°	15500	0.89	2	LOGU12
50	**VPX300R5006SA32S**	★	6	32	125	45	11	0.79°	15500	0.88	2	LOGU12

Note 1) The maximum spindle speeds **RPMX** are set to ensure tool and insert stability.
Note 2) When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.
* Number of Teeth

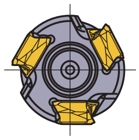
CUTTING CONDITIONS PG.547

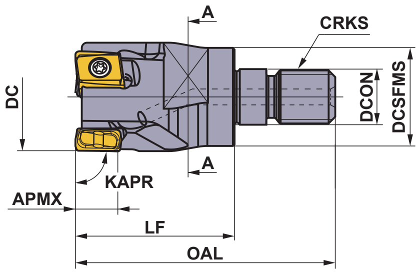
Spare Parts

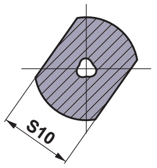
Tool Holder Type	 *		
	Clamp Screw	Wrench	Anti-seize Lubricant
VPX300	TPS40F1	TIP15W	MK1KS

* Clamp Torque (lbf-in) : TPS40F1 = 26.6

Multi-Functional Cutter for High Efficiency Machining







A-A Section

Right hand tool holder only.

Metric Standard

■ Screw-in Type

With Coolant Hole

(mm)

DC	Order Number	Stock	*1 No.T	DCON	DCSFMS	OAL	LF	S10	CRKS	WT (kg)	APMX	RMPX	Insert Type
		R											
25	**VPX300R2502AM1235**	★	2	12.5	23.5	57	35	19	M12	0.10	11	2.13°	LOGU12
28	**VPX300R2802AM1235**	★	2	12.5	23.5	57	35	19	M12	0.12	11	1.77°	LOGU12
32	**VPX300R3202AM1640**	★	2	17.0	28.5	63	40	24	M16	0.20	11	1.47°	LOGU12
32	**VPX300R3203AM1640**	★	3	17.0	28.5	63	40	24	M16	0.19	11	1.47°	LOGU12
35	**VPX300R3502AM1640**	★	2	17.0	28.5	63	40	24	M16	0.22	11	1.28°	LOGU12
35	**VPX300R3503AM1640**	★	3	17.0	28.5	63	40	24	M16	0.22	11	1.28°	LOGU12
40	**VPX300R4003AM1640**	★	3	17.0	28.5	63	40	24	M16	0.26	11	1.06°	LOGU12
40	**VPX300R4004AM1640**	★	4	17.0	28.5	63	40	24	M16	0.26	11	1.06°	LOGU12

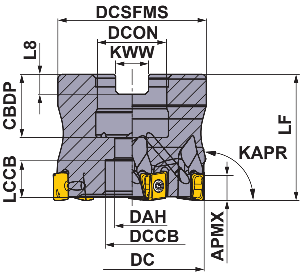
Note 1) For screw-in type arbors, refer to page 529−531.
*1 Number of Teeth

CUTTING CONDITIONS PG.533

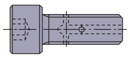
★ : Stocked in Japan

Metric Standard

For Metric Arbors



Right hand tool holder only.

DC	Set Bolt	Geometry
ϕ40	HSC08025H	
ϕ50, ϕ63	HSC10030H	
ϕ80	HSC12035H	

■Arbor Type

DCON=inch size, With Coolant Hole

(mm)

DC	Order Number	Stock R	*1 No.T	LF	DCON	WT (kg)	APMX	RMPX	RPMX (min^{-1})	Insert Type
80	**VPX300R08007CA**	★	7	50	25.4	1.00	11	0.45°	11500	LOGU12
80	**VPX300R08010CA**	★	10	50	25.4	1.00	11	0.45°	11500	LOGU12

DCON=mm size, With Coolant Hole

(mm)

DC	Order Number	Stock R	*1 No.T	LF	DCON	WT (kg)	APMX	RMPX	RPMX (min^{-1})	Insert Type
40	**VPX300-040A03AR**	★	3	40	16	0.21	11	1.06°	17900	LOGU12
40	**VPX300-040A04AR**	★	4	40	16	0.21	11	1.06°	17900	LOGU12
50	**VPX300-050A04AR**	★	4	40	22	0.34	11	0.79°	15500	LOGU12
50	**VPX300-050A06AR**	★	6	40	22	0.33	11	0.79°	15500	LOGU12
63	**VPX300-063A06AR**	★	6	40	22	0.61	11	0.60°	13400	LOGU12
63	**VPX300-063A08AR**	★	8	40	22	0.62	11	0.60°	13400	LOGU12
80	**VPX300-080A07AR**	★	7	50	27	0.99	11	0.45°	11500	LOGU12
80	**VPX300-080A10AR**	★	10	50	27	0.99	11	0.45°	11500	LOGU12

Note 1) The maximum spindle speeds are set to ensure tool and insert stability.
Note 2) When using the tool at high spindle speeds, ensure that the tool and arbor are correctly balanced.
*1 Number of Teeth

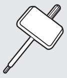
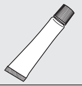
CUTTING CONDITIONS PG.533

Mounting Dimensions

(mm)

DC	Order Number	DCON	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8
40	**VPX300-040A03AR**	16	18	9	14	12.4	37	8.4	5.6
40	**VPX300-040A04AR**	16	18	9	14	12.4	37	8.4	5.6
50	**VPX300-050A04AR**	22	20	11	17	10.4	47	10.4	6.3
50	**VPX300-050A06AR**	22	20	11	17	10.4	47	10.4	6.3
63	**VPX300-063A06AR**	22	20	11	17	10.4	60	10.4	6.3
63	**VPX300-063A08AR**	22	20	11	17	10.4	60	10.4	6.3
80	**VPX300R08007CA**	25.4	26	13	20	13.4	56	9.5	6.0
80	**VPX300R08010CA**	25.4	26	13	20	13.4	56	9.5	6.0
80	**VPX300-080A07AR**	27	23	13	20	13.4	56	12.4	7.0
80	**VPX300-080A10AR**	27	23	13	20	13.4	56	12.4	7.0

Spare Parts

Tool Holder Type	 *		
	Clamp Screw	Wrench	Anti-seize Lubricant
VPX300	TPS40F1	TIP15W	MK1KS

* Clamp Torque (N • m) : TPS40F1 = 3.0

DEEP SHOULDER MILLING

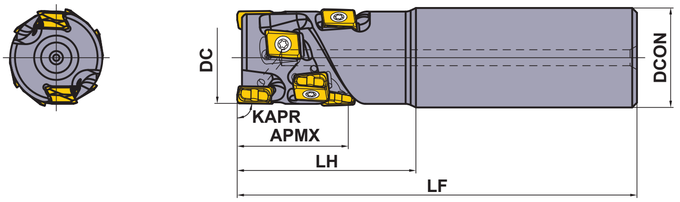
90° KAPR

VPX300

NEW

LONG CUTTING EDGE

P | M | K | N | S | H



Right hand tool holder only.

Metric Standard

Shank Type

With Coolant Hole

(mm)

DC	Order Number	Stock	∗1 No.T	Total	DCON	LF	LH	APMX	RMPX	WT	∗2 Insert Type
		R								(kg)	
40	**VPX300R402SA32S02104**	★	2	4	32	125	45	21	1.06°	0.78	LOGU12
40	**VPX300R402SA32S03106**	★	2	6	32	130	50	31	1.06°	0.79	LOGU12
40	**VPX300R402SA32S04208**	★	2	8	32	140	60	42	1.06°	0.84	LOGU12

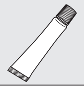
∗1 Number of Teeth

∗2 Corner radius RE .031 inch is recommended for the peripheral cutting edges except the bottom cutting edge (end cutting).
Insert RE .008 inch and .016 inch can also be used for the peripheral cutting edges.

CUTTING CONDITIONS PG.547

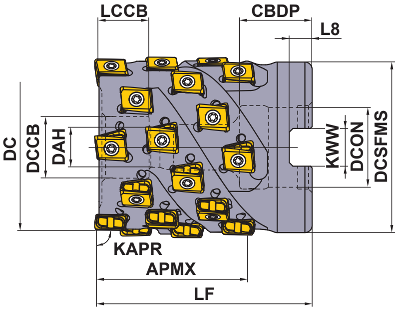
Spare Parts

(mm)

DC	Tool Holder Type	 ∗		
		Clamp Screw	Wrench	Anti-seize Lubricant
40	**VPX300R40**	TPS40F1	TIP15W	MK1KS

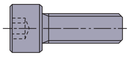
∗ Clamp Torque (lbf-in) : TPS40F1 = 31.0

★ : Stocked in Japan



Metric Standard

Right hand tool holder only.

Order Number	APMX	Set Bolt	Geometry
VPX300-040A02A031	31	HSC08040	
VPX300-040A02A042	42	HSC08050	
VPX300-050A03A031	31	HSC10040	
VPX300-050A03A042	42	HSC10050	
VPX300-050A03A052	52	HSC10060	
VPX300-063A04A042	42	HSC12050	
VPX300-063A04A052	52	HSC12060	
VPX300-080A05A052	52	HSC12060	
VPX300-080A05A063	63	HSC12070	
VPX300R08005CA052	52	HSC16055	
VPX300R08005CA063	63	HSC16065	

■Arbor Type

DCON = mm size, With Coolant Hole

(mm)

DC	Order Number	Stock	*1 No.T	Total	LF	DCON	WT (kg)	APMX	RMPX	*2 Insert Type
		R								
40	**VPX300-040A02A031R06**	★	2	6	50	16	0.26	31	1.06°	LOGU12
40	**VPX300-040A02A042R08**	★	2	8	60	16	0.31	42	1.06°	LOGU12
50	**VPX300-050A03A031R09**	★	3	9	55	22	0.47	31	0.79°	LOGU12
50	**VPX300-050A03A042R12**	★	3	12	65	22	0.55	42	0.79°	LOGU12
50	**VPX300-050A03A052R15**	★	3	15	75	22	0.63	52	0.79°	LOGU12
63	**VPX300-063A04A042R16**	★	4	16	65	27	0.92	42	0.6°	LOGU12
63	**VPX300-063A04A052R20**	★	4	20	75	27	1.06	52	0.6°	LOGU12
80	**VPX300-080A05A052R25**	★	5	25	75	27	1.94	52	0.45°	LOGU12
80	**VPX300-080A05A063R30**	★	5	30	85	27	2.20	63	0.45°	LOGU12

DCON = inch size, With Coolant Hole

(mm)

DC	Order Number	Stock	*1 No.T	Total	LF	DCON	WT (kg)	APMX	RMPX	*2 Insert Type
		R								
80	**VPX300R08005CA05225**	★	5	25	75	31.75	1.81	52	0.45°	LOGU12
80	**VPX300R08005CA06330**	★	5	30	85	31.75	2.06	63	0.45°	LOGU12

*1 Number of Teeth
*2 Corner radius RE .031 inch is recommended for the peripheral cutting edges except the bottom cutting edge (end cutting).
Insert RE .008 inch and .016 inch can also be used for the peripheral cutting edges.

CUTTING CONDITIONS PG.547

Mounting Dimensions

(mm)

DC	Order Number	DCON	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8
40	**VPX300-040A02A031R06**	16	18	9	14	8.4	37	8.4	5.6
40	**VPX300-040A02A042R08**	16	18	9	14	8.4	37	8.4	5.6
50	**VPX300-050A03A031R09**	22	20	11	17	12.4	47	10.4	6.3
50	**VPX300-050A03A042R12**	22	20	11	17	12.4	47	10.4	6.3
50	**VPX300-050A03A052R15**	22	20	11	17	12.4	47	10.4	6.3
63	**VPX300-063A04A042R16**	27	23	13	20	12.4	76	12.4	7.0
63	**VPX300-063A04A052R20**	27	23	13	20	12.4	76	12.4	7.0
80	**VPX300-080A05A052R25**	27	23	13	20	12.4	76	12.4	7.0
80	**VPX300-080A05A063R30**	27	23	13	20	12.4	76	12.4	7.0
80	**VPX300R08005CA05225**	31.75	32	17	26	17.4	76	12.7	8.0
80	**VPX300R08005CA06330**	31.75	32	17	26	17.4	76	12.7	8.0

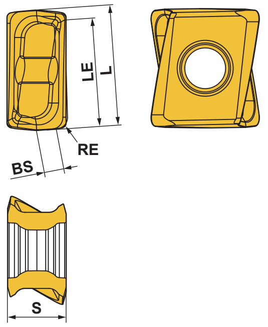
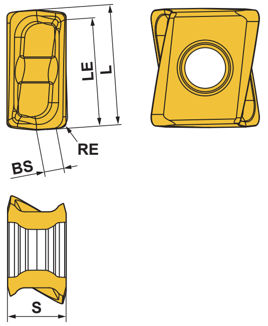
■Inserts

(inch)

Workpiece Material			MC5020	MP6120	MP6130	MP7130	MP9120	MP9130	VP15TF	TF15
	P	Steels		◐	✤				◐	
	M	Stainless Steels				◐			◐	
	K	Cast Irons	◐						✤	
	N	Non-ferrous Metals								◐
	S	Heat Resistant Alloys, Titanium Alloys					◐	✤	◐	
	H	Hardened Steels							◐	

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✤ : Unstable Cutting

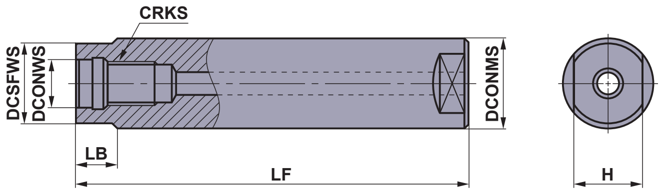
Edge Preparation :
E : Round F : Sharp

Shape	Order Number	Class	Edge Preparation	Coated							Carbide	L	RE	LE	S	BS	Geometry
				MC5020	MP6120	MP6130	MP7130	MP9120	MP9130	VP15TF	TF15						
NEW Low Cutting Resistance L Breaker 	**LOGU1207020PNER-L**	G	E	●	●	●	●	●	●	●		.488	.008	.445	.276	.118	
	LOGU1207040PNER-L	G	E	●	●	●	●	●	●	●		.488	.016	.445	.276	.110	
	LOGU1207080PNER-L	G	E	●	●	●	●	●	●	●		.488	.031	.445	.276	.102	
	LOGU1207100PNER-L	G	E	●	●	●	●	●	●	●		.488	.039	.445	.276	.098	
	LOGU1207120PNER-L	G	E	●	●	●	●	●	●	●		.488	.047	.445	.276	.094	
	LOGU1207160PNER-L	G	E	●	●	●	●	●	●	●		.488	.063	.445	.276	.071	
	LOGU1207200PNER-L	G	E	●	●	●	●	●	●	●		.488	.079	.445	.276	.055	
	LOGU1207240PNER-L	G	E	●	●	●	●	●	●	●		.488	.094	.445	.276	.047	
	LOGU1207300PNER-L	G	E	●	●	●	●	●	●	●		.488	.118	.445	.276	.024	
	LOGU1207320PNER-L	G	E	●	●	●	●	●	●	●		.488	.126	.445	.276	.016	
	LOGU1207020PNFR-L	G	F								●	.488	.008	.445	.276	.118	
	LOGU1207040PNFR-L	G	F								●	.488	.016	.445	.276	.110	
	LOGU1207080PNFR-L	G	F								●	.488	.031	.445	.276	.102	
	LOGU1207100PNFR-L	G	F								●	.488	.039	.445	.276	.098	
	LOGU1207120PNFR-L	G	F								●	.488	.047	.445	.276	.094	
	LOGU1207160PNFR-L	G	F								●	.488	.063	.445	.276	.071	
	LOGU1207200PNFR-L	G	F								●	.488	.079	.445	.276	.055	
	LOGU1207240PNFR-L	G	F								●	.488	.094	.445	.276	.047	
	LOGU1207300PNFR-L	G	F								●	.488	.118	.445	.276	.024	
	LOGU1207320PNFR-L	G	F								●	.488	.126	.445	.276	.016	Right hand insert only.
General Use M Breaker 	**LOGU1207020PNER-M**	G	E	●	●	●	●	●	●	●		.488	.008	.445	.276	.118	
	LOGU1207040PNER-M	G	E	●	●	●	●	●	●	●		.488	.016	.445	.276	.110	
	LOGU1207080PNER-M	G	E	●	●	●	●	●	●	●		.488	.031	.445	.276	.094	
	LOGU1207100PNER-M	G	E	●	●	●	●	●	●	●		.488	.039	.445	.276	.091	
	LOGU1207120PNER-M	G	E	●	●	●	●	●	●	●		.488	.047	.445	.276	.083	
	LOGU1207160PNER-M	G	E	●	●	●	●	●	●	●		.488	.063	.445	.276	.067	
	LOGU1207200PNER-M	G	E	●	●	●	●	●	●	●		.488	.079	.445	.276	.055	
	LOGU1207240PNER-M	G	E	●	●	●	●	●	●	●		.488	.094	.445	.276	.039	
	LOGU1207300PNER-M	G	E	●	●	●	●	●	●	●		.488	.118	.445	.276	.020	
	LOGU1207320PNER-M	G	E	●	●	●	●	●	●	●		.488	.126	.445	.276	.012	
	LOGU1207020PNFR-M	G	F								●	.488	.008	.445	.276	.118	
	LOGU1207040PNFR-M	G	F								●	.488	.016	.445	.276	.110	
	LOGU1207080PNFR-M	G	F								●	.488	.031	.445	.276	.094	
	LOGU1207100PNFR-M	G	F								●	.488	.039	.445	.276	.091	
	LOGU1207120PNFR-M	G	F								●	.488	.047	.445	.276	.083	
	LOGU1207160PNFR-M	G	F								●	.488	.063	.445	.276	.067	
	LOGU1207200PNFR-M	G	F								●	.488	.079	.445	.276	.055	
	LOGU1207240PNFR-M	G	F								●	.488	.094	.445	.276	.039	
	LOGU1207300PNFR-M	G	F								●	.488	.118	.445	.276	.020	
	LOGU1207320PNFR-M	G	F								●	.488	.126	.445	.276	.012	Right hand insert only.

● : USA Stock ★ : Stocked in Japan (10 inserts in one case)

SCREW-IN HOLDERS

STRAIGHT SHANK TYPE



■ Steel Shank Type

(inch)

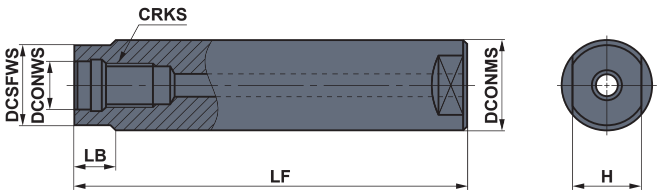
CRKS	Order Number	Stock	DCONMS	LF	DCONWS	DCSFWS	LB	H	WT (lbs)
M8	**SCU10M08S100S**	●	.625	3.937	.335	.571	.394	.394	.2
M8	**SCU10M08S200L**	●	.625	7.874	.335	.571	.394	.394	.7
M10	**SCU12M10S120S**	●	.750	4.724	.413	.728	.394	.551	.4
M10	**SCU12M10S220L**	●	.750	8.661	.413	.728	.394	.551	.9
M12	**SCU16M12S125S**	●	1.000	4.921	.492	.925	.394	.748	.9
M12	**SCU16M12S245L**	●	1.000	9.646	.492	.925	.394	.748	2.0
M16	**SCU20M16S140S**	●	1.250	5.512	.669	1.122	.591	.945	1.8
M16	**SCU20M16S280L**	●	1.250	11.024	.669	1.122	.591	.945	3.5

Metric Standard

(mm)

CRKS	Order Number	Stock	DCONMS	LF	DCONWS	DCSFWS	LB	H	WT (kg)
M8	**SC16M08S100S**	★	16	100	8.5	14.5	10	10	0.1
M8	**SC16M08S200L**	★	16	200	8.5	14.5	10	10	0.3
M10	**SC20M10S120S**	★	20	120	10.5	18.5	10	14	0.3
M10	**SC20M10S220L**	★	20	220	10.5	18.5	10	14	0.5
M12	**SC25M12S125S**	★	25	125	12.5	23.5	10	19	0.4
M12	**SC25M12S245L**	★	25	245	12.5	23.5	10	19	0.8
M16	**SC32M16S140S**	★	32	140	17.0	28.5	15	24	0.8
M16	**SC32M16S280L**	★	32	280	17.0	28.5	15	24	1.6

Multi-Functional Cutter for High Efficiency Machining



Carbide Shank Type

(inch)

CRKS	Order Number	Stock	DCONMS	LF	DCONWS	DCSFWS	LB	H	WT (lbs)
M8	**SCU10M08S100SW**	●	.625	3.937	.335	.571	.394	.394	.4
M8	**SCU10M08S200LW**	●	.625	7.874	.335	.571	.394	.394	1.1
M10	**SCU12M10S120SW**	●	.750	4.724	.413	.728	.394	.551	.9
M10	**SCU12M10S220LW**	●	.750	8.661	.413	.728	.394	.551	1.8
M12	**SCU16M12S125SW**	●	1.000	4.921	.492	.925	.394	.748	1.8
M12	**SCU16M12S245LW**	●	1.000	9.646	.492	.925	.394	.748	3.5
M16	**SCU20M16S140SW**	●	1.250	5.512	.669	1.122	.591	.945	3.1
M16	**SCU20M16S280LW**	●	1.250	11.024	1.250	1.122	.591	.945	6.4

Metric Standard

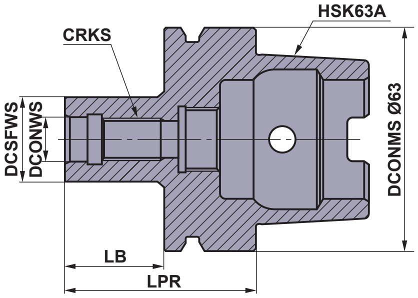
(mm)

CRKS	Order Number	Stock	DCONMS	LF	DCONWS	DCSFWS	LB	H	WT (kg)
M8	**SC16M08S100SW**	★	16	100	8.5	14.5	10	10	0.2
M8	**SC16M08S200LW**	★	16	200	8.5	14.5	10	10	0.5
M10	**SC20M10S120SW**	★	20	120	10.5	18.5	10	14	0.5
M10	**SC20M10S220LW**	★	20	220	10.5	18.5	10	14	0.9
M12	**SC25M12S125SW**	★	25	125	12.5	23.5	10	19	0.8
M12	**SC25M12S245LW**	★	25	245	12.5	23.5	10	19	1.5
M16	**SC32M16S140SW**	★	32	140	17.0	28.5	15	24	1.4
M16	**SC32M16S280LW**	★	32	280	17.0	28.5	15	24	2.8

● : USA Stock ★ : Stocked in Japan

SCREW-IN HOLDERS

HSK63A Shank Arbor



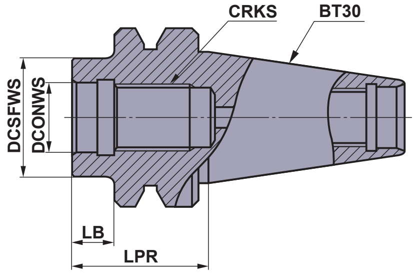
Metric Standard

The coolant tube has been already set.

(mm)

CRKS	Order Number	Stock	DCONWS	DCSFWS	LPR	LB	WT (kg)
M8	**SC16M08S22-HSK63A**	★	8.5	14.5	48	22	0.7
M10	**SC20M10S24-HSK63A**	★	10.5	18.5	50	24	0.7
M12	**SC25M12S27-HSK63A**	★	12.5	23.5	53	27	0.7
M16	**SC32M16S28-HSK63A**	★	17.0	28.5	54	28	0.8

BT30 Shank Arbor

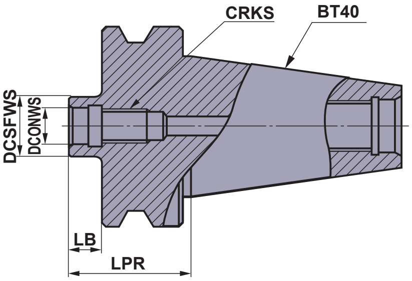


Metric Standard

(mm)

CRKS	Order Number	Stock	DCONWS	DCSFWS	LPR	LB	WT (kg)
M8	**SC16M08S10-BT30**	★	8.5	14.5	32	10	0.4
M10	**SC20M10S10-BT30**	★	10.5	18.5	32	10	0.4
M12	**SC25M12S10-BT30**	★	12.5	23.5	32	10	0.4
M16	**SC32M16S10-BT30**	★	17.0	28.5	32	10	0.4

BT40 Shank Arbor



Metric Standard

(mm)

CRKS	Order Number	Stock	DCONWS	DCSFWS	LPR	LB	WT (kg)
M8	**SC16M08S10-BT40**	★	8.5	14.5	37	10	1
M10	**SC20M10S10-BT40**	★	10.5	18.5	37	10	1
M12	**SC25M12S10-BT40**	★	12.5	23.5	37	10	1
M16	**SC32M16S10-BT40**	★	17.0	28.5	37	10	1

How to Install the Screw-in Head

①Thoroughly clean the clamp section of the head and the arbor with an air blower or brush before installation.

②Tighten the head at the recommended torque and ensure that there is no gap between the head and arbor.

(inch)

Screw Size	Recommended Torque (lbf-ft)	Wrench Size
M8	17.0	.394
M10	33.9	.551
M12	59.0	.748
M16	66.4	.945

- Cutting tools become extremely hot during cutting. Never touch them with bare hands after operation as this may produce risk of injuries or burns.
- Do not handle the cutting tools with bare hands as this may cause injuries.

VPX200/VPX300

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✤ : Unstable Cutting

Chip Breaker Recommendation

■ Chip Breaker Selection Table

	Workpiece Material	Properties	Cutting Conditions	Chip Breaker		Grade	
				1st Recommended	2nd Recommended	1st Recommended	2nd Recommended
P	Mild Steels	Hardness ≤180HB	● ◐	L	M	MP6120	VP15TF
			✤	M	L	MP6130	—
	Carbon Steels Alloy Steels Alloy Tool Steels	Hardness 180-350HB ≤350HB (Annealing)	●	L	M	MP6120	VP15TF
			◐	M	L	MP6120	VP15TF
			✤	M	L	MP6130	—
	Pre-hardened Steels	Hardness 35—45HRC	● ◐	M	L	MP6120	VP15TF
			✤	M	L	MP6130	—
M	Austenitic Stainless Steels	Hardness ≤280HB	● ◐	L	M	MP7130	VP15TF
			✤	M	L	MP7130	—
		Hardness >200HB	● ◐	L	M	MP7130	VP15TF
			✤	M	L	MP7130	—
	Duplex Stainless Steels	Hardness ≤280HB	● ◐	L	M	MP7130	VP15TF
			✤	M	L	MP7130	—
	Ferritic and Martensitic Stainless Steels	—	● ◐	L	M	MP7130	VP15TF
			✤	M	L	MP7130	—
	Precipitation Hardening Stainless Steels	Hardness <450HB	● ◐	L	M	MP7130	VP15TF
			✤	M	L	MP7130	—
K	Gray Cast Irons	Tensile Strength ≤350MPa	● ◐	M	L	MC5020	VP15TF
			✤	M	L	VP15TF	—
	Ductile Cast Irons	Tensile Strength ≤800MPa	● ◐	M	L	MC5020	VP15TF
			✤	M	L	VP15TF	—
N	Aluminum Alloys	Content Si<5%	● ◐	L	M	TF15	—
			✤	M	L	TF15	—
S	Titanium Alloys (Ti-6Al-4V,etc.)	—	● ◐	L	M	MP9120	VP15TF
			✤	M	L	MP9130	—
	Titanium Alloys (Ti-5Al-5V-5Mo-3Cr,etc.)	—	● ◐	L	M	MP9120	VP15TF
			✤	M	L	MP9130	—
	Heat Resistant Alloys	—	● ◐	M	L	MP9120	VP15TF
			✤	M	L	MP9130	—
H	Hardened Steels	Hardness 40—55HRC	● ◐ ✤	M	—	VP15TF	—

For cutting conditions please refer to next page.

VPX200

Recommended Cutting Conditions

■ Dry Cutting

Cutting Speed

(inch)

	Workpiece Material	Properties	Cutting Conditions	Grade	Cutting Width **ae**			
					≤.25DC	.25—.5DC	.5—.75DC	DC(Slot)
					Cutting Speed **vc** (SFM)			
P	Mild Steels	Hardness ≤180HB	● ◐	MP6120,VP15TF	755 (590—885)	720 (560—850)	590 (460—690)	590 (460—690)
			✣	MP6130	655 (490—785)	620 (460—755)	490 (360—590)	490 (360—590)
	Carbon Steels Alloy Steels Alloy Tool Steels	Hardness 180—350HB ≤350HB (Annealing)	● ◐	MP6120,VP15TF	590 (460—690)	560 (425—655)	460 (360—525)	460 (360—525)
			✣	MP6130	490 (360—590)	460 (330—560)	360 (260—425)	360 (260—425)
	Pre-hardened Steels	Hardness 35—45HRC	● ◐	MP6120,VP15TF	395 (295—460)	360 (260—425)	330 (230—395)	330 (230—395)
			✣	MP6130	330 (260—395)	295 (230—360)	260 (195—330)	260 (195—330)
M	Austenitic Stainless Steels	Hardness ≤200HB	● ◐ ✣	MP7130,VP15TF	590 (460—690)	560 (425—655)	460 (360—525)	460 (360—525)
		Hardness >200HB	● ◐ ✣	MP7130,VP15TF	490 (360—590)	460 (330—525)	360 (260—425)	360 (260—425)
	Duplex Stainless Steels	Hardness ≤280HB	● ◐ ✣	MP7130,VP15TF	460 (360—560)	425 (295—490)	330 (230—395)	330 (230—395)
	Ferritic and Martensitic Stainless Steels	—	● ◐ ✣	MP7130,VP15TF	590 (460—690)	560 (425—655)	460 (360—525)	460 (360—525)
	Precipitation Hardening Stainless Steels	Hardness <450HB	● ◐ ✣	MP7130,VP15TF	425 (330—525)	395 (260—460)	295 (195—360)	295 (195—360)
K	Gray Cast Irons	Tensile Strength ≤350MPa	● ◐	MC5020	820 (655—985)	785 (620—950)	690 (525—850)	690 (525—850)
			● ◐ ✣	VP15TF	655 (490—820)	620 (460—785)	525 (360—690)	525 (360—690)
	Ductile Cast Irons	Tensile Strength ≤800MPa	● ◐	MC5020	590 (490—655)	560 (460—620)	490 (395—560)	490 (395—560)
			● ◐ ✣	VP15TF	425 (330—490)	395 (295—460)	330 (260—395)	330 (260—395)
N	Aluminum Alloys	Content Si<5%	● ◐ ✣	TF15	1970 (1310—3280)	1970 (1310—3280)	1970 (1310—3280)	1970 (1310—3280)
H	Hardened Steels	Hardness 40—55HRC	● ◐ ✣	VP15TF	295 (230—330)	280 (195—330)	230 (165—260)	230 (165—260)

Note 1) These cutting conditions should be referenced for standard shank types (last letter in designation is S) and arbor shank types. If there is chatter, insert chipping, etc. during machining, alter conditions accordingly.

Note 2) Chattering vibration is more likely under the following circumstances. Use a cut and feed per tooth that are at minimum recommended conditions or below.
- When tool overhang is long (using a long shank, screw-in type, etc.)
- Rigidity of machine, workpiece material or attachment of workpiece material is low
- Corner radius during pocket milling

Note 3) A type with fewer teeth is recommended when the depth of cut in the radius direction (ae) is .5 DC or more.

Note 4) Wet cutting is recommended, when focusing on the surface finish. (Tool life is shorter than for dry cutting.)

Note 5) When using under higher than recommended cutting conditions, or for long periods of time, the clamp screw may become fatigued and break during machining. Please change out the clamp screw periodically.

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✤ : Unstable Cutting

Depth of Cut / Feed per Tooth

(inch)

	Workpiece Material	Properties	Cutting Width **ae**	Cutting Conditions	Cutter Diameter **DC**					
					ø.625-ø.750(ø16mm-ø18mm)		**ø.875-ø1.000(ø20mm-ø25mm)**		**ø1.125-ø2.500(ø28mm-ø63mm)**	
					Depth of Cut **ap**	Feed per Tooth **fz** (IPT)	Depth of Cut **ap**	Feed per Tooth **fz** (IPT)	Depth of Cut **ap**	Feed per Tooth **fz** (IPT)
P	Mild Steels	Hardness ≤180HB	≤.25DC	● ◐ ✤	≤.236	.004—.006	≤.315	.004—.008	≤.315	.004—.010
			.25—.5DC	● ◐ ✤	≤.197	.003—.005	≤.315	.004—.006	≤.315	.004—.008
			.5—.75DC	● ◐ ✤	≤.157	.003—.005	≤.236	.003—.005	≤.236	.004—.006
			DC(Slot)	● ◐ ✤	≤.079	.002—.004	≤.157	.002—.004	≤.157	.003—.005
	Carbon Steels Alloy Steels Alloy Tool Steels	Hardness 180—280HB	≤.25DC	● ◐ ✤	≤.236	.004—.006	≤.315	.004—.008	≤.315	.004—.010
			.25—.5DC	● ◐ ✤	≤.197	.003—.005	≤.315	.004—.006	≤.315	.004—.008
			.5—.75DC	● ◐ ✤	≤.157	.003—.005	≤.236	.003—.005	≤.236	.004—.006
			DC(Slot)	● ◐ ✤	≤.079	.002—.004	≤.157	.002—.004	≤.157	.003—.005
	Carbon Steels Alloy Steels Alloy Tool Steels	Hardness 280—350HB ≤350HB (Annealing)	≤.25DC	● ◐ ✤	≤.236	.004—.006	≤.315	.004—.006	≤.315	.004—.008
			.25—.5DC	● ◐ ✤	≤.197	.003—.005	≤.315	.003—.005	≤.315	.004—.006
			.5—.75DC	● ◐ ✤	≤.157	.003—.005	≤.236	.002—.004	≤.236	.003—.005
			DC(Slot)	● ◐ ✤	≤.079	.002—.004	≤.157	.002—.004	≤.157	.002—.004
	Pre-hardened Steels	Hardness 35—45HRC	≤.25DC	● ◐ ✤	≤.236	.004—.006	≤.315	.004—.006	≤.315	.004—.008
			.25—.5DC	● ◐ ✤	≤.197	.003—.005	≤.315	.003—.005	≤.315	.004—.006
			.5—.75DC	● ◐ ✤	≤.157	.003—.005	≤.236	.002—.004	≤.236	.003—.005
			DC(Slot)	● ◐ ✤	≤.079	.002—.004	≤.157	.002—.004	≤.157	.002—.004
M	Austenitic Stainless Steels	—	≤.25DC	● ◐	≤.236	.004—.006	≤.315	.004—.008	≤.315	.004—.008
				✤	≤.236	.003—.005	≤.315	.003—.006	≤.315	.003—.006
			.25—.5DC	● ◐	≤.197	.003—.005	≤.315	.003—.006	≤.315	.003—.006
				✤	≤.197	.002—.004	≤.315	.003—.005	≤.315	.003—.005
			.5—.75DC	● ◐	≤.157	.002—.004	≤.236	.003—.005	≤.236	.003—.005
				✤	≤.157	.002—.003	≤.236	.002—.004	≤.236	.002—.004
			DC(Slot)	● ◐	≤.079	.002—.004	≤.157	.002—.004	≤.157	.002—.004
				✤	≤.079	.002—.003	≤.157	.002—.003	≤.157	.002—.003
	Duplex Stainless Steels	Hardness ≤280HB	≤.25DC	● ◐	≤.236	.004—.006	≤.315	.004—.008	≤.315	.004—.008
				✤	≤.236	.003—.005	≤.315	.003—.006	≤.315	.003—.006
			.25—.5DC	● ◐	≤.197	.003—.005	≤.315	.003—.006	≤.315	.003—.006
				✤	≤.197	.002—.004	≤.315	.003—.005	≤.315	.003—.005
			.5—.75DC	● ◐	≤.157	.002—.004	≤.236	.003—.005	≤.236	.003—.005
				✤	≤.157	.002—.003	≤.236	.002—.004	≤.236	.002—.004
			DC(Slot)	● ◐	≤.079	.002—.004	≤.157	.002—.004	≤.157	.002—.004
				✤	≤.079	.002—.003	≤.157	.002—.003	≤.157	.002—.003
	Ferritic and Martensitic Stainless Steels	—	≤.25DC	● ◐	≤.236	.004—.006	≤.315	.004—.008	≤.315	.004—.008
				✤	≤.236	.003—.005	≤.315	.003—.006	≤.315	.003—.006
			.25—.5DC	● ◐	≤.197	.003—.005	≤.315	.003—.006	≤.315	.003—.006
				✤	≤.197	.002—.004	≤.315	.003—.005	≤.315	.003—.005
			.5—.75DC	● ◐	≤.157	.002—.004	≤.236	.003—.005	≤.236	.003—.005
				✤	≤.157	.002—.003	≤.236	.002—.004	≤.236	.002—.004
			DC(Slot)	● ◐	≤.079	.002—.004	≤.157	.002—.004	≤.157	.002—.004
				✤	≤.079	.002—.003	≤.157	.002—.003	≤.157	.002—.003
	Precipitation Hardening Stainless Steels	Hardness <450HB	≤.25DC	● ◐	≤.236	.004—.006	≤.315	.004—.006	≤.315	.004—.006
				✤	≤.236	.003—.005	≤.315	.003—.005	≤.315	.003—.005
			.25—.5DC	● ◐	≤.197	.003—.005	≤.315	.003—.005	≤.315	.003—.005
				✤	≤.197	.002—.004	≤.315	.003—.005	≤.315	.003—.005
			.5—.75DC	● ◐	≤.157	.002—.004	≤.236	.002—.004	≤.236	.002—.004
				✤	≤.157	.002—.003	≤.236	.002—.003	≤.236	.002—.003
			DC(Slot)	● ◐	≤.079	.002—.004	≤.157	.002—.004	≤.157	.002—.004
				✤	≤.079	.002—.003	≤.157	.002—.003	≤.157	.002—.003

Note 1) These cutting conditions should be referenced for standard shank types (last letter in designation is S) and arbor shank types. If there is chatter, insert chipping, etc. during machining, alter conditions accordingly.

Note 2) Chattering vibration is more likely under the following circumstances. Use a cut and feed per tooth that are at minimum recommended conditions or below.

- When tool overhang is long (using a long shank, screw-in type, etc.)
- Rigidity of machine, workpiece material or attachment of workpiece material is low
- Corner radius during pocket milling

Note 3) A type with fewer teeth is recommended when the depth of cut in the radius direction (ae) is .5 DC or more.

Note 4) Wet cutting is recommended, when focusing on the surface finish. (Tool life is shorter than for dry cutting.)

Note 5) When using under higher than recommended cutting conditions, or for long periods of time, the clamp screw may become fatigued and break during machining. Please change out the clamp screw periodically.

Multi-Functional Cutter for High Efficiency Machining

VPX200

Recommended Cutting Conditions

■ Dry Cutting

Depth of Cut / Feed per Tooth

(inch)

	Workpiece Material	Properties	Cutting Width ae	Cutting Conditions	Cutter Diameter DC					
					ø.625-ø.750(ø16mm-ø18mm)		ø.875-ø1.000(ø20mm-ø25mm)		ø1.125-ø2.500(ø28mm-ø63mm)	
					Depth of Cut ap	Feed per Tooth fz (IPT)	Depth of Cut ap	Feed per Tooth fz (IPT)	Depth of Cut ap	Feed per Tooth fz (IPT)
K	Gray Cast Irons	Tensile Strength ≤350MPa	≤.25DC	● ◐	≤.236	.004–.006	≤.315	.004–.008	≤.315	.004–.010
				✚	≤.236	.003–.005	≤.315	.003–.006	≤.315	.004–.008
			.25–.5DC	● ◐	≤.197	.003–.005	≤.315	.003–.006	≤.315	.004–.008
				✚	≤.197	.002–.004	≤.315	.003–.005	≤.315	.004–.006
			.5–.75DC	● ◐	≤.157	.003–.005	≤.236	.003–.005	≤.236	.004–.006
				✚	≤.157	.003–.005	≤.236	.002–.004	≤.236	.003–.005
			DC(Slot)	● ◐	≤.079	.002–.004	≤.157	.002–.004	≤.157	.003–.006
				✚	≤.079	.002–.003	≤.157	.002–.003	≤.157	.003–.004
	Ductile Cast Irons	Tensile Strength ≤800MPa	≤.25DC	● ◐	≤.236	.004–.006	≤.315	.004–.008	≤.315	.004–.008
				✚	≤.236	.003–.005	≤.315	.004–.006	≤.315	.004–.006
			.25–.5DC	● ◐	≤.197	.003–.005	≤.315	.004–.006	≤.315	.004–.006
				✚	≤.197	.002–.004	≤.315	.003–.005	≤.315	.003–.005
			.5–.75DC	● ◐	≤.157	.003–.005	≤.236	.003–.005	≤.236	.003–.005
				✚	≤.157	.003–.005	≤.236	.002–.004	≤.236	.002–.004
			DC(Slot)	● ◐	≤.079	.002–.004	≤.157	.002–.004	≤.157	.002–.004
				✚	≤.079	.002–.003	≤.157	.002–.003	≤.157	.002–.003
N	Aluminum Alloys	Content Si＜5%	≤.25DC	● ◐	≤.236	.004–.008	≤.315	.004–.010	≤.315	.004–.010
				✚	≤.236	.004–.006	≤.315	.004–.008	≤.315	.004–.008
			.25–.5DC	● ◐	≤.197	.004–.006	≤.315	.004–.008	≤.315	.004–.008
				✚	≤.197	.003–.005	≤.315	.004–.006	≤.315	.004–.006
			.5–.75DC	● ◐	≤.157	.003–.005	≤.236	.002–.006	≤.236	.003–.006
				✚	≤.157	.002–.004	≤.236	.002–.006	≤.236	.003–.006
			DC(Slot)	● ◐	≤.079	.002–.004	≤.157	.002–.006	≤.157	.003–.006
				✚	≤.079	.002–.003	≤.157	.002–.005	≤.157	.003–.005
H	Hardened Steels	Hardness 40–55HRC	≤.25DC	● ◐	≤.157	.003–.006	≤.157	.003–.006	≤.157	.003–.006
				✚	≤.157	.003–.005	≤.157	.003–.005	≤.157	.003–.005
			.25–.5DC	● ◐	≤.118	.003–.005	≤.118	.003–.005	≤.118	.003–.005
				✚	≤.118	.002–.004	≤.118	.003–.004	≤.118	.002–.004
			.5–.75DC	● ◐	≤.079	.002–.004	≤.079	.003–.004	≤.079	.002–.004
				✚	≤.079	.002–.003	≤.079	.002–.003	≤.079	.002–.003
			DC(Slot)	● ◐	≤.039	.002–.004	≤.039	.002–.004	≤.039	.002–.004
				✚	≤.039	.002–.003	≤.039	.002–.003	≤.039	.002–.003

Note 1) These cutting conditions should be referenced for standard shank types (last letter in designation is S) and arbor shank types. If there is chatter, insert chipping, etc. during machining, alter conditions accordingly.

Note 2) Chattering vibration is more likely under the following circumstances. Use a cut and feed per tooth that are at minimum recommended conditions or below.

- When tool overhang is long (using a long shank, screw-in type, etc.)
- Rigidity of machine, workpiece material or attachment of workpiece material is low
- Corner radius during pocket milling

Note 3) A type with fewer teeth is recommended when the depth of cut in the radius direction (ae) is .5 DC or more.

Note 4) Wet cutting is recommended, when focusing on the surface finish. (Tool life is shorter than for dry cutting.)

Note 5) When using under higher than recommended cutting conditions, or for long periods of time, the clamp screw may become fatigued and break during machining. Please change out the clamp screw periodically.

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✤ : Unstable Cutting

■ Wet Cutting
Cutting Speed

(inch)

	Workpiece Material	Properties	Cutting Conditions	Grade	Cutting Width **ae**			
					≤.25DC	.25—.5DC	.5—.75DC	DC(Slot)
					Cutting Speed **vc** (SFM)			
P	Mild Steels	Hardness ≤180HB	● ◐	MP6120	460 (330—620)	425 (295—590)	330 (230—395)	330 (230—395)
			● ◐	VP15TF				
			✤	MP6130				
	Carbon Steels Alloy Steels Alloy Tool Steels	Hardness 180—350HB ≤350HB (Annealing)	● ◐	MP6120	395 (295—460)	360 (260—425)	330 (230—395)	330 (230—395)
			● ◐	VP15TF				
			✤	MP6130				
	Pre-hardened Steels	Hardness 35—45HRC	● ◐	MP6120	330 (260—395)	295 (230—360)	260 (195—330)	260 (195—330)
			● ◐	VP15TF				
			✤	MP6130				
M	Austenitic Stainless Steels	Hardness ≤200HB	● ◐ ✤	MP7130	395 (330—490)	360 (295—460)	295 (230—395)	295 (230—395)
			● ◐	VP15TF				
		Hardness >200HB	● ◐ ✤	MP7130	330 (260—425)	295 (230—360)	230 (165—330)	230 (165—330)
			● ◐	VP15TF				
	Duplex Stainless Steels	Hardness ≤280HB	● ◐ ✤	MP7130	330 (260—425)	295 (230—395)	230 (165—330)	230 (165—330)
			● ◐	VP15TF				
	Ferritic and Martensitic Stainless Steels	—	● ◐ ✤	MP7130	395 (330—490)	360 (295—460)	295 (230—395)	295 (230—395)
			● ◐	VP15TF				
	Precipitation Hardening Stainless Steels	Hardness <450HB	● ◐ ✤	MP7130	295 (230—395)	260 (195—360)	195 (130—295)	195 (130—295)
			● ◐	VP15TF				
K	Gray Cast Irons	Tensile Strength ≤350MPa	● ◐	MC5020	590 (525—720)	560 (490—690)	490 (425—620)	490 (425—620)
			● ◐ ✤	VP15TF	425 (330—490)	395 (295—460)	330 (260—395)	330 (260—395)
	Ductile Cast Irons	Tensile Strength ≤800MPa	● ◐	MC5020	525 (460—590)	490 (425—560)	425 (360—490)	425 (360—490)
			● ◐ ✤	VP15TF	360 (260—460)	330 (230—425)	260 (195—395)	260 (195—395)
N	Aluminum Alloys	Content Si<5%	● ◐ ✤	TF15	1970 (1310—3280)	1970 (1310—3280)	1970 (1310—3280)	1970 (1310—3280)
S	Titanium Alloys (Ti-6Al-4V,etc.)	—	● ◐	MP9120	165 (130—230)	165 (130—230)	165 (130—230)	165 (130—230)
			● ◐	VP15TF	165 (130—230)	165 (130—230)	165 (130—230)	165 (130—230)
			✤	MP9130	130 (100—195)	130 (100—195)	130 (100—195)	130 (100—195)
	Titanium Alloys (Ti-5Al-5V-5Mo-3Cr,etc.)	—	● ◐	MP9120	100 (65—130)	100 (65—130)	100 (65—130)	100 (65—130)
			● ◐	VP15TF	100 (65—130)	100 (65—130)	100 (65—130)	100 (65—130)
			✤	MP9130	100 (65—130)	100 (65—130)	100 (65—130)	100 (65—130)
	Heat Resistant Alloys	—	● ◐	MP9120	130 (100—195)	130 (100—195)	130 (100—195)	130 (100—195)
			● ◐	VP15TF	130 (100—195)	130 (100—195)	130 (100—195)	130 (100—195)
			✤	MP9130	100 (65—130)	100 (65—130)	100 (65—130)	100 (65—130)
H	Hardened Steels	Hardness 40—55HRC	● ◐ ✤	VP15TF	295 (230—330)	280 (195—330)	230 (165—260)	230 (165—260)

Note 1) These cutting conditions should be referenced for standard shank types (last letter in designation is S) and arbor shank types. If there is chatter, insert chipping, etc. during machining, alter conditions accordingly.

Note 2) Chattering vibration is more likely under the following circumstances. Use a cut and feed per tooth that are at minimum recommended conditions or below.
- When tool overhang is long (using a long shank, screw-in type, etc.)
- Rigidity of machine, workpiece material or attachment of workpiece material is low
- Corner radius during pocket milling

Note 3) A type with fewer teeth is recommended when the depth of cut in the radius direction (ae) is .5 DC or more.

Note 4) Wet cutting is recommended, when focusing on the surface finish. (Tool life is shorter than for dry cutting.)

Note 5) When using under higher than recommended cutting conditions, or for long periods of time, the clamp screw may become fatigued and break during machining. Please change out the clamp screw periodically.

VPX200

Recommended Cutting Conditions

■ Wet Cutting

Depth of Cut / Feed per Tooth

(inch)

	Workpiece Material	Properties	Cutting Width ae	Cutting Conditions	Cutter Diameter DC					
					ø.625-ø.750(ø16mm-ø18mm)		ø.875-ø1.000(ø20mm-ø25mm)		ø1.125-ø2.500(ø28mm-ø63mm)	
					Depth of Cut **ap**	Feed per Tooth **fz** (IPT)	Depth of Cut **ap**	Feed per Tooth **fz** (IPT)	Depth of Cut **ap**	Feed per Tooth **fz** (IPT)
P	Mild Steels	Hardness ≤180HB	≤.25DC	● ◐ ❋	≤.236	.004−.006	≤.315	.004−.008	≤.315	.004−.010
			.25−.5DC	● ◐ ❋	≤.197	.004−.006	≤.315	.004−.006	≤.315	.004−.008
			.5−.75DC	● ◐ ❋	≤.157	.003−.005	≤.236	.003−.005	≤.236	.004−.006
			DC(Slot)	● ◐ ❋	≤.079	.002−.004	≤.157	.002−.004	≤.157	.003−.005
	Carbon Steels Alloy Steels Alloy Tool Steels	Hardness 180−280HB	≤.25DC	● ◐ ❋	≤.236	.004−.006	≤.315	.004−.008	≤.315	.004−.010
			.25−.5DC	● ◐ ❋	≤.197	.003−.005	≤.315	.004−.006	≤.315	.004−.008
			.5−.75DC	● ◐ ❋	≤.157	.003−.005	≤.236	.003−.005	≤.236	.004−.006
			DC(Slot)	● ◐ ❋	≤.079	.002−.004	≤.157	.002−.004	≤.157	.003−.005
	Carbon Steels Alloy Steels Alloy Tool Steels	Hardness 280−350HB ≤350HB (Annealing)	≤.25DC	● ◐ ❋	≤.236	.004−.006	≤.315	.004−.006	≤.315	.004−.008
			.25−.5DC	● ◐ ❋	≤.197	.003−.005	≤.315	.003−.005	≤.315	.004−.006
			.5−.75DC	● ◐ ❋	≤.157	.003−.005	≤.236	.002−.004	≤.236	.003−.005
			DC(Slot)	● ◐ ❋	≤.079	.002−.004	≤.157	.002−.004	≤.157	.002−.004
	Pre-hardened Steels	Hardness 35−45HRC	≤.25DC	● ◐ ❋	≤.236	.004−.006	≤.315	.004−.006	≤.315	.004−.008
			.25−.5DC	● ◐ ❋	≤.197	.003−.005	≤.315	.003−.005	≤.315	.004−.006
			.5−.75DC	● ◐ ❋	≤.157	.003−.005	≤.236	.002−.004	≤.236	.003−.005
			DC(Slot)	● ◐ ❋	≤.079	.002−.004	≤.157	.002−.004	≤.157	.002−.004
M	Austenitic Stainless Steels	−	≤.25DC	● ◐	≤.236	.004−.006	≤.315	.004−.008	≤.315	.004−.008
				❋	≤.236	.003−.005	≤.315	.003−.006	≤.315	.003−.006
			.25−.5DC	● ◐	≤.197	.003−.005	≤.315	.003−.006	≤.315	.003−.006
				❋	≤.197	.002−.004	≤.315	.003−.005	≤.315	.003−.005
			.5−.75DC	● ◐	≤.157	.002−.004	≤.236	.003−.005	≤.236	.003−.005
				❋	≤.157	.002−.003	≤.236	.002−.004	≤.236	.002−.004
			DC(Slot)	● ◐	≤.079	.002−.004	≤.157	.002−.004	≤.157	.002−.004
				❋	≤.079	.002−.003	≤.157	.002−.003	≤.157	.002−.003
	Duplex Stainless Steels	Hardness ≤280HB	≤.25DC	● ◐	≤.236	.004−.006	≤.315	.004−.008	≤.315	.004−.008
				❋	≤.236	.003−.005	≤.315	.003−.006	≤.315	.003−.006
			.25−.5DC	● ◐	≤.197	.003−.005	≤.315	.003−.006	≤.315	.003−.005
				❋	≤.197	.002−.004	≤.315	.003−.005	≤.315	.003−.005
			.5−.75DC	● ◐	≤.157	.002−.004	≤.236	.003−.005	≤.236	.003−.005
				❋	≤.157	.002−.003	≤.236	.002−.004	≤.236	.002−.004
			DC(Slot)	● ◐	≤.079	.002−.004	≤.157	.002−.004	≤.157	.002−.004
				❋	≤.079	.002−.003	≤.157	.002−.003	≤.157	.002−.003
	Ferritic and Martensitic Stainless Steels	−	≤.25DC	● ◐	≤.236	.004−.006	≤.315	.004−.008	≤.315	.004−.008
				❋	≤.236	.003−.005	≤.315	.003−.006	≤.315	.003−.006
			.25−.5DC	● ◐	≤.197	.003−.005	≤.315	.003−.006	≤.315	.003−.006
				❋	≤.197	.002−.004	≤.315	.003−.005	≤.315	.003−.005
			.5−.75DC	● ◐	≤.157	.002−.004	≤.236	.003−.005	≤.236	.003−.005
				❋	≤.157	.002−.003	≤.236	.002−.004	≤.236	.002−.004
			DC(Slot)	● ◐	≤.079	.002−.004	≤.157	.002−.004	≤.157	.002−.004
				❋	≤.079	.002−.003	≤.157	.002−.003	≤.157	.002−.003
	Precipitation Hardening Stainless Steels	Hardness <450HB	≤.25DC	● ◐	≤.236	.004−.006	≤.315	.004−.006	≤.315	.004−.006
				❋	≤.236	.003−.005	≤.315	.003−.005	≤.315	.003−.005
			.25−.5DC	● ◐	≤.197	.003−.005	≤.315	.003−.005	≤.315	.003−.005
				❋	≤.197	.002−.004	≤.315	.003−.005	≤.315	.003−.005
			.5−.75DC	● ◐	≤.157	.002−.004	≤.236	.002−.004	≤.236	.002−.004
				❋	≤.157	.002−.003	≤.236	.002−.003	≤.236	.002−.003
			DC(Slot)	● ◐	≤.079	.002−.004	≤.157	.002−.004	≤.157	.002−.004
				❋	≤.079	.002−.003	≤.157	.002−.003	≤.157	.002−.003

Note 1) These cutting conditions should be referenced for standard shank types (last letter in designation is S) and arbor shank types. If there is chatter, insert chipping, etc. during machining, alter conditions accordingly.

Note 2) Chattering vibration is more likely under the following circumstances. Use a cut and feed per tooth that are at minimum recommended conditions or below.

- When tool overhang is long (using a long shank, screw-in type, etc.)
- Rigidity of machine, workpiece material or attachment of workpiece material is low
- Corner radius during pocket milling

Note 3) A type with fewer teeth is recommended when the depth of cut in the radius direction (ae) is .5 DC or more.

Note 4) Wet cutting is recommended, when focusing on the surface finish. (Tool life is shorter than for dry cutting.)

Note 5) When using under higher than recommended cutting conditions, or for long periods of time, the clamp screw may become fatigued and break during machining. Please change out the clamp screw periodically.

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✤ : Unstable Cutting

(inch)

	Workpiece Material	Properties	Cutting Width **ae**	Cutting Conditions	Cutter Diameter **DC**					
					ø.625-ø.750(ø16mm-ø18mm)		**ø.875-ø1.000(ø20mm-ø25mm)**		**ø1.125-ø2.500(ø28mm-ø63mm)**	
					Depth of Cut **ap**	Feed per Tooth **fz** (IPT)	Depth of Cut **ap**	Feed per Tooth **fz** (IPT)	Depth of Cut **ap**	Feed per Tooth **fz** (IPT)
K	Gray Cast Irons	Tensile Strength ≤350MPa	≤.25DC	● ◐	≤.236	.004—.006	≤.315	.004—.008	≤.315	.004—.010
				✤	≤.236	.003—.005	≤.315	.003—.006	≤.315	.004—.008
			.25—.5DC	● ◐	≤.197	.003—.005	≤.315	.003—.006	≤.315	.004—.008
				✤	≤.197	.002—.004	≤.315	.003—.005	≤.315	.004—.006
			.5—.75DC	● ◐	≤.157	.003—.005	≤.236	.002—.004	≤.236	.004—.006
				✤	≤.157	.003—.005	≤.236	.002—.004	≤.236	.003—.005
			DC(Slot)	● ◐	≤.079	.002—.004	≤.157	.002—.004	≤.157	.003—.006
				✤	≤.079	.002—.003	≤.157	.002—.003	≤.157	.002—.004
	Ductile Cast Irons	Tensile Strength ≤800MPa	≤.25DC	● ◐	≤.236	.004—.006	≤.315	.004—.008	≤.315	.004—.008
				✤	≤.236	.003—.005	≤.315	.004—.006	≤.315	.004—.006
			.25—.5DC	● ◐	≤.197	.003—.005	≤.315	.004—.006	≤.315	.004—.006
				✤	≤.197	.002—.004	≤.315	.003—.005	≤.315	.003—.005
			.5—.75DC	● ◐	≤.157	.003—.005	≤.236	.003—.005	≤.236	.003—.005
				✤	≤.157	.003—.005	≤.236	.003—.005	≤.236	.002—.004
			DC(Slot)	● ◐	≤.079	.002—.004	≤.157	.002—.004	≤.157	.002—.004
				✤	≤.079	.002—.003	≤.157	.002—.003	≤.157	.002—.003
N	Aluminum Alloys	Content Si＜5%	≤.25DC	● ◐	≤.236	.004—.008	≤.315	.004—.010	≤.315	.004—.010
				✤	≤.236	.004—.006	≤.315	.004—.008	≤.315	.004—.008
			.25—.5DC	● ◐	≤.197	.004—.006	≤.315	.004—.008	≤.315	.004—.008
				✤	≤.197	.003—.005	≤.315	.004—.006	≤.315	.004—.006
			.5—.75DC	● ◐	≤.157	.003—.005	≤.236	.002—.006	≤.236	.003—.006
				✤	≤.157	.002—.004	≤.236	.002—.006	≤.236	.003—.006
			DC(Slot)	● ◐	≤.079	.002—.004	≤.157	.002—.006	≤.157	.003—.006
				✤	≤.079	.002—.003	≤.157	.002—.005	≤.157	.003—.005
S	Titanium Alloys (Ti-6Al-4V,etc.)	—	≤.25DC	● ◐ ✤	≤.236	.003—.006	≤.315	.003—.006	≤.315	.003—.006
			.25—.5DC	● ◐ ✤	≤.197	.003—.005	≤.315	.003—.005	≤.315	.003—.005
			.5—.75DC	● ◐ ✤	≤.157	.002—.004	≤.236	.002—.004	≤.236	.002—.004
			DC(Slot)	● ◐ ✤	≤.079	.002—.004	≤.157	.002—.004	≤.157	.002—.004
	Titanium Alloys (Ti-5Al-5V-5Mo-3Cr,etc.)	—	≤.25DC	● ◐ ✤	≤.236	.003—.005	≤.315	.003—.005	≤.315	.003—.005
			.25—.5DC	● ◐ ✤	≤.197	.003—.005	≤.315	.003—.005	≤.315	.003—.005
			.5—.75DC	● ◐ ✤	≤.157	.002—.004	≤.236	.002—.004	≤.236	.002—.004
			DC(Slot)	● ◐ ✤	≤.079	.002—.004	≤.157	.002—.004	≤.157	.002—.004
	Heat Resistant Alloys	—	≤.25DC	● ◐ ✤	≤.236	.003—.005	≤.315	.003—.005	≤.315	.003—.005
			.25—.5DC	● ◐ ✤	≤.197	.003—.005	≤.315	.003—.005	≤.315	.003—.005
			.5—.75DC	● ◐ ✤	≤.157	.002—.004	≤.236	.002—.004	≤.236	.002—.004
			DC(Slot)	● ◐ ✤	≤.079	.002—.004	≤.157	.002—.004	≤.157	.002—.004
H	Hardened Steels	Hardness 40—55HRC	≤.25DC	● ◐	≤.157	.003—.006	≤.157	.003—.006	≤.157	.003—.006
				✤	≤.157	.003—.005	≤.157	.003—.005	≤.157	.003—.005
			.25—.5DC	● ◐	≤.118	.003—.005	≤.118	.003—.005	≤.118	.003—.005
				✤	≤.118	.002—.004	≤.118	.002—.004	≤.118	.002—.004
			.5—.75DC	● ◐	≤.079	.002—.004	≤.079	.002—.004	≤.079	.002—.004
				✤	≤.079	.002—.004	≤.079	.002—.004	≤.079	.002—.004
			DC(Slot)	● ◐	≤.039	.002—.004	≤.039	.002—.004	≤.039	.002—.004
				✤	≤.039	.002—.004	≤.039	.002—.004	≤.039	.002—.004

Note 1) These cutting conditions should be referenced for standard shank types (last letter in designation is S) and arbor shank types. If there is chatter, insert chipping, etc. during machining, alter conditions accordingly.

Note 2) Chattering vibration is more likely under the following circumstances. Use a cut and feed per tooth that are at minimum recommended conditions or below.
- When tool overhang is long (using a long shank, screw-in type, etc.)
- Rigidity of machine, workpiece material or attachment of workpiece material is low
- Corner radius during pocket milling

Note 3) A type with fewer teeth is recommended when the depth of cut in the radius direction (ae) is .5 DC or more.

Note 4) Wet cutting is recommended, when focusing on the surface finish. (Tool life is shorter than for dry cutting.)

Note 5) When using under higher than recommended cutting conditions, or for long periods of time, the clamp screw may become fatigued and break during machining. Please change out the clamp screw periodically.

Multi-Functional Cutter for High Efficiency Machining

VPX300

Recommended Cutting Conditions

■ Dry Cutting

Cutting Speed

(inch)

	Workpiece Material	Properties	Cutting Conditions	Insert		Cutting Width **ae**			
				Grade	Chip Breaker	≤.25DC	.25—.5DC	.5—.75DC	DC(Slot)
						Cutting Speed **vc** (SFM)			
P	Mild Steels	Hardness ≤180HB	● ◐	MP6120 VP15TF	M	755 (590—885)	720 (560—850)	590 (460—690)	590 (460—690)
			✤	MP6130	M	655 (490—785)	620 (560—850)	490 (360—590)	490 (360—590)
	Carbon Steels Alloy Steels Alloy Tool Steels	Hardness 180—350HB ≤350HB (Annealing)	● ◐	MP6120 VP15TF	M	590 (460—690)	560 (425—655)	460 (360—525)	460 (360—590)
			✤	MP6130	M	490 (360—590)	460 (330—560)	360 (260—425)	360 (260—425)
	Pre-hardened Steels	Hardness 35—45HRC	● ◐	MP6120 VP15TF	M	395 (295—460)	360 (260—425)	330 (230—395)	330 (230—395)
			✤	MP6130	M	330 (260—395)	295 (230—360)	260 (195—330)	260 (195—330)
M	Austenitic Stainless Steels	Hardness ≤200HB	● ◐ ✤	MP7130 VP15TF	M	590 (460—690)	560 (425—655)	460 (360—525)	460 (360—525)
		Hardness >200HB	● ◐ ✤	MP7130 VP15TF	M	490 (360—590)	460 (330—525)	360 (260—425)	360 (260—425)
	Duplex Stainless Steels	Hardness ≤280HB	● ◐ ✤	MP7130 VP15TF	M	460 (360—560)	425 (295—490)	330 (230—395)	330 (230—395)
	Ferritic and Martensitic Stainless Steels	—	● ◐ ✤	MP7130 VP15TF	M	590 (460—690)	560 (425—655)	460 (360—525)	460 (360—525)
	Precipitation Hardening Stainless Steels	Hardness <450HB	● ◐ ✤	MP7130 VP15TF	M	425 (330—525)	395 (260—460)	295 (195—360)	295 (195—360)
K	Gray Cast Irons	Tensile Strength ≤350MPa	● ◐	MC5020	M	820 (655—985)	785 (620—950)	690 (525—850)	690 (525—850)
			● ◐ ✤	VP15TF	M	655 (490—820)	620 (460—785)	525 (360—690)	525 (360—690)
	Ductile Cast Irons	Tensile Strength ≤800MPa	● ◐	MC5020	M	590 (490—655)	560 (460—620)	490 (395—560)	490 (395—560)
			● ◐ ✤	VP15TF	M	425 (330—490)	395 (295—460)	330 (260—395)	330 (260—395)
N	Aluminum Alloys	Content Si<5%	● ◐ ✤	TF15	M	1970 (1310—3280)	1970 (1310—3280)	1970 (1310—3280)	1970 (1310—3280)
H	Hardened Steels	Hardness 40—55HRC	● ◐ ✤	VP15TF	M	295 (230—330)	280 (195—330)	230 (165—260)	230 (165—260)

Note 1) These cutting conditions should be referenced for standard shank types (last letter in designation is S) and arbor shank types. If there is chatter, insert chipping, etc. during machining, alter conditions accordingly.

Note 2) Chattering vibration is more likely under the following circumstances. Use a cut and feed per tooth that are at minimum recommended conditions or below.

- When tool overhang is long (using a long shank, screw-in type, etc.)
- Rigidity of machine, workpiece material or attachment of workpiece material is low
- Corner radius during pocket milling

Note 3) A type with fewer teeth is recommended when the depth of cut in the radius direction (ae) is .5 DC or more.

Note 4) Wet cutting is recommended, when focusing on the surface finish. (Tool life is shorter than for dry cutting.)

Note 5) When using under higher than recommended cutting conditions, or for long periods of time, the clamp screw may become fatigued and break during machining. Please change out the clamp screw periodically.

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✤ : Unstable Cutting

Depth of Cut / Feed per Tooth

(inch)

	Workpiece Material	Properties	Cutting Width **ae**	Cutting Conditions	Cutter Diameter **DC**			
					ø1.000 (ø25mm)		**ø1.125—ø3.000 (ø28mm-ø80mm)**	
					Depth of Cut **ap**	Feed per Tooth. **fz** (IPT)	Depth of Cut **ap**	Feed per Tooth. **fz** (IPT)
P	Mild Steels	Hardness ≤180HB	≤.25DC	● ◐ ✤	≤.433	.004—.008	≤.433	.004—.012
			.25—.5DC	● ◐ ✤	≤.433	.004—.006	≤.433	.004—.010
			.5—.75DC	● ◐ ✤	≤.315	.003—.005	≤.315	.004—.008
			DC(Slot)	● ◐ ✤	≤.197	.002—.004	≤.197	.003—.006
	Carbon Steels Alloy Steels Alloy Tool Steels	Hardness 180—280HB	≤.25DC	● ◐ ✤	≤.433	.004—.008	≤.433	.004—.012
			.25—.5DC	● ◐ ✤	≤.433	.004—.006	≤.433	.004—.010
			.5—.75DC	● ◐ ✤	≤.315	.003—.005	≤.315	.004—.008
			DC(Slot)	● ◐ ✤	≤.197	.002—.004	≤.197	.003—.006
	Carbon Steels Alloy Steels Alloy Tool Steels	Hardness 280—350HB ≤350HB (Annealing)	≤.25DC	● ◐ ✤	≤.433	.004—.006	≤.433	.004—.010
			.25—.5DC	● ◐ ✤	≤.433	.003—.005	≤.433	.004—.008
			.5—.75DC	● ◐ ✤	≤.315	.002—.004	≤.315	.004—.006
			DC(Slot)	● ◐ ✤	≤.197	.002—.004	≤.197	.003—.005
	Pre-hardened Steels	Hardness 35—45HRC	≤.25DC	● ◐ ✤	≤.433	.004—.006	≤.433	.004—.010
			.25—.5DC	● ◐ ✤	≤.433	.003—.005	≤.433	.004—.008
			.5—.75DC	● ◐ ✤	≤.315	.002—.004	≤.315	.004—.006
			DC(Slot)	● ◐ ✤	≤.197	.002—.004	≤.197	.003—.005
M	Austenitic Stainless Steels	—	≤.25DC	● ◐	≤.433	.004—.008	≤.433	.004—.008
				✤	≤.433	.003—.006	≤.433	.003—.006
			.25—.5DC	● ◐	≤.433	.003—.006	≤.433	.003—.006
				✤	≤.433	.003—.005	≤.433	.003—.005
			.5—.75DC	● ◐	≤.315	.003—.005	≤.315	.003—.005
				✤	≤.315	.002—.004	≤.315	.002—.004
			DC(Slot)	● ◐	≤.197	.002—.004	≤.197	.002—.004
				✤	≤.197	.002—.003	≤.197	.002—.003
	Duplex Stainless Steels	Hardness ≤280HB	≤.25DC	● ◐	≤.433	.004—.008	≤.433	.004—.008
				✤	≤.433	.003—.006	≤.433	.003—.006
			.25—.5DC	● ◐	≤.433	.003—.006	≤.433	.003—.006
				✤	≤.433	.003—.005	≤.433	.003—.005
			.5—.75DC	● ◐	≤.315	.003—.005	≤.315	.003—.005
				✤	≤.315	.002—.004	≤.315	.002—.004
			DC(Slot)	● ◐	≤.197	.002—.004	≤.197	.002—.004
				✤	≤.197	.002—.003	≤.197	.002—.003
	Ferritic and Martensitic Stainless Steels	—	≤.25DC	● ◐	≤.433	.004—.008	≤.433	.004—.008
				✤	≤.433	.003—.006	≤.433	.003—.006
			.25—.5DC	● ◐	≤.433	.003—.006	≤.433	.003—.006
				✤	≤.433	.003—.005	≤.433	.003—.005
			.5—.75DC	● ◐	≤.315	.003—.005	≤.315	.003—.005
				✤	≤.315	.002—.004	≤.315	.002—.004
			DC(Slot)	● ◐	≤.197	.002—.004	≤.197	.002—.004
				✤	≤.197	.002—.003	≤.197	.002—.003
	Precipitation Hardening Stainless Steels	Hardness <450HB	≤.25DC	● ◐	≤.433	.004—.006	≤.433	.004—.006
				✤	≤.433	.003—.005	≤.433	.003—.005
			.25—.5DC	● ◐	≤.433	.003—.005	≤.433	.003—.005
				✤	≤.433	.003—.005	≤.433	.002—.004
			.5—.75DC	● ◐	≤.315	.002—.004	≤.315	.002—.004
				✤	≤.315	.002—.003	≤.315	.002—.003
			DC(Slot)	● ◐	≤.197	.002—.004	≤.197	.002—.004
				✤	≤.197	.002—.003	≤.197	.002—.003

Note 1) These cutting conditions should be referenced for standard shank types (last letter in designation is S) and arbor shank types. If there is chatter, insert chipping, etc. during machining, alter conditions accordingly.
Note 2) Chattering vibration is more likely under the following circumstances. Use a cut and feed per tooth that are at minimum recommended conditions or below.
- When tool overhang is long (using a long shank, screw-in type, etc.)
- Rigidity of machine, workpiece material or attachment of workpiece material is low
- Corner radius during pocket milling

Note 3) A type with fewer teeth is recommended when the depth of cut in the radius direction (ae) is .5 DC or more.
Note 4) Wet cutting is recommended, when focusing on the surface finish. (Tool life is shorter than for dry cutting.)
Note 5) When using under higher than recommended cutting conditions, or for long periods of time, the clamp screw may become fatigued and break during machining. Please change out the clamp screw periodically.

VPX300

Recommended Cutting Conditions

■ Dry Cutting

Depth of Cut / Feed per Tooth

(inch)

	Workpiece Material	Properties	Cutting Width **ae**	Cutting Conditions	Cutter Diameter **DC**			
					ø1.000 (ø25mm)		**ø1.125—ø3.000 (ø28mm-ø80mm)**	
					Depth of Cut **ap**	Feed per Tooth. **fz** (IPT)	Depth of Cut **ap**	Feed per Tooth. **fz** (IPT)
K	Gray Cast Irons	Tensile Strength ≤350MPa	≤.25DC	● ◐	≤.433	.004—.008	≤.433	.004—.012
				✤	≤.433	.003—.006	≤.433	.004—.010
			.25—.5DC	● ◐	≤.433	.003—.006	≤.433	.004—.010
				✤	≤.433	.003—.005	≤.433	.004—.008
			.5—.75DC	● ◐	≤.315	.003—.005	≤.315	.004—.008
				✤	≤.315	.002—.004	≤.315	.003—.006
			DC(Slot)	● ◐	≤.197	.002—.004	≤.197	.003—.006
				✤	≤.197	.002—.003	≤.197	.003—.005
	Ductile Cast Irons	Tensile Strength ≤800MPa	≤.25DC	● ◐	≤.433	.004—.008	≤.433	.004—.010
				✤	≤.433	.004—.006	≤.433	.004—.008
			.25—.5DC	● ◐	≤.433	.004—.006	≤.433	.004—.008
				✤	≤.433	.003—.005	≤.433	.004—.006
			.5—.75DC	● ◐	≤.315	.003—.005	≤.315	.004—.006
				✤	≤.315	.003—.005	≤.315	.003—.005
			DC(Slot)	● ◐	≤.197	.002—.004	≤.197	.003—.005
				✤	≤.197	.002—.003	≤.197	.002—.004
N	Aluminum Alloys	Content Si< 5%	≤.25DC	● ◐	≤.433	.004—.010	≤.433	.004—.010
				✤	≤.433	.004—.008	≤.433	.004—.008
			.25—.5DC	● ◐	≤.433	.004—.008	≤.433	.004—.008
				✤	≤.433	.004—.006	≤.433	.004—.006
			.5—.75DC	● ◐	≤.315	.002—.006	≤.315	.003—.006
				✤	≤.315	.002—.006	≤.315	.003—.006
			DC(Slot)	● ◐	≤.197	.002—.006	≤.197	.003—.006
				✤	≤.197	.002—.006	≤.197	.003—.005
H	Hardened Steels	Hardness 40—55HRC	≤.25DC	● ◐	≤.197	.003—.006	≤.197	.003—.006
				✤	≤.197	.003—.005	≤.197	.003—.005
			.25—.5DC	● ◐	≤.157	.003—.005	≤.157	.003—.005
				✤	≤.157	.002—.004	≤.157	.002—.004
			.5—.75DC	● ◐	≤.118	.002—.004	≤.118	.002—.004
				✤	≤.118	.002—.003	≤.118	.002—.003
			DC(Slot)	● ◐	≤.079	.002—.004	≤.079	.002—.004
				✤	≤.079	.002—.003	≤.079	.002—.003

Note 1) These cutting conditions should be referenced for standard shank types (last letter in designation is S) and arbor shank types. If there is chatter, insert chipping, etc. during machining, alter conditions accordingly.

Note 2) Chattering vibration is more likely under the following circumstances. Use a cut and feed per tooth that are at minimum recommended conditions or below.

- When tool overhang is long (using a long shank, screw-in type, etc.)
- Rigidity of machine, workpiece material or attachment of workpiece material is low
- Corner radius during pocket milling

Note 3) A type with fewer teeth is recommended when the depth of cut in the radius direction (ae) is .5 DC or more.

Note 4) Wet cutting is recommended, when focusing on the surface finish. (Tool life is shorter than for dry cutting.)

Note 5) When using under higher than recommended cutting conditions, or for long periods of time, the clamp screw may become fatigued and break during machining. Please change out the clamp screw periodically.

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✤ : Unstable Cutting

■ Wet Cutting

Cutting Speed

(inch)

	Workpiece Material	Properties	Cutting Conditions	Insert		Cutting Width **ae**			
				Grade	Chip Breaker	≤.25DC	.25–.5DC	.5–.75DC	DC(Slot)
						Cutting Speed **vc** (SFM)			
P	Mild Steels	Hardness ≤180HB	● ◐	MP6120	M	460 (330–620)	425 (295–590)	330 (230–395)	330 (230–395)
			● ◐	VP15TF	M	460 (330–620)	425 (295–590)	330 (230–395)	330 (230–395)
			✤	MP6130	M	460 (330–620)	425 (295–590)	330 (230–395)	330 (230–395)
	Carbon Steels Alloy Steels Alloy Tool Steels	Hardness 180–350HB ≤350HB (Annealing)	● ◐	MP6120	M	395 (295–460)	360 (260–425)	330 (230–395)	330 (230–395)
			● ◐	VP15TF	M	395 (295–460)	360 (260–425)	330 (230–395)	330 (230–395)
			✤	MP6130	M	395 (295–460)	360 (260–425)	330 (230–395)	330 (230–395)
	Pre-hardened Steels	Hardness 35–45HRC	● ◐	MP6120	M	330 (260–395)	295 (230–360)	260 (195–330)	260 (195–330)
			● ◐	VP15TF	M	330 (260–395)	295 (230–360)	260 (195–330)	260 (195–330)
			✤	MP6130	M	330 (260–395)	295 (230–360)	260 (195–330)	260 (195–330)
M	Austenitic Stainless Steels	Hardness ≤200HB	● ◐ ✤	MP7130	M	395 (330–490)	360 (295–460)	295 (230–395)	295 (230–395)
			● ◐	VP15TF	M	395 (330–490)	360 (295–460)	295 (230–395)	295 (230–395)
		Hardness >200HB	● ◐ ✤	MP7130	M	330 (260–425)	295 (230–395)	230 (165–330)	230 (165–330)
			● ◐	VP15TF	M	330 (260–425)	295 (230–395)	230 (165–330)	230 (165–330)
	Duplex Stainless Steels	Hardness ≤280HB	● ◐ ✤	MP7130	M	330 (260–425)	295 (230–395)	230 (165–330)	230 (165–330)
			● ◐	VP15TF	M	330 (260–425)	295 (230–395)	230 (165–330)	230 (165–330)
	Ferritic and Martensitic Stainless Steels	–	● ◐ ✤	MP7130	M	395 (330–490)	360 (295–460)	295 (230–395)	295 (230–395)
			● ◐	VP15TF	M	395 (330–490)	360 (295–460)	295 (230–395)	295 (230–395)
	Precipitation Hardening Stainless Steels	Hardness <450HB	● ◐ ✤	MP7130	M	295 (230–395)	260 (195–360)	195 (130–295)	195 (130–295)
			● ◐	VP15TF	M	295 (230–395)	260 (195–360)	195 (130–295)	195 (130–295)
K	Gray Cast Irons	Tensile Strength ≤350MPa	● ◐	MC5020	M	590 (525–720)	560 (490–690)	490 (425–620)	490 (425–620)
			● ◐ ✤	VP15TF	M	425 (330–490)	395 (295–460)	330 (260–395)	330 (260–395)
	Ductile Cast Irons	Tensile Strength ≤800MPa	● ◐	MC5020	M	525 (460–590)	490 (425–560)	425 (360–490)	425 (360–490)
			● ◐ ✤	VP15TF	M	360 (260–460)	330 (230–425)	260 (195–395)	260 (195–395)
N	Aluminum Alloys	Content Si<5%	● ◐ ✤	TF15	M	1970 (1310–3280)	1970 (1310–3280)	1970 (1310–3280)	1970 (1310–3280)
S	Titanium Alloys (Ti-6Al-4V,etc.)	–	● ◐	MP9120	M	165 (130–230)	165 (130–230)	165 (130–230)	165 (130–230)
			● ◐	VP15TF	M	165 (130–230)	165 (130–230)	165 (130–230)	165 (130–230)
			✤	MP9130	M	130 (100–195)	130 (100–195)	130 (100–195)	130 (100–195)
	Titanium Alloys (Ti-5Al-5V-5Mo-3Cr,etc.)	–	● ◐	MP9120	M	100 (65–130)	100 (65–130)	100 (65–130)	100 (65–130)
			● ◐	VP15TF	M	100 (65–130)	100 (65–130)	100 (65–130)	100 (65–130)
			✤	MP9130	M	100 (65–130)	100 (65–130)	100 (65–130)	100 (65–130)
	Heat Resistant Alloys	–	● ◐	MP9120	M	130 (100–195)	130 (100–195)	130 (100–195)	130 (100–195)
			● ◐	VP15TF	M	130 (100–195)	130 (100–195)	130 (100–195)	130 (100–195)
			✤	MP9130	M	100 (65–130)	100 (65–130)	100 (65–130)	100 (65–130)
H	Hardened Steels	Hardness 40–55HRC	● ◐ ✤	VP15TF	M	295 (230–330)	280 (195–330)	230 (165–260)	230 (165–260)

Note 1) These cutting conditions should be referenced for standard shank types (last letter in designation is S) and arbor shank types. If there is chatter, insert chipping, etc. during machining, alter conditions accordingly.

Note 2) Chattering vibration is more likely under the following circumstances. Use a cut and feed per tooth that are at minimum recommended conditions or below.

- When tool overhang is long (using a long shank, screw-in type, etc.)
- Rigidity of machine, workpiece material or attachment of workpiece material is low
- Corner radius during pocket milling

Note 3) A type with fewer teeth is recommended when the depth of cut in the radius direction (ae) is .5 DC or more.

Note 4) Wet cutting is recommended, when focusing on the surface finish. (Tool life is shorter than for dry cutting.)

Note 5) When using under higher than recommended cutting conditions, or for long periods of time, the clamp screw may become fatigued and break during machining. Please change out the clamp screw periodically.

VPX300

Recommended Cutting Conditions

■ Wet Cutting

Depth of Cut / Feed per Tooth

(inch)

	Workpiece Material	Properties	Cutting Width **ae**	Cutting Conditions	Cutter Diameter **DC**			
					ø1.000 (ø25mm)		**ø1.125—ø3.000 (ø28mm-ø80mm)**	
					Depth of Cut **ap**	Feed per Tooth. **fz** (IPT)	Depth of Cut **ap**	Feed per Tooth. **fz** (IPT)
P	Mild Steels	Hardness ≤180HB	≤.25DC	● ◐ ✤	≤.433	.004—.008	≤.433	.004—.012
			.25—.5DC	● ◐ ✤	≤.433	.004—.006	≤.433	.004—.010
			.5—.75DC	● ◐ ✤	≤.315	.003—.005	≤.315	.004—.008
			DC(Slot)	● ◐ ✤	≤.197	.002—.004	≤.197	.003—.006
	Carbon Steels Alloy Steels Alloy Tool Steels	Hardness 180—280HB	≤.25DC	● ◐ ✤	≤.433	.004—.008	≤.433	.004—.012
			.25—.5DC	● ◐ ✤	≤.433	.004—.006	≤.433	.004—.010
			.5—.75DC	● ◐ ✤	≤.315	.003—.005	≤.315	.004—.008
			DC(Slot)	● ◐ ✤	≤.197	.002—.004	≤.197	.003—.006
	Carbon Steels Alloy Steels Alloy Tool Steels	Hardness 280—350HB ≤350HB (Annealing)	≤.25DC	● ◐ ✤	≤.433	.004—.006	≤.433	.004—.010
			.25—.5DC	● ◐ ✤	≤.433	.003—.005	≤.433	.004—.008
			.5—.75DC	● ◐ ✤	≤.315	.002—.004	≤.315	.004—.006
			DC(Slot)	● ◐ ✤	≤.197	.002—.004	≤.197	.003—.005
	Pre-hardened Steels	Hardness 35—45HRC	≤.25DC	● ◐ ✤	≤.433	.004—.006	≤.433	.004—.010
			.25—.5DC	● ◐ ✤	≤.433	.003—.005	≤.433	.004—.008
			.5—.75DC	● ◐ ✤	≤.315	.002—.004	≤.315	.004—.006
			DC(Slot)	● ◐ ✤	≤.197	.002—.004	≤.197	.003—.005
M	Austenitic Stainless Steels	—	≤.25DC	● ◐	≤.433	.004—.008	≤.433	.004—.008
				✤	≤.433	.003—.006	≤.433	.003—.006
			.25—.5DC	● ◐	≤.433	.003—.005	≤.433	.003—.006
				✤	≤.433	.002—.004	≤.433	.003—.005
			.5—.75DC	● ◐	≤.315	.002—.004	≤.315	.003—.005
				✤	≤.315	.002—.004	≤.315	.002—.004
			DC(Slot)	● ◐	≤.197	.002—.004	≤.197	.002—.004
				✤	≤.197	.002—.003	≤.197	.002—.003
	Duplex Stainless Steels	Hardness ≤280HB	≤.25DC	● ◐	≤.433	.004—.008	≤.433	.004—.008
				✤	≤.433	.003—.006	≤.433	.003—.006
			.25—.5DC	● ◐	≤.433	.003—.006	≤.433	.003—.006
				✤	≤.433	.003—.005	≤.433	.003—.005
			.5—.75DC	● ◐	≤.315	.003—.005	≤.315	.003—.005
				✤	≤.315	.002—.004	≤.315	.002—.004
			DC(Slot)	● ◐	≤.197	.002—.004	≤.197	.002—.004
				✤	≤.197	.002—.003	≤.197	.002—.003
	Ferritic and Martensitic Stainless Steels	—	≤.25DC	● ◐	≤.433	.004—.008	≤.433	.004—.008
				✤	≤.433	.003—.006	≤.433	.003—.006
			.25—.5DC	● ◐	≤.433	.003—.006	≤.433	.003—.006
				✤	≤.433	.003—.005	≤.433	.003—.005
			.5—.75DC	● ◐	≤.315	.003—.005	≤.315	.003—.005
				✤	≤.315	.002—.004	≤.315	.002—.004
			DC(Slot)	● ◐	≤.197	.002—.004	≤.197	.002—.004
				✤	≤.197	.002—.003	≤.197	.002—.003
	Precipitation Hardening Stainless Steels	Hardness <450HB	≤.25DC	● ◐	≤.433	.004—.006	≤.433	.004—.006
				✤	≤.433	.003—.005	≤.433	.003—.005
			.25—.5DC	● ◐	≤.433	.003—.005	≤.433	.003—.005
				✤	≤.433	.003—.005	≤.433	.003—.005
			.5—.75DC	● ◐	≤.315	.002—.004	≤.315	.002—.004
				✤	≤.315	.002—.003	≤.315	.002—.003
			DC(Slot)	● ◐	≤.197	.002—.004	≤.197	.002—.004
				✤	≤.197	.002—.003	≤.197	.002—.003

Note 1) These cutting conditions should be referenced for standard shank types (last letter in designation is S) and arbor shank types. If there is chatter, insert chipping, etc. during machining, alter conditions accordingly.

Note 2) Chattering vibration is more likely under the following circumstances. Use a cut and feed per tooth that are at minimum recommended conditions or below.
- When tool overhang is long (using a long shank, screw-in type, etc.)
- Rigidity of machine, workpiece material or attachment of workpiece material is low
- Corner radius during pocket milling

Note 3) A type with fewer teeth is recommended when the depth of cut in the radius direction (ae) is .5 DC or more.

Note 4) Wet cutting is recommended, when focusing on the surface finish. (Tool life is shorter than for dry cutting.)

Note 5) When using under higher than recommended cutting conditions, or for long periods of time, the clamp screw may become fatigued and break during machining. Please change out the clamp screw periodically.

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✤ : Unstable Cutting

(inch)

	Workpiece Material	Properties	Cutting Width **ae**	Cutting Conditions	Cutter Diameter **DC**			
					ø1.000 (ø25mm)		**ø1.125—ø3.000 (ø28mm-ø80mm)**	
					Depth of Cut **ap**	Feed per Tooth. **fz** (IPT)	Depth of Cut **ap**	Feed per Tooth. **fz** (IPT)
K	Gray Cast Irons	Tensile Strength ≤350MPa	≤.25DC	● ◐	≤.433	.004—.008	≤.433	.004—.012
				✤	≤.433	.003—.006	≤.433	.004—.010
			.25—.5DC	● ◐	≤.433	.003—.006	≤.433	.004—.010
				✤	≤.433	.003—.005	≤.433	.004—.008
			.5—.75DC	● ◐	≤.315	.003—.005	≤.315	.004—.008
				✤	≤.315	.002—.004	≤.315	.003—.006
			DC(Slot)	● ◐	≤.197	.002—.004	≤.197	.003—.006
				✤	≤.197	.002—.003	≤.197	.003—.005
	Ductile Cast Irons	Tensile Strength ≤800MPa	≤.25DC	● ◐	≤.433	.004—.008	≤.433	.004—.010
				✤	≤.433	.004—.006	≤.433	.004—.008
			.25—.5DC	● ◐	≤.433	.004—.006	≤.433	.004—.008
				✤	≤.433	.003—.005	≤.433	.004—.006
			.5—.75DC	● ◐	≤.315	.003—.005	≤.315	.004—.006
				✤	≤.315	.002—.004	≤.315	.003—.005
			DC(Slot)	● ◐	≤.197	.002—.004	≤.197	.003—.005
				✤	≤.197	.002—.003	≤.197	.002—.004
N	Aluminum Alloys	Content Si<5%	≤.25DC	● ◐	≤.433	.004—.010	≤.433	.004—.010
				✤	≤.433	.004—.008	≤.433	.004—.008
			.25—.5DC	● ◐	≤.433	.004—.008	≤.433	.004—.008
				✤	≤.433	.004—.006	≤.433	.004—.006
			.5—.75DC	● ◐	≤.315	.002—.006	≤.315	.003—.006
				✤	≤.315	.002—.006	≤.315	.003—.006
			DC(Slot)	● ◐	≤.197	.002—.006	≤.197	.003—.006
				✤	≤.197	.002—.006	≤.197	.003—.005
S	Titanium Alloys (Ti-6Al-4V,etc.)	–	≤.25DC	● ◐ ✤	≤.433	.003—.006	≤.433	.003—.006
			.25—.5DC	● ◐ ✤	≤.433	.003—.005	≤.433	.003—.005
			.5—.75DC	● ◐ ✤	≤.315	.002—.004	≤.315	.002—.004
			DC(Slot)	● ◐ ✤	≤.197	.002—.004	≤.197	.002—.004
	Titanium Alloys (Ti-5Al-5V-5Mo-3Cr,etc.)	–	≤.25DC	● ◐ ✤	≤.433	.003—.005	≤.433	.003—.005
			.25—.5DC	● ◐ ✤	≤.433	.003—.005	≤.433	.003—.005
			.5—.75DC	● ◐ ✤	≤.315	.002—.004	≤.315	.002—.004
			DC(Slot)	● ◐ ✤	≤.197	.002—.004	≤.197	.002—.004
	Heat Resistant Alloys	–	≤.25DC	● ◐ ✤	≤.433	.003—.005	≤.433	.003—.005
			.25—.5DC	● ◐ ✤	≤.433	.003—.005	≤.433	.003—.005
			.5—.75DC	● ◐ ✤	≤.315	.002—.004	≤.315	.002—.004
			DC(Slot)	● ◐ ✤	≤.197	.002—.004	≤.197	.002—.004
H	Hardened Steels	Hardness 40—55HRC	≤.25DC	● ◐	≤.197	.003—.006	≤.197	.003—.006
				✤	≤.197	.003—.005	≤.197	.003—.005
			.25—.5DC	● ◐	≤.157	.003—.005	≤.157	.003—.005
				✤	≤.157	.002—.004	≤.157	.002—.004
			.5—.75DC	● ◐	≤.118	.002—.004	≤.118	.002—.004
				✤	≤.118	.002—.004	≤.118	.002—.003
			DC(Slot)	● ◐	≤.079	.002—.004	≤.079	.002—.004
				✤	≤.079	.002—.004	≤.079	.002—.003

Note 1) These cutting conditions should be referenced for standard shank types (last letter in designation is S) and arbor shank types. If there is chatter, insert chipping, etc. during machining, alter conditions accordingly.

Note 2) Chattering vibration is more likely under the following circumstances. Use a cut and feed per tooth that are at minimum recommended conditions or below.

- When tool overhang is long (using a long shank, screw-in type, etc.)
- Rigidity of machine, workpiece material or attachment of workpiece material is low
- Corner radius during pocket milling

Note 3) A type with fewer teeth is recommended when the depth of cut in the radius direction (ae) is .5 DC or more.

Note 4) Wet cutting is recommended, when focusing on the surface finish. (Tool life is shorter than for dry cutting.)

Note 5) When using under higher than recommended cutting conditions, or for long periods of time, the clamp screw may become fatigued and break during machining. Please change out the clamp screw periodically.

Memo

VPX200/300
DEEP SHOULDER MILLING

Recommended Cutting Conditions

Cutting Speed

(inch)

	Workpiece Material	Properties	Cutting Conditions	Grade	Width of Cut **ae**				Cutting Mode
					≤.25DC	.25–.5DC	.5–.75DC	DC(Slot)	
					Cutting Speed **vc** (SFM)				
P	Mild Steels	Hardness ≤180HB	● ◐	MP6120,VP15TF	460(330–620)	425(295–590)	330(230–395)	330(230–395)	Dry, Wet
			✽	MP6130	460(330–620)	425(295–590)	330(230–395)	330(230–395)	Dry, Wet
	Carbon Steels Alloy Steels	Hardness 180–350HB	● ◐	MP6120,VP15TF	395(295–460)	360(260–425)	330(230–395)	330(230–395)	Dry, Wet
			✽	MP6130	395(295–460)	360(260–425)	330(230–395)	330(230–395)	Dry, Wet
	Pre-hardened Steels	Hardness 180–350HB	● ◐	MP6120,VP15TF	330(260–395)	295(230–360)	260(195–330)	260(195–330)	Dry, Wet
			✽	MP6130	330(260–395)	295(230–360)	260(195–330)	260(195–330)	Dry, Wet
M	Austenitic Stainless Steels	Hardness ≤200HB	● ◐	MP7130,VP15TF	395(330–490)	360(295–460)	295(230–395)	295(230–395)	Dry, Wet
			✽	MP7130	395(330–490)	360(295–460)	295(230–395)	295(230–395)	Dry, Wet
		Hardness >200HB	● ◐	MP7130,VP15TF	330(260–425)	295(230–395)	230(165–330)	230(165–330)	Dry, Wet
			✽	MP7130	330(260–425)	295(230–395)	230(165–330)	230(165–330)	Dry, Wet
	Ferritic and Martensitic Stainless Steels	–	● ◐	MP7130,VP15TF	395(330–490)	360(295–460)	295(230–395)	295(230–395)	Dry, Wet
			✽	MP7130	395(330–490)	360(295–460)	295(230–395)	295(230–395)	Dry, Wet
	Duplex Stainless Steels	Hardness ≤280HB	● ◐	MP7130,VP15TF	330(260–425)	295(230–395)	230(165–330)	230(165–330)	Dry, Wet
			✽	MP7130	330(260–425)	295(230–395)	230(165–330)	230(165–330)	Dry, Wet
	Precipitation Hardening Stainless Steels	Hardness <450HB	● ◐	MP7130,VP15TF	295(230–395)	260(195–360)	195(130–295)	195(130–295)	Dry, Wet
			✽	MP7130	295(230–395)	260(195–360)	195(130–295)	195(130–295)	Dry, Wet
K	Gray Cast Irons	Tensile Strength ≤350MPa	● ◐	MC5020	590(525–720)	560(490–690)	490(425–620)	490(425–620)	Dry, Wet
			◐ ✽	VP15TF	425(330–490)	395(295–460)	330(260–395)	330(260–395)	Dry, Wet
	Ductile Cast Irons	Tensile Strength ≤800MPa	● ◐	MC5020	525(460–590)	490(425–560)	425(360–490)	425(360–490)	Dry, Wet
			◐ ✽	VP15TF	360(260–460)	330(230–425)	260(195–395)	260(195–395)	Dry, Wet
N	Aluminum Alloys	Content Si<5%	● ◐ ✽	TF15	1970(1310–3280)	1970(1310–3280)	1970(1310–3280)	1970(1310–3280)	Dry, Wet
S	Titanium Alloys (Ti-6Al-4V etc.)	–	● ◐	MP9120	165(130–230)	165(130–230)	165(130–230)	165(130–230)	Wet
			●	VP15TF	165(130–230)	165(130–230)	165(130–230)	165(130–230)	Wet
			◐ ✽	MP9130	165(130–230)	165(130–230)	165(130–230)	165(130–230)	Wet
	Titanium Alloys (Ti-6Al-5V-5Mo-3Cr etc.)	–	● ◐	MP9120	100(65–130)	100(65–130)	100(65–130)	100(65–130)	Wet
			●	VP15TF	100(65–130)	100(65–130)	100(65–130)	100(65–130)	Wet
			◐ ✽	MP9130	100(65–130)	100(65–130)	100(65–130)	100(65–130)	Wet
	Heat Resistant Alloys	–	● ◐	MP9120	130(100–195)	130(100–195)	130(100–195)	130(100–195)	Wet
			●	VP15TF	130(100–195)	130(100–195)	130(100–195)	130(100–195)	Wet
			◐ ✽	MP9130	130(100–195)	130(100–195)	130(100–195)	130(100–195)	Wet

Note 1) If there is chatter, insert chipping, etc. during machining, alter conditions accordingly.

Note 2) Chattering vibration is more likely under the following circumstances. Use a cut and feed per tooth that are at minimum recommended conditions or below.
- When tool overhang is long
- Rigidity of machine, workpiece material or attachment of workpiece material is low
- Corner radius during pocket milling

Note 3) A type with fewer teeth is recommended when the depth of cut in the radius direction (ae) is .5 DC or more.

Note 4) Wet cutting is recommended, when focusing on the surface finish. (Service life is shorter than for dry cutting.)

Note 5) When using under higher than recommended cutting conditions, or for long periods of time, the clamp screw may become fatigued and break during machining. Please change out the clamp screw periodically.

VPX200
DEEP SHOULDER MILLING

Recommended Cutting Conditions

Depth of Cut / Feed per Tooth

(inch)

	Workpiece Material	Properties	Width of Cut **ae**	Cutting Conditions	DC			
					ø20—ø28mm, ø.875—ø1.125"		**ø32—ø50mm, ø1.250—ø1.500"**	
					Depth of Cut **ap**	Feed per Tooth **fz** (IPT)	Depth of Cut **ap**	Feed per Tooth **fz** (IPT)
P	Mild Steels	Hardness ≤180HB	≤.25DC	● ◕ ✤	≤.551	.005(.004—.006)	≤APMX	.006(.004—.008)
			.25—.5DC	● ◕ ✤	≤.315	.004(.003—.005)	≤1.102	.005(.004—.006)
			.5—.75DC	● ◕ ✤	≤.236	.004(.003—.005)	≤.551	.004(.003—.005)
			DC(Slot)	● ◕ ✤	≤.157	.003(.002—.004)	≤.157	.003(.002—.004)
	Carbon Steels Alloy Steels	Hardness 180—280HB	≤.25DC	● ◕ ✤	≤.551	.005(.004—.006)	≤APMX	.006(.004—.008)
			.25—.5DC	● ◕ ✤	≤.315	.004(.003—.005)	≤1.102	.005(.004—.006)
			.5—.75DC	● ◕ ✤	≤.236	.004(.003—.005)	≤.551	.004(.003—.005)
			DC(Slot)	● ◕ ✤	≤.157	.003(.002—.004)	≤.157	.003(.002—.004)
	Carbon Steels Alloy Steels	Hardness 280—350HB	≤.25DC	● ◕ ✤	≤.551	.005(.004—.006)	≤APMX	.005(.004—.006)
			.25—.5DC	● ◕ ✤	≤.315	.004(.003—.005)	≤1.102	.004(.003—.005)
			.5—.75DC	● ◕ ✤	≤.236	.004(.003—.005)	≤.551	.003(.002—.004)
			DC(Slot)	● ◕ ✤	≤.157	.003(.002—.004)	≤.157	.003(.002—.004)
	Pre-hardened Steels	Hardness 35—45HRC	≤.25DC	● ◕ ✤	≤.551	.005(.004—.006)	≤APMX	.005(.004—.006)
			.25—.5DC	● ◕ ✤	≤.315	.004(.003—.005)	≤1.102	.004(.003—.005)
			.5—.75DC	● ◕ ✤	≤.236	.004(.003—.005)	≤.551	.003(.002—.004)
			DC(Slot)	● ◕ ✤	≤.157	.003(.002—.004)	≤.157	.003(.002—.004)
M	Austenitic Stainless Steels	—	≤.25DC	● ◕	≤.551	.005(.004—.006)	≤APMX	.006(.004—.008)
				✤	≤.551	.004(.003—.005)	≤APMX	.005(.003—.006)
			.25—.5DC	● ◕	≤.315	.004(.003—.005)	≤1.102	.005(.003—.006)
				✤	≤.315	.003(.002—.004)	≤1.102	.004(.003—.005)
			.5—.75DC	● ◕	≤.236	.003(.002—.004)	≤.551	.004(.003—.005)
				✤	≤.236	.003(.002—.003)	≤.551	.003(.002—.004)
			DC(Slot)	● ◕	≤.157	.003(.002—.004)	≤.157	.003(.002—.004)
				✤	≤.157	.003(.002—.003)	≤.157	.003(.002—.003)
	Ferritic and Martensitic Stainless Steels	Hardness ≤200HB	≤.25DC	● ◕	≤.551	.005(.004—.006)	≤APMX	.006(.004—.008)
				✤	≤.551	.004(.003—.005)	≤APMX	.005(.003—.006)
			.25—.5DC	● ◕	≤.315	.004(.003—.005)	≤1.102	.005(.003—.006)
				✤	≤.315	.003(.002—.004)	≤1.102	.004(.003—.005)
			.5—.75DC	● ◕	≤.236	.003(.002—.004)	≤.551	.004(.003—.005)
				✤	≤.236	.003(.002—.003)	≤.551	.003(.002—.004)
			DC(Slot)	● ◕	≤.157	.003(.002—.004)	≤.157	.003(.002—.004)
				✤	≤.157	.003(.002—.003)	≤.157	.003(.002—.003)
	Duplex Stainless Steels	Hardness ≤280HB	≤.25DC	● ◕	≤.551	.005(.004—.006)	≤APMX	.006(.004—.008)
				✤	≤.551	.004(.003—.005)	≤APMX	.005(.003—.006)
			.25—.5DC	● ◕	≤.315	.004(.003—.005)	≤1.102	.005(.003—.006)
				✤	≤.315	.003(.002—.004)	≤1.102	.004(.003—.005)
			.5—.75DC	● ◕	≤.236	.003(.002—.004)	≤.551	.004(.003—.005)
				✤	≤.236	.003(.002—.003)	≤.551	.003(.002—.004)
			DC(Slot)	● ◕	≤.157	.003(.002—.004)	≤.157	.003(.002—.004)
				✤	≤.157	.003(.002—.003)	≤.157	.003(.002—.003)
	Precipitation Hardening Stainless Steels	Hardness <450HB	≤.25DC	● ◕	≤.551	.005(.004—.006)	≤APMX	.005(.004—.006)
				✤	≤.551	.004(.003—.005)	≤APMX	.004(.003—.005)
			.25—.5DC	● ◕	≤.315	.004(.003—.005)	≤1.102	.004(.003—.005)
				✤	≤.315	.003(.002—.004)	≤1.102	.004(.003—.005)
			.5—.75DC	● ◕	≤.236	.003(.002—.004)	≤.551	.003(.002—.004)
				✤	≤.236	.003(.002—.003)	≤.551	.003(.002—.003)
			DC(Slot)	● ◕	≤.157	.003(.002—.004)	≤.157	.003(.002—.004)
				✤	≤.157	.003(.002—.003)	≤.157	.003(.002—.003)

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✤ : Unstable Cutting

(inch)

	Workpiece Material	Properties	Width of Cut **ae**	Cutting Conditions	DC			
					ø20—ø28mm, ø.875—ø1.125"		**ø32—ø50mm, ø1.250—ø1.500"**	
					Depth of Cut **ap**	Feed per Tooth **fz** (IPT)	Depth of Cut **ap**	Feed per Tooth **fz** (IPT)
K	Gray Cast Irons	Tensile Strength ≤350MPa	≤.25DC	● ◐	≤.551	.005(.004—.006)	≤APMX	.006(.004—.008)
				✤	≤.551	.004(.003—.005)	≤APMX	.005(.003—.006)
			.25—.5DC	● ◐	≤.315	.004(.003—.005)	≤1.102	.005(.003—.006)
				✤	≤.315	.003(.002—.004)	≤1.102	.004(.003—.005)
			.5—.75DC	● ◐	≤.236	.004(.003—.005)	≤.551	.004(.003—.005)
				✤	≤.236	.003(.002—.004)	≤.551	.003(.002—.004)
			DC(Slot)	● ◐	≤.157	.003(.002—.004)	≤.157	.003(.002—.004)
				✤	≤.157	.003(.002—.003)	≤.157	.003(.002—.003)
	Ductile Cast Irons	—	≤.25DC	● ◐	≤.551	.005(.004—.006)	≤APMX	.006(.004—.008)
				✤	≤.551	.004(.003—.005)	≤APMX	.005(.004—.006)
			.25—.5DC	● ◐	≤.315	.004(.003—.005)	≤1.102	.005(.004—.006)
				✤	≤.315	.003(.002—.004)	≤1.102	.004(.003—.005)
			.5—.75DC	● ◐	≤.236	.004(.003—.005)	≤.551	.004(.003—.005)
				✤	≤.236	.003(.002—.004)	≤.551	.003(.002—.004)
			DC(Slot)	● ◐	≤.157	.003(.002—.004)	≤.157	.003(.002—.004)
				✤	≤.157	.003(.002—.003)	≤.157	.003(.002—.003)
N	Aluminum Alloys	Content Si<5%	≤.25DC	● ◐	≤.551	.006(.004—.008)	≤APMX	.007(.004—.010)
				✤	≤.551	.005(.004—.006)	≤APMX	.006(.004—.008)
			.25—.5DC	● ◐	≤.315	.005(.004—.006)	≤1.102	.006(.004—.008)
				✤	≤.315	.004(.003—.005)	≤1.102	.005(.004—.006)
			.5—.75DC	● ◐	≤.236	.004(.003—.005)	≤.551	.004(.002—.006)
				✤	≤.236	.003(.002—.004)	≤.551	.004(.002—.006)
			DC(Slot)	● ◐	≤.157	.003(.002—.004)	≤.157	.004(.002—.006)
				✤	≤.157	.003(.002—.003)	≤.157	.004(.002—.005)
S	Titanium Alloys (Ti-6Al-4V etc.)	—	≤.25DC	● ◐ ✤	≤.551	.005(.003—.006)	≤APMX	.005(.003—.006)
			.25—.5DC	● ◐ ✤	≤.315	.004(.003—.005)	≤1.102	.004(.003—.005)
			.5—.75DC	● ◐ ✤	≤.236	.003(.002—.004)	≤.551	.003(.002—.004)
			DC(Slot)	● ◐ ✤	≤.157	.003(.002—.004)	≤.157	.003(.002—.004)
	Titanium Alloys (Ti-5Al-5V-5Mo-3Cr etc.)	—	≤.25DC	● ◐ ✤	≤.551	.004(.003—.005)	≤APMX	.004(.003—.005)
			.25—.5DC	● ◐ ✤	≤.315	.004(.003—.005)	≤1.102	.004(.003—.005)
			.5—.75DC	● ◐ ✤	≤.236	.003(.002—.004)	≤.551	.003(.002—.004)
			DC(Slot)	● ◐ ✤	≤.157	.003(.002—.004)	≤.157	.003(.002—.004)
	Heat Resistant Alloys	—	≤.25DC	● ◐ ✤	≤.551	.004(.003—.005)	≤APMX	.004(.003—.005)
			.25—.5DC	● ◐ ✤	≤.315	.004(.003—.005)	≤1.102	.004(.003—.005)
			.5—.75DC	● ◐ ✤	≤.236	.003(.002—.004)	≤.551	.003(.002—.004)
			DC(Slot)	● ◐ ✤	≤.157	.003(.002—.004)	≤.157	.003(.002—.004)

Note 1) If there is chatter, insert chipping, etc. during machining, alter conditions accordingly.
Note 2) Chattering vibration is more likely under the following circumstances. Use a cut and feed per tooth that are at minimum recommended conditions or below.
· When tool overhang is long
· Rigidity of machine, workpiece material or attachment of workpiece material is low
· Corner radius during pocket milling
Note 3) A type with fewer teeth is recommended when the depth of cut in the radius direction (ae) is .5 DC or more.
Note 4) Wet cutting is recommended, when focusing on the surface finish. (Service life is shorter than for dry cutting.)
Note 5) When using under higher than recommended cutting conditions, or for long periods of time, the clamp screw may become fatigued and break during machining. Please change out the clamp screw periodically.

VPX300
DEEP SHOULDER MILLING

Recommended Cutting Conditions

Depth of Cut / Feed per Tooth

(inch)

	Workpiece Material	Properties	Width of Cut **ae**	Cutting Conditions	DC			
					ø40mm, ø.1.500"		**ø50—ø80mm, ø2.000—ø3.000"**	
					Depth of Cut **ap**	Feed per Tooth **fz** (IPT)	Depth of Cut **ap**	Feed per Tooth **fz** (IPT)
P	Mild Steels	Hardness ≤180HB	≤.25DC	● ◕ ✤	≤APMX	.006(.004—.008)	≤APMX	.007(.004—.010)
			.25—.5DC	● ◕ ✤	≤APMX	.005(.004—.006)	≤1.220	.006(.004—.008)
			.5—.75DC	● ◕ ✤	≤.827	.004(.003—.005)	≤.827	.005(.004—.006)
			DC(Slot)	● ◕ ✤	≤.197	.003(.002—.004)	≤.197	.004(.003—.005)
	Carbon Steels Alloy Steels	Hardness 180—280HB	≤.25DC	● ◕ ✤	≤APMX	.006(.004—.008)	≤APMX	.007(.004—.010)
			.25—.5DC	● ◕ ✤	≤APMX	.005(.004—.006)	≤1.220	.006(.004—.008)
			.5—.75DC	● ◕ ✤	≤.827	.004(.003—.005)	≤.827	.005(.004—.006)
			DC(Slot)	● ◕ ✤	≤.197	.003(.002—.004)	≤.197	.004(.003—.005)
	Carbon Steels Alloy Steels	Hardness 280—350HB	≤.25DC	● ◕ ✤	≤APMX	.005(.004—.006)	≤APMX	.006(.004—.008)
			.25—.5DC	● ◕ ✤	≤APMX	.004(.003—.005)	≤1.220	.005(.004—.006)
			.5—.75DC	● ◕ ✤	≤.827	.003(.002—.004)	≤.827	.004(.003—.005)
			DC(Slot)	● ◕ ✤	≤.197	.003(.002—.004)	≤.197	.003(.002—.004)
	Pre-hardened Steels	Hardness 35—45HRC	≤.25DC	● ◕ ✤	≤APMX	.005(.004—.006)	≤APMX	.006(.004—.008)
			.25—.5DC	● ◕ ✤	≤APMX	.004(.003—.005)	≤1.220	.005(.004—.006)
			.5—.75DC	● ◕ ✤	≤.827	.003(.002—.004)	≤.827	.004(.003—.005)
			DC(Slot)	● ◕ ✤	≤.197	.003(.002—.004)	≤.197	.003(.002—.004)
M	Austenitic Stainless Steels	—	≤.25DC	● ◕	≤APMX	.006(.004—.008)	≤APMX	.006(.004—.008)
				✤	≤APMX	.005(.003—.006)	≤APMX	.005(.003—.006)
			.25—.5DC	● ◕	≤APMX	.005(.003—.006)	≤1.220	.005(.003—.006)
				✤	≤APMX	.004(.003—.005)	≤1.220	.004(.003—.005)
			.5—.75DC	● ◕	≤.827	.004(.003—.005)	≤.827	.004(.003—.005)
				✤	≤.827	.003(.002—.004)	≤.827	.003(.002—.004)
			DC(Slot)	● ◕	≤.197	.003(.002—.004)	≤.197	.003(.002—.004)
				✤	≤.197	.003(.002—.003)	≤.197	.003(.002—.003)
	Ferritic and Martensitic Stainless Steels	Hardness ≤200HB	≤.25DC	● ◕	≤APMX	.006(.004—.008)	≤APMX	.006(.004—.008)
				✤	≤APMX	.005(.003—.006)	≤APMX	.005(.003—.006)
			.25—.5DC	● ◕	≤APMX	.005(.003—.006)	≤1.220	.005(.003—.006)
				✤	≤APMX	.004(.003—.005)	≤1.220	.004(.003—.005)
			.5—.75DC	● ◕	≤.827	.004(.003—.005)	≤.827	.004(.003—.005)
				✤	≤.827	.003(.002—.004)	≤.827	.003(.002—.004)
			DC(Slot)	● ◕	≤.197	.003(.002—.004)	≤.197	.003(.002—.004)
				✤	≤.197	.003(.002—.003)	≤.197	.003(.002—.003)
	Duplex Stainless Steels	Hardness ≤280HB	≤.25DC	● ◕	≤APMX	.006(.004—.008)	≤APMX	.006(.004—.008)
				✤	≤APMX	.005(.003—.006)	≤APMX	.005(.003—.006)
			.25—.5DC	● ◕	≤APMX	.005(.003—.006)	≤1.220	.005(.003—.006)
				✤	≤APMX	.004(.003—.005)	≤1.220	.004(.003—.005)
			.5—.75DC	● ◕	≤.827	.004(.003—.005)	≤.827	.004(.003—.005)
				✤	≤.827	.003(.002—.004)	≤.827	.003(.002—.004)
			DC(Slot)	● ◕	≤.197	.003(.002—.004)	≤.197	.003(.002—.004)
				✤	≤.197	.003(.002—.003)	≤.197	.003(.002—.003)
	Precipitation Hardening Stainless Steels	Hardness <450HB	≤.25DC	● ◕	≤APMX	.005(.004—.006)	≤APMX	.005(.004—.006)
				✤	≤APMX	.004(.003—.005)	≤APMX	.004(.003—.005)
			.25—.5DC	● ◕	≤APMX	.004(.003—.005)	≤1.220	.004(.003—.005)
				✤	≤APMX	.004(.003—.005)	≤1.220	.004(.003—.005)
			.5—.75DC	● ◕	≤.827	.003(.002—.004)	≤.827	.003(.002—.004)
				✤	≤.827	.003(.002—.003)	≤.827	.003(.002—.003)
			DC(Slot)	● ◕	≤.197	.003(.002—.004)	≤.197	.003(.002—.004)
				✤	≤.197	.003(.002—.003)	≤.197	.003(.002—.003)

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✽ : Unstable Cutting

(inch)

	Workpiece Material	Properties	Width of Cut **ae**	Cutting Conditions	**DC**			
					ø40mm, ø.1.500"		**ø50—ø80mm, ø2.000—ø3.000"**	
					Depth of Cut **ap**	Feed per Tooth **fz** (IPT)	Depth of Cut **ap**	Feed per Tooth **fz** (IPT)
K	Gray Cast Irons	Tensile Strength ≦350MPa	≦.25DC	● ◐	≦APMX	.006(.004—.008)	≦APMX	.007(.004—.010)
				✽	≦APMX	.005(.003—.006)	≦APMX	.006(.004—.008)
			.25—.5DC	● ◐	≦APMX	.005(.003—.006)	≦1.220	.006(.004—.008)
				✽	≦APMX	.004(.003—.005)	≦1.220	.005(.004—.006)
			.5—.75DC	● ◐	≦.827	.004(.003—.005)	≦.827	.005(.004—.006)
				✽	≦.827	.003(.002—.004)	≦.827	.004(.003—.005)
			DC(Slot)	● ◐	≦.197	.003(.002—.004)	≦.197	.005(.003—.006)
				✽	≦.197	.003(.002—.003)	≦.197	.003(.002—.004)
	Ductile Cast Irons	—	≦.25DC	● ◐	≦APMX	.006(.004—.008)	≦APMX	.006(.004—.008)
				✽	≦APMX	.005(.004—.006)	≦APMX	.005(.004—.006)
			.25—.5DC	● ◐	≦APMX	.005(.004—.006)	≦1.220	.005(.004—.006)
				✽	≦APMX	.004(.003—.005)	≦1.220	.004(.003—.005)
			.5—.75DC	● ◐	≦.827	.004(.003—.005)	≦.827	.004(.003—.005)
				✽	≦.827	.003(.002—.004)	≦.827	.003(.002—.004)
			DC(Slot)	● ◐	≦.197	.003(.002—.004)	≦.197	.003(.002—.004)
				✽	≦.197	.003(.002—.003)	≦.197	.003(.002—.003)
N	Aluminum Alloys	Content Si＜5%	≦.25DC	● ◐	≦APMX	.007(.004—.010)	≦APMX	.007(.004—.010)
				✽	≦APMX	.006(.004—.008)	≦APMX	.006(.004—.008)
			.25—.5DC	● ◐	≦APMX	.006(.004—.008)	≦1.220	.006(.004—.008)
				✽	≦APMX	.005(.004—.006)	≦1.220	.005(.004—.006)
			.5—.75DC	● ◐	≦.827	.004(.002—.006)	≦.827	.005(.003—.006)
				✽	≦.827	.004(.002—.006)	≦.827	.005(.003—.006)
			DC(Slot)	● ◐	≦.197	.004(.002—.006)	≦.197	.005(.003—.006)
				✽	≦.197	.004(.002—.005)	≦.197	.004(.003—.005)
S	Titanium Alloys (Ti-6Al-4V etc.)	—	≦.25DC	● ◐ ✽	≦APMX	.005(.003—.006)	≦APMX	.005(.003—.006)
			.25—.5DC	● ◐ ✽	≦APMX	.004(.003—.005)	≦1.220	.004(.003—.005)
			.5—.75DC	● ◐ ✽	≦.827	.003(.002—.004)	≦.827	.003(.002—.004)
			DC(Slot)	● ◐ ✽	≦.197	.003(.002—.004)	≦.197	.003(.002—.004)
	Titanium Alloys (Ti-5Al-5V-5Mo-3Cr etc.)	—	≦.25DC	● ◐ ✽	≦APMX	.004(.003—.005)	≦APMX	.004(.003—.005)
			.25—.5DC	● ◐ ✽	≦APMX	.004(.003—.005)	≦1.220	.004(.003—.005)
			.5—.75DC	● ◐ ✽	≦.827	.003(.002—.004)	≦.827	.003(.002—.004)
			DC(Slot)	● ◐ ✽	≦.197	.003(.002—.004)	≦.197	.003(.002—.004)
	Heat Resistant Alloys	—	≦.25DC	● ◐ ✽	≦APMX	.004(.003—.005)	≦APMX	.004(.003—.005)
			.25—.5DC	● ◐ ✽	≦APMX	.004(.003—.005)	≦1.220	.004(.003—.005)
			.5—.75DC	● ◐ ✽	≦.827	.003(.002—.004)	≦.827	.003(.002—.004)
			DC(Slot)	● ◐ ✽	≦.197	.003(.002—.004)	≦.197	.003(.002—.004)

Note 1) If there is chatter, insert chipping, etc. during machining, alter conditions accordingly.
Note 2) Chattering vibration is more likely under the following circumstances. Use a cut and feed per tooth that are at minimum recommended conditions or below.
- When tool overhang is long
- Rigidity of machine, workpiece material or attachment of workpiece material is low
- Corner radius during pocket milling

Note 3) A type with fewer teeth is recommended when the depth of cut in the radius direction (ae) is .5 DC or more.
Note 4) Wet cutting is recommended, when focusing on the surface finish. (Service life is shorter than for dry cutting.)
Note 5) When using under higher than recommended cutting conditions, or for long periods of time, the clamp screw may become fatigued and break during machining. Please change out the clamp screw periodically.

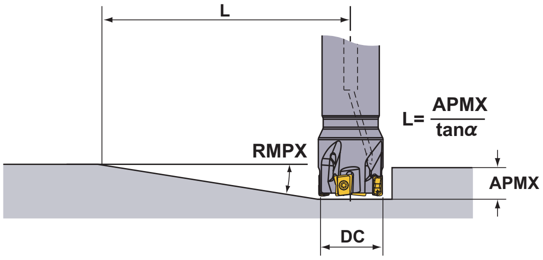
Multi-Functional Cutter for High Efficiency Machining

VPX200

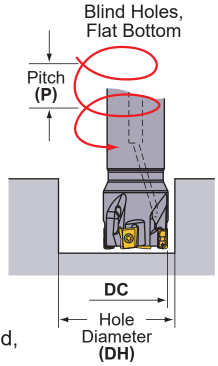
Recommended Cutting Conditions

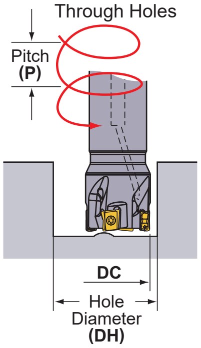
Ramping / Helical Milling

● **Ramping**



● **Helical Milling**





Refer to the table below for cutting conditions. For feed per tooth and cutting speed, follow the cutting conditions for slot milling.

(inch)

Cutting Edge Diameter DC	RE	Ramping		Helical Milling (Blind Hole, Flat Bottom)				Helical Milling (Through Hole)	
		Maximum Ramping Angle RMPX	Minimum Distance L *	Maximum Hole Diameter DH max.	Maximum Pitch P max.	Minimum Hole Diameter DH min.	Maximum Pitch P max.	Minimum Hole Diameter DH min.	Maximum Pitch P max.
.625	.008	1.87°	9.7	1.213	.060	1.072	.046	.942	.032
	.016	1.87°	9.7	1.197	.059	1.073	.046	.942	.032
	.031	1.87°	9.7	1.165	.055	1.073	.046	.942	.032
	.039	1.87°	9.7	1.150	.054	1.073	.046	.942	.032
	.047	1.87°	9.7	1.134	.052	1.073	.046	.942	.032
	.063	1.87°	9.7	1.102	.049	1.073	.046	.942	.032
.750	.008	1.43°	12.6	1.463	.056	1.323	.045	1.187	.034
	.016	1.43°	12.6	1.447	.055	1.323	.045	1.187	.034
	.031	1.43°	12.6	1.415	.052	1.323	.045	1.187	.034
	.039	1.43°	12.6	1.400	.051	1.323	.045	1.187	.034
	.047	1.43°	12.6	1.384	.050	1.323	.045	1.187	.034
	.063	1.43°	12.6	1.352	.047	1.323	.045	1.187	.034
.875	.008	1.14°	15.9	1.713	.052	1.574	.044	1.435	.035
	.016	1.14°	15.9	1.697	.051	1.574	.044	1.435	.035
	.031	1.14°	15.9	1.665	.049	1.574	.044	1.435	.035
	.039	1.14°	15.9	1.650	.048	1.574	.044	1.435	.035
	.047	1.14°	15.9	1.634	.047	1.574	.044	1.435	.035
	.063	1.14°	15.9	1.602	.045	1.575	.044	1.435	.035
1.000	.008	0.95°	19.0	1.963	.050	1.824	.043	1.685	.036
	.016	0.95°	19.0	1.947	.049	1.824	.043	1.685	.036
	.031	0.95°	19.0	1.915	.048	1.824	.043	1.685	.036
	.039	0.95°	19.0	1.900	.047	1.824	.043	1.685	.036
	.047	0.95°	19.0	1.884	.046	1.824	.043	1.685	.036
	.063	0.95°	19.0	1.852	.044	1.825	.043	1.685	.036
1.125	.008	0.82°	22.0	2.213	.049	2.074	.043	1.935	.036
	.016	0.82°	22.0	2.197	.048	2.074	.043	1.935	.036
	.031	0.82°	22.0	2.165	.047	2.074	.043	1.935	.036
	.039	0.82°	22.0	2.150	.046	2.074	.043	1.935	.036
	.047	0.82°	22.0	2.134	.045	2.074	.043	1.935	.036
	.063	0.82°	22.0	2.102	.044	2.075	.043	1.935	.036
1.250	.008	0.71°	25.4	2.463	.047	2.320	.042	2.183	.036
	.016	0.71°	25.4	2.447	.047	2.320	.042	2.183	.036
	.031	0.71°	25.4	2.415	.045	2.320	.042	2.183	.036
	.039	0.71°	25.4	2.400	.045	2.320	.042	2.183	.036
	.047	0.71°	25.4	2.384	.044	2.320	.042	2.183	.036
	.063	0.71°	25.4	2.352	.043	2.321	.042	2.183	.036

Note 1) When machining a highly ductile workpiece material with the ramping angles in the table above, chips may be elongated.
* Shows the distance until a maximum depth of cut of .315" is achieved at the maximum ramping angle L (= .315"/tan α).

(inch)

Cutting Edge Diameter DC	RE	Ramping		Helical Milling (Blind Hole, Flat Bottom)				Helical Milling (Through Hole)	
		Maximum Ramping Angle RMPX	Minimum Distance * L	Maximum Hole Diameter DH max.	Maximum Pitch P max.	Minimum Hole Diameter DH min.	Maximum Pitch P max.	Minimum Hole Diameter DH min.	Maximum Pitch P max.
1.375	.008	0.64°	28.2	2.713	.047	2.574	.042	2.435	.037
	.016	0.64°	28.2	2.697	.046	2.574	.042	2.435	.037
	.031	0.64°	28.2	2.665	.045	2.574	.042	2.435	.037
	.039	0.64°	28.2	2.650	.045	2.574	.042	2.435	.037
	.047	0.64°	28.2	2.634	.044	2.574	.042	2.435	.037
	.063	0.64°	28.2	2.602	.043	2.574	.042	2.435	.037
1.500	.008	0.57°	31.7	2.963	.046	2.820	.041	2.683	.037
	.016	0.57°	31.7	2.947	.045	2.820	.041	2.683	.037
	.031	0.57°	31.7	2.915	.044	2.820	.041	2.683	.037
	.039	0.57°	31.7	2.900	.044	2.820	.041	2.683	.037
	.047	0.57°	31.7	2.884	.043	2.820	.041	2.683	.037
	.063	0.57°	31.7	2.852	.042	2.821	.041	2.683	.037
2.000	.008	0.41°	44.0	3.963	.044	3.820	.041	3.683	.038
	.016	0.41°	44.0	3.947	.044	3.820	.041	3.683	.038
	.031	0.41°	44.0	3.915	.043	3.820	.041	3.683	.038
	.039	0.41°	44.0	3.900	.043	3.820	.041	3.683	.038
	.047	0.41°	44.0	3.884	.042	3.820	.041	3.683	.038
	.063	0.41°	44.0	3.852	.042	3.820	.041	3.683	.038
2.500	.008	0.32°	56.4	4.963	.043	4.820	.041	4.683	.038
	.016	0.32°	56.4	4.947	.043	4.820	.041	4.683	.038
	.031	0.32°	56.4	4.915	.042	4.820	.041	4.683	.038
	.039	0.32°	56.4	4.900	.042	4.820	.041	4.683	.038
	.047	0.32°	56.4	4.884	.042	4.820	.041	4.683	.038
	.063	0.32°	56.4	4.852	.041	4.820	.041	4.683	.038

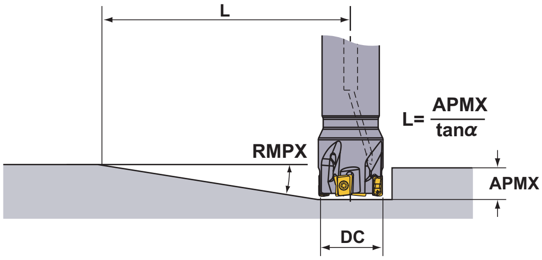
Note 1) When machining a highly ductile workpiece material with the ramping angles in the table above, chips may be elongated.
* Shows the distance until a maximum depth of cut of .315” is achieved at the maximum ramping angle L (= .315”/tan α).

VPX200

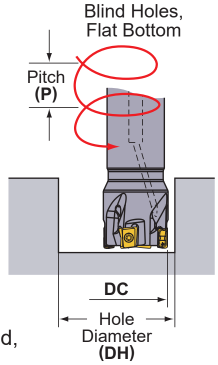
Recommended Cutting Conditions

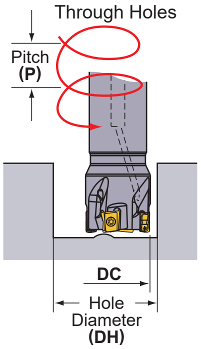
Ramping / Helical Milling

● Ramping



● Helical Milling





Refer to the table below for cutting conditions. For feed per tooth and cutting speed, follow the cutting conditions for slot milling.

(mm)

DC	RE	Ramping		Helical Milling (Blind Hole, Flat Bottom)				Helical Milling (Through Hole)	
		RMPX	L *	DH max.	P max.	DH min.	P max.	DH min.	P max.
16	0.2	1.85°	248	31.0	1.5	27.5	1.2	24.2	0.8
	0.4	1.85°	248	30.6	1.5	27.5	1.2	24.2	0.8
	0.8	1.85°	248	29.8	1.4	27.5	1.2	24.2	0.8
	1.0	1.85°	248	29.4	1.4	27.5	1.2	24.2	0.8
	1.2	1.85°	248	29.0	1.3	27.5	1.2	24.2	0.8
	1.6	1.85°	248	28.2	1.2	27.5	1.2	24.2	0.8
18	0.2	1.56°	294	35.0	1.5	31.5	1.2	28.1	0.9
	0.4	1.56°	294	34.6	1.4	31.5	1.2	28.1	0.9
	0.8	1.56°	294	33.8	1.4	31.5	1.2	28.1	0.9
	1.0	1.56°	294	33.4	1.3	31.5	1.2	28.1	0.9
	1.2	1.56°	294	33.0	1.3	31.5	1.2	28.1	0.9
	1.6	1.56°	294	32.2	1.2	31.5	1.2	28.1	0.9
20	0.2	1.35°	340	39.0	1.4	35.5	1.1	32.0	0.9
	0.4	1.35°	340	38.6	1.4	35.5	1.1	32.0	0.9
	0.8	1.35°	340	37.8	1.3	35.5	1.1	32.0	0.9
	1.0	1.35°	340	37.4	1.3	35.5	1.1	32.0	0.9
	1.2	1.35°	340	37.0	1.3	35.5	1.1	32.0	0.9
	1.6	1.35°	340	36.2	1.2	35.5	1.1	32.0	0.9
22	0.2	1.16°	396	43.0	1.3	39.5	1.1	36.0	0.9
	0.4	1.16°	396	42.6	1.3	39.5	1.1	36.0	0.9
	0.8	1.16°	396	41.8	1.3	39.5	1.1	36.0	0.9
	1.0	1.16°	396	41.4	1.2	39.5	1.1	36.0	0.9
	1.2	1.16°	396	41.0	1.2	39.5	1.1	36.0	0.9
	1.6	1.16°	396	40.2	1.2	39.5	1.1	36.0	0.9
25	0.2	0.97°	473	49.0	1.3	45.5	1.1	42.0	0.9
	0.4	0.97°	473	48.6	1.3	45.5	1.1	42.0	0.9
	0.8	0.97°	473	47.8	1.2	45.5	1.1	42.0	0.9
	1.0	0.97°	473	47.4	1.2	45.5	1.1	42.0	0.9
	1.2	0.97°	473	47.0	1.2	45.5	1.1	42.0	0.9
	1.6	0.97°	473	46.2	1.1	45.5	1.1	42.0	0.9
28	0.2	0.84°	546	55.0	1.2	51.5	1.1	48.0	0.9
	0.4	0.84°	546	54.6	1.2	51.5	1.1	48.0	0.9
	0.8	0.84°	546	53.8	1.2	51.5	1.1	48.0	0.9
	1.0	0.84°	546	53.4	1.2	51.5	1.1	48.0	0.9
	1.2	0.84°	546	53.0	1.2	51.5	1.1	48.0	0.9
	1.6	0.84°	546	52.2	1.1	51.5	1.1	48.0	0.9
30	0.2	0.77°	596	59.0	1.2	55.5	1.1	52.0	0.9
	0.4	0.77°	596	58.6	1.2	55.5	1.1	52.0	0.9
	0.8	0.77°	596	57.8	1.2	55.5	1.1	52.0	0.9
	1.0	0.77°	596	57.4	1.2	55.5	1.1	52.0	0.9
	1.2	0.77°	596	57.0	1.1	55.5	1.1	52.0	0.9
	1.6	0.77°	596	56.2	1.1	55.5	1.1	52.0	0.9

(mm)

DC	RE	Ramping		Helical Milling (Blind Hole, Flat Bottom)				Helical Milling (Through Hole)	
		RMPX	L *	DH max.	P max.	DH min.	P max.	DH min.	P max.
32	0.2	0.71°	646	62.8	1.2	59.4	1.1	56.0	0.9
	0.4	0.71°	646	62.4	1.2	59.4	1.1	56.0	0.9
	0.8	0.71°	646	61.6	1.2	59.4	1.1	56.0	0.9
	1.0	0.71°	646	61.2	1.1	59.4	1.1	56.0	0.9
	1.2	0.71°	646	60.8	1.1	59.4	1.1	56.0	0.9
	1.6	0.71°	646	60.0	1.1	59.4	1.1	56.0	0.9
35	0.2	0.63°	728	69.0	1.2	65.5	1.1	62.0	0.9
	0.4	0.63°	728	68.6	1.2	65.5	1.1	62.0	0.9
	0.8	0.63°	728	67.8	1.1	65.5	1.1	62.0	0.9
	1.0	0.63°	728	67.4	1.1	65.5	1.1	62.0	0.9
	1.2	0.63°	728	67.0	1.1	65.5	1.1	62.0	0.9
	1.6	0.63°	728	66.2	1.1	65.5	1.1	62.0	0.9
40	0.2	0.54°	849	78.8	1.2	75.4	1.0	72.0	0.9
	0.4	0.54°	849	78.4	1.1	75.4	1.0	72.0	0.9
	0.8	0.54°	849	77.6	1.1	75.4	1.0	72.0	0.9
	1.0	0.54°	849	77.2	1.1	75.4	1.0	72.0	0.9
	1.2	0.54°	849	76.8	1.1	75.4	1.0	72.0	0.9
	1.6	0.54°	849	76.0	1.1	75.4	1.0	72.0	0.9
50	0.2	0.42°	1092	98.8	1.1	95.4	1.0	92.0	1.0
	0.4	0.42°	1092	98.4	1.1	95.4	1.0	92.0	1.0
	0.8	0.42°	1092	97.6	1.1	95.4	1.0	92.0	1.0
	1.0	0.42°	1092	97.2	1.1	95.4	1.0	92.0	1.0
	1.2	0.42°	1092	96.8	1.1	95.4	1.0	92.0	1.0
	1.6	0.42°	1092	96.0	1.1	95.4	1.0	92.0	1.0
63	0.2	0.32°	1433	124.8	1.1	121.4	1.0	118.0	1.0
	0.4	0.32°	1433	124.4	1.1	121.4	1.0	118.0	1.0
	0.8	0.32°	1433	123.6	1.1	121.4	1.0	118.0	1.0
	1.0	0.32°	1433	123.2	1.1	121.4	1.0	118.0	1.0
	1.2	0.32°	1433	122.8	1.1	121.4	1.0	118.0	1.0
	1.6	0.32°	1433	122.0	1.0	121.4	1.0	118.0	1.0

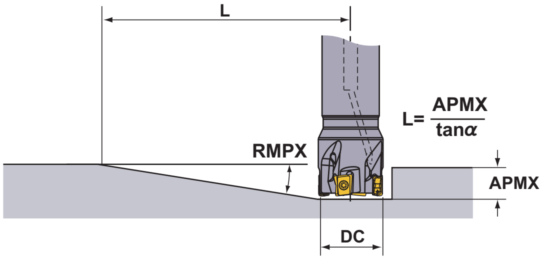
Note 1) When machining a highly ductile workpiece material with the ramping angles in the table above, chips may be elongated.
* Shows the distance until a maximum depth of cut of 8 mm is achieved at the maximum ramping angle L (= 8/tan α).

VPX300

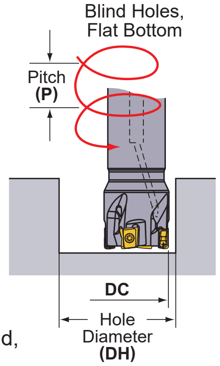
Recommended Cutting Conditions

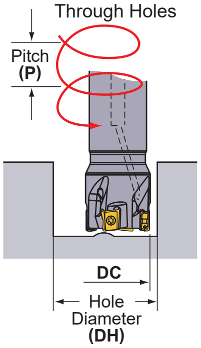
Ramping / Helical Milling

● **Ramping**



● **Helical Milling**





Refer to the table below for cutting conditions. For feed per tooth and cutting speed, follow the cutting conditions for slot milling.

(inch)

Cutting Edge Diameter DC	RE	Ramping		Helical Milling (Blind Hole, Flat Bottom)				Helical Milling (Through Hole)	
		Maximum Ramping Angle RMPX	Minimum Distance * L	Maximum Hole Diameter DH max.	Maximum Pitch P max.	Minimum Hole Diameter DH min.	Maximum Pitch P max.	Minimum Hole Diameter DH min.	Maximum Pitch P max.
1.000	.008	2.07°	12.0	1.963	.109	1.713	.081	1.483	.055
	.016	2.07°	12.0	1.947	.108	1.713	.081	1.483	.055
	.031	2.07°	12.0	1.915	.104	1.713	.081	1.483	.055
	.039	2.07°	12.0	1.900	.102	1.713	.081	1.483	.055
	.047	2.07°	12.0	1.884	.100	1.713	.081	1.483	.055
	.063	2.07°	12.0	1.852	.097	1.713	.081	1.483	.055
	.079	2.07°	12.0	1.821	.093	1.713	.081	1.483	.055
	.094	2.07°	12.0	1.789	.090	1.713	.081	1.483	.055
	.118	2.07°	12.0	1.742	.084	1.713	.081	1.483	.055
	.126	2.07°	12.0	1.726	.082	1.713	.081	1.483	.055
1.125	.008	1.73°	14.4	2.213	.103	1.963	.080	1.726	.057
	.016	1.73°	14.4	2.197	.102	1.963	.080	1.726	.057
	.031	1.73°	14.4	2.165	.099	1.963	.080	1.726	.057
	.039	1.73°	14.4	2.150	.097	1.963	.080	1.726	.057
	.047	1.73°	14.4	2.134	.096	1.963	.080	1.726	.057
	.063	1.73°	14.4	2.102	.093	1.963	.080	1.726	.057
	.079	1.73°	14.4	2.071	.090	1.963	.080	1.726	.057
	.094	1.73°	14.4	2.039	.087	1.963	.080	1.726	.057
	.118	1.73°	14.4	1.992	.082	1.963	.080	1.726	.057
	.126	1.73°	14.4	1.976	.081	1.963	.079	1.726	.057
1.250	.008	1.49°	16.7	2.463	.099	2.214	.079	1.973	.059
	.016	1.49°	16.7	2.447	.098	2.214	.079	1.973	.059
	.031	1.49°	16.7	2.415	.095	2.214	.079	1.973	.059
	.039	1.49°	16.7	2.400	.094	2.214	.079	1.973	.059
	.047	1.49°	16.7	2.384	.093	2.214	.079	1.973	.059
	.063	1.49°	16.7	2.352	.090	2.214	.079	1.973	.059
	.079	1.49°	16.7	2.321	.088	2.214	.079	1.973	.059
	.094	1.49°	16.7	2.289	.085	2.214	.079	1.973	.059
	.118	1.49°	16.7	2.242	.081	2.214	.079	1.973	.059
	.126	1.49°	16.7	2.226	.080	2.214	.079	1.973	.059
1.375	.008	1.28°	19.4	2.713	.094	2.465	.076	2.221	.059
	.016	1.28°	19.4	2.697	.093	2.465	.076	2.221	.059
	.031	1.28°	19.4	2.665	.091	2.465	.076	2.221	.059
	.039	1.28°	19.4	2.650	.089	2.465	.076	2.221	.059
	.047	1.28°	19.4	2.634	.088	2.465	.076	2.221	.059
	.063	1.28°	19.4	2.602	.086	2.465	.076	2.221	.059
	.079	1.28°	19.4	2.571	.084	2.465	.076	2.221	.059
	.094	1.28°	19.4	2.539	.082	2.465	.076	2.221	.059
	.118	1.28°	19.4	2.492	.078	2.465	.077	2.221	.059
	.126	1.28°	19.4	2.476	.077	2.465	.077	2.221	.059

Note 1) When machining a highly ductile workpiece material with the ramping angles in the table above, chips may be elongated.
* Shows the distance until a maximum depth of cut of .433" is achieved at the maximum ramping angle L (= .433"/tan α).

(inch)

Cutting Edge Diameter **DC**	**RE**	Ramping		Helical Milling (Blind Hole, Flat Bottom)				Helical Milling (Through Hole)	
		Maximum Ramping Angle **RMPX**	Minimum Distance * **L**	Maximum Hole Diameter **DH max.**	Maximum Pitch **P max.**	Minimum Hole Diameter **DH min.**	Maximum Pitch **P max.**	Minimum Hole Diameter **DH min.**	Maximum Pitch **P max.**
1.500	.008	1.13°	22.0	2.963	.091	2.711	.075	2.469	.060
	.016	1.13°	22.0	2.947	.090	2.711	.075	2.469	.060
	.031	1.13°	22.0	2.915	.088	2.711	.075	2.469	.060
	.039	1.13°	22.0	2.900	.087	2.711	.075	2.469	.060
	.047	1.13°	22.0	2.884	.086	2.711	.075	2.469	.060
	.063	1.13°	22.0	2.852	.084	2.711	.075	2.469	.060
	.079	1.13°	22.0	2.821	.082	2.711	.075	2.469	.060
	.094	1.13°	22.0	2.789	.080	2.711	.075	2.469	.060
	.118	1.13°	22.0	2.742	.077	2.711	.075	2.469	.060
	.126	1.13°	22.0	2.726	.076	2.711	.075	2.469	.060
2.000	.008	0.78°	31.8	3.963	.084	3.711	.073	3.469	.063
	.016	0.78°	31.8	3.947	.083	3.711	.073	3.469	.063
	.031	0.78°	31.8	3.915	.082	3.711	.073	3.469	.063
	.039	0.78°	31.8	3.900	.081	3.711	.073	3.469	.063
	.047	0.78°	31.8	3.884	.081	3.711	.073	3.469	.063
	.063	0.78°	31.8	3.852	.079	3.711	.073	3.469	.063
	.079	0.78°	31.8	3.821	.078	3.711	.073	3.469	.063
	.094	0.78°	31.8	3.789	.077	3.711	.073	3.469	.063
	.118	0.78°	31.8	3.742	.075	3.711	.073	3.469	.063
	.126	0.78°	31.8	3.726	.074	3.711	.073	3.469	.063
2.500	.008	0.59°	42.1	4.963	.080	4.711	.072	4.469	.064
	.016	0.59°	42.1	4.947	.079	4.711	.072	4.469	.064
	.031	0.59°	42.1	4.915	.078	4.711	.072	4.469	.064
	.039	0.59°	42.1	4.900	.078	4.711	.072	4.469	.064
	.047	0.59°	42.1	4.884	.077	4.711	.072	4.469	.064
	.063	0.59°	42.1	4.852	.076	4.711	.072	4.469	.064
	.079	0.59°	42.1	4.821	.075	4.711	.072	4.469	.064
	.094	0.59°	42.1	4.789	.074	4.711	.072	4.469	.064
	.118	0.59°	42.1	4.742	.073	4.711	.072	4.469	.064
	.126	0.59°	42.1	4.726	.072	4.711	.072	4.469	.064
3.000	.008	0.48°	51.7	5.955	.078	5.711	.071	5.469	.065
	.016	0.48°	51.7	5.939	.077	5.711	.071	5.469	.065
	.031	0.48°	51.7	5.907	.077	5.711	.071	5.469	.065
	.039	0.48°	51.7	5.892	.076	5.711	.071	5.469	.065
	.047	0.48°	51.7	5.876	.076	5.711	.071	5.469	.065
	.063	0.48°	51.7	5.844	.075	5.711	.071	5.469	.065
	.079	0.48°	51.7	5.813	.074	5.711	.071	5.469	.065
	.094	0.48°	51.7	5.781	.073	5.711	.071	5.469	.065
	.118	0.48°	51.7	5.734	.072	5.711	.071	5.469	.065
	.126	0.48°	51.7	5.718	.072	5.711	.071	5.469	.065

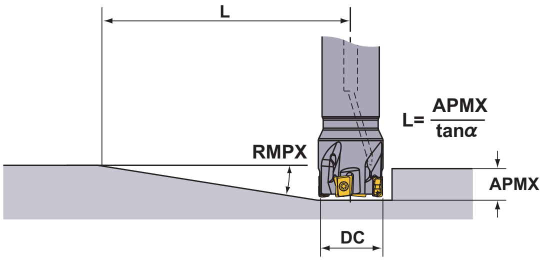
Note 1) When machining a highly ductile workpiece material with the ramping angles in the table above, chips may be elongated.
* Shows the distance until a maximum depth of cut of .433" is achieved at the maximum ramping angle L (= .433"/tan α).

VPX300

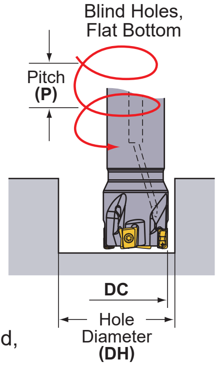
Recommended Cutting Conditions

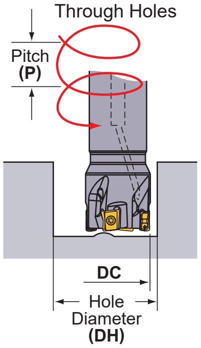
Ramping / Helical Milling

● **Ramping**



● **Helical Milling**





Refer to the table below for cutting conditions. For feed per tooth and cutting speed, follow the cutting conditions for slot milling.

(mm)

DC	RE	Ramping		Helical Milling (Blind Hole, Flat Bottom)				Helical Milling (Through Hole)	
		RMPX	L *	DH max.	P max.	DH min.	P max.	DH min.	P max.
25	0.2	2.13°	296	49.0	2.8	42.7	2.1	36.9	1.4
	0.4	2.13°	296	48.6	2.8	42.7	2.1	36.9	1.4
	0.8	2.13°	296	47.8	2.7	42.7	2.1	36.9	1.4
	1.0	2.13°	296	47.4	2.6	42.7	2.1	36.9	1.4
	1.2	2.13°	296	47.0	2.6	42.7	2.1	36.9	1.4
	1.6	2.13°	296	46.2	2.5	42.7	2.1	36.9	1.4
	2.0	2.13°	296	45.4	2.4	42.7	2.1	36.9	1.4
	2.4	2.13°	296	44.6	2.3	42.7	2.1	36.9	1.4
	3.0	2.13°	296	43.4	2.2	42.7	2.1	36.9	1.4
	3.2	2.13°	296	43.0	2.1	42.7	2.1	36.9	1.4
28	0.2	1.77°	356	55.0	2.6	48.7	2.0	42.7	1.4
	0.4	1.77°	356	54.6	2.6	48.7	2.0	42.7	1.4
	0.8	1.77°	356	53.8	2.5	48.7	2.0	42.7	1.4
	1.0	1.77°	356	53.4	2.5	48.7	2.0	42.7	1.4
	1.2	1.77°	356	53.0	2.4	48.7	2.0	42.7	1.4
	1.6	1.77°	356	52.2	2.4	48.7	2.0	42.7	1.4
	2.0	1.77°	356	51.4	2.3	48.7	2.0	42.7	1.4
	2.4	1.77°	356	50.6	2.2	48.7	2.0	42.7	1.4
	3.0	1.77°	356	49.4	2.1	48.7	2.0	42.7	1.4
	3.2	1.77°	356	49.0	2.0	48.7	2.0	42.7	1.4
30	0.2	1.61°	392	59.0	2.6	52.7	2.0	46.6	1.5
	0.4	1.61°	392	58.6	2.5	52.7	2.0	46.6	1.5
	0.8	1.61°	392	57.8	2.5	52.7	2.0	46.6	1.5
	1.0	1.61°	392	57.4	2.4	52.7	2.0	46.6	1.5
	1.2	1.61°	392	57.0	2.4	52.7	2.0	46.6	1.5
	1.6	1.61°	392	56.2	2.3	52.7	2.0	46.6	1.5
	2.0	1.61°	392	55.4	2.2	52.7	2.0	46.6	1.5
	2.4	1.61°	392	54.6	2.2	52.7	2.0	46.6	1.5
	3.0	1.61°	392	53.4	2.1	52.7	2.0	46.6	1.5
	3.2	1.61°	392	53.0	2.0	52.7	2.0	46.6	1.5
32	0.2	1.47°	429	63.0	2.5	56.7	2.0	50.6	1.5
	0.4	1.47°	429	62.6	2.5	56.7	2.0	50.6	1.5
	0.8	1.47°	429	61.8	2.4	56.7	2.0	50.6	1.5
	1.0	1.47°	429	61.4	2.4	56.7	2.0	50.6	1.5
	1.2	1.47°	429	61.0	2.3	56.7	2.0	50.6	1.5
	1.6	1.47°	429	60.2	2.3	56.7	2.0	50.6	1.5
	2.0	1.47°	429	59.4	2.2	56.7	2.0	50.6	1.5
	2.4	1.47°	429	58.6	2.1	56.7	2.0	50.6	1.5
	3.0	1.47°	429	57.4	2.1	56.7	2.0	50.6	1.5
	3.2	1.47°	429	57.0	2.0	56.7	2.0	50.6	1.5

(mm)

DC	RE	Ramping		Helical Milling (Blind Hole, Flat Bottom)				Helical Milling (Through Hole)	
		RMPX	**L** *	**DH max.**	**P max.**	**DH min.**	**P max.**	**DH min.**	**P max.**
35	0.2	1.28°	493	69.0	2.4	62.8	1.9	56.6	1.5
	0.4	1.28°	493	68.6	2.4	62.8	1.9	56.6	1.5
	0.8	1.28°	493	67.8	2.3	62.8	1.9	56.6	1.5
	1.0	1.28°	493	67.4	2.3	62.8	1.9	56.6	1.5
	1.2	1.28°	493	67.0	2.2	62.8	1.9	56.6	1.5
	1.6	1.28°	493	66.2	2.2	62.8	1.9	56.6	1.5
	2.0	1.28°	493	65.4	2.1	62.8	1.9	56.6	1.5
	2.4	1.28°	493	64.6	2.1	62.8	1.9	56.6	1.5
	3.0	1.28°	493	63.4	2.0	62.8	1.9	56.6	1.5
	3.2	1.28°	493	63.0	2.0	62.8	1.9	56.6	1.5
40	0.2	1.06°	595	78.8	2.3	72.7	1.9	66.5	1.5
	0.4	1.06°	595	78.4	2.2	72.7	1.9	66.5	1.5
	0.8	1.06°	595	77.6	2.2	72.7	1.9	66.5	1.5
	1.0	1.06°	595	77.2	2.2	72.7	1.9	66.5	1.5
	1.2	1.06°	595	76.8	2.1	72.7	1.9	66.5	1.5
	1.6	1.06°	595	76.0	2.1	72.7	1.9	66.5	1.5
	2.0	1.06°	595	75.2	2.0	72.7	1.9	66.5	1.5
	2.4	1.06°	595	74.4	2.0	72.7	1.9	66.5	1.5
	3.0	1.06°	595	73.2	1.9	72.7	1.9	66.5	1.5
	3.2	1.06°	595	72.8	1.9	72.7	1.9	66.5	1.5
50	0.2	0.79°	798	98.8	2.1	92.7	1.8	86.5	1.6
	0.4	0.79°	798	98.4	2.1	92.7	1.8	86.5	1.6
	0.8	0.79°	798	97.6	2.1	92.7	1.8	86.5	1.6
	1.0	0.79°	798	97.2	2.0	92.7	1.8	86.5	1.6
	1.2	0.79°	798	96.8	2.0	92.7	1.8	86.5	1.6
	1.6	0.79°	798	96.0	2.0	92.7	1.8	86.5	1.6
	2.0	0.79°	798	95.2	2.0	92.7	1.8	86.5	1.6
	2.4	0.79°	798	94.4	1.9	92.7	1.8	86.5	1.6
	3.0	0.79°	798	93.2	1.9	92.7	1.8	86.5	1.6
	3.2	0.79°	798	92.8	1.9	92.7	1.8	86.5	1.6
63	0.2	0.6°	1051	124.8	2.0	118.7	1.8	112.5	1.6
	0.4	0.6°	1051	124.4	2.0	118.7	1.8	112.5	1.6
	0.8	0.6°	1051	123.6	2.0	118.7	1.8	112.5	1.6
	1.0	0.6°	1051	123.2	2.0	118.7	1.8	112.5	1.6
	1.2	0.6°	1051	122.8	2.0	118.7	1.8	112.5	1.6
	1.6	0.6°	1051	122.0	1.9	118.7	1.8	112.5	1.6
	2.0	0.6°	1051	121.2	1.9	118.7	1.8	112.5	1.6
	2.4	0.6°	1051	120.4	1.9	118.7	1.8	112.5	1.6
	3.0	0.6°	1051	119.2	1.9	118.7	1.8	112.5	1.6
	3.2	0.6°	1051	118.8	1.8	118.7	1.8	112.5	1.6
80	0.2	0.45°	1401	158.8	1.9	152.6	1.8	146.5	1.6
	0.4	0.45°	1401	158.4	1.9	152.7	1.8	146.5	1.6
	0.8	0.45°	1401	157.6	1.9	152.7	1.8	146.5	1.6
	1.0	0.45°	1401	157.2	1.9	152.7	1.8	146.5	1.6
	1.2	0.45°	1401	156.8	1.9	152.7	1.8	146.5	1.6
	1.6	0.45°	1401	156.0	1.9	152.7	1.8	146.5	1.6
	2.0	0.45°	1401	155.2	1.9	152.7	1.8	146.5	1.6
	2.4	0.45	1401	154.4	1.8	152.7	1.8	146.5	1.6
	3.0	0.45	1401	153.2	1.8	152.7	1.8	146.5	1.6
	3.2	0.45	1401	152.8	1.8	152.7	1.8	146.5	1.6

Note 1) When machining a highly ductile workpiece material with the ramping angles in the table above, chips may be elongated.
* Shows the distance until a maximum depth of cut of 11 mm is achieved at the maximum ramping angle L (= 11/tan α).

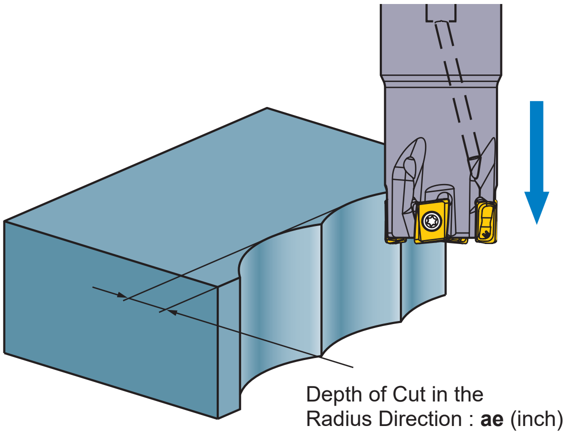
VPX200

Recommended Cutting Conditions

For Plunging and Drilling

See the tables to the right for cutting conditions. Follow the cutting conditions for slot milling regarding feed per tooth and cutting speed.

● Plunging

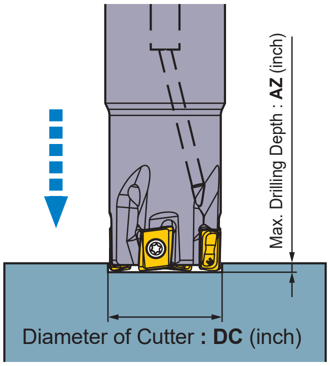


(inch)

DC	ae max.
.625	.154
.750	.154
.875	.157
1.000	.157
1.125	.157
1.250	.157
1.375	.157
1.500	.157
2.000	.157
2.500	.157

Note 1) No step feed necessary.

● Drilling



(inch)

DC	AZ max.
.625	.012
.750	.012
.875	.012
1.000	.012
1.125	.012
1.250	.012
1.375	.012
1.500	.012
2.000	.012
2.500	.012

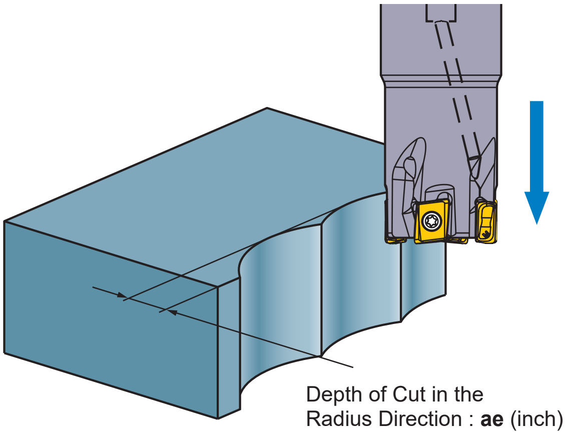
Note 1) Exercise due caution as chips scatter easily.
Note 2) Use compressed air to eliminate chips (or coolant for when machining aluminum alloy).

Recommended Cutting Conditions

For Plunging and Drilling

See the tables to the right for cutting conditions. Follow the cutting conditions for slot milling regarding feed per tooth and cutting speed.

● Plunging

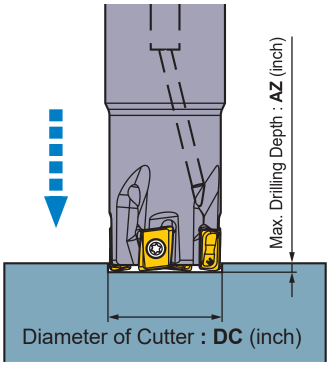


(inch)

DC	ae max.
1.000	.256
1.125	.260
1.250	.260
1.375	.260
1.500	.264
2.000	.264
2.500	.264
3.000	.264

Note 1) No step feed necessary.

● Drilling



(inch)

DC	AZ max.
1.000	.022
1.125	.022
1.250	.022
1.375	.022
1.500	.022
2.000	.022
2.500	.022
3.000	.022

Note 1) Exercise due caution as chips scatter easily.
Note 2) Use compressed air to eliminate chips (or coolant for when machining aluminum alloy).

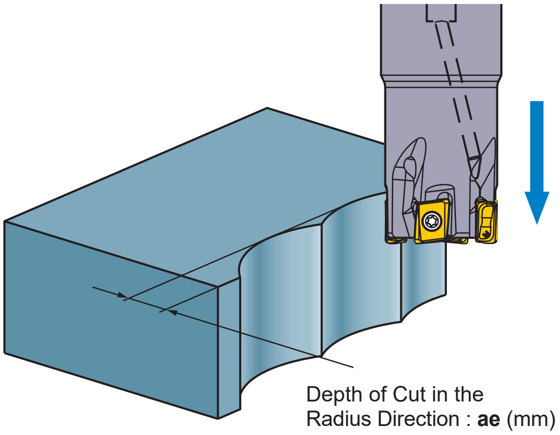
VPX200/300

Recommended Cutting Conditions

For Plunging and Drilling

See the tables to the right for cutting conditions. Follow the cutting conditions for slot milling regarding feed per tooth and cutting speed.

● Plunging



Note1) No step feed necessary.

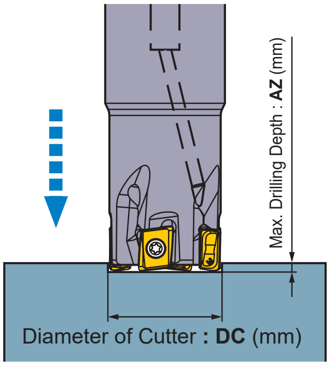
VPX200 (mm)

DC	ae max.
16	3.9
18	3.9
20	3.9
22	4.0
25	4.0
28	4.0
30	4.0
32	4.0
35	4.0
40	4.0
50	4.0
63	4.0

VPX300 (mm)

DC	ae max.
25	6.5
28	6.6
30	6.6
32	6.6
35	6.7
40	6.7
50	6.7
63	6.7
80	6.7

● Drilling



VPX200 (mm)

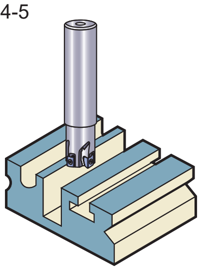
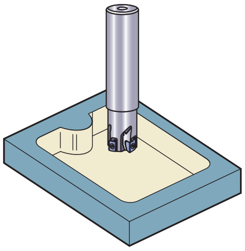
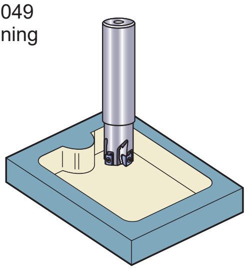
DC	AZ max.
16	0.3
18	0.3
20	0.3
22	0.3
25	0.3
28	0.3
30	0.3
32	0.3
35	0.3
40	0.3
50	0.3
63	0.3

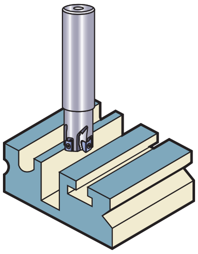
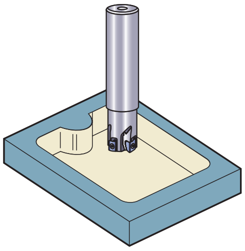
VPX300 (mm)

DC	AZ max.
25	0.55
28	0.55
30	0.55
32	0.55
35	0.55
40	0.55
50	0.55
63	0.55
80	0.55

Note 1) Exercise due caution as chips scatter easily.
Note 2) Use compressed air to eliminate chips (or coolant for when machining aluminium alloy).

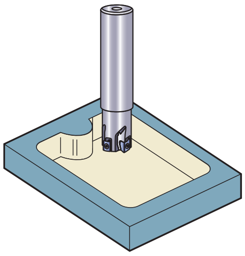
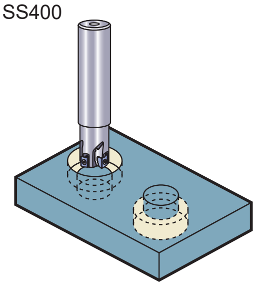
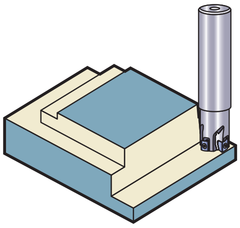
Application Examples

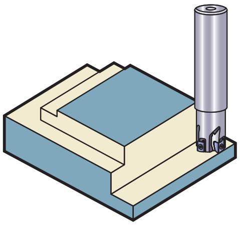
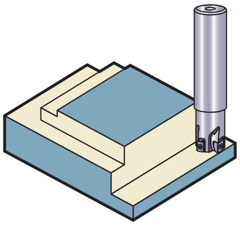
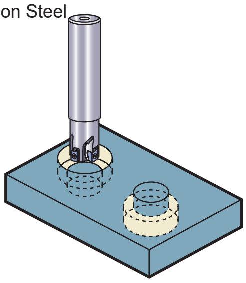
Holder		VPX300R4004SA32S	VPX300R2502SA25S	VPX200R2504SA25S
Insert (Grade)		LOGU1207080PNER-M(MP6120)	LOGU1207080PNER-M(VP15TF)	LOGU0904080PNER-M(MP6120)
Workpiece		13CrMo4-5 	Alloy Tool Steel (55HRC) 	AISI 1049 Hardening 
Component		Machined Parts	Dies	Dies
Cutting Conditions	Cutting Speed **vc** (SFM)	525 → 590	230	655
	Feed per Tooth **fz** (IPT)	.0047 → .0059	.0031	.0059
	Depth of Cut (inch)	ap = .118 → .165 , ae = 1.575	ap = .197 , ae = .738	ap = .118
Cutting Mode		Wet Cutting	Dry Cutting	Dry Cutting
Results		Achieves 2X the insert tool life of conventional product, even when changing to high efficiency conditions.	When machining hardened steel, it achieves 2X the machining of conventional product whose insert tool life is limited by defects.	There is no seating flattening or deformation even when machining for 2500 minutes. And the number of tools has been reduced by increasing corner count to four.

Holder		VPX200R1602SA16S	VPX200R3203SA32S
Insert (Grade)		LOGU0904040PNER-L(VP15TF)	LOGU0904040PNER-L (MP6120)
Workpiece		AISI D2 Mild Steel 	AISI 1045 
Component		Machined Parts	Machined Parts
Cutting Conditions	Cutting Speed **vc** (SFM)	655	460
	Feed per Tooth **fz** (IPT)	.004 → .006	.004
	Depth of Cut (inch)	ap = .004	ap = .055
Cutting Mode		Dry Cutting	Dry Cutting
Results		Compared to conventional product, cutting noise is reduced and chattering vibration is suppressed. Furthermore, cutting conditions have been improved and high efficiency machining has been achieved.	Compared to conventional product, the sharpness is better and the surface accuracy has been improved.

The above application examples are customer's applications, so it can be different from the recommended conditions.

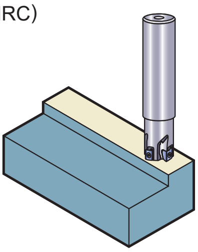
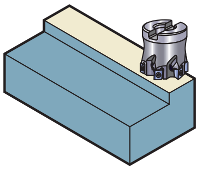
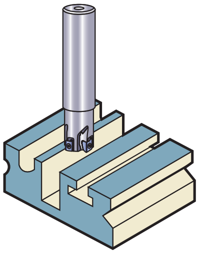
Application Examples

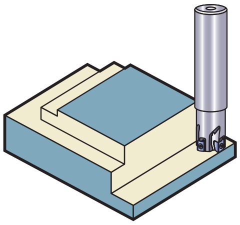
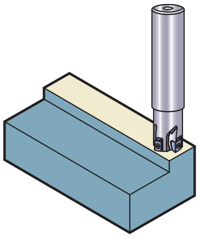
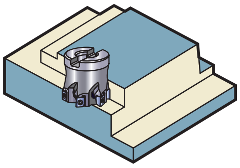
Holder		**VPX200R2503SA25S**	**VPX200R1602SA16S**	**VPX200R1602SA16S**
Insert (Grade)		**LOGU0904080PNER-M(MP6120)**	**LOGU0904080PNER-M(MP6130)**	**LOGU0904080PNER-M(MP7130)**
Workpiece		AISI 1045 	JIS SS400 	JIS SS400+Stainless Steel 
Component		Chucked Parts	Machined Parts	Machined Parts
Cutting Conditions	Cutting Speed **vc** (SFM)	490	280	655
	Feed per Tooth **fz** (IPT)	.0043	.0037	.0039
	Depth of Cut (inch)	ap = .177 , ae = .984 Max.	ap = .167	ap = .059—.118
Cutting Mode		Dry Cutting	Wet Cutting	Wet Cutting
Results		Compared with conventional product with varying insert tool life due to breakage, VPX has a stable insert tool life that allows for 1.7X more machining.	Solves the problem of easily damaged clamp screws for conventional product, ensuring an excellent finish.	The number of machining has achieved more than 3X the tool life of the conventional product caused by the defect, and the finished surface is also improved.

Holder		**VPX200R2003SA20S**	**VPX200R2504SA25S**	**VPX200R2504SA25S**
Insert (Grade)		**LOGU0904080PNER-M(MP6120)**	**LOGU0904080PNER-M(MP6120)**	**LOGU0904080PNER-M(MP6120)**
Workpiece		20MnCr5(Alloy Steel) 	Cast Iron 	Carbon Steel 
Component		Machined Parts	Automotive Components	Machined Parts
Cutting Conditions	Cutting Speed **vc** (SFM)	575	655	335
	Feed per Tooth **fz** (IPT)	.0070	.0068	.0051
	Depth of Cut (inch)	ap = .079	ap = .118	ap = .055 , ae = .433
Cutting Mode		Dry Cutting	Dry Cutting	Wet Cutting
Results		Conventional product has achieved machining times of 330 min before breaking, whereas VPX can maintain sustained machining for over 400 mins.	It is capable of cutting speeds of 655 SFM compared to 560 SFM for conventional product, increasing machining efficiency. Good machining accuracy makes possible stable machining.	VPX has less load on its main shaft than conventional product, achieving more than 3X as much machining. It also has excellent clamp rigidity compared to other conventional product suppressing clamp screw breakage.

The above application examples are customer's applications, so it can be different from the recommended conditions.

Application Examples

Holder		VPX200R3004SA25S	VPX200-050A05AR	VPX200R2503SA25S
Insert (Grade)		LOGU0904080PNER-M(MP9130)	LOGU0904040PNER-M(VP15TF)	LOGU0904080PNER-M(MP6120)
Workpiece		Precipitation Hardening Stainless Steel (38-43HRC) 	AISI 60-40-18 	JIS SS400, AISI 1050 
Component		Machined Parts	Parts	Machined Parts
Cutting Conditions	Cutting Speed **vc** (SFM)	130	1130	385
	Feed per Tooth **fz** (IPT)	.0024	.0055	.0063
	Depth of Cut (inch)	ap = .071	ap = .079—.118 , ae = 1.575	ap = .236
Cutting Mode		Dry Cutting	Wet Cutting	Dry Cutting
Results		Good sharpness compared to conventional product allows VPX to achieve 2X their insert tool life.	Conventional product can only be used for roughing, but VPX can be used for finishing as well, eliminating processing steps.	VPX achieves better chip evacuation and better surface finish compared to conventional product, better insert tool life.

Holder		VPX200R2503SA25S	VPX300R4004SA32S	VPX300-080A10AR
Insert (Grade)		LOGU0904040PNER-M(MP7130)	LOGU1207080PNER-M(MP6120)	LOGU1207080PNER-M(MP6120)
Workpiece		AISI 304 	AISI 4140 	Alloy Tool Steel 
Component		Machined Parts	Center Block	Machined Parts
Cutting Conditions	Cutting Speed **vc** (SFM)	590	490	740
	Feed per Tooth **fz** (IPT)	.0236	.0059	.0051
	Depth of Cut (inch)	ap = .106	ap = .197	ap = .197 , ae = 2.756
Cutting Mode		—	Dry Cutting	—
Results		Less cutting noise than conventional product, allowing cutting conditions to be improved. Also, insert tool life has been lengthened when using the same inserts to machine AISI 1045.	Compared to conventional product, less vibration and good wall surface finish, achieving more than 3X insert tool life.	The number of machining has achieved 2.7X the tool life of the conventional product caused by finish degradation.

The above application examples are customer's applications, so it can be different from the recommended conditions.

Multi-Functional Cutter for High Efficiency Machining

VPX Series

DIAEDGE

TOOL NEWS

2022.3 Update
B028A

High Feed Radius Milling Cutter

AJX

Product Line Expansion

Expansive Multi-Functional, Multi-Application, Ultra-High Feed Milling Line-up for High Efficiency & Reduced Costs!

MITSUBISHI MATERIALS CORPORATION

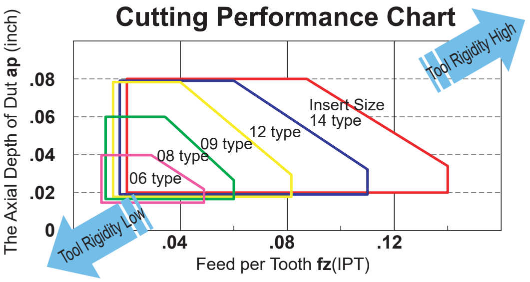
High Feed Radius Milling Cutter

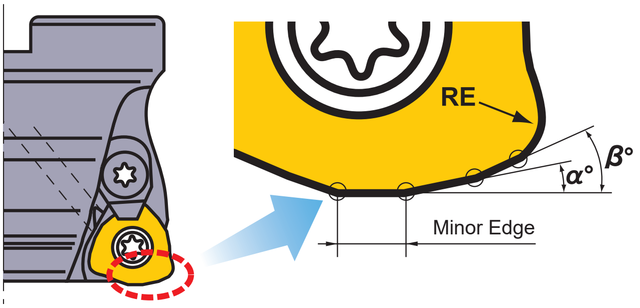
AJX

Features

Ultra High Feed Cutting

Employing a double phased straight cutting edge to form the lead angle α and β with a minor edge, the AJX can achieve an ultra high feed rate of up to .138 IPT for the ultimate efficiency in rough machining.


Cutting Performance Chart



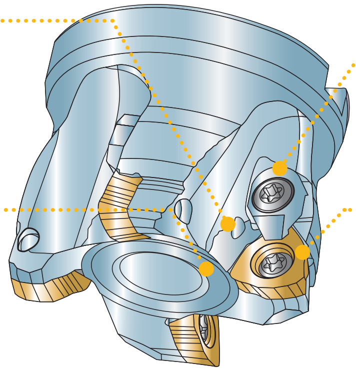
High Reliability Cutter Body

Standard with Coolant Holes

All AJX bodies are supplied with through coolant holes for smooth chip discharge, cutting edge cooling and lubrication.

Durable Tool Body

AJX bodies are made from heat resistant alloys.
The special surface treatment applied to the body increases corrosion and friction resistance.



Highly Rigid Clamping

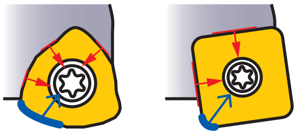
Insert clamp bridges are standard (except in the AJX 06, 08 types, and the super extra fine pitch type).
Rigid insert clamping allows for stable and reliable cutting.

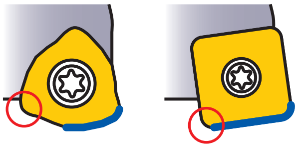
Cost-effective Insert

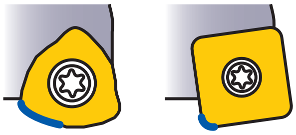
Specially designed triangular style insert geometry for cost effective milling.

Triangular Insert Shape is Ideal for Safe Multi-Functional Milling

Edge Used During Machining

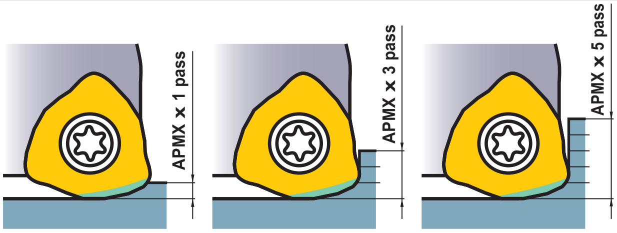

Insert pocket is designed to ensure precise positioning and provide secure multi directional clamping.


The unused edge is protected even during pocket milling and ramping.


Even if the ramping angle is steep, the left side of the cutting edge is designed to be used and therefore not be damaged.

Anti-Vibration Properties

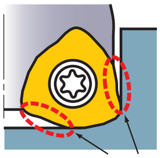
The AJX always uses the same portion of the cutting edge thereby maintaining stable cutting even when the tool overhang is long.



APMX=Max. Depth of Cut 🟩=Cutting Portion

Preventing Chip Packing Problems

The indents engineered into the inner and outer cutting edges maintain a large clearance preventing chip packing problems.
This provides improved efficiency and a more stable cutting performance when ramping and sinking compared to conventional products.



Large Clearance

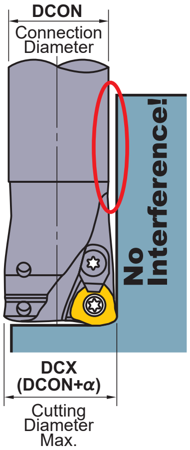
Comparison of Ramping Angles

	Max. Ramping Angle
AJX	3°
4 Corner Insert	1°
Conventional Products	1°

∗With **DCX**=.625" type

No Workpiece Material Interference

Some AJX shank types are designed with an oversized cutting diameter for workpiece material and chip clearance, as shown.
Ideal for deep cutting and reduces the need for special long tools.



(inch)

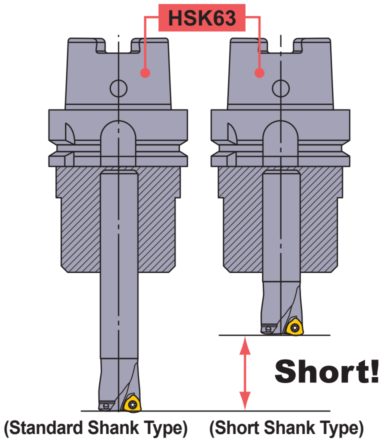
Order Number	DCX	DCON
AJXU06R112◌A10◌	.688	.625
AJXU08R142◌A12◌	.875	.750
AJXU09R182◌A16◌	1.125	1.000
AJXU09R244SA20M	1.500	1.250
AJXU12R243◌A20◌	1.500	1.250
AJXU14R323WA24S	2.000	1.500

Please refer to page 574 for details of the holder.

HSK63 Type Short Shanks

Short shank type AJX06 end mills are available.
Although HSK63 holders are already short, the use of the short shank type AJX permits minimum overhang for maximum rigidity.

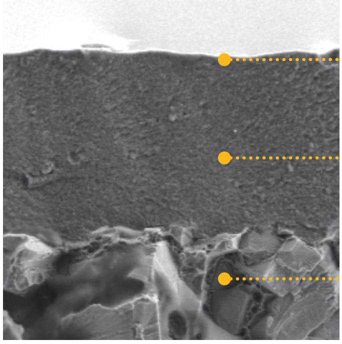
The minimum tool overhang length enables stable, high efficiency machining even on high-speed machining centers.



PVD Coated Grade for Difficult-to-Cut Materials

MP9140

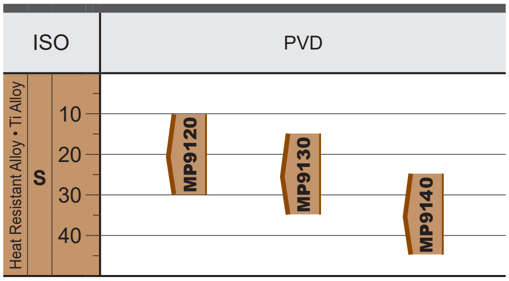
MP9140 provides excellent weld and fracture resistance resulting from a special cemented carbide substrate and a smoothened surface.



Smooth surface is excellent in providing welding resistance.

The high Al-rich AlTiN coating succeeds in dramatically improving wear and heat resistance.

Special cemented carbide substrate with improved fracture resistance.

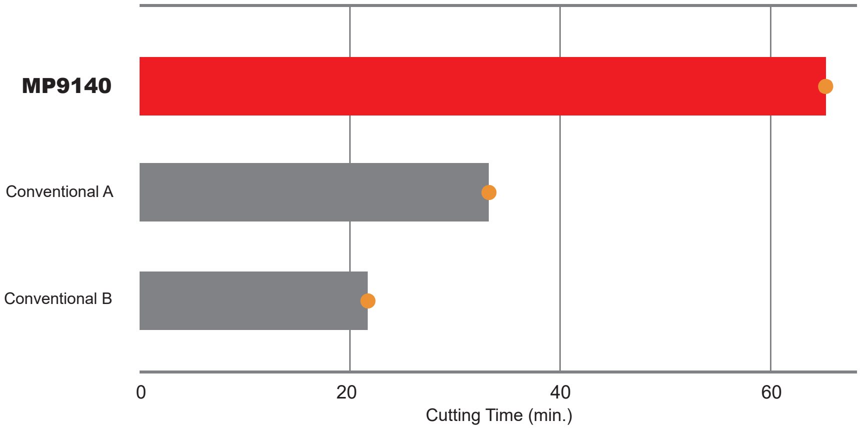


Grade	Features
MP9120	Focus on Wear Resistance
MP9130	Standard Grade
MP9140	Focus on Fracture Resistance

Cutting Performance

Comparison of Fracture Resistance by Titanium Alloy Machining

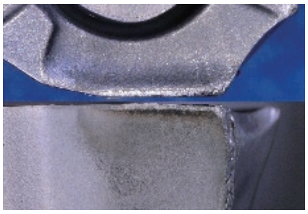
MP9140 achieved 3X more tool life than conventional product B.



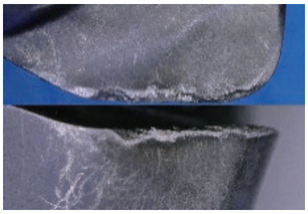
<Cutting Conditions>
Workpiece Material : Ti-6Al-4V
Tool : AJX06R162AM0830
Inserts : JOMT06T216ZZER-JL
Cutting Speed : vc=195 SFM
Feed per Tooth : fz=.020 IPT
Depth of Cut : ap=.02 inch
Width of Cut ae=.315 inch, .63 inch
Cutting Mode : Wet Cutting

MP9140

Conventional A

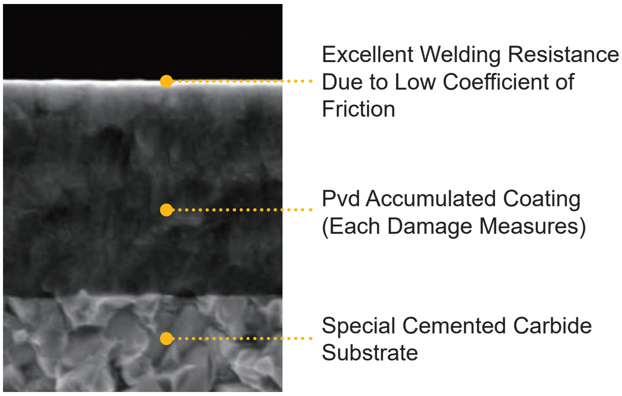


Conventional B

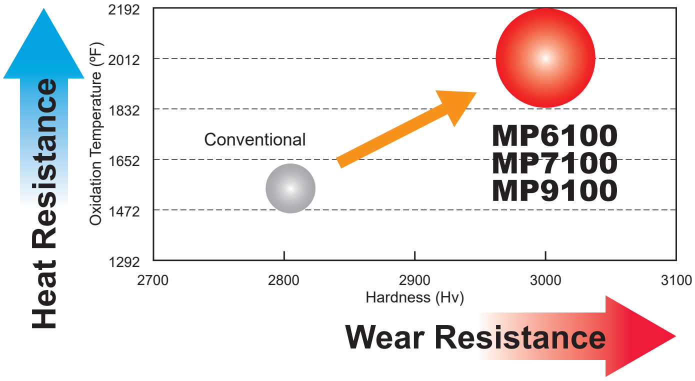


Insert Grades for a Wide Range of Workpiece Materials

Al-Ti-Cr-N Base PVD Accumulated Coating



Dramatically Improving the Heat and Wear Resistance!



Excellent Welding Resistance due to Low Coefficient Friction!

	Workpiece Material	Grade	Coefficient of Friction Measured at 1112ºF		
			1055	304	Ti-6Al-4V
P	Carbon Steels, Alloy Steels	**MP6100**	.4		
M	Stainless Steels	**MP7100**		.5	
S	Titanium Alloys, Heat Resistant Alloys	**MP9100**			.3
	Conventional		.7	.7	.7

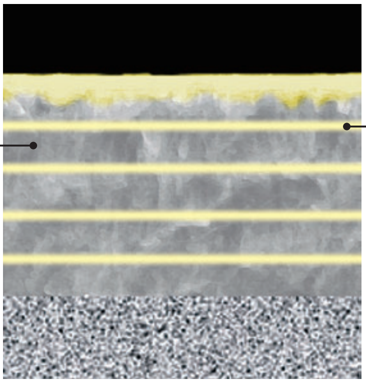
TOUGH-Σ Technology

A fusion of the separate coating technologies; PVD and multilayering realises extra toughness.

PVD Accumulated Coating

Base Layer
High Al-(Al, Ti)N

The new technology Al-(Al, Ti)N coating provides stabilization of the high hardness phase and succeeds in dramatically improving wear, crater and welding resistance.

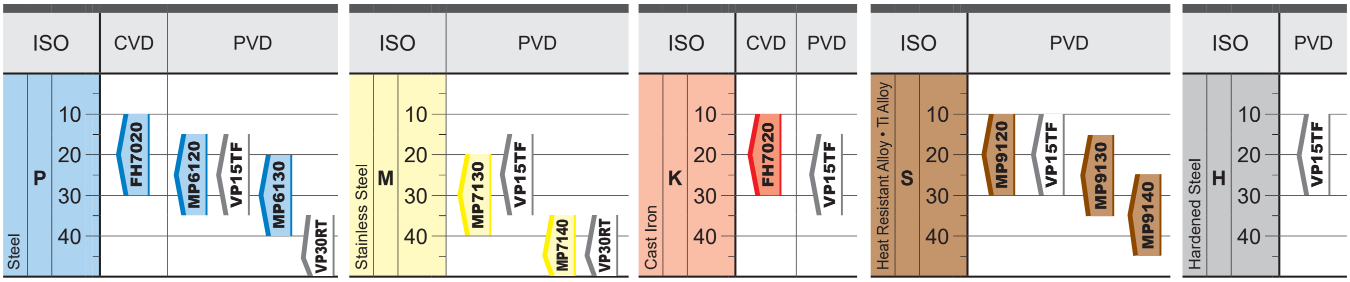


*Graphical Representation.

Best Layer of Each Workpiece Material

P		**(Al,Cr)N** **Tough! Thermal Cracks**
M		**TiN** **Tough! Notching**
S		**CrN** **Tough! Resistant Chipping**

Application Range

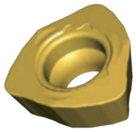


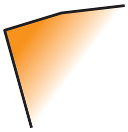
Wide Selection of Inserts

ST

Strong Cutting Edge Type Chip Breaker

P M K S H





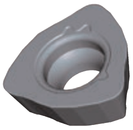
Stable Machining even on Interrupted Workpiece Material Surfaces

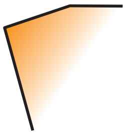
With increased fracture resistance during interrupted cutting due to the tougher cutting edges.
For increased reliability and higher efficiency machining to reduce costs.

FT

General Use Type Chip Breaker

P M K S H





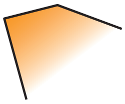
First Recommended Chip Breaker for General Cutting

An optimum balance of sharpness and fracture resistance.
Versatile insert for a wide range of workpiece materials and cutting conditions.

JM

Sharp Cutting Edge Type Chip Breaker
(For General Use)

P M K S H



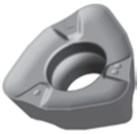
Suitable for Use on BT40 and HSK63 Machines

Boosts cutting performance with a large rake angle.
Effective for anti-vibration machining for long overhang applications at higher than normal feeds for cost saving efficiency.

JL

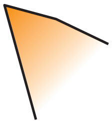
Sharp Cutting Edge Type Chip Breaker
(For Difficult-to-cut Materials)

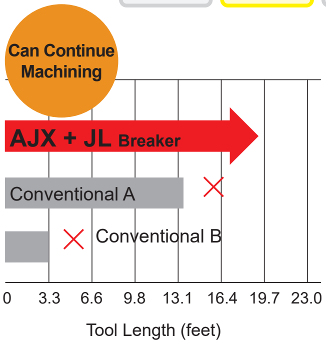
P M K S H



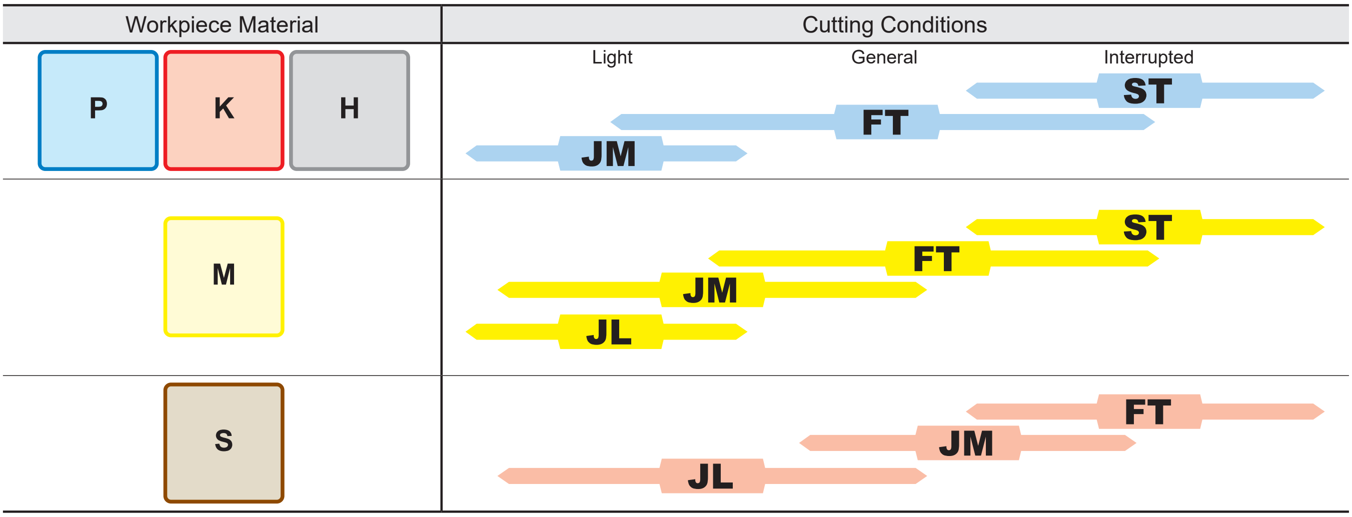
Optimized for Difficult-to-cut Materials

The optimized cutting edge of the JL breaker provides the sharpness and low cutting resistance that is ideal for difficult-to-cut materials.
The maximum depth of cut is different in the insert size.
Please refer to page 598.





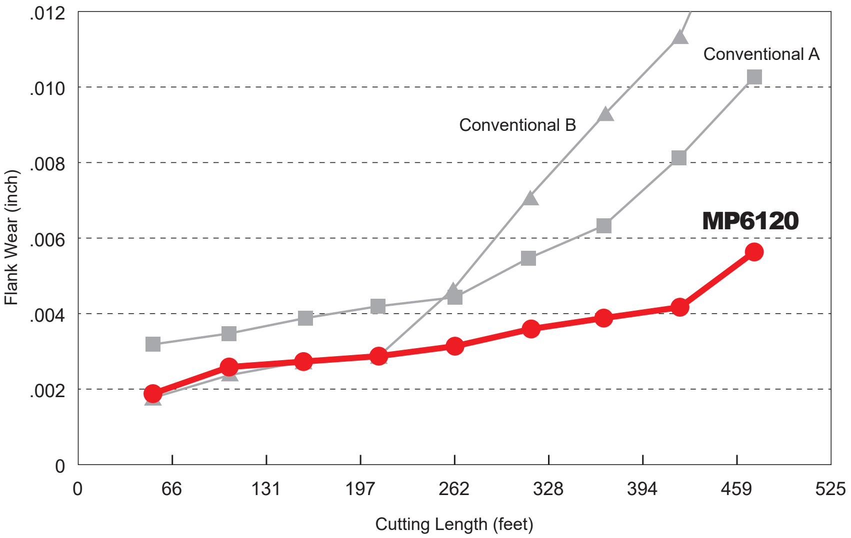
<Cutting Conditions>
Tool : DCX=ø2.5"
5 teeth
Workpiece Material : Ti-6Al-4V
Revolution : n=202 min^{-1}
Cutting Speed : vc=130 SFM
Table Feed : vf=23.86 IPM
Feed per Tooth : fz=.024 IPT
Depth of Cut : ap=.04 inch
Width of Cut : ae=1.77 inch
Cutting Mode : Wet Cutting

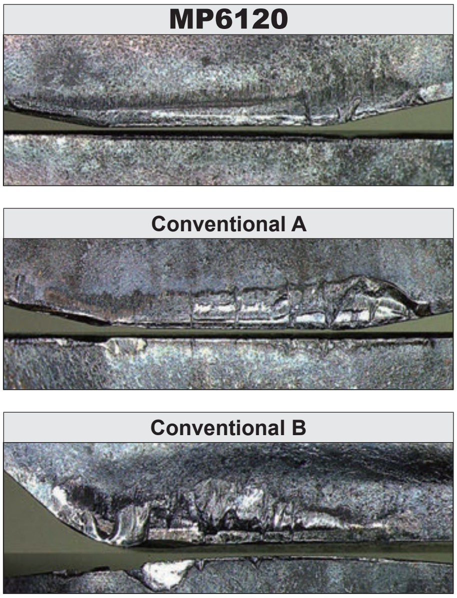


Cutting Performance

General Steel Machining

MP6120 Provides Superior Resistance to Thermal Cracking and Welding



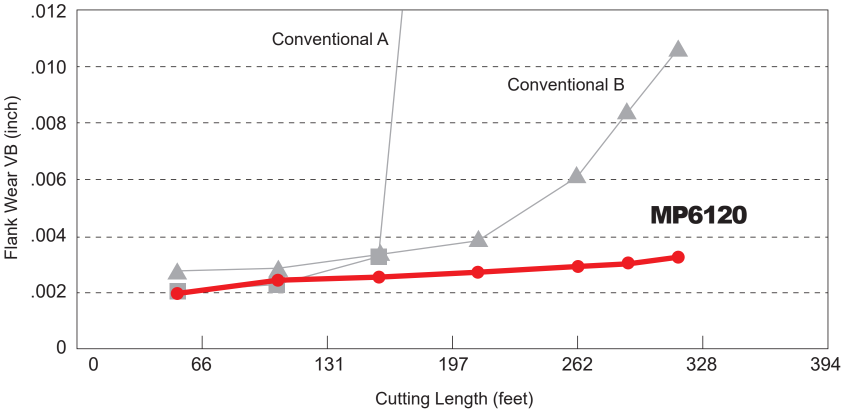


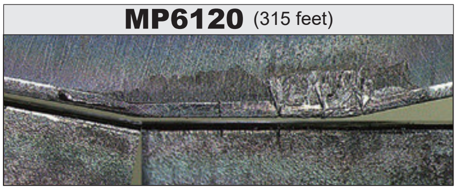
Cutting Length : 459.3 feet

<Cutting Conditions>
Tool : AJX14-063A04R
Inserts : JDMT140520ZDSR-JM
Cutting Speed : vc=655 SFM
Feed per Tooth : fz=.059 IPT
Depth of Cut : ap=.039 inch
Width of Cut : ae=1.969 inch
Cutting Mode : Dry Cutting

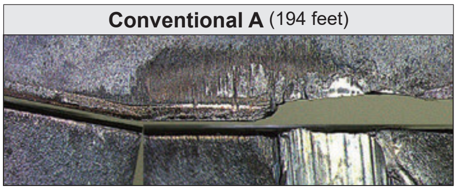
MP6120 Achieves Long Tool Life in Low to Middle Speed Cutting

CVD coated FH7020 is recommended for higher speeds that exceed 655 SFM.

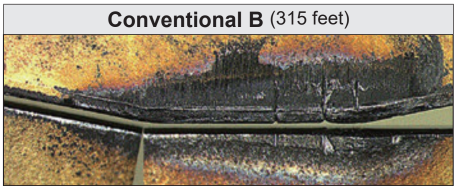




MP6120 (315 feet)



Conventional A (194 feet)



Conventional B (315 feet)

<Cutting Conditions>
Workpiece Material : AISI 4140
Tool : AJX14-063A04R
Inserts : JDMW140520ZDSR-FT
Cutting Speed : vc=655 SFM
Feed per Tooth : fz=.059 IPT
Depth of Cut : ap=.039 inch
Width of Cut : ae=1.969 inch
Cutting Mode : Dry Cutting

MULTI-FUNCTIONAL MILLING

AJX

P M K N S H

Fig.1 “FA” Flat Shank

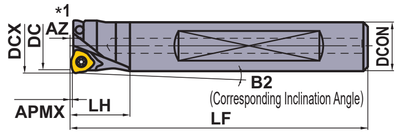


Fig.2

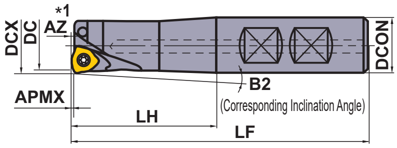


Fig.3

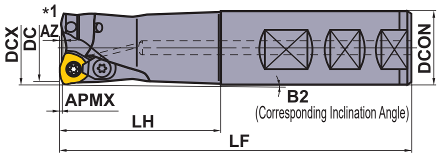
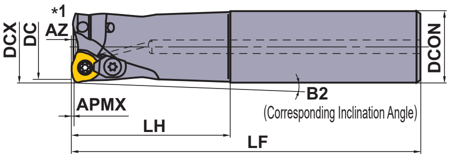


Fig.4



■ Shank Type

Right hand tool holder only.

With Coolant Hole

(inch)

DCX	Order Number	Stock	*2 No.T	LF	DC	LH	DCON	B2	APMX	RMPX	Fig.	Insert Type
		R										
.625	**AJXU06R102FA10S**	●	2	3.750	.346	1.250	.625	2.12°	.039	3°	1	JOM◌06T2
.625	**AJXU06R102SA10M**	●	2	5.750	.346	1.500	.625	1.75°	.039	3°	4	JOM◌06T2
.625	**AJXU06R102SA10L**	●	2	5.750	.346	2.750	.625	0.93°	.039	3°	4	JOM◌06T2
.688	**AJXU06R112FA10S**	●	2	3.750	.409	.750	.625	–	.039	2.5°	1	JOM◌06T2
.688	**AJXU06R112SA10L**	●	2	5.750	.409	.750	.625	–	.039	2.5°	4	JOM◌06T2
.750	**AJXU08R122WA12S**	●	2	4.750	.417	2.000	.750	1.31°	.059	3.5°	2	JOM◌0803
.750	**AJXU06R123SA12M**	●	3	7.000	.472	2.375	.750	1.11°	.039	1.7°	4	JOM◌06T2
.750	**AJXU08R122SA12L**	●	2	7.000	.417	4.000	.750	0.64°	.059	3.5°	4	JOM◌0803
.875	**AJXU08R142FA12S**	●	2	4.750	.535	1.250	.750	–	.059	3°	1	JOM◌0803
.875	**AJXU08R142SA12L**	●	2	7.000	.535	1.250	.750	–	.059	3°	4	JOM◌0803
1.000	**AJXU09R162WA16S**	●	2	5.625	.602	2.375	1.000	1.1°	.079	4°	3	JDM◌09T3
1.000	**AJXU08R163SA16M**	●	3	8.000	.661	2.750	1.000	0.94°	.059	2°	4	JOM◌0803
1.000	**AJXU09R162SA16L**	●	2	8.000	.602	4.750	1.000	0.54°	.079	4°	4	JDM◌09T3
1.125	**AJXU09R182FA16S**	●	2	5.625	.728	1.625	1.000	–	.079	3°	1	JDM◌09T3
1.125	**AJXU09R182SA16L**	●	2	8.000	.728	1.625	1.000	–	.079	3°	4	JDM◌09T3
1.250	**AJXU12R202WA20S**	●	2	6.000	.789	2.750	1.250	0.94°	.079	4°	3	JDM◌1204
1.250	**AJXU09R203SA20M**	●	3	8.000	.854	3.125	1.250	0.82°	.079	3.3°	4	JDM◌09T3
1.250	**AJXU12R202SA20L**	●	2	8.000	.789	4.750	1.250	0.54°	.079	4°	4	JDM◌1204
1.500	**AJXU12R243WA20S**	●	3	6.000	1.038	2.000	1.250	–	.079	3°	3	JDM◌1204
1.500	**AJXU09R244SA20M**	●	4	10.000	1.114	2.375	1.250	–	.079	2.4°	4	JDM◌09T3
1.500	**AJXU12R243SA20L**	●	3	10.000	1.038	2.000	1.250	–	.079	3°	4	JDM◌1204
2.000	**AJXU14R323WA24S**	●	3	6.000	1.534	2.000	1.500	–	.079	4.2°	3	JDM◌1405
2.000	**AJXU12R243SA24L**	●	3	10.000	1.038	2.750	1.500	0.94°	.079	3°	4	JDM◌1204

*1 Refer to page 598, for the max. drilling depth (**AZ**).

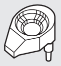
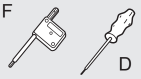
*2 Number of Teeth

Note 1) Refer to page 598, for the max. depth of cut (**APMX**) and max. drilling depth (**AZ**).

● : **USA Stock**

Spare Parts

(inch)

Tool Holder Type	 *		 *		
	Clamp Screw	Clamp Bridge	Clamp Bridge Screw	Spring	Wrench
AJXU06R	TS25	—	—	—	TKY08F
AJXU08R	TS33	—	—	—	TKY08D
AJXU09R	TS351	AMS3	AJS3010T10	ASS2	TKY10D
AJXU12R	TS43	AMS4	AJS4012T15	ASS2	TKY15D
AJXU14R	TS54	AMS5	AJS5014T25	ASS3	TKY25D

* Clamp Torque (lbf-in) : TS25=8.9, TS33=8.9, TS351=22, TS43=31, TS54=66, AJS3010T10=22, AJS4012T15=31, AJS5014T25=66

Dimensions and Symbols (ISO 13399 Compliance)

DCX = Cutting Diameter Max.
DC = Cutting Diameter
LF = Functional Length
LH = Head Length
DCON = Connection Diameter
APMX = Depth of Cut Max.
RMPX = Ramping Angle Max.

High Feed Radius Milling Cutter

Fig.1

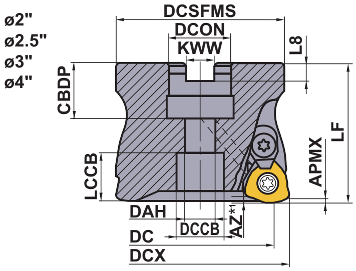
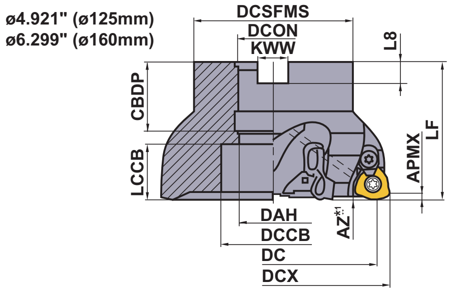
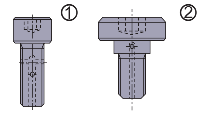


Fig.2



Right hand tool holder only.

(inch)

DCX	Set Bolt	Geometry	
2.000"	HSCU37513H	①	
2.500", 3.000"	HSCU50014H		
4.000"	HSCU75016H		
4.921"	MBAU75016H	②	
6.299"	MBAU100016H		

Arbor Type

With Coolant Hole

DCX = Inch, DCON = Inch

(inch)

DCX	Order Number	Stock R	*2 No.T	DC	LF	DCON	WT (lbs)	APMX	RMPX	Fig.	Insert Type
2.000	**AJXU12R0203**	●	3	1.539	2.000	.750	.888	.059	2°	1	JDM○1204
2.000	**AJXU12R0204**	●	4	1.539	2.000	.750	.866	.059	2°	1	JDM○1204
2.000	**AJXU09R0205**	●	5	1.606	2.000	.750	.925	.039	1.1°	1	JDM○09T3
2.500	**AJXU14R2503C**	●	3	2.032	2.000	1.000	1.393	.079	2.8°	1	JDM○1405
2.500	**AJXU14R2504C**	●	4	2.032	2.000	1.000	1.338	.079	2.8°	1	JDM○1405
2.500	**AJXU12R2505C**	●	5	2.039	2.000	1.000	1.427	.059	1.5°	1	JDM○1204
3.000	**AJXU14R0304C**	●	4	2.532	2.000	1.000	2.133	.079	1.8°	1	JDM○1405
3.000	**AJXU14R0305C**	●	5	2.532	2.000	1.000	2.078	.079	1.8°	1	JDM○1405
3.000	**AJXU12R0306C**	●	6	2.543	2.000	1.000	2.274	.059	1.2°	1	JDM○1204
4.000	**AJXU14R0405E**	●	5	3.531	2.500	1.500	4.806	.079	1.2°	1	JDM○1405
4.000	**AJXU14R0406E**	●	6	3.531	2.500	1.500	4.981	.079	1.2°	1	JDM○1405
4.000	**AJXU12R0407E**	●	7	3.539	2.500	1.500	5.283	.059	0.8°	1	JDM○1204
4.921	**AJX14RA12505E**	●	5	4.457	2.480	1.500	7.275	.079	0.8°	2	JDM○1405
4.921	**AJX14RA12507E**	●	7	4.457	2.480	1.500	7.275	.079	0.8°	2	JDM○1405
6.299	**AJX14RA16006F**	●	6	5.835	2.480	2.000	11.023	.079	0.5°	2	JDM○1405
6.299	**AJX14RA16008F**	●	8	5.835	2.480	2.000	11.023	.079	0.5°	2	JDM○1405

*1 Refer to page 598, for the max. drilling depth (**AZ**).
*2 Number of Teeth
Note 1) Refer to page 598, for the max. depth of cut (**APMX**) and max. drilling depth (**AZ**).

Mounting Dimensions

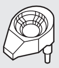
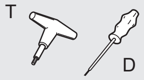
DCX = Inch, DCON = Inch

(inch)

DCX	Order Number	DCON	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8	Fig.
2.000	**AJXU12R0203**	.750	.748	.415	.600	.633	1.875	.313	.187	1
2.000	**AJXU12R0204**	.750	.748	.415	.600	.633	1.875	.313	.187	1
2.000	**AJXU09R0205**	.750	.748	.415	.600	.634	1.875	.313	.187	1
2.500	**AJXU14R2503C**	1.000	1.024	.539	.787	.628	2.375	.375	.219	1
2.500	**AJXU14R2504C**	1.000	1.024	.539	.787	.628	2.375	.375	.219	1
2.500	**AJXU12R2505C**	1.000	1.024	.539	.787	.633	2.375	.375	.219	1
3.000	**AJXU14R0304C**	1.000	1.024	.539	.787	.628	2.750	.375	.219	1
3.000	**AJXU14R0305C**	1.000	1.024	.539	.787	.628	2.750	.375	.219	1
3.000	**AJXU12R0306C**	1.000	1.024	.539	.787	.630	2.750	.375	.219	1
4.000	**AJXU14R0405E**	1.500	1.181	.787	1.181	.931	3.750	.625	.375	1
4.000	**AJXU14R0406E**	1.500	1.181	.787	1.181	.931	3.750	.625	.375	1
4.000	**AJXU12R0407E**	1.500	1.181	.787	1.181	.936	3.750	.625	.375	1
4.921	**AJX14RA12505E**	1.500	1.575	-	2.205	.872	3.937	.625	.375	2
4.921	**AJX14RA12507E**	1.500	1.575	-	2.205	.872	3.937	.625	.375	2
6.299	**AJX14RA16006F**	2.000	1.693	-	2.835	.754	3.937	.750	.437	2
6.299	**AJX14RA16008F**	2.000	1.693	-	2.835	.754	3.937	.750	.437	2

Spare Parts

(inch)

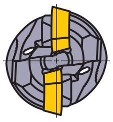
Tool Holder Type	 *		 *		
	Clamp Screw	Clamp Bridge	Clamp Bridge Screw	Spring	Wrench
AJXU09R	TS351	AMS3	AJS3010T10	ASS2	TKY10D
AJXU12R	TS43	AMS4	AJS4012T15	ASS2	TKY15T
AJXU14R	TS54	AMS5	AJS5014T25	ASS3	TKY25T
AJX14R	TS54	AMS5	AJS5014T25	ASS3	TKY25T

* Clamp Torque (lbf-in) : TS351=22, TS43=31, TS54=66, AJS3010T10=22, AJS4012T15=31, AJS5014T25=66

Dimensions and Symbols (ISO 13399 Compliance)

DCX = Cutting Diameter Max.
DC = Cutting Diameter
LF = Functional Length
DCON = Connection Diameter
WT = Weight of Item
APMX = Depth of Cut Max.
RMPX = Ramping Angle Max.
CBDP = Connection Bore Depth
DAH = Diameter Access Hole
DCCB = Counterbore Diameter Connection Bore
LCCB = Counterbore Depth Connection Bore
DCSFMS = Contact Surface Diameter Machine Side
KWW = Keyway Width

High Feed Radius Milling Cutter



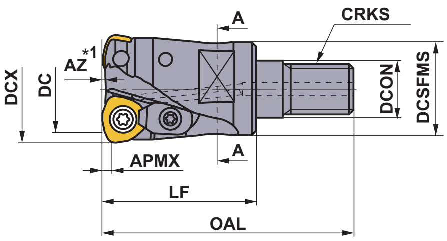


Fig.1

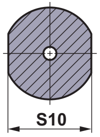


Fig.2

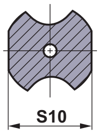
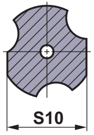


Fig.3



A-A Section

Screw-in Type

With Coolant Hole

Right hand tool holder only.

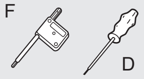
(inch)

DCX	Order Number	Stock	⁎2 No.T	DC	LF	OAL	DCON	DCSFMS	S10	CRKS	WT (lbs)	APMX	RMPX	Fig.	Shank Arbor Type	Insert Type
		R														
.625	**AJXU06R102AM0830**	●	2	.346	1.181	1.890	.335	.512	.394	M8	.2	.039	3°	1	SCU10M08	JOM◌06T2
.750	**AJXU08R122AM1030**	●	2	.417	1.181	1.929	.413	.709	.551	M10	.2	.059	3.5°	2	SCU12M10	JOM◌0803
.750	**AJXU06R123AM1030**	●	3	.472	1.181	1.929	.413	.709	.551	M10	.2	.039	1.7°	3	SCU12M10	JOM◌06T2
.875	**AJXU08R142AM1030**	●	2	.535	1.181	1.929	.413	.709	.551	M10	.2	.059	3°	2	SCU12M10	JOM◌0803
.875	**AJXU06R143AM1030**	●	3	.595	1.181	1.929	.413	.709	.551	M10	.2	.039	0.7°	3	SCU12M10	JOM◌06T2
1.000	**AJXU09R162AM1235**	●	2	.602	1.378	2.244	.492	.827	.748	M12	.4	.079	4°	2	SCU16M12	JDM◌09T3
1.000	**AJXU08R163AM1235**	●	3	.661	1.378	2.244	.492	.827	.748	M12	.2	.059	2°	1	SCU16M12	JOM◌0803
1.125	**AJXU09R182AM1235**	●	2	.728	1.378	2.244	.492	.827	.748	M12	.4	.079	3°	2	SCU16M12	JDM◌09T3
1.125	**AJXU08R183AM1235**	●	3	.784	1.378	2.244	.492	.827	.748	M12	.2	.059	0.5°	1	SCU16M12	JOM◌0803
1.250	**AJXU09R203AM1645**	●	3	.854	1.772	2.677	.669	1.142	.945	M16	.4	.079	2.5°	1	SCU20M16	JDM◌09T3
1.375	**AJXU09R223AM1645**	●	3	.976	1.772	2.677	.669	1.142	.945	M16	.4	.079	2°	1	SCU20M16	JDM◌09T3

⁎1 Refer to page 598, for the max. drilling depth (**AZ**).
⁎2 Number of Teeth
Note 1) Refer to page 598, for the max. depth of cut (**APMX**) and max. drilling depth (**AZ**).
Note 2) For screw-in type shank arbors, refer to page 587.

Spare Parts

(inch)

Tool Holder Type	 *		 *		
	Clamp Screw	Clamp Bridge	Clamp Bridge Screw	Spring	Wrench
AJXU06R	TS25	–	–	–	TKY08F
AJXU08R	TS33	–	–	–	TKY08D
AJXU09R	TS351	AMS3	AJS3010T10	ASS2	TKY10D

⁎ Clamp Torque (lbf-in) : TS25=8.9, TS33=8.9, TS351=22, AJS3010T10=22

Fig.1

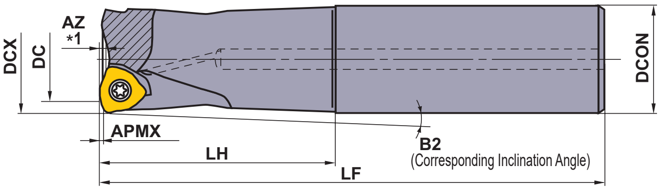


Fig.2

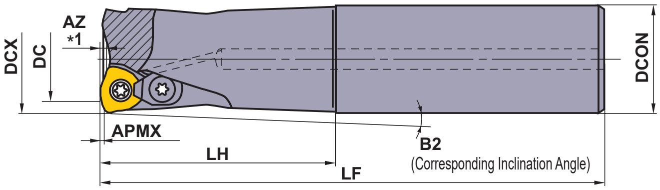
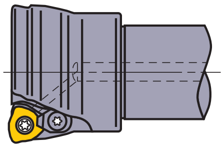


Fig3



Metric Standard

Right hand tool holder only.

■Shank Type

With Coolant Hole

(mm)

DCX	Order Number	Stock	*2 No.T	LF	DC	LH	DCON	B2	APMX	RMPX	Fig.	Insert Type
		R										
16	**AJX06R162SA16SS**	★	2	70	8.9	20	16	3.5	0.6	3°	1	JOM◌06T2
16	**AJX06R162SA16S**	★	2	110	8.9	30	16	2.25	0.6	3°	1	JOM◌06T2
16	**AJX06R162SA16L**	★	2	150	8.9	70	16	0.93	0.6	3°	1	JOM◌06T2
16	**AJX06R162SA16EL**	★	2	200	8.9	100	16	0.64	0.6	3°	1	JOM◌06T2
17	**AJX06R172SA16SS**	★	2	70	9.9	20	16	–	0.6	2.5°	1	JOM◌06T2
17	**AJX06R172SA16S**	★	2	110	9.9	20	16	–	0.6	2.5°	1	JOM◌06T2
17	**AJX06R172SA16L**	★	2	150	9.9	20	16	–	0.6	2.5°	1	JOM◌06T2
17	**AJX06R172SA16EL**	★	2	200	9.9	20	16	–	0.6	2.5°	1	JOM◌06T2
20	**AJX08R202SA20S**	★	2	130	11.4	50	20	1.34	0.9	3.5°	1	JOM◌0803
20	**AJX06R203SA20S**	★	3	130	12.9	50	20	1.31	0.6	1.5°	1	JOM◌06T2
20	**AJX08R202SA20L**	★	2	180	11.4	100	20	0.65	0.9	3.5°	1	JOM◌0803
20	**AJX06R203SA20L**	★	3	180	12.9	100	20	0.64	0.6	1.5°	1	JOM◌06T2
20	**AJX08R202SA20EL**	★	2	250	11.4	130	20	0.5	0.9	3.5°	1	JOM◌0803
22	**AJX08R222SA20S**	★	2	130	13.4	30	20	–	0.9	3°	1	JOM◌0803
22	**AJX06R223SA20S**	★	3	130	14.9	30	20	–	0.6	1°	1	JOM◌06T2
22	**AJX08R222SA20L**	★	2	180	13.4	30	20	–	0.9	3°	1	JOM◌0803
22	**AJX06R223SA20L**	★	3	180	14.9	30	20	–	0.6	1°	1	JOM◌06T2
22	**AJX08R222SA20EL**	★	2	250	13.4	30	20	–	0.9	3°	1	JOM◌0803
25	**AJX09R252SA25S**	★	2	140	14.9	60	25	1.1	1.2	4°	2	JDM◌09T3
25	**AJX08R253SA25S**	★	3	140	16.4	60	25	1.1	0.9	2°	1	JOM◌0803
NEW 25	**AJX06R254SA25S**	★	4	140	17.9	60	25	1.11	0.6	0.8°	1	JOM◌06T2
25	**AJX09R252SA25L**	★	2	200	14.9	120	25	0.54	1.2	4°	2	JDM◌09T3
25	**AJX08R253SA25L**	★	3	200	16.4	120	25	0.54	0.9	2°	1	JOM◌0803
NEW 25	**AJX06R254SA25L**	★	4	200	17.9	120	25	0.54	0.6	0.8°	1	JOM◌06T2
25	**AJX09R252SA25EL**	★	2	300	14.9	180	25	0.36	1.2	4°	2	JDM◌09T3

*1 Refer to page 598, for the maximum drilling depth (**AZ**).

*2 Number of Teeth

Note 1) Refer to page 598, for the max. depth of cut (**APMX**) and maximum drilling depth (**AZ**).

Continued on the next page.

Dimensions and Symbols (ISO 13399 Compliance)

DCX = Cutting Diameter Max.
DC = Cutting Diameter
LF = Functional Length
OAL = Overall Length
DCON = Connection Diameter
DCSFMS = Contact Surface Diameter Machine Side
CRKS = Connection Retention Knob Thread Size
APMX = Depth of Cut Max.
RMPX = Ramping Angle Max.

High Feed Radius Milling Cutter

(mm)

DCX	Order Number	Stock	∗2 No.T	LF	DC	LH	DCON	B2	APMX	RMPX	Fig.	Insert Type
		R										
28	**AJX09R282SA25S**	★	2	140	17.9	40	25	–	1.2	3°	2	JDM○09T3
28	**AJX08R283SA25S**	★	3	140	19.4	40	25	–	0.9	1.7°	1	JOM○0803
NEW 28	**AJX06R284SA25S**	★	4	140	20.9	40	25	–	0.6	0.7°	1	JOM○06T2
28	**AJX09R282SA25L**	★	2	200	17.9	40	25	–	1.2	3°	2	JDM○09T3
28	**AJX08R283SA25L**	★	3	200	19.4	40	25	–	0.9	1.7°	1	JOM○0803
NEW 28	**AJX06R284SA25L**	★	4	200	20.9	40	25	–	0.6	0.7°	1	JOM○06T2
28	**AJX09R282SA25EL**	★	2	300	17.9	40	25	–	1.2	3°	2	JDM○09T3
30	**AJX12R302SA32S**	★	2	150	18.3	70	32	1.82	1.2	4.5°	2	JDM○1204
30	**AJX09R303SA32S**	★	3	150	20	70	32	1.79	1.2	2.7°	2	JDM○09T3
30	**AJX12R302SA32L**	★	2	200	18.3	120	32	1.04	1.2	4.5°	2	JDM○1204
30	**AJX09R303SA32L**	★	3	200	20	120	32	1.03	1.2	2.7°	2	JDM○09T3
30	**AJX12R302SA32EL**	★	2	300	18.3	180	32	0.69	1.2	4.5°	2	JDM○1204
32	**AJX12R322SA32S**	★	2	150	20.3	70	32	0.96	1.2	4°	2	JDM○1204
32	**AJX09R323SA32S**	★	3	150	21.9	70	32	0.94	1.2	2.5°	2	JDM○09T3
NEW 32	**AJX08R324SA32S**	★	4	150	23.4	70	32	0.95	0.9	1.4°	1	JOM○0803
NEW 32	**AJX06R325SA32S**	★	5	150	24.9	70	32	0.94	0.6	0.5°	1	JOM○06T2
NEW 32	**AJX06R326SA32S**	★	6	150	24.9	70	32	0.94	0.6	0.5°	1	JOM○06T2
32	**AJX12R322SA32L**	★	2	200	20.3	120	32	0.55	1.2	4°	2	JDM○1204
32	**AJX09R323SA32L**	★	3	200	21.9	120	32	0.54	1.2	2.5°	2	JDM○09T3
NEW 32	**AJX08R324SA32L**	★	4	200	23.4	120	32	0.55	0.9	1.4°	1	JOM○0803
NEW 32	**AJX06R325SA32L**	★	5	200	24.9	120	32	0.54	0.6	0.5°	1	JOM○06T2
32	**AJX12R322SA32EL**	★	2	300	20.3	180	32	0.36	1.2	4°	2	JDM○1204
35	**AJX12R352SA32S**	★	2	150	23.3	50	32	–	1.2	3.5°	2	JDM○1204
35	**AJX09R353SA32S**	★	3	150	24.9	50	32	–	1.2	2°	2	JDM○09T3
35	**AJX12R352SA32L**	★	2	200	23.3	50	32	–	1.2	3.5°	2	JDM○1204
35	**AJX09R353SA32L**	★	3	200	24.9	50	32	–	1.2	2°	2	JDM○09T3
35	**AJX12R352SA32EL**	★	2	300	23.3	50	32	–	1.2	3.5°	2	JDM○1204
40	**AJX12R403SA32S**	★	3	150	28.3	50	32	–	1.2	3°	2	JDM○1204
40	**AJX09R404SA32S**	★	4	150	29.9	50	32	–	1.2	1.5°	2	JDM○09T3
NEW 40	**AJX08R406SA32S**	★	6	150	31.4	50	32	–	0.9	1°	1	JOM○0803
40	**AJX12R403SA32L**	★	3	250	28.3	50	32	–	1.2	3°	2	JDM○1204
40	**AJX09R404SA32L**	★	4	250	29.9	50	32	–	1.2	1.5°	2	JDM○09T3
NEW 40	**AJX08R406SA32L**	★	6	250	31.4	50	32	–	0.9	1°	1	JOM○0803
40	**AJX12R402SA32EL**	★	2	350	28.3	50	32	–	1.2	3°	2	JDM○1204
40	**AJX12R403SA42S**	★	3	150	28.3	70	42	1.79	1.2	3°	2	JDM○1204
40	**AJX09R404SA42S**	★	4	150	29.9	70	42	1.8	1.2	1.5°	2	JDM○09T3
40	**AJX12R403SA42L**	★	3	250	28.3	70	42	1.79	1.2	3°	2	JDM○1204
40	**AJX09R404SA42L**	★	4	250	29.9	70	42	1.8	1.2	1.5°	2	JDM○09T3
40	**AJX12R402SA42EL**	★	2	350	28.3	70	42	1.79	1.2	3°	2	JDM○1204
50	**AJX14R503SA42S**	★	3	150	38.2	50	42	–	1.2	4.2°	2	JDM○1405
50	**AJX14R503SA42L**	★	3	250	38.1	50	42	–	1.2	4.2°	2	JDM○1405
63	**AJX14R634SA42S**	★	4	150	51.1	50	42	–	1.2	2.8°	3	JDM○1405
63	**AJX14R634SA42L**	★	4	250	51.1	50	42	–	1.2	2.8°	3	JDM○1405

∗1 Refer to page 598, for the maximum drilling depth (**AZ**).
∗2 Number of Teeth
Note 1) Refer to page 598, for the max. depth of cut (**APMX**) and maximum drilling depth (**AZ**).

Fig.1

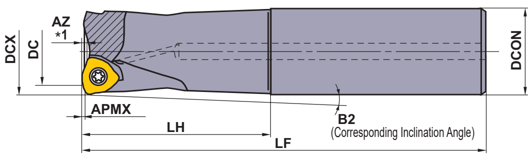


Fig.2

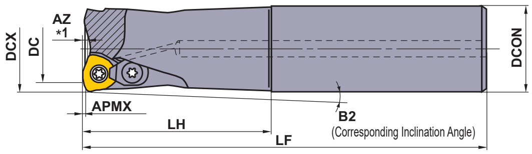
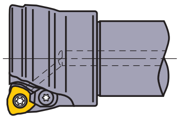


Fig3

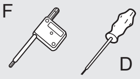


Right hand tool holder only.

★ : Stocked in Japan

Spare Parts

(mm)

Tool Holder Type	 *		 *		F  D
	Clamp Screw	Clamp Bridge	Clamp Bridge Screw	Spring	Wrench
AJX06R	TS25	—	—	—	TKY08F
AJX08R	TS33	—	—	—	TKY08D
AJX09R	TS351	AMS3	AJS3010T10	ASS2	TKY10D
AJX12R30	TS407	AMS4	AJS4012T15	ASS2	TKY15D
AJX12R32	TS43	AMS4	AJS4012T15	ASS2	TKY15D
AJX12R35	TS43	AMS4	AJS4012T15	ASS2	TKY15D
AJX12R40	TS43	AMS4	AJS4012T15	ASS2	TKY15D
AJX14R	TS54	AMS5	AJS5014T25	ASS3	TKY25D

* Clamp Torque (N • m) : TS25=1.0, TS33=1.0, TS351=2.5, TS407=3.5, TS43=3.5, TS54=7.5, AJS3010T10=2.5, AJS4012T15=3.5, AJS5014T25=7.5

Dimensions and Symbols (ISO 13399 Compliance)

DCX = Cutting Diameter Max.
DC = Cutting Diameter
LF = Functional Length
LH = Head Length
DCON = Connection Diameter
APMX = Depth of Cut Max.
RMPX = Ramping Angle Max.

High Feed Radius Milling Cutter

Fig.1

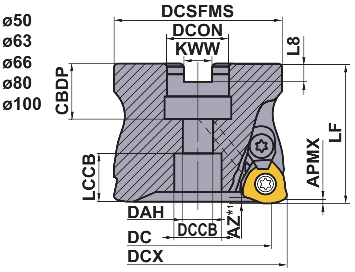
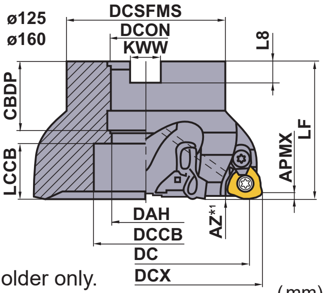
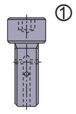
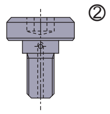


Fig.2



Right hand tool holder only.

(mm)

DCX		Set Bolt	Geometry	
DCON inch size	DCON mm size			
ϕ50, ϕ63	ϕ50, ϕ63(DCON=22)	HSC10030H	①	 ①  ②
	ϕ63(DCON=27), ϕ80	HSC12035H		
ϕ80, ϕ100	ϕ100	HSC16040H		
ϕ125	ϕ125, ϕ160	MBA20040H	②	
ϕ160		MBA24045H		

Metric Standard

■Arbor Type

With Coolant Hole

DCX = mm size, DCON = inch size

(mm)

DCX	Order Number	Stock R	*2 No.T	DC	LF	DCON	WT (kg)	APMX	RMPX	Fig.	Insert Type
50	**AJX12R05003B**	★	3	38.3	50	22.225	0.4	1.2	2°	1	JDM◌1204
50	**AJX12R05004B**	★	4	38.3	50	22.225	0.4	1.2	2°	1	JDM◌1204
50	**AJX09R05005B**	★	5	40.0	50	22.225	0.5	1.2	1.1°	1	JDM◌09T3
63	**AJX14R06303B**	★	3	51.1	50	22.225	0.7	1.2	2.8°	1	JDM◌1405
63	**AJX14R06304B**	★	4	51.1	50	22.225	0.7	1.2	2.8°	1	JDM◌1405
63	**AJX12R06305B**	★	5	51.3	50	22.225	0.9	1.2	1.5°	1	JDM◌1204
80	**AJX14R08004D**	★	4	68.1	63	31.75	1.3	1.2	1.8°	1	JDM◌1405
80	**AJX14R08005D**	★	5	68.1	63	31.75	1.3	1.2	1.8°	1	JDM◌1405
80	**AJX12R08006D**	★	6	68.3	63	31.75	1.7	1.2	1.1°	1	JDM◌1204
100	**AJX14R10005D**	★	5	88.1	63	31.75	2.4	1.2	1.2°	1	JDM◌1405
100	**AJX14R10006D**	★	6	88.1	63	31.75	2.4	1.2	1.2°	1	JDM◌1405
100	**AJX12R10007D**	★	7	88.3	63	31.75	2.9	1.2	0.8°	1	JDM◌1204
125	**AJX14R12505E**	★	5	113.2	63	38.1	3.3	1.2	0.8°	2	JDM◌1405
125	**AJX14R12507E**	★	7	113.2	63	38.1	3.3	1.2	0.8°	2	JDM◌1405
160	**AJX14R16006F**	★	6	148.2	63	50.8	5.0	1.2	0.5°	2	JDM◌1405
160	**AJX14R16008F**	★	8	148.2	63	50.8	5.0	1.2	0.5°	2	JDM◌1405

DCX = mm size, DCON = mm size

(mm)

DCX	Order Number	Stock R	*2 No.T	DC	LF	DCON	WT (kg)	APMX	RMPX	Fig.	Insert Type
50	**AJX12-050A03R**	★	3	38.3	50	22	0.4	1.2	2°	1	JDM◌1204
50	**AJX12-050A04R**	★	4	38.3	50	22	0.4	1.2	2°	1	JDM◌1204
50	**AJX09-050A05R**	★	5	40.0	50	22	0.5	1.2	1.1°	1	JDM◌09T3
63	**AJX14-063A03R**	★	3	51.1	50	22	0.7	1.2	2.8°	1	JDM◌1405
63	**AJX14-063A04R**	★	4	51.1	50	22	0.7	1.2	2.8°	1	JDM◌1405
63	**AJX12-063A05R**	★	5	51.3	50	22	0.9	1.2	1.5°	1	JDM◌1204
NEW 63	**AJX14-063X03R**	★	3	51.1	50	27	0.6	1.2	2.8	1	JDM◌1405
NEW 63	**AJX14-063X04R**	★	4	51.1	50	27	0.6	1.2	2.8	1	JDM◌1405
NEW 63	**AJX12-063X05R**	★	5	51.3	50	27	0.6	1.2	1.5	1	JDM◌1204
NEW 66	**AJX14-066X03R**	★	3	54.1	50	27	0.6	1.2	2.6	1	JDM◌1405
NEW 66	**AJX14-066X04R**	★	4	54.1	50	27	0.6	1.2	2.6	1	JDM◌1405
NEW 66	**AJX12-066X05R**	★	5	54.3	50	27	0.7	1.2	1.4	1	JDM◌1204
80	**AJX14-080A04R**	★	4	68.1	50	27	1.2	1.2	1.8°	1	JDM◌1405
80	**AJX14-080A05R**	★	5	68.1	50	27	1.2	1.2	1.8°	1	JDM◌1405
80	**AJX12-080A06R**	★	6	68.3	50	27	1.2	1.2	1.1°	1	JDM◌1204
100	**AJX14-100A05R**	★	5	88.1	63	32	2.4	1.2	1.2°	1	JDM◌1405
100	**AJX14-100A06R**	★	6	88.1	63	32	2.4	1.2	1.2°	1	JDM◌1405
100	**AJX12-100A07R**	★	7	88.3	63	32	2.6	1.2	0.8°	1	JDM◌1204

★ : Stocked in Japan

DCX	Order Number	Stock R	*2 No.T	DC	LF	DCON	WT (kg)	APMX	RMPX	Fig.	Insert Type
125	**AJX14-125B05R**	★	5	113.2	63	40	3.3	1.2	0.8°	2	JDM◌1405
125	**AJX14-125B07R**	★	7	113.2	63	40	3.3	1.2	0.8°	2	JDM◌1405
160	**AJX14-160B06R**	★	6	148.2	63	40	5.0	1.2	0.5°	2	JDM◌1405
160	**AJX14-160B08R**	★	8	148.2	63	40	5.0	1.2	0.5°	2	JDM◌1405

Fig.3

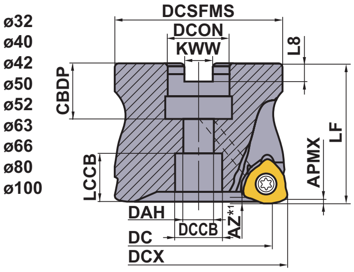
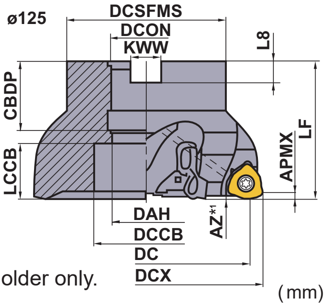
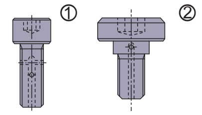


Fig.4



Right hand tool holder only.

(mm)

DCX	Set Bolt	Geometry	
ϕ32, ϕ40, ϕ42	HSC08025H	①	
ϕ50, ϕ52, ϕ63 ϕ66 (DCON=22)	HSC10030H		
ϕ63 ϕ66 (DCON=27), ϕ80	HSC12035H		
ϕ100	HSC16040H		
ϕ125	MBA20040H	②	

■Arbor Type Super Extra Fine Pitch

With Coolant Hole
DCX = mm size, DCON = mm size

(mm)

	DCX	Order Number	Stock R	*2 No.T	DC	LF	DCON	WT (kg)	APMX	RMPX	Fig.	Insert Type
NEW	32	**AJX06-032A05R**	★	5	24.9	40	16	0.1	0.6	0.5°	3	JOM◌06T2
NEW	32	**AJX06-032A06R**	★	6	24.9	40	16	0.1	0.6	0.5°	3	JOM◌06T2
NEW	40	**AJX08-040A06R**	★	6	31.4	40	16	0.2	0.9	1°	3	JOM◌0803
NEW	42	**AJX08-042A06R**	★	6	33.4	40	16	0.2	0.9	0.9°	3	JOM◌0803
NEW	50	**AJX09-050A06R**	★	6	39.3	50	22	0.4	1.2	1.1°	3	JDM◌09T3
NEW	50	**AJX08-050A07R**	★	7	41.4	50	22	0.4	0.9	0.7°	3	JOM◌0803
NEW	52	**AJX09-052A06R**	★	6	41.9	50	22	0.4	1.2	1°	3	JDM◌09T3
NEW	52	**AJX08-052A07R**	★	7	43.4	50	22	0.5	0.9	0.7°	3	JOM◌0803
NEW	63	**AJX12-063A06R**	★	6	51.3	50	22	0.7	1.2	1.5°	3	JDM◌1204
NEW	63	**AJX09-063A07R**	★	7	52.9	50	22	0.7	1.2	0.8°	3	JDM◌09T3
NEW	63	**AJX12-063X06R**	★	6	51.3	50	27	0.6	1.2	1.5°	3	JDM◌1204
NEW	63	**AJX09-063X07R**	★	7	52.9	50	27	0.7	1.2	0.8°	3	JDM◌09T3
NEW	66	**AJX12-066A06R**	★	6	54.3	50	22	0.7	1.2	1.4°	3	JDM◌1204
NEW	66	**AJX09-066A07R**	★	7	55.9	50	22	0.8	1.2	0.8°	3	JDM◌09T3
NEW	66	**AJX12-066X06R**	★	6	54.3	50	27	0.7	1.2	1.4°	3	JDM◌1204
NEW	66	**AJX09-066X07R**	★	7	55.9	50	27	0.8	1.2	0.8°	3	JDM◌09T3
NEW	80	**AJX12-080A08R**	★	8	68.3	50	27	1.1	1.2	1.1°	3	JDM◌1204
NEW	100	**AJX12-100A09R**	★	9	88.3	63	32	2.5	1.2	0.8°	3	JDM◌1204
NEW	125	**AJX14-125B09R**	★	9	113.2	63	40	3.0	1.2	0.8°	4	JDM◌1405

*1 Refer to page 598, for the maximum drilling depth (**AZ**).
*2 Number of Teeth
Note 1) Refer to page 598, for the max. depth of cut (**APMX**) and maximum drilling depth (**AZ**).

Dimensions and Symbols (ISO 13399 Compliance)

DCX = Cutting Diameter Max.
DC = Cutting Diameter
LF = Functional Length
LH = Head Length
DCON = Connection Diameter
APMX = Depth of Cut Max.
RMPX = Ramping Angle Max.

High Feed Radius Milling Cutter

Mounting Dimensions

Fig.1

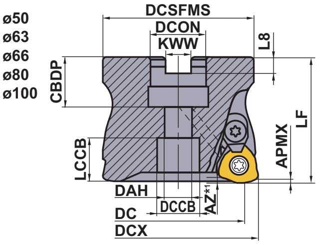


Fig.2

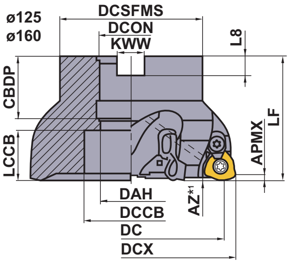


Fig.3

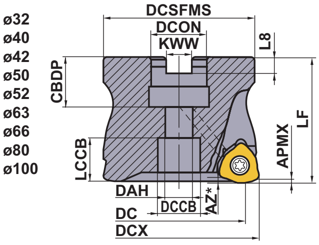
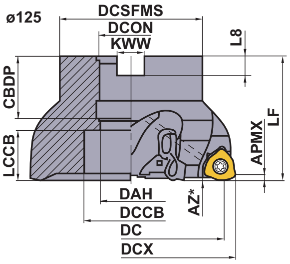


Fig.4



DCX = mm size, DCON = inch size

(mm)

DCX	Order Number	DCON	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8	Fig.
50	**AJX12R050**	22.225	19	11	17	18.3	47	8.4	5	1
50	**AJX09R050**	22.225	19	11	17	18.3	47	8.4	5	1
63	**AJX14R063**	22.225	19	11	17	18.2	60	8.4	5	1
63	**AJX12R063**	22.225	19	11	17	18.3	60	8.4	5	1
80	**AJX14R080**	31.75	32	17	26	20.2	76	12.7	8	1
80	**AJX12R080**	31.75	32	17	26	20.3	76	12.7	8	1
100	**AJX14R100**	31.75	32	17	26	20.2	96	12.7	8	1
100	**AJX12R100**	31.75	32	17	26	20.3	96	12.7	8	1
125	**AJX14R125**	38.1	40	40	56	22.1	100	15.9	10	2
160	**AJX14R160**	50.8	43	53	72	19.1	100	19.1	11	2

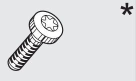
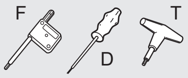
DCX = mm size, DCON = mm size

(mm)

DCX	Order Number	DCON	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8	Fig.
32	**AJX06-032A**	16	18	9	14	14.5	30	8.4	5.6	3
40	**AJX08-040A**	16	18	9	14	14.3	37	8.4	5.6	3
42	**AJX08-042A**	16	18	9	14	14.3	37	8.4	5.6	3
50	**AJX12-050A**	22	20	11	17	17.3	47	10.4	6.3	1
50	**AJX09-050A**	22	20	11	17	17.3	47	10.4	6.3	1, 3
52	**AJX09-052A**	22	20	11	17	17.3	47	10.4	6.3	3
52	**AJX08-052A**	22	20	11	17	17.4	47	10.4	6.3	3
63	**AJX14-063A**	22	20	11	17	17.2	60	10.4	6.3	1
63	**AJX12-063A**	22	20	11	17	17.3	60	10.4	6.3	1, 3
63	**AJX09-063A**	22	20	11	17	17.3	60	10.4	6.3	3
63	**AJX12-063X**	27	23	13	20	16.3	60	12.4	7.0	3
63	**AJX09-063X**	27	23	13	20	16.3	60	12.4	7.0	3
66	**AJX12-066A**	22	20	11	17	17.3	60	10.4	6.3	3
66	**AJX09-066A**	22	20	11	17	17.3	60	10.4	6.3	3
66	**AJX14-066X**	27	23	13	20	16.2	60	12.4	7.0	1
66	**AJX12-066X**	27	23	13	20	16.3	60	12.4	7.0	1, 3
66	**AJX09-066X**	27	23	13	20	16.3	60	12.4	7.0	3
80	**AJX14-080A**	27	23	13	19	16.2	76	12.4	7.0	1
80	**AJX12-080A**	27	23	13	19	16.3	76	12.4	7.0	1, 3
100	**AJX14-100A**	32	26	17	26	26.2	96	14.4	8.0	1
100	**AJX12-100A**	32	26	17	26	26.3	96	14.4	8.0	1, 3
125	**AJX14-125B**	40	40	42	56	22.1	100	16.4	9.0	2, 4
160	**AJX14-160B**	40	40	42	56	22.1	100	16.4	9.0	2

Spare Parts

(mm)

Tool Holder Type	 *		 *		
	Clamp Screw	Clamp Bridge	Clamp Bridge Screw	Spring	Wrench
AJX06 Super Extra Fine Pitch	TS25	–	–	–	TKY08F
AJX08 Super Extra Fine Pitch	TS33	–	–	–	TKY08D
AJX09	TS351	AMS3	AJS3010T10	ASS2	TKY10D
AJX09 Super Extra Fine Pitch	TS351	-	–	–	TKY10D
AJX12	TS43	AMS4	AJS4012T15	ASS2	TKY15T
AJX12 Super Extra Fine Pitch	TS43	–	–	–	TKY15T
AJX14	TS54	AMS5	AJS5014T25	ASS3	TKY25T
AJX14 Super Extra Fine Pitch	TS54	–	–	–	TKY25T

* Clamp Torque (N • m) : TS25=1.0, TS33=1.5, TS351=2.5, TS43=3.5, TS54=7.5, AJS3010T10=2.5, AJS4012T15=3.5, AJS5014T25=7.5

Fig.1

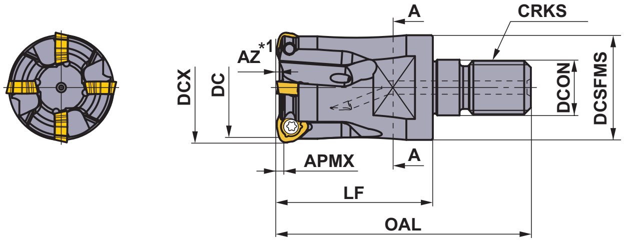
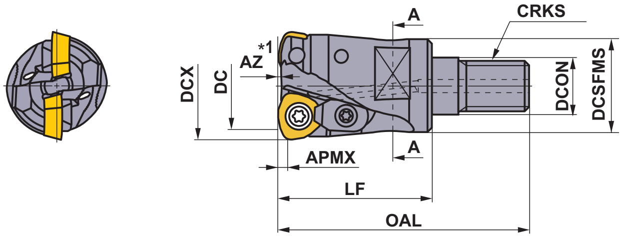
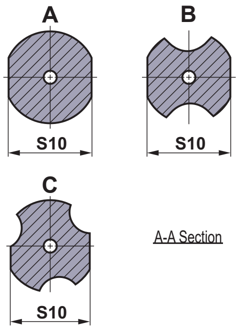


Fig.2





A-A Section

Screw-in Type

With Coolant Hole

Right hand tool holder only.

(mm)

DCX	Order Number	Stock	*2 No.T	DC	LF	OAL	DCON	WT (kg)	APMX	RMPX	Fig.	Insert Type
		R										
16	**AJX06R162AM0830**	★	2	8.9	30	48	8.5	0.1	0.6	3°	1	JOM◌06T2
17	**AJX06R172AM0830**	★	2	9.9	30	48	8.5	0.1	0.6	2.5°	1	JOM◌06T2
20	**AJX08R202AM1030**	★	2	11.4	30	49	10.5	0.1	0.9	3.5°	1	JOM◌0803
20	**AJX06R203AM1030**	★	3	12.9	30	49	10.5	0.1	0.6	1.5°	1	JOM◌06T2
22	**AJX08R222AM1030**	★	2	13.4	30	49	10.5	0.1	0.9	3°	1	JOM◌0803
22	**AJX06R223AM1030**	★	3	14.9	30	49	10.5	0.1	0.6	1°	1	JOM◌06T2
25	**AJX09R252AM1235**	★	2	14.9	35	57	12.5	0.2	1.2	4°	2	JDM◌09T3
25	**AJX08R253AM1235**	★	3	16.4	35	57	12.5	0.1	0.9	2°	1	JOM◌0803
NEW 25	**AJX06R254AM1235**	★	4	17.9	35	57	12.5	0.1	0.6	0.8°	1	JOM◌06T2
28	**AJX09R282AM1235**	★	2	17.9	35	57	12.5	0.2	1.2	3°	2	JDM◌09T3
28	**AJX08R283AM1235**	★	3	19.4	35	57	12.5	0.1	0.9	1.7°	1	JOM◌0803
NEW 28	**AJX06R284AM1235**	★	4	20.9	35	57	12.5	0.1	0.6	0.7°	1	JOM◌06T2
30	**AJX12R302AM1645**	★	2	18.3	45	68	17.0	0.3	1.2	4.5°	2	JDM◌1204
30	**AJX09R303AM1645**	★	3	20	45	68	17.0	0.2	1.2	2.7°	2	JDM◌09T3
32	**AJX12R322AM1645**	★	2	20.3	45	68	17.0	0.3	1.2	4°	2	JDM◌1204
32	**AJX09R323AM1645**	★	3	21.9	45	68	17.0	0.2	1.2	2.5°	2	JDM◌09T3
NEW 32	**AJX08R324AM1645**	★	4	23.4	45	68	17.0	0.2	0.9	1.4°	1	JOM◌0803
35	**AJX12R352AM1645**	★	2	23.3	45	68	17.0	0.3	1.2	3.5°	2	JDM◌1204
35	**AJX09R353AM1645**	★	3	24.9	45	68	17.0	0.2	1.2	2°	2	JDM◌09T3
NEW 35	**AJX08R354AM1645**	★	4	26.4	45	68	17.0	0.2	0.9	1.2°	1	JOM◌0803
40	**AJX12R403AM1645**	★	3	28.3	45	68	17.0	0.3	1.2	3°	2	JDM◌1204
40	**AJX09R404AM1645**	★	4	29.9	45	68	17.0	0.2	1.2	1.5°	2	JDM◌09T3
NEW 40	**AJX08R406AM1645**	★	6	31.4	45	68	17.0	0.3	0.9	1°	1	JOM◌0803

*1 Refer to page 598, for the maximum drilling depth (**AZ**).

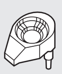
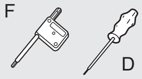
*2 Number of Teeth

Note 1) Refer to page 598, for the max. depth of cut (**APMX**) and maximum drilling depth (**AZ**).

Note 2) For screw-in type arbors, refer to page 587.

Spare Parts

(mm)

Tool Holder Type	 * Clamp Screw	 Clamp Bridge	 * Clamp Bridge Screw	 Spring	 F D Wrench
AJX06R	TS25	–	–	–	TKY08F
AJX08R	TS33	–	–	–	TKY08D
AJX09R	TS351	AMS3	AJS3010T10	ASS2	TKY10D
AJX12R30	TS407	AMS4	AJS4012T15	ASS2	TKY15D
AJX12R32	TS43	AMS4	AJS4012T15	ASS2	TKY15D
AJX12R35	TS43	AMS4	AJS4012T15	ASS2	TKY15D
AJX12R40	TS43	AMS4	AJS4012T15	ASS2	TKY15D

* Clamp Torque (N • m) : TS25=1.0, TS33=1.0, TS351=2.5, TS407=3.5, TS43=3.5, AJS3010T10=2.5, AJS4012T15=3.5, AJS5014T25=7.5

Mounting Dimensions

(mm)

	DCX	Order Number	DCON	DCSFMS	S10	CRKS	Connection Type	Shank Arbor Type
	16	**AJX06R162AM0830**	8.5	13	10	M8	A	SC16M08
	17	**AJX06R172AM0830**	8.5	13	10	M8	A	SC16M08
	20	**AJX08R202AM1030**	10.5	18	14	M10	B	SC20M10
	20	**AJX06R203AM1030**	10.5	18	14	M10	C	SC20M10
	22	**AJX08R222AM1030**	10.5	18	14	M10	B	SC20M10
	22	**AJX06R223AM1030**	10.5	18	14	M10	C	SC20M10
	25	**AJX09R252AM1235**	12.5	21	19	M12	B	SC25M12
	25	**AJX08R253AM1235**	12.5	21	19	M12	A	SC25M12
NEW	25	**AJX06R254AM1235**	12.5	23.5	19	M12	A	SC25M12
	28	**AJX09R282AM1235**	12.5	21	19	M12	B	SC25M12
	28	**AJX08R283AM1235**	12.5	21	19	M12	A	SC25M12
NEW	28	**AJX06R284AM1235**	12.5	23.5	19	M12	A	SC25M12
	30	**AJX12R302AM1645**	17.0	29	24	M16	B	SC32M16
	30	**AJX09R303AM1645**	17.0	29	24	M16	A	SC32M16
	32	**AJX12R322AM1645**	17.0	29	24	M16	B	SC32M16
	32	**AJX09R323AM1645**	17.0	29	24	M16	A	SC32M16
NEW	32	**AJX08R324AM1645**	17.0	29	24	M16	A	SC32M16
	35	**AJX12R352AM1645**	17.0	29	24	M16	B	SC32M16
	35	**AJX09R353AM1645**	17.0	29	24	M16	A	SC32M16
NEW	35	**AJX08R354AM1645**	17.0	29	24	M16	A	SC32M16
	40	**AJX12R403AM1645**	17.0	29	24	M16	B	SC32M16
	40	**AJX09R404AM1645**	17.0	29	24	M16	A	SC32M16
NEW	40	**AJX08R406AM1645**	17.0	29	24	M16	A	SC32M16

How to Install the Screw-in Head

①Thoroughly clean the clamp section of the head and the arbor with an air blower or brush before installation.

②Tighten the head at the recommended torque and ensure that there is no gap between the head and arbor.

(mm)

Screw Size	Recommended Torque (N • m)	Wrench Size
M8	23	10
M10	46	14
M12	80	19
M16	90	24

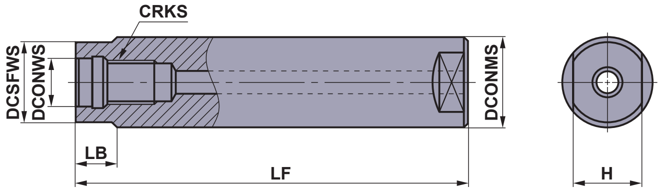
- ●Cutting tools become extremely hot during cutting. Never touch them with bare hands after operation as this may produce risk of injuries or burns.
- ●Do not handle the cutting tools with bare hands as this may cause injuries.

Dimensions and Symbols (ISO 13399 Compliance)

DCX = Cutting Diameter Max.
DC = Cutting Diameter
LF = Functional Length
OAL = Overall Length
DCON = Connection Diameter
DCSFMS = Contact Surface Diameter Machine Side
CRKS = Connection Retention Knob Thread Size
APMX = Depth of Cut Max.
RMPX = Ramping Angle Max.

SCREW-IN HOLDERS

STRAIGHT SHANK TYPE



■Steel Shank Type

(inch)

CRKS	Order Number	Stock	DCONMS	LF	DCONWS	DCSFWS	LB	H	WT (lbs)
M8	**SCU10M08S100S**	●	.625	3.937	.335	.571	.394	.394	.2
M8	**SCU10M08S200L**	●	.625	7.874	.335	.571	.394	.394	.7
M10	**SCU12M10S120S**	●	.750	4.724	.413	.728	.394	.551	.4
M10	**SCU12M10S220L**	●	.750	8.661	.413	.728	.394	.551	.9
M12	**SCU16M12S125S**	●	1.000	4.921	.492	.925	.394	.748	.9
M12	**SCU16M12S245L**	●	1.000	9.646	.492	.925	.394	.748	2.0
M16	**SCU20M16S140S**	●	1.250	5.512	.669	1.122	.591	.945	1.8
M16	**SCU20M16S280L**	●	1.250	11.024	.669	1.122	.591	.945	3.5

Metric Standard

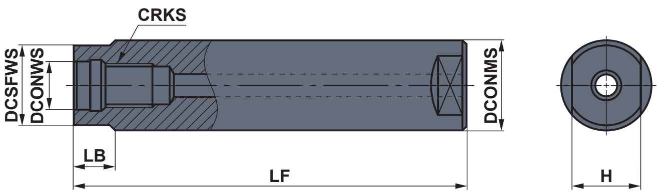
(mm)

CRKS	Order Number	Stock	DCONMS	LF	DCONWS	DCSFWS	LB	H	WT (kg)
M8	**SC16M08S100S**	★	16	100	8.5	14.5	10	10	0.1
M8	**SC16M08S200L**	★	16	200	8.5	14.5	10	10	0.3
M10	**SC20M10S120S**	★	20	120	10.5	18.5	10	14	0.3
M10	**SC20M10S220L**	★	20	220	10.5	18.5	10	14	0.5
M12	**SC25M12S125S**	★	25	125	12.5	23.5	10	19	0.4
M12	**SC25M12S245L**	★	25	245	12.5	23.5	10	19	0.8
M16	**SC32M16S140S**	★	32	140	17	28.5	15	24	0.8
M16	**SC32M16S280L**	★	32	280	17	28.5	15	24	1.6

● : USA Stock ★ : Stocked in Japan

High Feed Radius Milling Cutter

SCREW-IN HOLDERS



■Carbide Shank Type

(inch)

CRKS	Order Number	Stock	DCONMS	LF	DCONWS	DCSFWS	LB	H	WT (lbs)
M8	**SCU10M08S100SW**	●	.625	3.937	.335	.571	.394	.394	.4
M8	**SCU10M08S200LW**	●	.625	7.874	.335	.571	.394	.394	1.1
M10	**SCU12M10S120SW**	●	.750	4.724	.413	.728	.394	.551	.9
M10	**SCU12M10S220LW**	●	.750	8.661	.413	.728	.394	.551	1.8
M12	**SCU16M12S125SW**	●	1.000	4.921	.492	.925	.394	.748	1.8
M12	**SCU16M12S245LW**	●	1.000	9.646	.492	.925	.394	.748	3.5
M16	**SCU20M16S140SW**	●	1.250	5.512	.669	1.122	.591	.945	3.1
M16	**SCU20M16S280LW**	●	1.250	11.024	1.250	1.122	.591	.945	6.4

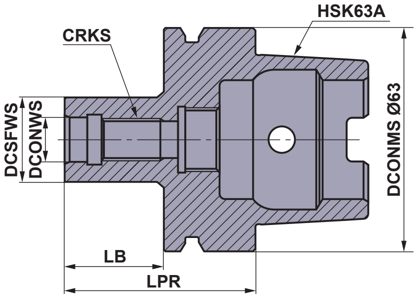
Metric Standard

(mm)

CRKS	Order Number	Stock	DCONMS	LF	DCONWS	DCSFWS	LB	H	WT (kg)
M8	**SC16M08S100SW**	★	16	100	8.5	14.5	10	10	0.2
M8	**SC16M08S200LW**	★	16	200	8.5	14.5	10	10	0.5
M10	**SC20M10S120SW**	★	20	120	10.5	18.5	10	14	0.5
M10	**SC20M10S220LW**	★	20	220	10.5	18.5	10	14	0.9
M12	**SC25M12S125SW**	★	25	125	12.5	23.5	10	19	0.8
M12	**SC25M12S245LW**	★	25	245	12.5	23.5	10	19	1.5
M16	**SC32M16S140SW**	★	32	140	17	28.5	15	24	1.4
M16	**SC32M16S280LW**	★	32	280	17	28.5	15	24	2.8

● : USA Stock ★ : Stocked in Japan

HSK63A Shank Arbor

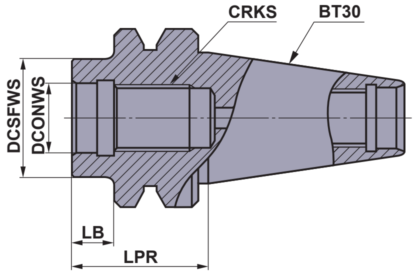


Metric Standard

(mm)

CRKS	Order Number	Stock	DCONWS	DCSFWS	LPR	LB	WT (kg)
M8	**SC16M08S22-HSK63A**	★	8.5	14.5	48	22	0.7
M10	**SC20M10S24-HSK63A**	★	10.5	18.5	50	24	0.7
M12	**SC25M12S27-HSK63A**	★	12.5	23.5	53	27	0.7
M16	**SC32M16S28-HSK63A**	★	17	28.5	54	28	0.8

BT30 Shank Arbor

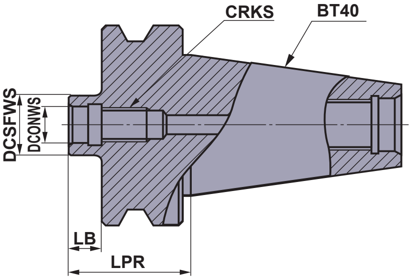


Metric Standard

(mm)

CRKS	Order Number	Stock	DCONWS	DCSFWS	LPR	LB	WT (kg)
M8	**SC16M08S10-BT30**	★	8.5	14.5	32	10	0.4
M10	**SC20M10S10-BT30**	★	10.5	18.5	32	10	0.4
M12	**SC25M12S10-BT30**	★	12.5	23.5	32	10	0.4
M16	**SC32M16S10-BT30**	★	17	28.5	32	10	0.4

BT40 Shank Arbor



Metric Standard

(mm)

CRKS	Order Number	Stock	DCONWS	DCSFWS	LPR	LB	WT (kg)
M8	**SC16M08S10-BT40**	★	8.5	14.5	37	10	1
M10	**SC20M10S10-BT40**	★	10.5	18.5	37	10	1
M12	**SC25M12S10-BT40**	★	12.5	23.5	37	10	1
M16	**SC32M16S10-BT40**	★	17	28.5	37	10	1

How To Install the Screw-in Head

①Thoroughly clean the clamp section of the head and the arbor with an air blower or brush before installation.

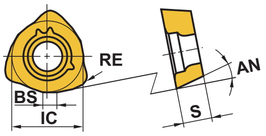
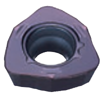
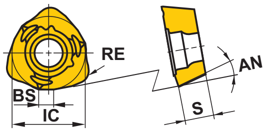
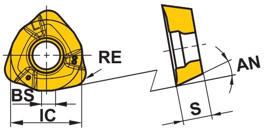
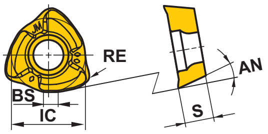
②Tighten the head at the recommended torque and ensure that there is no gap between the head and arbor.

Screw Size	Recommended Torque (lbf-ft)	Wrench Size (inch)
M8	17.0	.394
M10	33.9	.551
M12	59.0	.748
M16	66.4	.945

- Cutting tools become extremely hot during cutting. Never touch them with bare hands after operation as this may produce risk of injuries or burns.
- Do not handle the cutting tools with bare hands as this may cause injuries.

Inserts

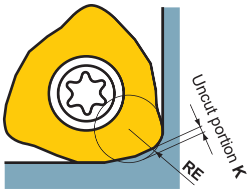
(inch)

Workpiece Material	**P** Steels		●	◐	✤						◐	✤					
	M Stainless Steels					◐	✤				◐	✤					
	K Cast Irons		●								✤						
	S Heat Rresistant Alloys, Titanium Alloys							◐	✤	✤	◐						
	H Hardened Steels										◐						
Shape	Order Number	Class	Coated										AN	IC	S	BS	RE	Geometry
			FH7020	MP6120	MP6130	MP7130	MP7140	MP9120	MP9130	MP9140	VP15TF	VP30RT						
General Use Type 	**JOMW06T215ZZSR-FT**	M	●	●	●	●	●	●	●		●	●	13°	.250	.109	.047	.059	
	JOMW080320ZZSR-FT	M	●	●	●	●	●	●	●		●	●	13°	.315	.125	.055	.079	
	JDMW09T320ZDSR-FT	M	●	●	●	●	●	●	●		●	●	15°	.375	.156	.071	.079	
	JDMW120420ZDSR-FT	M	●	●	●	●	●	●	●		●	●	15°	.472	.187	.098	.079	
	JDMW140520ZDSR-FT	M	●	●	●	●	●	●	●		●	●	15°	.551	.219	.110	.079	
Strong Cutting Edge Type 	**JDMT120420ZDSR-ST**	M	●	●	●	●	●				●	●	15°	.472	.187	.098	.079	
	JDMT140520ZDSR-ST	M	●	●	●	●	●				●	●	15°	.551	.219	.110	.079	
Sharp Cutting Edge Type (For Difficult-to-cut Materials) 	**JOMT06T216ZZER-JL**	M				●	●	●	●	●			13°	.250	.109	.047	.063	
	JOMT080322ZZER-JL	M				●	●	●	●	●			13°	.315	.125	.055	.087	
	JDMT09T323ZDER-JL	M				●	●	●	●	●			15°	.375	.156	.071	.091	
	JDMT120423ZDER-JL	M				●	●	●	●	●			15°	.472	.187	.098	.091	
	JDMT140523ZDER-JL	M				●	●	●	●	●			15°	.551	.219	.110	.091	
Sharp Cutting Edge Type (For General Use) 	**JOMT06T215ZZSR-JM**	M	●	●	●	●	●	●	●		●	●	13°	.250	.109	.047	.059	
	JOMT080320ZZSR-JM	M	●	●	●	●	●	●	●		●	●	13°	.315	.125	.055	.079	
	JDMT09T320ZDSR-JM	M	●	●	●	●	●	●	●		●	●	15°	.375	.156	.071	.079	
	JDMT120420ZDSR-JM	M	●	●	●	●	●	●	●		●	●	15°	.472	.187	.098	.079	
	JDMT140520ZDSR-JM	M	●	●	●	●	●	●	●		●	●	15°	.551	.219	.110	.079	

Cutting Conditions :
● : Stable Cutting ◐ : General Cutting ✤ : Unstable Cutting

Note 1) When using ST breaker, please check the height setting as it differs from other chip breakers.

Note for Programming



When using the AJX, please program the approximate radius as indicated.
The approximate uncut portions for the program are as in the right table.

(inch)

Insert Size	Breaker	Approx. **RE**	Uncut Portion **K**
JOM◌06T2◌◌ZZ◌R-◌◌	**FT / JM**	.079	.013
	JL	.098	.013
JOM◌0803◌◌ZZ◌R-◌◌	**FT / JM**	.098	.018
	JL	.079	.016
JOM◌09T3◌◌ZD◌R-◌◌	**FT / JM**	.118	.019
	JL	.118	.018
JOM◌1204◌◌ZD◌R-◌◌	**FT / JM / ST**	.118	.025
	JL	.118	.021
JOM◌1405◌◌ZD◌R-◌◌	**FT / JM / ST**	.118	.025
	JL	.118	.022

Note) The uncut portion may change slightly depending on cutting conditions.

● : USA Stock
(10 inserts in one case)

Memo

Recommended Cutting Conditions

Cutting Speed

Workpiece Material		Properties	Cutting Speed **vc** (SFM)			
P			**FH7020**	**MP6120**	**MP6130**	**VP30RT**
	Mild Steels	Hardness ≤180HB	850 (700—1000)	750 (580—910)	685 (515—845)	620 (450—880)
	Carbon Steels Alloy Steels	Hardness 180—280HB	550 (400—700)	480 (320—630)	415 (255—565)	350 (190—500)
	Carbon Steels Alloy Steels	Hardness 280—350HB	450 (300—600)	350 (190—500)	285 (125—435)	220 (60—370)
	Alloy Tool Steels	Hardness ≤350HB (Annealing)	450 (300—600)	350 (190—500)	285 (125—435)	220 (60—370)
	Pre-hardened Steels	Hardness 35—45HRC	—	330 (230—425)	265 (165—360)	200 (100—295)
M			**MP7130**	**MP7140**	—	—
	Stainless Steels	Hardness ≤270HB	450 (300—600)	385 (235—535)		
K			**FH7020**	**VP15TF**	—	—
	Gray Cast Irons	Tensile Strength ≤350MPa	850 (700—1000)	—		
	Ductile Cast Irons	Tensile Strength ≤800MPa	—	500 (400—700)	—	—
S			**MP9120**	**MP9130**	**MP9140**	—
	Heat Resistant Alloys	Hardness ≤350HB	100 (65—130)	80 (65—115)	65 (50—100)	
	Titanium Alloys	—	165 (130—195)	150 (100—180)	130 (100—165)	—
H			**VP15TF**	—	—	—
	Hardened Steels	Hardness 40—55HRC	230 (165—295)			

High Feed Radius Milling Cutter

Recommended Cutting Conditions

■Depth of Cut/Feed

	Workpiece Material	Properties	DCX=φ.625", φ.688" (φ16mm, φ17mm) (Shank Type)			DCX=φ.750", φ.875" (φ20mm, φ22mm) (Shank Type)			DCX=φ.750" (φ20mm, φ22mm) (Shank Type)		
			AJXU06 Type			AJXU08 Type			AJXU06 Type		
			2 (Number of Teeth)			2 (Number of Teeth)			3 (Number of Teeth)		
			Over-hang	Axial Depth of Cut	Feed per Tooth (IPT)	Over-hang	Axial Depth of Cut	Feed per Tooth (IPT)	Over-hang	Axial Depth of Cut	Feed per Tooth (IPT)
P	Mild Steels	Hardness ≤180HB	5.5	.031	.031	6.3	.039	.039	6.3	.035	.035
			7.0	.024	.024	8.3	.031	.031	8.3	.028	.028
			8.2	.016	.016	9.4	.024	.024	9.4	.020	.020
	Carbon Steels Alloy Steels	Hardness 180—280HB	5.5	.031	.031	6.3	.039	.039	6.3	.035	.035
			7.0	.024	.024	8.3	.031	.031	8.3	.028	.028
			8.2	.016	.016	9.4	.024	.024	9.4	.020	.020
	Carbon Steels Alloy Steels	Hardness 280—350HB	5.5	.028	.031	6.3	.031	.039	6.3	.028	.035
			7.0	.020	.024	8.3	.024	.031	8.3	.020	.028
			8.2	.012	.016	9.4	.016	.024	9.4	.016	.020
	Alloy Tool Steels	Hardness ≤350HB (Annealing)	5.5	.028	.031	6.3	.031	.039	6.3	.028	.035
			7.0	.020	.024	8.3	.024	.031	8.3	.020	.028
			8.2	.012	.016	9.4	.016	.024	9.4	.016	.020
	Pre-hardened Steels	Hardness 35—45HRC	5.5	.028	.028	6.3	.031	.031	6.3	.028	.028
			7.0	.020	.020	8.3	.024	.024	8.3	.020	.020
			8.2	.012	.012	9.4	.016	.016	9.4	.016	.012
M	Stainless Steels	Hardness ≤270HB	5.5	.031	.028	6.3	.039	.031	6.3	.035	.028
			7.0	.024	.020	8.3	.031	.024	8.3	.028	.020
			8.2	.016	.012	9.4	.024	.016	9.4	.020	.012
K	Gray Cast Irons	Tensile Strength ≤350MPa	5.5	.031	.039	6.3	.039	.047	6.3	.035	.039
			7.0	.024	.031	8.3	.031	.039	8.3	.028	.031
			8.2	.016	.024	9.4	.024	.031	9.4	.020	.024
	Ductile Cast Irons	Tensile Strength ≤800MPa	5.5	.028	.031	6.3	.031	.039	6.3	.028	.035
			7.0	.020	.024	8.3	.024	.031	8.3	.020	.028
			8.2	.012	.016	9.4	.016	.024	9.4	.016	.020
S	Heat Resistant Alloys	Hardness ≤350HB	5.5	.024	.024	6.3	.031	.024	5.5	.024	.024
			7.0	.016	.016	8.2	.024	.016	7.0	.016	.016
	Titanium Alloys	—	8.2	.012	.012	9.4	.016	.012	8.2	.012	.012
H	Hardened Steels	Hardness 40—55HRC	5.5	.020	.020	6.3	.020	.024	6.3	.020	.020
			7.0	.016	.012	8.3	.016	.016	8.3	.016	.016
			8.2	.012	.008	9.4	.012	.008	9.4	.012	.008

* Depth of cut of JL breaker is up to .024 inch. (06 size)
* Depth of cut of JL breaker is up to .035 inch. (08 size)

(inch)

DCX=ϕ1.000", ϕ1.125" (ϕ25mm, ϕ28mm) (Shank Type)			DCX=ϕ1.000" (ϕ25mm) (Shank Type)			DCX=ϕ1.250" (ϕ32mm) (Shank Type)			DCX=ϕ1.250" (ϕ32mm) (Shank Type)			DCX=ϕ1.500" (ϕ40mm) (ϕ1.250"Shank)			DCX=ϕ1.500" (ϕ40mm) (ϕ1.250"Shank)		
AJXU09 Type			AJXU08 Type			AJXU12 Type			AJXU09 Type			AJXU12 Type			AJXU09 Type		
2 (Number of Teeth)			3 (Number of Teeth)			2 (Number of Teeth)			3 (Number of Teeth)			3 (Number of Teeth)			4 (Number of Teeth)		
Over-hang	Axial Depth of Cut	Feed per Tooth (IPT)	Over-hang	Axial Depth of Cut	Feed per Tooth (IPT)	Over-hang	Axial Depth of Cut	Feed per Tooth (IPT)	Over-hang	Axial Depth of Cut	Feed per Tooth (IPT)	Over-hang	Axial Depth of Cut	Feed per Tooth (IPT)	Over-hang	Axial Depth of Cut	Feed per Tooth (IPT)
6.7	.039	.047	6.7	.035	.039	7.0	.047	.055	7.0	.043	.047	7.0	.047	.055	7.0	.043	.047
9.0	.031	.039	9.0	.028	.031	9.0	.039	.047	9.0	.035	.039	9.5	.039	.047	9.5	.035	.039
11.5	.024	.031	11.5	.020	.024	11.0	.031	.039	11.5	.028	.031	12.0	.031	.039	12.0	.028	.031
6.7	.039	.047	6.7	.035	.039	7.0	.047	.055	7.0	.043	.047	7.0	.047	.055	7.0	.043	.047
9.0	.031	.039	9.0	.028	.031	9.0	.039	.047	9.0	.035	.039	9.5	.039	.047	9.5	.035	.039
11.5	.024	.031	11.5	.020	.024	11.0	.031	.039	11.5	.028	.031	12.0	.031	.039	12.0	.028	.031
6.7	.031	.047	6.7	.028	.039	7.0	.039	.055	7.0	.035	.047	7.0	.039	.055	7.0	.035	.047
9.0	.024	.039	9.0	.020	.031	9.0	.031	.047	9.0	.028	.039	9.5	.031	.047	9.5	.028	.039
11.5	.016	.031	11.5	.016	.024	11.0	.024	.039	11.5	.020	.031	12.0	.024	.039	12.0	.020	.031
6.7	.031	.047	6.7	.028	.039	7.0	.039	.055	7.0	.035	.047	7.0	.039	.055	7.0	.035	.047
9.0	.024	.039	9.0	.020	.031	9.0	.031	.047	9.0	.028	.039	9.5	.031	.047	9.5	.028	.039
11.5	.016	.031	11.5	.016	.024	11.0	.024	.039	11.5	.020	.031	12.0	.024	.039	12.0	.020	.031
6.7	.031	.039	6.7	.028	.035	7.0	.039	.047	7.0	.035	.039	7.0	.039	.047	7.0	.035	.039
9.0	.024	.031	9.0	.020	.028	9.0	.031	.039	9.0	.028	.031	9.5	.031	.039	9.5	.028	.031
11.5	.016	.024	11.5	.016	.020	11.0	.024	.031	11.5	.020	.024	12.0	.024	.031	12.0	.020	.024
6.7	.039	.039	6.7	.035	.035	7.0	.047	.047	7.0	.043	.039	7.0	.047	.047	7.0	.043	.039
9.0	.031	.031	9.0	.028	.028	9.0	.039	.039	9.0	.035	.031	9.5	.039	.039	9.5	.035	.031
11.5	.024	.024	11.5	.020	.020	11.0	.031	.031	11.5	.028	.024	12.0	.031	.031	12.0	.028	.024
6.7	.039	.055	6.7	.035	.047	7.0	.047	.063	7.0	.043	.055	7.0	.047	.063	7.0	.043	.055
9.0	.031	.047	9.0	.028	.039	9.0	.039	.055	9.0	.035	.047	9.5	.039	.055	9.5	.035	.047
11.5	.024	.039	11.5	.020	.031	11.0	.031	.047	11.5	.028	.035	12.0	.031	.047	12.0	.028	.035
6.7	.031	.047	6.7	.028	.039	7.0	.039	.055	7.0	.035	.047	7.0	.039	.055	7.0	.035	.047
9.0	.024	.039	9.0	.020	.031	9.0	.031	.047	9.0	.028	.039	9.5	.031	.047	9.5	.028	.039
11.5	.016	.031	11.5	.016	.024	11.0	.024	.039	11.5	.020	.031	12.0	.024	.039	12.0	.020	.031
6.7	.047	.024	6.3	.031	.024	7.0	.047	.024	7.0	.047	.024	7.0	.047	.024	7.0	.047	.024
9.0	.039	.016	8.2	.024	.016	9.0	.039	.016	9.0	.039	.016	9.5	.039	.016	9.5	.039	.016
11.5	.031	.012	9.4	.016	.012	11.0	.031	.012	11.5	.031	.012	12.0	.031	.012	12.0	.031	.012
6.7	.020	.031	6.7	.020	.028	7.0	.024	.039	7.0	.020	.035	7.0	.024	.039	7.0	.020	.035
9.0	.016	.024	9.0	.016	.020	9.0	.020	.031	9.0	.016	.028	9.5	.020	.031	9.5	.016	.028
11.5	.012	.016	11.5	.012	.012	11.0	.016	.024	11.5	.012	.020	12.0	.016	.024	12.0	.012	.020

* Depth of cut of JL breaker is up to .047 inch.(09, 12, 14 sizes)

Recommended Cutting Conditions

Depth of Cut/Feed

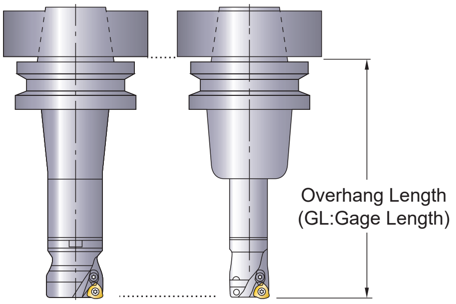
	Workpiece Material	Properties	DCX=ϕ1.500" (ϕ40mm) (ϕ1.500"Shank)			DCX=ϕ2.000" (ϕ50mm) (Shank Type)			DCX=ϕ2.000", ϕ2.500" (ϕ50mm, ϕ63mm, ϕ66mm) (Arbor Type)		
			AJXU12 Type			AJXU14 Type			AJXU09, 12 (ϕ2.000") AJXU12, 14 (ϕ2.500")		
			3 (Number of Teeth)			3 (Number of Teeth)			3, 4, 5 (Number of Teeth)		
			Over-hang	Axial Depth of Cut	Feed per Tooth (IPT)	Over-hang	Axial Depth of Cut	Feed per Tooth (IPT)	Over-hang	Axial Depth of Cut	Feed per Tooth (IPT)
P	Mild Steels	Hardness ≤180HB	7.0	.047	.059	7.0	.055	.059	6.0	.059	.059
			9.5	.039	.051	9.5	.047	.051	10.0	.051	.051
			12.0	.031	.043	—	—	—	14.0	.043	.043
	Carbon Steels Alloy Steels	Hardness 180—280HB	7.0	.047	.059	7.0	.055	.059	6.0	.059	.059
			9.5	.039	.051	9.5	.047	.051	10.0	.051	.051
			12.0	.031	.043	—	—	—	14.0	.043	.043
	Carbon Steels Alloy Steels	Hardness 280—350HB	7.0	.039	.059	7.0	.047	.059	6.0	.051	.059
			9.5	.031	.051	9.5	.039	.051	10.0	.043	.051
			12.0	.024	.043	—	—	—	14.0	.035	.043
	Alloy Tool Steels	Hardness ≤350HB (Annealing)	7.0	.039	.059	7.0	.047	.059	6.0	.051	.059
			9.5	.031	.051	9.5	.039	.051	10.0	.043	.051
			12.0	.024	.043	—	—	—	14.0	.035	.043
	Pre-hardened Steels	Hardness 35—45HRC	7.0	.039	.051	7.0	.047	.051	6.0	.051	.051
			9.5	.031	.043	9.5	.039	.043	10.0	.043	.043
			12.0	.024	.035	—	—	—	14.0	.035	.035
M	Stainless Steels	Hardness ≤270HB	7.0	.047	.051	7.0	.055	.051	6.0	.059	.051
			9.5	.039	.043	9.5	.047	.043	10.0	.051	.043
			12.0	.031	.035	—	—	—	14.0	.043	.035
K	Gray Cast Irons	Tensile Strength ≤350MPa	7.0	.047	.067	7.0	.055	.067	6.0	.059	.067
			9.5	.039	.059	9.5	.047	.059	10.0	.051	.059
			12.0	.031	.051	—	—	—	14.0	.043	.051
	Ductile Cast Irons	Tensile Strength ≤800MPa	7.0	.039	.059	7.0	.047	.059	6.0	.051	.059
			9.5	.031	.051	9.5	.039	.051	10.0	.043	.051
			12.0	.024	.043	—	—	—	14.0	.035	.043
S	Heat Resistant Alloys	Hardness ≤350HB	7.0	.047	.024	7.0	.047	.024	6.0	.047	.024
			9.5	.039	.016	9.5	.039	.016	10.0	.039	.016
	Titanium Alloys	—	12.0	.031	.012	—	—	—	14.0	.031	.012
H	Hardened Steels	Hardness 40—55HRC	7.0	.024	.043	7.0	.031	.043	6.0	.035	.043
			9.5	.020	.035	9.5	.024	.035	10.0	.028	.035
			12.0	.016	.028	—	—	—	—	—	—

(inch)

DCX=φ2.000", φ2.500" (φ50mm, φ63mm, φ66mm) (Arbor Type)			DCX=φ3.000", φ4.000", φ4.921", φ6.299" (φ80mm, φ100mm, φ125mm, φ160mm) (Arbor Type)			DCX=φ3.000", φ4.000" (φ80mm, φ100mm) (Arbor Type)		
AJXU09 Type (φ2.000") AJXU12 Type (φ2.500")			AJXU14 Type AJX14 Type			AJXU12 Type		
5 (Number of Teeth)			4 or 5 or 6 or 7 or 8 (Number of Teeth)			6 or 7 (Number of Teeth)		
Over-hang	Axial Depth of Cut	Feed per Tooth (IPT)	Over-hang	Axial Depth of Cut	Feed per Tooth (IPT)	Over-hang	Axial Depth of Cut	Feed per Tooth (IPT)
6.0	.053	.051	7.0	.059	.059	7.0	.053	.051
10.0	.046	.043	12.0	.051	.051	12.0	.046	.043
14.0	.039	.035	18.0	.039	.039	18.0	.035	.031
6.0	.053	.051	7.0	.059	.059	7.0	.053	.051
10.0	.046	.043	12.0	.051	.051	12.0	.046	.043
14.0	.039	.035	18.0	.039	.039	18.0	.035	.031
6.0	.046	.051	7.0	.051	.059	7.0	.046	.051
10.0	.039	.043	12.0	.043	.051	12.0	.039	.043
14.0	.032	.035	18.0	.031	.039	18.0	.028	.031
6.0	.046	.051	7.0	.051	.059	7.0	.046	.051
10.0	.039	.043	12.0	.043	.051	12.0	.039	.043
14.0	.032	.035	18.0	.031	.039	18.0	.028	.031
6.0	.046	.043	7.0	.051	.051	7.0	.046	.043
10.0	.039	.035	12.0	.043	.043	12.0	.039	.035
14.0	.032	.028	18.0	.031	.031	18.0	.028	.024
6.0	.053	.043	7.0	.059	.051	7.0	.053	.043
10.0	.046	.035	12.0	.051	.043	12.0	.046	.035
14.0	.039	.028	18.0	.039	.031	18.0	.035	.024
6.0	.053	.059	7.0	.059	.067	7.0	.053	.059
10.0	.046	.051	12.0	.051	.059	12.0	.046	.051
14.0	.039	.039	18.0	.039	.047	18.0	.035	.035
6.0	.046	.051	7.0	.051	.059	7.0	.046	.051
10.0	.039	.043	12.0	.043	.051	12.0	.039	.043
14.0	.032	.035	18.0	.031	.039	18.0	.028	.031
6.0	.047	.024	7.0	.047	.024	7.0	.047	.024
10.0	.039	.016	12.0	.039	.016	12.0	.039	.016
14.0	.031	.012	18.0	.031	.012	18.0	.031	.012
6.0	.032	.039	7.0	.035	.043	7.0	.032	.039
10.0	.025	.031	12.0	.028	.035	12.0	.025	.031
—	—	—	—	—	—	—	—	—

＊ Depth of cut of JL breaker is up to .047 inch.

①Overhang Length



②Main Spindle Speed
n(min^{-1})=(Recommended Cutting Speed x 12)÷(DCX x 3.14)

③Table Feed Rate
vf(IPM)=n x feed per tooth fz x number of teeth

④Recommended width of cut (ae) is more than 60% of cutting edge diameter.

⑤The cutting condition on the left are guide when using a CAT50 size holder. In case of CAT40 and HSK63 machines, a cutter diameter of under 1.5 inch is recommended. In this case, reduce the depth of cut and table feed rate.

⑥Use of ST chip breaker with a tougher cutting edge is recommended for interrupted cutting.

⑦A cutter body with a coarse pitch is recommended for use in unstable conditions such as a long tool overhang.

⑧Use “sharp” JM chip breaker to lower cutting forces or when there is a long tool overhang.

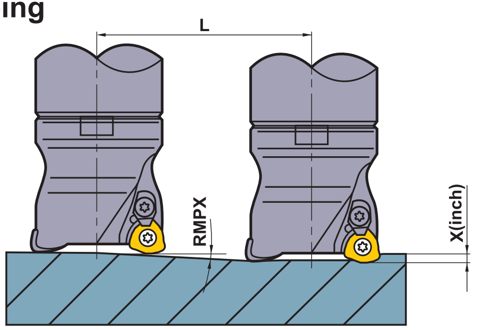
⑨Large chips are generated when machining with the AJX. To avoid chip jamming-related problems, machine using an air blow to disperse the chips effectively.

⑩The maximum depth of cut JL chip breaker is different in the insert size. 06 size is up to .024 inch, 08 size is up to .035 inch, and 09, 12, 14 size is up to .047 inch.

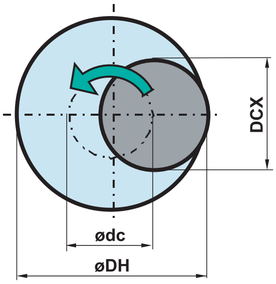
High Feed Radius Milling Cutter

Maximum Capacities by Mode

■ Ramping



■ Helical Milling and Drilling



- ●How to calculate the theoretical center of the tool path.

ødc = øDH - DCX

ødc	øDH	DCX
Theoretical Center of the Tool	Desired Hole Diameter	Cutting Diameter Max.

- ●Please set the depth of cut per cycle under max. depth of cut (APMX).
- ●Please machine in a down (Climb) cutting direction.

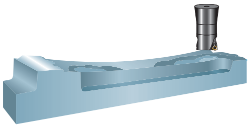
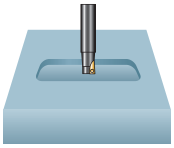
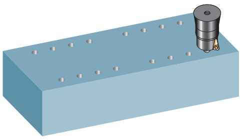
- ●When ramping and helical milling, it is recommended to reduce the feed rate by 40%.
- ●When drilling, please set the feed in the axial direction .008 IPR or less.
- ●The long chips generated can discharge in any direction, so ensure that adequate safety precautions are taken.

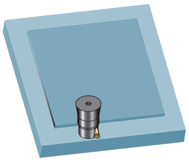
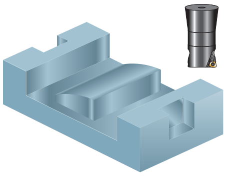
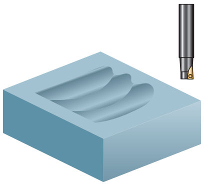
(inch)

	Tool Holder Type	DCX	DC	Max. Depth of Cut APMX		Ramping machining					Helical Milling		AZ
				FT/JM/ST	JL	RMPX	L Required Distance for X Inch Depth				Min. Hole Diameter	Max. Hole Diameter	
							Z=.039	Z=.047	Z=.059	Z=.079			
Shank Type	**AJXU06R102**	.625	.340	.039	.024	3°	.744	—	—	—	.90	1.13	.012
	AJXU06R112	.688	.400	.039	.024	2.5°	.893	—	—	—	1.02	1.26	.012
	AJXU06R123	.750	.472	.039	.024	1.7°	1.314	—	—	—	1.15	1.38	.012
	AJXU06R143	.875	.595	.039	.024	0.7°	3.192	—	—	—	1.40	1.63	.012
	AJXU08R122	.750	.410	.059	.035	3.5°	.638	.768	.965	—	.99	1.34	.020
	AJXU08R142	.875	.530	.059	.035	3°	.744	.897	1.126	—	1.24	1.59	.020
	AJXU08R163	1.000	.661	.059	.035	2°	1.117	1.346	1.690	—	1.49	1.84	.020
	AJXU08R183	1.125	.784	.059	.035	0.5°	4.469	5.386	6.761	—	1.74	2.09	.020
	AJXU09R162	1.000	.590	.079	.047	4°	.558	.672	.844	1.130	1.33	1.84	.039
	AJXU09R182	1.125	.720	.079	.047	3°	.744	.897	1.126	1.507	1.58	2.09	.039
	AJXU09R203	1.250	.854	.079	.047	3.3°	.676	.815	1.023	1.370	1.83	2.34	.039
	AJXU09R223	1.375	.976	.079	.047	2°	1.117	1.346	1.690	2.262	2.08	2.59	.039
	AJXU09R244	1.500	1.114	.079	.047	2.4°	.931	1.121	1.408	1.885	2.33	2.84	.039
	AJXU12R202	1.250	.790	.079	.047	4°	.558	.672	.844	1.130	1.59	2.34	.059
	AJXU12R243	1.500	1.040	.079	.047	3°	.744	.897	1.126	1.507	2.09	2.84	.059
	AJXU14R323	2.000	1.530	.079	.047	4.2°	.531	.640	.803	1.076	2.90	3.84	.079
Arbor Type	**AJXU09R02**	2.000	1.606	.079	.047	1.1°	2.031	2.448	3.073	4.114	3.33	3.84	.039
	AJXU12R02	2.000	1.540	.079	.047	2°	1.117	1.346	1.690	2.262	3.09	3.84	.059
	AJXU12R2505	2.500	2.039	.079	.047	1.5°	1.489	1.795	2.253	3.017	4.09	4.84	.059
	AJXU12R0306	3.000	2.543	.079	.047	1.2°	1.862	2.244	2.817	3.771	5.09	5.84	.059
	AJXU12R0407	4.000	3.539	.079	.047	0.8°	2.793	3.366	4.225	5.658	7.09	7.84	.059
	AJXU14R25	2.500	2.030	.079	.047	2.8°	.797	.961	1.206	1.615	3.90	4.84	.079
	AJXU14R03	3.000	2.530	.079	.047	1.8°	1.241	1.496	1.877	2.514	4.90	5.84	.079
	AJXU14R04	4.000	3.530	.079	.047	1.2°	1.862	2.244	2.817	3.771	6.90	7.84	.079
	AJX14RA125	4.920	4.530	.079	.047	0.8°	2.793	3.366	4.225	5.658	8.74	9.68	.079
	AJX14RA160	6.300	5.830	.079	.047	0.5°	4.469	5.386	6.761	9.053	11.50	12.44	.079

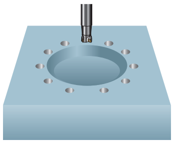
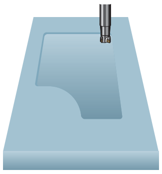
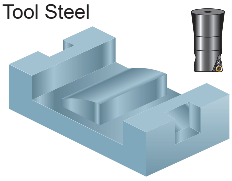
DCX = Cutting Diameter Max.
APMX = Depth of Cut Max.
DC = Cutting Diameter
RMPX = Ramping Angle Max.
DH = Desired Hole Diameter
AZ = Max. Drilling Depth

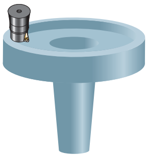
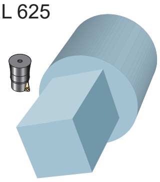
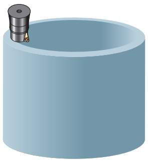
Application Examples

Tool (Grade)		AJXU14R2504C **FT Chip Breaker (FH7020)**	AJXU06R112FA10S **FT Chip Breaker (VP15TF)**	AJXU14R0304C **ST Chip Breaker (FH7020)**
Workpiece		AISI 1055 (220HB) 	ATSM H13 (40HRC) 	AISI 1049 (200HB) 
Component		Resin Mold	Resin Mold (Pocket Milling for Bushes)	Resin Mold
Cutting Conditions	Cutting Speed **vc** (SFM)	589 SFM (900 min^{-1})	504 SFM (2800 min^{-1})	471 SFM (600 min^{-1})
	Table Feed **vf** (Feed per T. **fz**)	160 IPM (.045 IPT)	157 IPM (.028 IPT)	192 IPM (.08 IPT)
	Depth of Cut **ap** (inch)	.060	.020	.060
	Width of Cut **ae** (inch)	1.8	.315	2.0
	Overhang Length (inch)	9.8	7.0(GL)	8.4(GL)
Cutting Mode		Air Blow	Air Blow	Air Blow
Results		Compared to a conventional product whose tool life was 2 hours, the AJX improved tool life by 3 hours. Realization of long tool life achieves great cost reductions.	Conventional solid end mills were used for pocket milling, but low efficiency and high costs were problematic. The use of the ø.688"AJX achieved high efficiency and cut costs.	The workpiece was perforated and conventional inserts suffered from fracturing. The ST chip breaker with tougher cutting edges did not fracture, making un-manned machining possible.

Tool (Grade)		AJXU14R0406E **FT Chip Breaker (VP30RT)**	AJXU14R0305C **FT Chip Breaker (FH7020)**	AJXU12R243WA20S **ST Chip Breaker (VP15TF)**
Workpiece		304SS (200HB) 	Cast iron, Class45 	ASTM H13 (50HRC) 
Component		Electronics Part Manufacturing Device Component	Press Mold	Forging Mold
Cutting Conditions	Cutting Speed **vc** (SFM)	419 SFM (400 min^{-1})	628 SFM (800 min^{-1})	190 SFM (490 min^{-1})
	Table Feed **vf** (Feed per T. **fz**)	100 IPM (.042 IPT)	160 IPM (.040 IPT)	47 IPM (.032 IPT)
	Depth of Cut **ap** (inch)	.040	.080	.040
	Width of Cut **ae** (inch)	2.4	2.1	1.2
	Overhang Length (inch)	5.4 (GL)	11.7 (GL)	7.9 (GL)
Cutting Mode		Wet Cutting	Air Blow	Air Blow
Results		Although the workpiece was a thin stainless plate, the AJX displayed stable cutting performance without suffering from vibrations. The AJX achieved 3X longer tool life than a conventional product.	Enabled a stable cutting performance despite an uneven machining allowance. FH7020 achieved a longer tool life due to less crater wear of the insert.	Machining recycled molds with holes or welds, conventional inserts suffered from fracturing. The ST chip breaker with tougher cutting edges suffered no sudden fracturing.

Application Examples

	Tool (Grade)	**AJX09R252SA25S JM Chip Breaker (FH7020)**	**AJXU08R122WA12S FT Chip Breaker (VP15TF)**	**AJX14R10006D JM Chip Breaker (MP6120)**
	Workpiece	ASTM52100 	P20 (45HRC) 	Alloy Tool Steel 
	Component	Automotive Part	Die Casting Mold	Press Mold
Cutting Conditions	Cutting Speed **vc** (SFM)	600 SFM (2300 min^{-1})	196 SFM (1000 min^{-1})	330 SFM (320 min^{-1})
	Table Feed **vf** (Feed per T. **fz**)	184 IPM (.040 IPT)	64 IPM (.032 IPT)	46 IPM (.024 IPT)
	Depth of Cut **ap** (inch)	.039	.039	.059
	Width of Cut **ae** (inch)	.710	.35	2.756
	Overhang Length (inch)	3.8(GL)	4.2(GL)	3.150
	Cutting Mode	Air Blow	Air Blow	Air Blow
	Results	Possible to use an HSK63 high-speed machining center to full capacity. No fear of workpiece distortion thanks to low cutting resistance and low heat generation of the JM chip breaker.	High efficiency machining possible even on a high speed machining center with a CAT40 main spindle. Manufacturing costs have been slashed by directly machining quenched steel.	Achieved 2X longer tool life compared to conventional product.

	Tool (Grade)	**AJX12R08006D JL Chip Breaker (MP9130)**	**AJX12-080A06R JL Chip Breaker (MP9120)**	**AJX12-080A06R JL Chip Breaker (MP9130)**
	Workpiece	Co-Cr Alloy 	INCONEL 625 	Ti-6Al-4V 
	Component	Medical Component	Aerospace Component	Aerospace Component
Cutting Conditions	Cutting Speed **vc** (SFM)	165 SFM (240 min^{-1})	115 SFM (140 min^{-1})	165 SFM (240 min^{-1})
	Table Feed **vf** (Feed per T. **fz**)	34.0 IPM (.024 IPT)	19.7 IPM (.024 IPT)	17.9 IPM (.015 IPT)
	Depth of Cut **ap** (inch)	.02	.031	.04
	Width of Cut **ae** (inch)	2.36	2.56	1.97
	Overhang Length (inch)	—	—	—
	Cutting Mode	Wet Cutting	Wet Cutting	Wet Cutting
	Results	The reduced wear displayed by MP9130 grade with JL breaker gave an increase in efficiency of 40%.	JL breaker + MP9120 achieves 1.5X longer tool life compared to conventional product.	The increased tool life and reduced wear displayed by MP9130 grade with JL breaker gave an increase in efficiency of 40%.

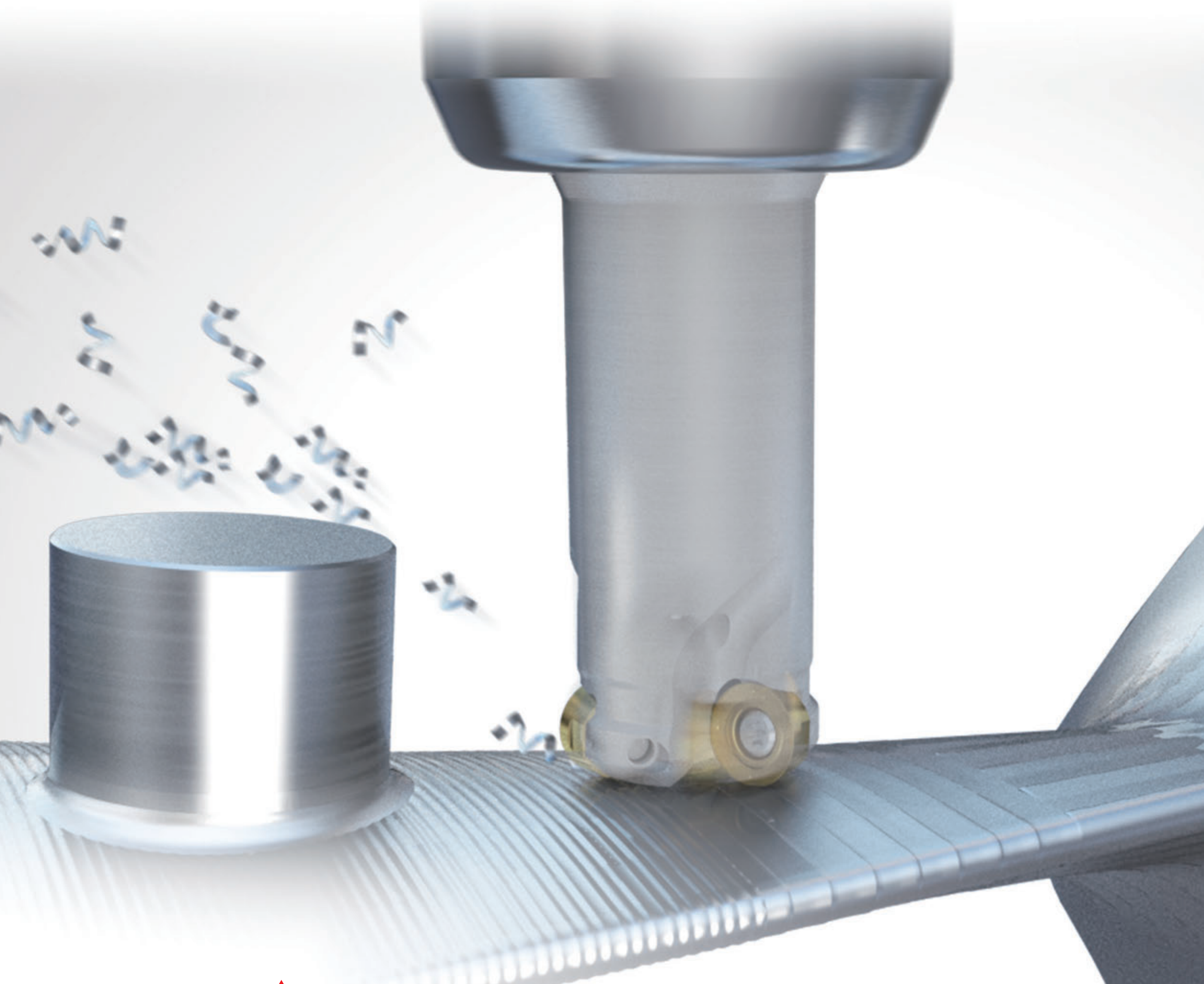
●Please note that the machining performed in the application examples is dependent on the rigidity of the machine used and the rigidity of the workpiece and clamping.

Round Insert Cutter for Difficult-to-Cut Materials

ARP Series

Inserts Expansion

High Accuracy Run-Out, Easy Indexing & Effective Chip Removal

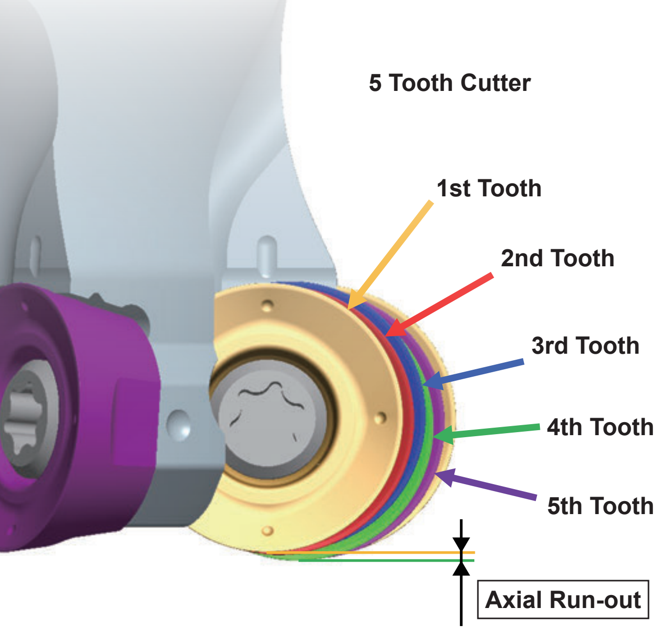


MITSUBISHI MATERIALS CORPORATION

Round Insert Cutter for Difficult-to-Cut Materials

ARP Series

Highest level of run-out accuracy increases tool life.



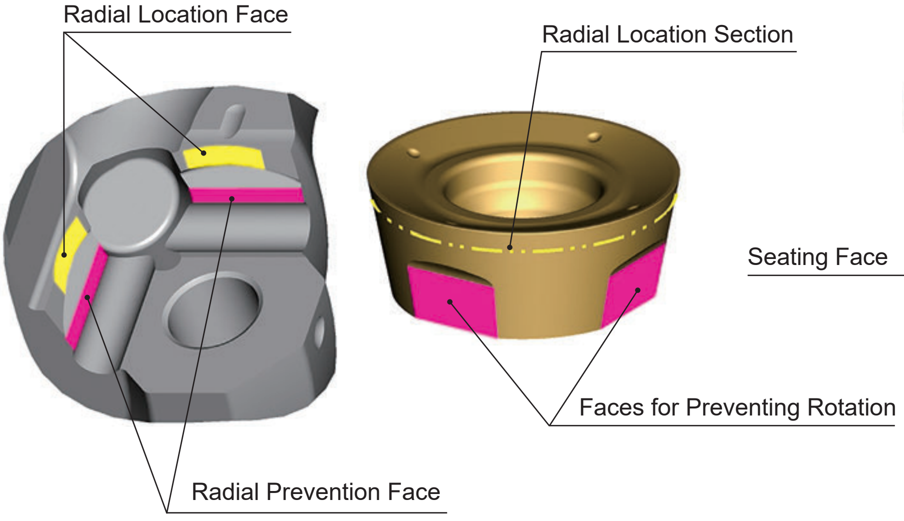
Highly accurate seating provides minimal change of run-out accuracy when indexing the inserts.

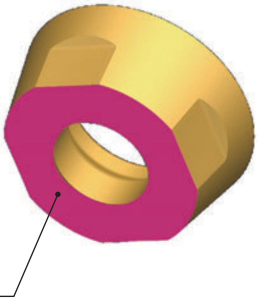
Compared to Conventional Tools

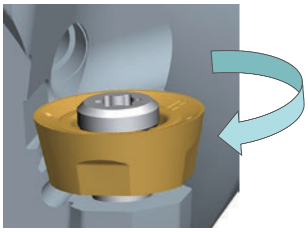
Axial Run-out
25%
Improvement

Strong Clamping System

A wide seating face and 2 side location faces prevent inserts from moving during cutting.



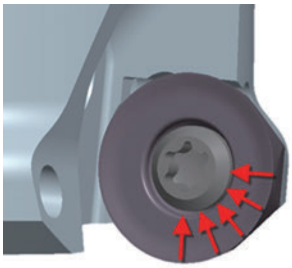




Easy indexing - No need to completely remove the clamping screw.

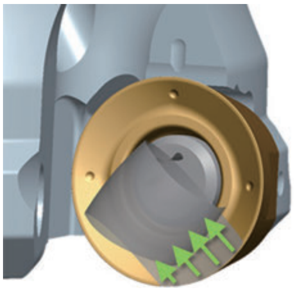
NEW Choose 4 or 8 Indexing Faces According to the Depth of Cut

8 seating face inserts are economical for small depth of cut machining.

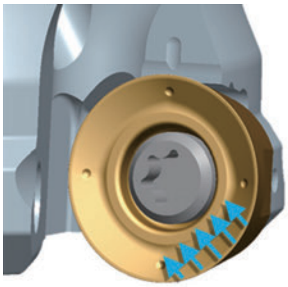


Rake design of
8 indexing face insert

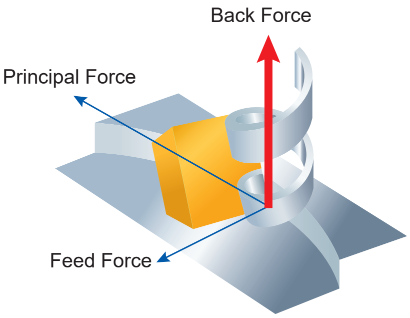
When the cutting depth is medium or higher, the rake face is in the same direction as the chip flow, achieving low cutting resistance. (4 indexing face insert)



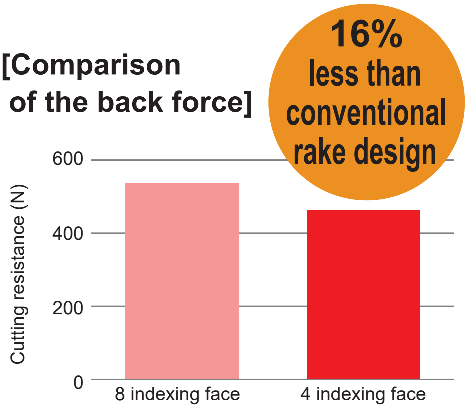
Even chip flow



Rake design of 4 indexing face insert

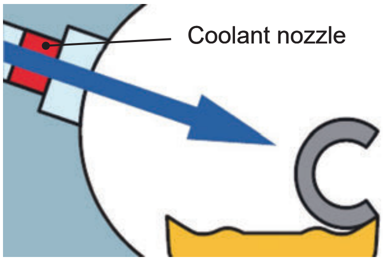


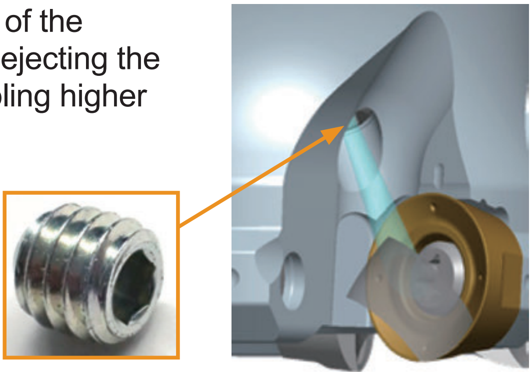
[Comparison of the back force]



Improved Chip Removal with Coolant

The internal coolant is directed slightly above the rake face of the cutting edge so that it is aimed directly at the chip. Forcibly ejecting the chips prevents them from welding to the cutting edge, enabling higher efficiency machining.



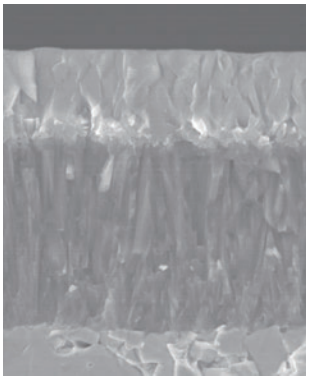


Use of the coolant nozzle discharges chips under high pressure and prevents welding of chips to the cutting edge.

CVD Coated Grade for Machining of Stainless Steels

MC7020

Excellent Wear, Chipping and Thermal Crack Resistance
These features prevent the problems usually associated with machining stainless steel over prolonged periods.



Improved Wear Resistance

The micro-grain wear resistant Al_2O_3 and fibrous TiCN layers deliver excellent wear resistance when milling a wide range of cast irons.

Improved Fracture Resistance

Use of a specially developed cemented carbide that provides superior resistance to fracture and thermal cracking prevents the cutting edge from sudden fracturing.

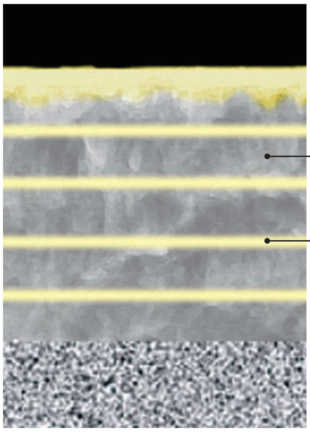
Reduced Abnormal Damage

An extremely smooth black super-smooth coating prevents abnormal damage such as weld chipping.

With Accumulated Al-Ti-Cr-N Based PVD Coating

MP7100, MP9100

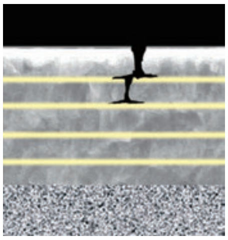
A fusion of the separate coating technologies; PVD and multi-layering realises extra toughness.



Base Layer
High Al-(Al, Ti)N
The new technology Al-(Al, Ti)N coating provides stabilisation of the high hardness phase and succeeds in dramatically improving wear, crater and welding resistance.

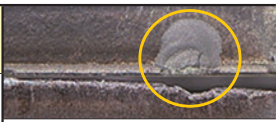
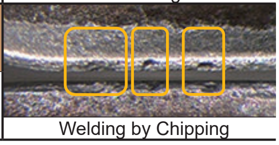
Each Grade Has a Layer Suitable for Each Application Area

*Graphical representation.



Multi-layering of the coating prevents any cracks penetrating through to the substrate.

*Graphical representation.

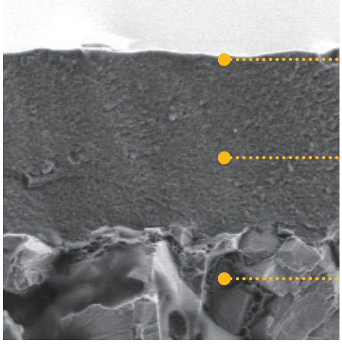
M 	TiN	
	Tough Against Notching	Notching
S 	CrN	
	Tough Against Chipping	Welding by Chipping

PVD Coated Grade for Difficult-to-cut Materials

NEW

MP9140

Excellent Welding Resistance Due to the Smoothened Surface



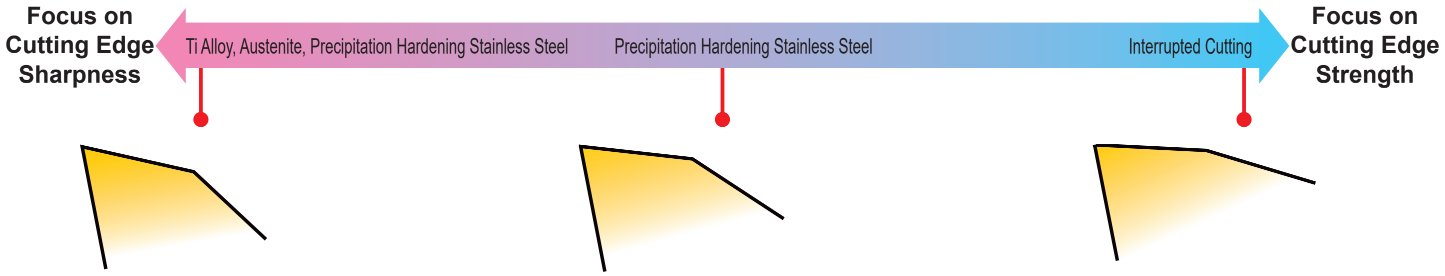
Sooth surfaces provide excellent welding resistance.

The high Al-rich AlTiN coating succeeds in dramatically improving wear and heat resistance.

Special cemented carbide substrate with improved fracture resistance.

Chip Breaker System

Chip breaker Series for Various Applications



L Breaker

Focus on Cutting Edge Sharpness
Low Resistance Type

- Accurate Molded Type
- Precision Ground Type

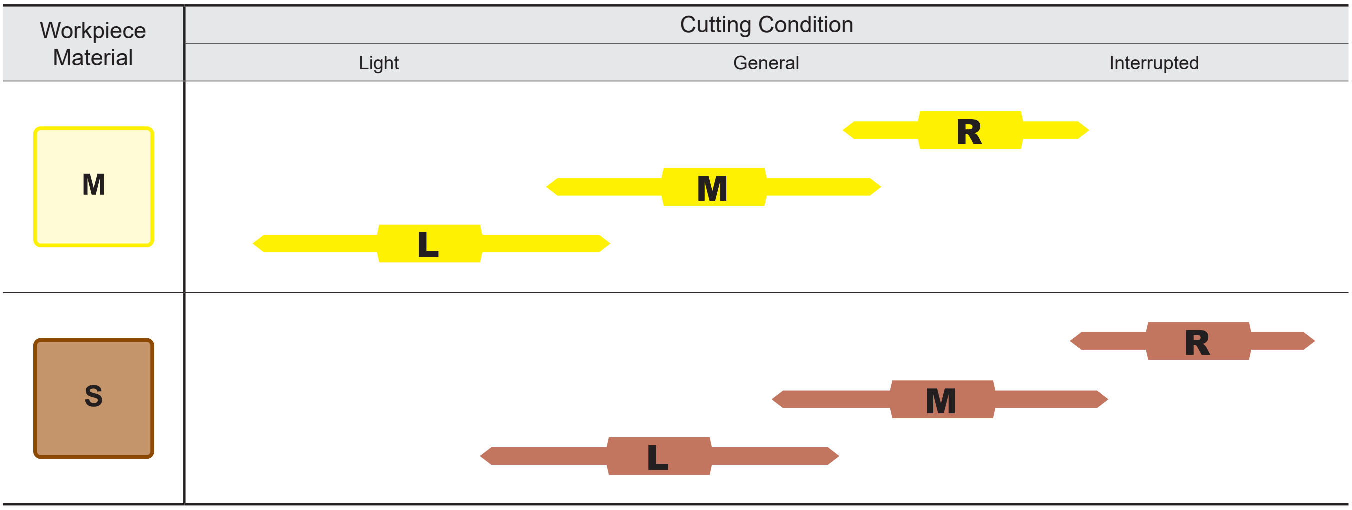
M Breaker

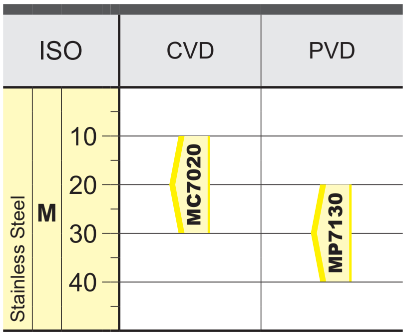
- Accurate Molded Type
- Precision Ground Type

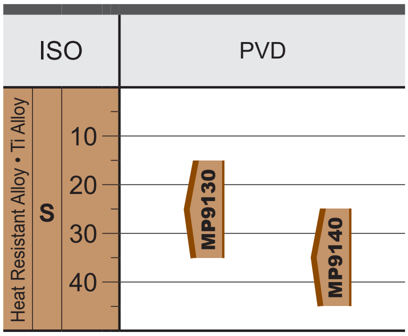
R Breaker

Reinforced Edge Type

- Accurate Molded Type
- Precision Ground Type







MULTI FUNCTIONAL MILLING

ARP

P	M	K	N	S	H

Fig.1

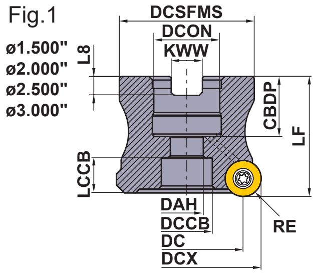
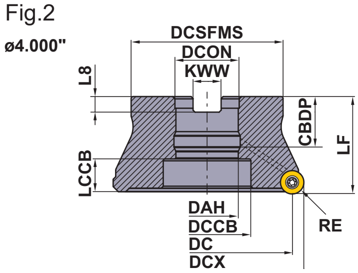
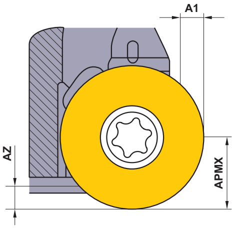
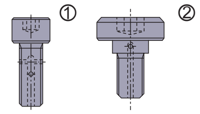


Fig.2



Right hand tool holder only.



DCX	Set Bolt	Geometry	
ϕ1.500"	HSC08025H	①	 ① ②
ϕ2.000"	HSC10030H		
ϕ2.500", ϕ3.000"	HSC12035H		
ϕ4.000"	MBA16033H	②	

Arbor Type

KAPR: R
GAMP: +4° GAMF : -6°
DCON = inch size

(inch)

DCX	Order Number	Stock	*1 Coolant Hole	RE	*2 No.T	Pitch	DC	LF	DCON	WT (lbs)	Max. Depth of Cut		RMPX	Fig.	Insert Type
		R									A1	AZ			
1.500	**ARP5UPR1504SA**	●	Y	.197	4	Fine	1.104	1.500	.500	.3	.079	.047	2.8°	1	RP◌T1040
1.500	**ARP5UPR1505SA**	●	Y	.197	5	Extra Fine	1.104	1.500	.500	.3	.079	.047	2.8°	1	RP◌T1040
1.500	**ARP6UPR1504SA**	●	Y	.236	4	Fine	1.026	1.500	.500	.3	.079	.041	2.7°	1	RP◌T1248
2.000	**ARP5UPR0206AA**	●	Y	.197	6	Fine	1.604	1.750	.750	.8	.079	.073	2.9°	1	RP◌T1040
2.000	**ARP5UPR0207AA**	●	Y	.197	7	Extra Fine	1.604	1.750	.750	.8	.079	.073	2.9°	1	RP◌T1040
2.000	**ARP6UPR0205AA**	●	Y	.236	5	Fine	1.526	1.750	.750	.7	.079	.067	2.8°	1	RP◌T1248
2.000	**ARP6UPR0206AA**	●	Y	.236	6	Extra Fine	1.526	1.750	.750	.7	.079	.067	2.8°	1	RP◌T1248
2.500	**ARP5UPR2507CA**	●	Y	.197	7	Fine	2.104	2.000	1.000	1.4	.098	.098	2.9°	1	RP◌T1040
2.500	**ARP5UPR2508CA**	●	Y	.197	8	Extra Fine	2.104	2.000	1.000	1.4	.098	.098	2.9°	1	RP◌T1040
2.500	**ARP6UPR2506CA**	●	Y	.236	6	Fine	2.026	2.000	1.000	1.4	.098	.098	3.1°	1	RP◌T1248
2.500	**ARP6UPR2507CA**	●	Y	.236	7	Extra Fine	2.026	2.000	1.000	1.4	.098	.098	3.1°	1	RP◌T1248
3.000	**ARP6UPR0308CA**	●	Y	.236	8	Fine	2.526	2.000	1.000	1.8	.098	.098	2.4°	1	RP◌T1248
3.000	**ARP6UPR0309CA**	●	Y	.236	9	Extra Fine	2.526	2.000	1.000	1.8	.098	.098	2.4°	1	RP◌T1248
4.000	**ARP6UPR0409EA**	●	Y	.236	9	Fine	3.526	2.500	1.500	4.5	.098	.098	1.7°	2	RP◌T1248
4.000	**ARP6UPR0411EA**	●	Y	.236	11	Extra Fine	3.526	2.500	1.500	4.5	.098	.098	1.7°	2	RP◌T1248

*1 Y=Yes, N=No
*2 Number of Teeth
Note 1) For the maximum width of cut (APMX), Please refer to page 613.

Mounting Dimensions

(inch)

DCX	Order Number	DCON	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8	Fig.
1.500	**ARP5UPR15**	.500	.630	.433	.276	.359	1.250	.250	.156	1
1.500	**ARP6UPR15**	.500	.630	.433	.276	.354	1.250	.250	.156	1
2.000	**ARP5UPR02**	.750	.748	.630	.413	.649	1.750	.313	.187	1
2.000	**ARP6UPR02**	.750	.748	.630	.413	.643	1.750	.313	.187	1
2.500	**ARP5UPR25**	1.000	.945	.787	.539	.702	2.190	.375	.219	1
2.500	**ARP6UPR25**	1.000	.945	.787	.539	.696	2.190	.375	.219	1
3.000	**ARP6UPR03**	1.000	.945	.787	.539	.696	2.190	.375	.219	1
4.000	**ARP6UPR04**	1.500	1.417	1.500	2.205	.802	3.500	.625	.375	2

Dimensions and Symbols (ISO 13399 Compliance)

DCX = Cutting Diameter Maximum
RE = Corner Radius
DC = Cutting Diameter
LF = Functional Length
DCON = Connection Diameter

WT = Weight of Item
A1 = Max. Width of Cut in the Radius Direction
AZ = Plunge Depth Maximum
RMPX = Max.Ramping Angle

● : Inventory maintained.

Fig.1

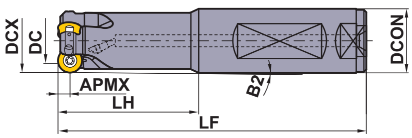


Fig.2

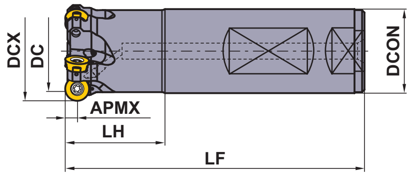


Fig.3

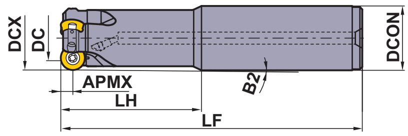
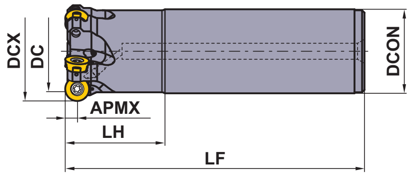


Fig.4



■Shank Type

KAPR: R
GAMP: +4°   GAMF : -6°
DCON = inch size

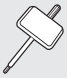
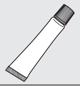
(inch)

DCX	Order Number	Stock	*1	RE	*2	DC	LF	LF	DCON	B2	WT	Max. Depth of Cut		RMPX	Fig.	Insert Type
		R	Coolant Hole		No.T						(lbs)	A1	AZ			
1.000	**ARP5UPR1603FA16M**	●	Y	.197	3	.608	5.500	2.250	1.000	1.170°	.9	.039	.018	1.9°	1	RP◌T1040
1.000	**ARP5UPR1602SA16L**	●	Y	.197	2	.608	7.000	3.000	1.000	.570°	1.3	.039	.018	1.9°	3	RP◌T1040
1.250	**ARP5UPR2004FA20M**	●	Y	.197	4	.858	6.000	2.750	1.250	.760°	1.7	.039	.026	1.9°	1	RP◌T1040
1.250	**ARP5UPR2003SA20L**	●	Y	.197	3	.858	8.000	4.750	1.250	1.010°	2.2	.039	.026	1.9°	3	RP◌T1040
1.250	**ARP6UPR2003FA20M**	●	Y	.236	3	.781	6.000	2.750	1.250	.950°	1.7	.039	.024	2.0°	1	RP◌T1248
1.250	**ARP6UPR2002SA20L**	●	Y	.236	2	.781	8.000	4.750	1.250	.510°	2.2	.039	.024	2.0°	3	RP◌T1248
1.500	**ARP6UPR2404FA20M**	●	Y	.236	4	1.028	6.000	2.000	1.250	-	1.8	.098	.041	2.7°	2	RP◌T1248
1.500	**ARP6UPR2403SA20L**	●	Y	.236	3	1.028	10.000	2.000	1.250	-	3.2	.098	.041	2.7°	4	RP◌T1248
2.000	**ARP6UPR3205FA24M**	●	Y	.236	5	1.528	6.000	2.000	1.500	-	2.7	.098	.067	2.8°	2	RP◌T1248
2.000	**ARP6UPR3204SA24L**	●	Y	.236	4	1.528	10.000	2.000	1.500	-	4.7	.098	.067	2.8°	4	RP◌T1248

*1 Y=Yes, N=No
*2 Number of Teeth
Note 1) For the maximum width of cut (APMX), Please refer to page 613.

Spare Parts

(inch)

Tool Holder Type	 * Clamp Screw	 Wrench (Insert)	 Anti-seize Lubricant
ARP5	TPS351B	TIP10D	MK1KS
ARP6	TPS4	TIP15D	MK1KS

* Clamp Torque (lbf-in) : TPS351B=22,TPS4=31

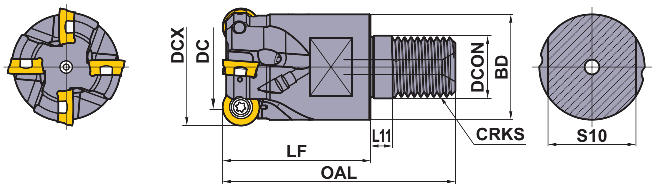
	≤1Mpa (≤20 l/min.)	←Standard→	**≥5Mpa (≥30 l/min.)**	**≥7Mpa (≥50 l/min.)**	To Plug a Coolant Hole
Nozzle Dia.	**ø.024"**	**ø.031"**	**ø.047"**	**ø.063"**	–
Order Number	**HSD04004H06**	**HSD04004H08**	**HSD04004H12**	**HSD04004H16**	**HSS04004**

Note 1) Coolant nozzles are available with varying diameters for adjusting coolant pressure. Select nozzles as required by the specification.
Clamp Torque (lbf-in) : HSS04004H◌◌= 13, HSS04004◌◌= 13

Dimensions and Symbols (ISO 13399 Compliance)

DCX = Cutting Diameter Maximum
DCON = Connection Diameter
CBDP = Connection Bore Depth
DAH = Diameter Access Hole
DCCB = Fixing Bolt Seat Diameter
LCCB = Counterbore Depth Connection Bore
DCSFMS = Contact Surface Diameter Machine Side
KWW = Keyway Width
L8 = Depth of Keyway

Round Insert Cutter for Difficult-to-Cut Materials



Right hand tool holder only.

■Screw-in Type

KAPR: R
GAMP: +4°   GAMF : -6°ー-7°
With Coolant Hole

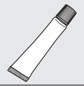
(inch)

DCX	Order Number	Stock	*1	RE	*2	DC	DCON	DCSFMS	OAL	LF	S10	CRKS	WT	Max. Depth of Cut		RMPX	Insert Type
		R	Coolant Hole		No.T								(lbs)	A1	AZ		
1.000	**ARP5UPR1603AM1235**	●	Y	.197	3	.606	.492	.925	2.244	1.378	.748	M12	.2	―	.016	1.9°	RP◌T1040
1.250	**ARP5UPR2004AM1640**	●	Y	.197	4	.856	.669	1.122	2.480	1.575	.945	M16	.4	.039	.026	1.9°	RP◌T1040
1.250	**ARP6UPR2003AM1640**	●	Y	.236	3	.778	.669	1.122	2.480	1.575	.945	M16	.4	.039	.024	2.0°	RP◌T1248
1.500	**ARP6UPR2404AM1640**	●	Y	.236	4	1.028	.669	1.122	2.480	1.575	.945	M16	.4	.098	.045	2.7°	RP◌T1248

*1 Y=Yes, N=No
*2 Number of Teeth
Note 1) For the maximum width of cut (APMX), Please refer to page 613.
Note 2) For screw-in type shank arbors, refer to page 587.

Spare Parts

(inch)

Tool Holder Type	 * Clamp Screw	 Wrench (Insert)	 Anti-seize Lubricant
ARP5	TPS351B	TIP10D	MK1KS
ARP6	TPS4	TIP15D	MK1KS

* Clamp Torque (lbf-in) : TPS351B=22,TPS4=31

	≤1Mpa (≤20 l/min.)	←Standard→	**≥5Mpa (≥30 l/min.)**	**≥7Mpa (≥50 l/min.)**	To Plug a Coolant Hole
Nozzle Dia.	ø.024"	ø.031"	ø.047"	ø.063"	−
Order Number	**HSD04004H06**	**HSD04004H08**	**HSD04004H12**	**HSD04004H16**	**HSS04004**

Note 1) Coolant nozzles are available with varying diameters for adjusting coolant pressure. Select nozzles as required by the specification.
Clamp Torque (lbf-in) : HSS04004H◌◌= 13, HSS04004◌◌= 13

Dimensions and Symbols (ISO 13399 Compliance)

DCX = Cutting Diameter Maximum
RE = Corner Radius
DC = Cutting Diameter
DCON = Functional Length
DCSFMS = Contact Surface Diameter Machine Side
OAL = Overall Length
LF = Functional Length
CRKS = Connection Retention Knob Thread Size
WT = Weight of Item
A1 = Max. Width of Cut in the Radius Direction
AZ = Plunge Depth Maximum
RMPX = Max.Ramping Angle

● : Inventory maintained.   ★ : Inventory maintained in Japan.

ARP

P M K N S H

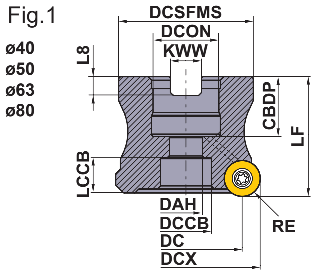


Fig.1

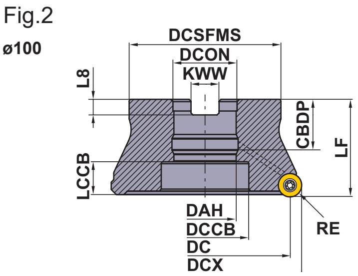
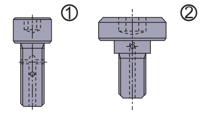


Fig.2

Right hand tool holder only.

DCX		Set Bolt		Geometry
DCON inch size	**DCON** mm size			
–	ϕ40	HSC08025H	①	 ① ②
–	ϕ50, ϕ63	HSC10030H		
ϕ80	ϕ80	HSC12035H		
ϕ100	ϕ100	MBA16033H	②	

Metric Standard

■Arbor Type

KAPR: R
GAMP: +4° GAMF : -6°
DCON = inch size, With Coolant Hole

(mm)

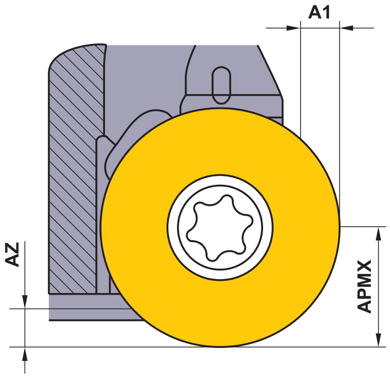
DCX	Order Number	Stock	RE	*1 No.T	DC	LF	DCON	WT (kg)	Max. Depth of Cut		RMPX	Fig.	Insert Type
		R							A1	AZ			
80	**ARP6PR08008CA**	★	6	8	68	50	25.4	0.9	2.5	2.5	2.3°	1	RP◌T1248
80	**ARP6PR08009CA**	★	6	9	68	50	25.4	0.9	2.5	2.5	2.3°	1	RP◌T1248
100	**ARP6PR10009DA**	★	6	9	88	50	31.75	1.4	2.5	2.5	1.7°	2	RP◌T1248
100	**ARP6PR10011DA**	★	6	11	88	50	31.75	1.4	2.5	2.5	1.7°	2	RP◌T1248

DCON = mm size, With Coolant Hole

(mm)

DCX	Order Number	Stock	RE	*1 No.T	DC	LF	DCON	WT (kg)	Max. Depth of Cut		RMPX	Fig.	Insert Type
		R							A1	AZ			
40	**ARP5P-040A05AR**	★	5	5	29.9	40	16	0.2	2.0	1.3	2.8°	1	RP◌T1040
40	**ARP6P-040A04AR**	★	6	4	28	40	16	0.2	2.0	1.1	2.7°	1	RP◌T1248
50	**ARP5P-050A06AR**	★	5	6	39.9	40	22	0.3	2.0	1.8	2.9°	1	RP◌T1040
50	**ARP5P-050A07AR**	★	5	7	39.9	40	22	0.3	2.0	1.8	2.9°	1	RP◌T1040
50	**ARP6P-050A05AR**	★	6	5	38	40	22	0.3	2.0	1.7	2.9°	1	RP◌T1248
50	**ARP6P-050A06AR**	★	6	6	38	40	22	0.3	2.0	1.7	2.9°	1	RP◌T1248
63	**ARP5P-063A07AR**	★	5	7	52.9	40	22	0.5	2.5	2.5	3.0°	1	RP◌T1040
63	**ARP5P-063A08AR**	★	5	8	52.9	40	22	0.5	2.5	2.5	3.0°	1	RP◌T1040
63	**ARP6P-063A06AR**	★	6	6	51	40	22	0.4	2.5	2.5	3.1°	1	RP◌T1248
63	**ARR6P-063A07AR**	★	6	7	51	40	22	0.4	2.5	2.5	3.1°	1	RP◌T1248
80	**ARP6P-080A08AR**	★	6	8	68	50	27	0.9	2.5	2.5	2.3°	1	RP◌T1248
80	**ARP6P-080A09AR**	★	6	9	68	50	27	0.9	2.5	2.5	2.3°	1	RP◌T1248
100	**ARP6P-100B09AR**	★	6	9	88	50	32	1.5	2.5	2.5	1.7°	2	RP◌T1248
100	**ARP6P-100B11AR**	★	6	11	88	50	32	1.5	2.5	2.5	1.7°	2	RP◌T1248

*1 Number of Teeth
Note 1) For the maximum width of cut (APMX), Please refer to page 613.



Dimensions and Symbols (ISO 13399 Compliance)

DCX = Cutting Diameter Maximum
RE = Corner Radius
DC = Cutting Diameter
LF = Functional Length
DCON = Connection Diameter
WT = Weight of Item
A1 = Max. Width of Cut in the Radius Direction
AZ = Plunge Depth Maximum
RMPX = Max.Ramping Angle

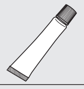
Mounting Dimensions

(mm)

DCX	Order Number	DCON	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8	Fig.
40	**ARP5P-040A05AR**	16	18	9	14	14.0	34	8.4	5.6	1
40	**ARP6P-040A04AR**	16	18	9	13.4	13.9	34	8.4	5.6	1
50	**ARP5P-050A06AR**	22	20	11	17	12.0	45	10.4	6.3	1
50	**ARP5P-050A07AR**	22	20	11	17	12.0	45	10.4	6.3	1
50	**ARP6P-050A05AR**	22	20	11	17	11.9	45	10.4	6.3	1
50	**ARP6P-050A06AR**	22	20	11	17	11.9	45	10.4	6.3	1
63	**ARP5P-063A07AR**	22	20	11	17	12.0	50	10.4	6.3	1
63	**ARP5P-063A08AR**	22	20	11	17	12.0	50	10.4	6.3	1
63	**ARP6P-063A06AR**	22	20	11	17	11.9	50	10.4	6.3	1
63	**ARR6P-063A07AR**	22	20	11	17	11.9	50	10.4	6.3	1
80	**ARP6PR08008CA**	25.4	26	20	13	14.9	56	9.5	6.0	1
80	**ARP6PR08009CA**	25.4	26	20	13	14.9	56	9.5	6.0	1
80	**ARP6P-080A08AR**	27	23	13	20	14.9	56	12.4	7.0	1
80	**ARP6P-080A09AR**	27	23	13	20	14.9	56	12.4	7.0	1
100	**ARP6PR10009DA**	31.75	32	31.75	45	11.9	70	12.7	8.0	2
100	**ARP6PR10011DA**	31.75	32	31.75	45	11.9	70	12.7	8.0	2
100	**ARP6P-100B09AR**	32	26	45	32	16.9	78	14.4	8.0	2
100	**ARP6P-100B11AR**	32	26	45	32	16.9	78	14.4	8.0	2

Spare Parts

(mm)

Tool Holder Type	 *		
	Clamp Screw	Wrench (Insert)	Anti-seize Lubricant
ARP5	TPS351B	TIP10D	MK1KS
ARP6	TPS4	TIP15D	MK1KS

* Clamp Torque (N • m) : TPS351B=2.5,TPS4=3.5

	≦1Mpa **(≦20 l/min.)**	←Standard→	**≧5Mpa** **(≧30 l/min.)**	**≧7Mpa** **(≧50 l/min.)**	To Plug a Coolant Hole
Nozzle Dia.	ø0.6mm	ø0.8mm	ø1.2mm	ø1.6mm	−
Order Number	**HSD04004H06**	**HSD04004H08**	**HSD04004H12**	**HSD04004H16**	**HSS04004**

Note 1) Coolant nozzles are available with varying diameters for adjusting coolant pressure. Select nozzles as required by the specification.
Note 2) Use HSS04004 (JIS B 1177 flat point M4x4, clamp torque 1.5 Nm) to plug the coolant hole.

Dimensions and Symbols (ISO 13399 Compliance)

DCX = Cutting Diameter Maximum
DCON = Connection Diameter
CBDP = Connection Bore Depth
DAH = Diameter Access Hole
DCCB = Fixing Bolt Seat Diameter
LCCB = Counterbore Depth Connection Bore
DCSFMS = Contact Surface Diameter Machine Side
KWW = Keyway Width
L8 = Depth of Keyway

★ : Inventory maintained in Japan.

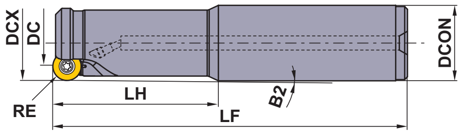


Fig.1

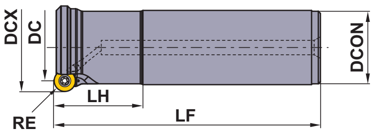


Fig.2

Arbor Type

KAPR: R
GAMP: +4°   GAMF : -6°−-7°
With Coolant Hole

(mm)

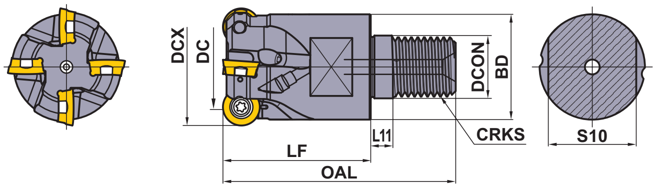
DCX	Order Number	Stock	RE	*1 No.T	DC	LF	LH	DCON	B2	WT	Max. Depth of Cut		RMPX	Fig.	Insert Type
		R								(kg)	A1	AZ			
25	**ARP5PR2503SA25M**	★	5	3	15	140	60	25	1.10°	0.4	1.0	0.40	1.8°	1	RP◌T1040
25	**ARP5PR2502SA25L**	★	5	2	15	180	80	25	0.80°	0.6	1.0	0.40	1.8°	1	RP◌T1040
32	**ARP5PR3204SA32M**	★	5	4	22	150	70	32	0.92°	0.8	1.0	0.65	1.9°	1	RP◌T1040
32	**ARP6PR3203SA32M**	★	6	3	20	150	70	32	0.51°	0.8	1.0	0.60	2.0°	1	RP◌T1248
32	**ARP5PR3203SA32L**	★	5	3	22	200	120	32	0.94°	1.0	1.0	0.65	1.9°	1	RP◌T1040
32	**ARP6PR3202SA32L**	★	6	2	20	200	120	32	0.52°	1.0	1.0	0.60	2.0°	1	RP◌T1248
40	**ARP6PR4004SA32M**	★	6	4	28	150	50	32	−	0.9	2.5	1.15	2.7°	2	RP◌T1248
40	**ARP6PR4003SA32L**	★	6	3	28	250	50	32	−	1.5	2.5	1.15	2.7°	2	RP◌T1248
50	**ARP6PR5005SA42M**	★	6	5	38	150	50	42	−	1.5	2.5	1.70	2.9°	2	RP◌T1248
50	**ARP6PR5004SA42L**	★	6	4	38	250	50	42	−	2.5	2.5	1.70	2.9°	2	RP◌T1248

*1 Number of Teeth
Note 1) For the maximum width of cut (APMX), Please refer to page 613.

Dimensions and Symbols (ISO 13399 Compliance)

DCX = Cutting Diameter Maximum
RE = Corner Radius
DC = Cutting Diameter
LF = Functional Length
LH = Neck Length
DCON = Connection Diameter
WT = Weight of Item
A1 = Max. Width of Cut in the Radius Direction
AZ = Plunge Depth Maximum
RMPX = Max.Ramping Angle

Round Insert Cutter for Difficult-to-Cut Materials



Screw-in Type

KAPR: R
GAMP: +4° GAMF : -6°−-7°
With Coolant Hole

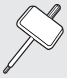
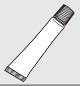
(mm)

DCX	Order Number	Stock	RE	*1	DC	DCON	DCSFMS	OAL	LF	S10	CRKS	WT	Max. Depth of Cut		RMPX	Insert Type
		R		No.T								(kg)	A1	AZ		
25	**ARP5PR2502AM1235**	★	5	2	15	12.5	23.5	57	35	19	M12	0.1	−	0.40	1.8°	RP◌T1040
25	**ARP5PR2503AM1235**	★	5	3	15	12.5	23.5	57	35	19	M12	0.1	−	0.40	1.8°	RP◌T1040
32	**ARP5PR3203AM1640**	★	5	3	22	17.0	28.5	63	40	24	M16	0.2	1.0	0.65	1.9°	RP◌T1040
32	**ARP5PR3204AM1640**	★	5	4	22	17.0	28.5	63	40	24	M16	0.2	1.0	0.65	1.9°	RP◌T1040
32	**ARP6PR3202AM1640**	★	6	2	20	17.0	28.5	63	40	24	M16	0.2	1.0	0.60	2.0°	RP◌T1248
32	**ARP6PR3203AM1640**	★	6	3	20	17.0	28.5	63	40	24	M16	0.2	1.0	0.60	2.0°	RP◌T1248
40	**ARP6PR4003AM1640**	★	6	3	28	17.0	28.5	63	40	24	M16	0.2	2.5	1.15	2.7°	RP◌T1248
40	**ARP6PR4004AM1640**	★	6	4	28	17.0	28.5	63	40	24	M16	0.2	2.5	1.15	2.7°	RP◌T1248

*1 Number of Teeth
Note 1) For the maximum width of cut (APMX), Please refer to page 613.
Note 2) For screw-in type shank arbors, refer to page 587.

Spare Parts

(mm)

Tool Holder Type	 *		
	Clamp Screw	Wrench (Insert)	Anti-seize Lubricant
ARP5	TPS351B	TIP10D	MK1KS
ARP6	TPS4	TIP15D	MK1KS

* Clamp Torque (N • m) : TPS351B=2.5,TPS4=3.5

	≤1Mpa (≤20 l/min.)	←Standard→	≥5Mpa (≥30 l/min.)	≥7Mpa (≥50 l/min.)	To Plug a Coolant Hole
Nozzle Dia.	ø0.6mm	ø0.8mm	ø1.2mm	ø1.6mm	−
Order Number	**HSD04004H06**	**HSD04004H08**	**HSD04004H12**	**HSD04004H16**	**HSS04004**

Note 1) Coolant nozzles are available with varying diameters for adjusting coolant pressure. Select nozzles as required by the specification.
Note 2) Use HSS04004 (JIS B 1177 flat point M4x4, clamp torque 1.5 Nm) to plug the coolant hole.

Dimensions and Symbols (ISO 13399 Compliance)

DCX = Cutting Diameter Maximum
RE = Corner Radius
DC = Cutting Diameter
DCON = Functional Length
DCSFMS = Contact Surface Diameter Machine Side
OAL = Overall Length
LF = Functional Length
CRKS = Connection Retention Knob Thread Size
WT = Weight of Item
A1 = Max. Width of Cut in the Radius Direction
AZ = Plunge Depth Maximum
RMPX = Max.Ramping Angle

● : Inventory maintained. ★ : Inventory maintained in Japan. (10 inserts in one case)

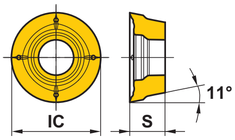
Inserts

(inch)

Workpiece Material			MC7020	MP7130	MP9130	MP9140
	M	Stainless Steels	◐	◐		
	S	Heat-resistant Alloys, Titanium Alloys			✤	

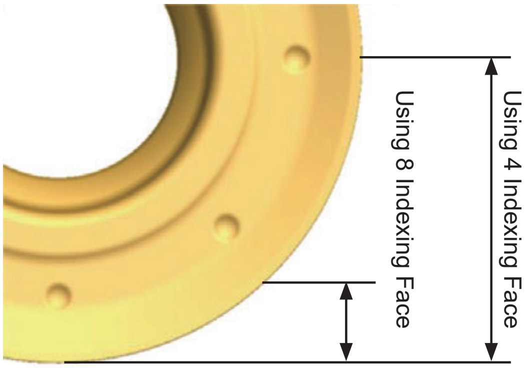
Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting
✤ : Unstable Cutting

Edge Preparation (Honing) :
E : Round

Shape	Holder		Order Number	Type	Class	Edge Preparation	Coated MC7020	 MP7130	 MP9130	 NEW MP9140	IC	S	APMX 4 Seats	 8 Seats	Geometry
		NEW	RPMT1040M0E4-L2	Low Resistance, High Rigidity	M	E				●	.394	.156	.197	–	
			RPHT1040M0E4-M	General, High Precision	H	E	●	●	●		.394	.156	.197	–	
			RPMT1040M0E4-M	General Purpose	M	E	●	●	●		.394	.156	.197	–	
		NEW	RPMT1040M0E8-M1	General, 8 Seats	M	E	●	●	●	●	.394	.156	.197	.055	
		NEW	RPMT1040M0E4-M2	General, High Rigidity	M	E				●	.394	.156	.197	–	
			RPHT1040M0E4-R	Reinforced Edge, High Precision	H	E	●	●	●		.394	.156	.197	–	
			RPMT1040M0E4-R	Reinforced Edge	M	E	●	●	●		.394	.156	.197	–	
		NEW	RPMT1040M0E8-R1	Reinforced Edge, 8 Seats	M	E	●	●	●		.394	.156	.197	.055	
	ARP6		RPHT1248M0E4-L	Low Resistance, High Precision	H	E	●	●	●		.472	.187	.236	–	
			RPMT1248M0E4-L	Low Resistance	M	E	●	●	●		.472	.187	.236	–	
		NEW	RPMT1248M0E8-L1	Low Resistance, 8 Seats	M	E	●	●	●	●	.472	.187	.236	.067	
		NEW	RPMT1248M0E4-L2	Low Resistance, High Rigidity	M	E				●	.472	.187	.236	–	
			RPHT1248M0E4-M	General, High Precision	H	E	●	●	●		.472	.187	.236	–	
			RPMT1248M0E4-M	General Purpose	M	E	●	●	●		.472	.187	.236	–	
		NEW	RPMT1248M0E8-M1	General, 8 Seats	M	E	●	●	●	●	.472	.187	.236	.067	
		NEW	RPMT1248M0E4-M2	General, High Rigidity	M	E				●	.472	.187	.236	–	
			RPHT1248M0E4-R	Reinforced Edge, High Precision	H	E	●	●	●		.472	.187	.236	–	
			RPMT1248M0E4-R	Reinforced Edge	M	E	●	●	●		.472	.187	.236	–	
		NEW	RPMT1248M0E8-R1	Reinforced Edge, 8 Seats	M	E	●	●	●		.472	.187	.236	.067	

Depth of cut (ap) for 8 indexing face insert

8 indexing face type inserts can also be used at the same depth of cut as the 4 face type insert.



Recommended Cutting Conditions

Dry Cutting

(inch)

Work Material		Hardness	Grade	vc (SFM)	fz (IPT)
M	Austenitic Stainless Steel	≤200HB	**MC7020**	720 (560–885)	.008 (.004–.014)
			MP7130	655 (490–820)	.008 (.004–.014)
	Austenitic Stainless Steel	>200HB	**MC7020**	620 (460–785)	.008 (.004–.014)
			MP7130	560 (395–720)	.008 (.004–.014)
	Duplex Stainless Steel	≤280HB	**MC7020**	590 (425–755)	.008 (.004–.014)
			MP7130	525 (360–690)	.008 (.004–.014)
	Ferritic and Martensitic Stainless Steel	≤200MPa	**MC7020**	785 (620–950)	.008 (.004–.014)
			MP7130	655 (490–820)	.008 (.004–.014)
	Ferritic and Martensitic Stainless Steel	>200HB	**MC7020**	785 (620–950)	.008 (.004–.014)
			MP7130	655 (490–820)	.008 (.004–.014)
	Precipitation Hardening Stainless Steel	<450HB	**MC7020**	560 (395–720)	.008 (.004–.014)
			MP7130	490 (330–655)	.008 (.004–.014)

Wet Cutting

(inch)

Work Material		Hardness	Grade	vc (SFM)	fz (IPT)
M	Austenitic Stainless Steel	≤200HB	**MC7020**	490 (330–655)	.008 (.004–.014)
			MP7130	425 (260–590)	.008 (.004–.014)
	Austenitic Stainless Steel	>200HB	**MC7020**	395 (230–560)	.008 (.004–.014)
			MP7130	330 (260–490)	.008 (.004–.014)
	Duplex Stainless Steel	≤280HB	**MC7020**	395 (230–560)	.008 (.004–.014)
			MP7130	330 (260–490)	.008 (.004–.014)
	Ferritic and Martensitic Stainless Steel	≤200MPa	**MC7020**	560 (395–720)	.008 (.004–.014)
			MP7130	425 (260–590)	.008 (.004–.014)
	Ferritic and Martensitic Stainless Steel	>200HB	**MC7020**	560 (395–720)	.008 (.004–.014)
			MP7130	425 (260–590)	.008 (.004–.014)
	Precipitation Hardening Stainless Steel	<450HB	**MC7020**	360 (195–525)	.008 (.004–.014)
			MP7130	295 (165–460)	.008 (.004–.014)
S	Titanium Alloy	–	**MP9130**	150 (100–180)	.004 (.002–.006)
			MP9140	130 (100–165)	.004 (.002–.006)
	Heat Resistant Alloy	–	**MP9130**	115 (50–150)	.004 (.002–.006)
			MP9140	100 (50–130)	.004 (.002–.006)

Notes:

* Actual cutting conditions are estimated to avoid chatter vibration with high rigidity of a machine or work material.
Make appropriate adjustments when chatter and/or insert chipping occurs during cutting.
Use with lowered conditions when there is a big overhang and/or when pocket-cutting.

* Feed rate for recommended cutting conditions table above based when axial depth of cut is ap=.098” with ARP5, and when depth of cut is ap=.118” with ARP6.

* Due to the chip thinning effect when the axial depth of cut fluctuates, feed rate compensation table below shows (correction values “F”) to help calculate correct feed.

* Example: Feed recommended for ARP5, 304 Stainless steel, MP7130, ap=.039” is .008IPTx1.5(correction values “F”)=.012IPT.

* For slotting, use 70% of the recommended feed rate listed above. For ramping, helical cutting, and plunging, use 50% of the recommended feed rate listed above.

* Internal coolant is recommended in titanium alloy and heat resistant alloy machining.

Feed rate compensation table, (correction values “F”) based on axial depth of cut “ap” fluctuation.

Holder	ap = .020"	ap = .039"	ap = .059"	ap = .079"	ap = .098"	ap = .118"	ap = .138"	ap = .157"	ap = .197"	ap = .236"
ARP5	2.3	1.5	1.2	1.1	1.0	.9	.8	.8	.8	–
ARP6	2.5	1.7	1.3	1.1	1.0		.9	.9	.8	.8

* Tool body durability may weaken, when the amount of axial cutting exceeds ARP5=.197" and ARP6=.236".

■ Maximum Capacities for Each Type

(inch)

APMX	DCX	Order Number	Install	Type	Depth of Cut (4Seats)		Ramping	Helical Cutting		Plunging Depth	Plunging
					ap	ae	RMPX(deg)	DH min.	DH max.	AZ max.	A1
.197" 5mm	.984" 25mm	**ARP5PR2502AM1235**	Screw-in	Standard	≤ .098	≤1.00DCX	1.8°	1.575	1.890	.016	—
		ARP5PR2503AM1235	Screw-in	Fine Pitch	≤ .059	≤1.00DCX	1.8°	1.575	1.890	.016	—
		ARP5PR2503SA25M	Shank	Standard	≤ .059	≤1.00DCX	1.8°	1.575	1.890	.016	.039
		ARP5PR2502SA25L	Shank	Long	≤ .059	≤1.00DCX	1.8°	1.575	1.890	.016	.039
	1.000"	**ARP5UPR1603AM1235**	Screw-in	Fine Pitch	≤ .059	≤1.00DCX	1.9°	1.606	1.921	.018	.039
		ARP5UPR1603FA16M	Shank	Standard	≤ .059	≤1.00DCX	1.9°	1.606	1.921	.018	.039
		ARP5UPR1602SA16L	Shank	Long	≤ .098	≤1.00DCX	1.9°	1.606	1.921	.018	.039
	1.250"	**ARP5UPR2004AM1640**	Screw-in	Fine Pitch	≤ .098	≤1.00DCX	1.9°	2.106	2.421	.026	.039
		ARP5UPR2004FA20M	Shank	Standard	≤ .098	≤1.00DCX	1.9°	2.106	2.421	.026	.039
		ARP5UPR2003SA20L	Shank	Long	≤ .098	≤1.00DCX	1.9°	2.106	2.421	.026	.039
	1.260" 32mm	**ARP5PR3203AM1640**	Screw-in	Standard	≤ .098	≤1.00DCX	1.9°	2.126	2.441	.026	.039
		ARP5PR3204AM1640	Screw-in	Fine Pitch	≤ .098	≤1.00DCX	1.9°	2.126	2.441	.026	.039
		ARP5PR3204SA32M	Shank	Standard	≤ .098	≤1.00DCX	1.9°	2.126	2.441	.026	.039
		ARP5PR3203SA32L	Shank	Long	≤ .098	≤1.00DCX	1.9°	2.126	2.441	.026	.039
	1.500"	**ARP5UPR1504SA**	Arbor	Fine Pitch	≤ .098	≤1.00DCX	2.8°	2.606	2.921	.047	.079
		ARP5UPR1505SA	Arbor	Ex.-Fine	≤ .098	≤1.00DCX	2.8°	2.606	2.921	.047	.079
	1.575" 40mm	**ARP5P-040A05AR**	Arbor	Fine Pitch	≤ .098	≤1.00DCX	2.8°	2.756	3.071	.051	.079
	1.969" 50mm	**ARP5P-050A06AR**	Arbor	Fine Pitch	≤ .098	≤1.00DCX	2.9°	3.543	3.858	.073	.079
		ARP5P-050A07AR	Arbor	Ex.-Fine	≤ .059	≤1.00DCX	2.9°	3.543	3.858	.073	.079
	2.000"	**ARP5UPR0206AA**	Arbor	Fine Pitch	≤ .098	≤ .95DCX	2.9°	3.606	3.921	.007	.079
		ARP5UPR0207AA	Arbor	Ex.-Fine	≤ .059	≤ .95DCX	2.9°	3.606	3.921	.007	.079
	2.48" 63mm	**ARP5P-063A07AR**	Arbor	Fine Pitch	≤ .098	≤ .75DCX	3.0°	4.567	4.882	.098	.098
		ARP5P-063A08AR	Arbor	Ex.-Fine	≤ .059	≤ .75DCX	3.0°	4.567	4.882	.098	.098
	2.500"	**ARP5UPR2507CA**	Arbor	Fine Pitch	≤ .098	≤ .75DCX	2.9°	4.606	4.921	.098	.098
		ARP5UPR2508CA	Arbor	Ex.-Fine	≤ .059	≤ .75DCX	2.9°	4.606	4.921	.098	.098

Note 1) When drilling long chips may be generated.

Note 2) When cutting helical holes, do not exceed the largest APMX cutting depth per rotation.

Note 3) Calculate using the following formula for center tool tracks and ϕdc when cutting helical holes: Center tool tracks ϕdc=desired hole diameter ϕDH tool diameter ϕDCX

Note 4) Use of air blow to disperse chips effectively is strongly recommended.

Note 5) Insert pockets are small in fine pitch and small diameter cutters therefore care should be taken to avoid chip jamming. Regulate the feed and speed accordingly.

Note 6) When machining with a large diameter cutter at high feed rates, chip jamming may occur. Regulate the feed and speed accordingly.

Round Insert Cutter for Difficult-to-Cut Materials

(inch)

APMX	DCX	Order Number	Install	Type	Depth of Cut (4Seats)		Ramping	Helical Cutting		Plunging Depth	Plunging
					ap	ae	RMPX(deg)	DH min.	DH max.	AZ max.	A1
.236" 6mm	1.250"	**ARP6UPR2003AM1640**	Screw-in	Fine Pitch	≤ .138	≤1.00DCX	2.0°	2.028	2.421	.024	.039
		ARP6UPR2003FA20M	Shank	Standard	≤ .138	≤1.00DCX	2.0°	2.028	2.421	.024	.039
		ARP6UPR2002SA20L	Shank	Long	≤ .138	≤1.00DCX	2.0°	2.028	2.421	.024	.039
	1.260" 32mm	**ARP6PR3202AM1640**	Screw-in	Standard	≤ .138	≤1.00DCX	2.0°	2.047	2.441	.024	.039
		ARP6PR3203AM1640	Screw-in	Fine Pitch	≤ .138	≤1.00DCX	2.0°	2.047	2.441	.024	.039
		ARP6PR3203SA32M	Shank	Standard	≤ .138	≤1.00DCX	2.0°	2.047	2.441	.024	.039
		ARP6PR3202SA32L	Shank	Long	≤ .138	≤1.00DCX	2.0°	2.047	2.441	.024	.039
	1.575" 40mm	**ARP6PR4003AM1640**	Screw-in	Standard	≤ .138	≤1.00DCX	2.7°	2.677	3.071	.045	.098
		ARP6PR4004AM1640	Screw-in	Fine Pitch	≤ .138	≤1.00DCX	2.7°	2.677	3.071	.045	.098
		ARP6PR4004SA32M	Shank	Standard	≤ .138	≤1.00DCX	2.7°	2.677	3.071	.045	.098
		ARP6PR4003SA32L	Shank	Long	≤ .138	≤1.00DCX	2.7°	2.677	3.071	.045	.098
		ARP6P-040A04AR	Arbor	Fine Pitch	≤ .138	≤1.00DCX	2.7°	2.677	3.071	.045	.079
	1.500"	**ARP6UPR2404AM1640**	Screw-in	Fine Pitch	≤ .138	≤1.00DCX	2.7°	2.528	2.921	.041	.079
		ARP6UPR2404FA20M	Shank	Standard	≤ .138	≤1.00DCX	2.7°	2.528	2.921	.041	.079
		ARP6UPR2403SA20L	Shank	Long	≤ .138	≤1.00DCX	2.7°	2.528	2.921	.041	.079
		ARP6UPR1504SA	Arbor	Fine Pitch	≤ .138	≤1.00DCX	2.7°	2.528	2.921	.041	.079
	1.969" 50mm	**ARP6PR5005SA42M**	Shank	Standard	≤ .138	≤1.00DCX	2.9°	3.465	3.858	.067	.098
		ARP6PR5004SA42L	Shank	Long	≤ .138	≤1.00DCX	2.9°	3.465	3.858	.067	.098
		ARP6P-050A05AR	Arbor	Fine Pitch	≤ .138	≤1.00DCX	2.9°	3.465	3.858	.067	.079
		ARP6P-050A06AR	Arbor	Ex.-Fine	≤ .098	≤1.00DCX	2.9°	3.465	3.858	.067	.079
	2.000"	**ARP6UPR3205FA24M**	Shank	Standard	≤ .138	≤1.00DCX	2.8°	3.528	3.921	.067	.098
		ARP6UPR3204SA24L	Shank	Long	≤ .138	≤1.00DCX	2.8°	3.528	3.921	.067	.098
		ARP6UPR0205AA	Arbor	Fine Pitch	≤ .138	≤ .95DCX	2.8°	3.528	3.921	.067	.079
		ARP6UPR0206AA	Arbor	Ex.-Fine	≤ .098	≤ .95DCX	2.8°	3.528	3.921	.067	.079
	2.48" 63mm	**ARP6P-063A06AR**	Arbor	Fine Pitch	≤ .138	≤ .75DCX	3.1°	4.488	4.882	.098	.098
		ARP6P-063A07AR	Arbor	Ex.-Fine	≤ .098	≤ .75DCX	3.1°	4.488	4.882	.098	.098
	2.500"	**ARP6UPR2506CA**	Arbor	Fine Pitch	≤ .138	≤ .75DCX	3.1°	4.528	4.921	.098	.098
		ARP6UPR2507CA	Arbor	Ex.-Fine	≤ .098	≤ .75DCX	3.1°	4.528	4.921	.098	.098
	3.000"	**ARP6UPR0308CA**	Arbor	Fine Pitch	≤ .138	≤ .65DCX	2.4°	5.528	5.921	.098	.098
		ARP6UPR0309CA	Arbor	Ex.-Fine	≤ .098	≤ .65DCX	2.4°	5.528	5.921	.098	.098
	3.150" 80mm	**ARP6PR08008CA**	Arbor	Fine Pitch	≤ .138	≤ .60DCX	2.3°	5.827	6.220	.098	.098
		ARP6PR08009CA	Arbor	Ex.-Fine	≤ .098	≤ .60DCX	2.3°	5.827	6.220	.098	.098
		ARP6P-080A08AR	Arbor	Fine Pitch	≤ .138	≤ .60DCX	2.3°	5.827	6.220	.098	.098
		ARP6P-080A09AR	Arbor	Ex.-Fine	≤ .098	≤ .60DCX	2.3°	5.827	6.220	.098	.098
	3.937" 100mm	**ARP6PR10009DA**	Arbor	Fine Pitch	≤ .138	≤ .50DCX	1.7°	7.402	7.795	.098	.098
		ARP6PR10011DA	Arbor	Ex.-Fine	≤ .098	≤ .50DCX	1.7°	7.402	7.795	.098	.098
		ARP6P-100B09AR	Arbor	Fine Pitch	≤ .138	≤ .50DCX	1.7°	7.402	7.795	.098	.098
		ARP6P-100B11AR	Arbor	Ex.-Fine	≤ .098	≤ .50DCX	1.7°	7.402	7.795	.098	.098
	4.000"	**ARP6UPR0409EA**	Arbor	Fine Pitch	≤ .138	≤ .45DCX	1.7°	7.528	7.921	.098	.098
		ARP6UPR0411EA	Arbor	Ex.-Fine	≤ .098	≤ .45DCX	1.7°	7.528	7.921	.098	.098

Note 1) When drilling long chips may be generated.

Note 2) When cutting helical holes, do not exceed the largest APMX cutting depth per rotation.

Note 3) Calculate using the following formula for center tool tracks and ϕdc when cutting helical holes: Center tool tracks ϕdc=desired hole diameter ϕDH tool diameter ϕDCX

Note 4) Use of air blow to disperse chips effectively is strongly recommended.

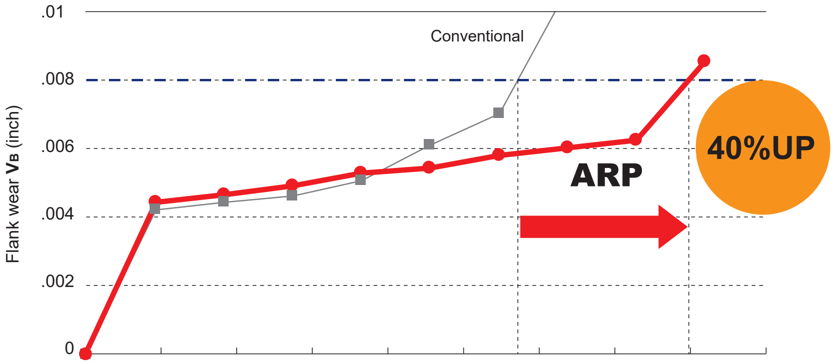
Note 5) Insert pockets are small in fine pitch and small diameter cutters therefore care should be taken to avoid chip jamming. Regulate the feed and speed accordingly.

Note 6) When machining with a large diameter cutter at high feed rates, chip jamming may occur. Regulate the feed and speed accordingly.

Cutting Performance

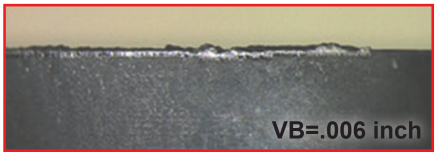
Cutting of 420 Stainless Steel

Long tool life! At least 40% more when compared to conventional tooling.

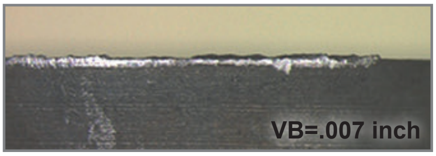


0	2	4	6	8	10	12	14	16	18	Cutting Time (min)
0	5.2	10.2	15.4	20.3	25.6	30.8	35.8	41.0	45.9	Cutting Length (feet)

<Cutting Conditions>
Tool : ARP5P-050A06AR
RPHT1040M0E4-R MC7020
Cutting Speed : 1150 SFM
Feed per Tooth : .014 IPT
Depth of Cut : ap=.098 inch
ae=.984 inch
Cutting Mode : Dry
Single Insert



ARP5 (Cutting Length 27.6 feet)

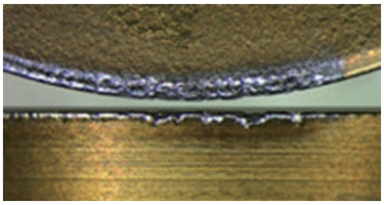


Conventional (Cutting Length 27.6 feet)

Cutting of 631 Precipitation Hardening Stainless Steel

Implementation of stable processing compared to conventional products with precipitation hardening stainless steel.

ARP5 (Cutting Length 1.3 feet)



VB=.006 inch Minute Chipping

Conventional A (Cutting Length 1.3 feet)

VB=.014 inch Large Chipping

Conventional B (Cutting Length 1.3 feet)

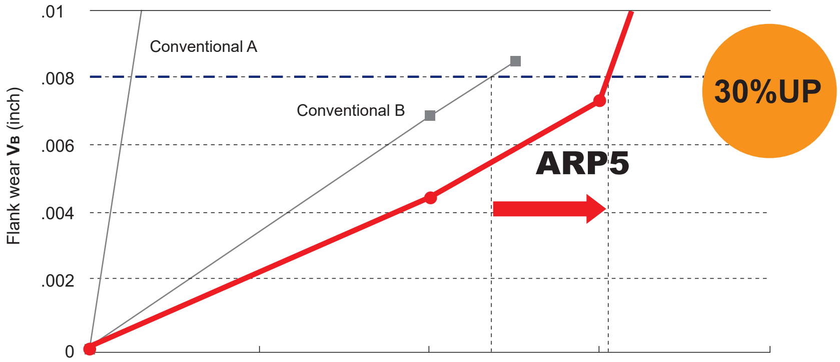
VB=.007 inch Chipping

<Cutting Conditions>
Tool : ARP5P-050A06AR
RPHT1040M0E4-L MP7130
Cutting Speed : 1150 SFM
Feed per Tooth : .010 IPT
Depth of Cut : ap=.098 inch
ae=.551 inch
Cutting Mode : Wet
Single Insert

Cutting Performance

Cutting of 304 Stainless Steel

Long tool life! A 30% improvement when compared to conventional tooling.

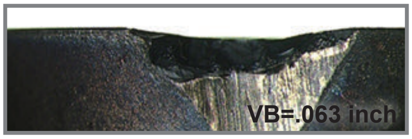


0	0.82	1.63	2.45	3.27	Cutting Time (min)
0	1.31	2.62	3.93	5.24	Cutting Length (feet)

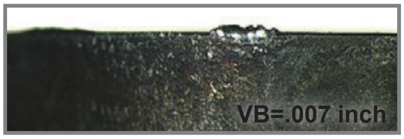
<Cutting Conditions>

Tool	: ARP5P-050A06AR RPHT1040M0E4-L MP7130
Cutting Speed	: 720 SFM
Feed per Tooth	: .014 IPT
Depth of Cut	: ap=.098 inch ae=.984 inch
Cutting Mode	: Dry Single Insert

ARP5 (Cutting Length 2.62 feet)



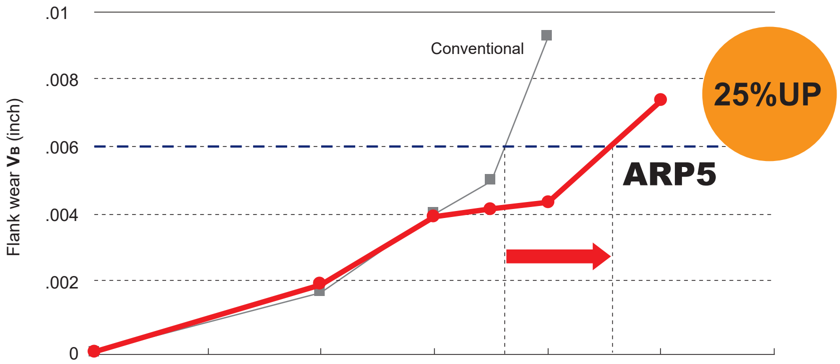
Conventional A (Cutting Length 2.62 feet)



Conventional B (Cutting Length 2.62 feet)

Cutting of Ti-6Al-4V

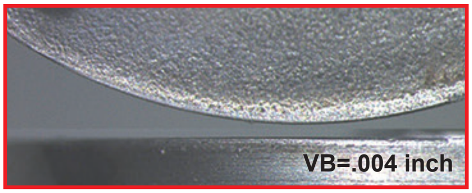
Long tool life! A 25% improvement when compared to conventional tooling.



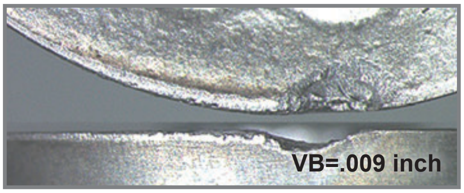
0	13.1	26.2	39.3	52.4	65.4	78.5	Cutting Time (min)
0	1.64	3.28	4.92	6.56	8.20	9.84	Cutting Length (feet)

<Cutting Conditions>

Tool	: ARP5P-050A06AR RPHT1040M0E4-L MP9130
Cutting Speed	: 195 SFM
Feed per Tooth	: .004 IPT
Depth of Cut	: ap=.098 inch ae=.984 inch
Cutting Mode	: Wet (Low Pressure) Single Insert



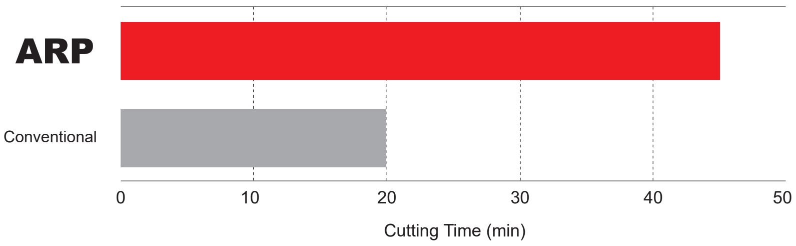
ARP5 (Cutting Length 6.56 feet)



Conventional (Cutting Length 6.56 feet)

Stainless Steel, Tool Life Comparison

MP9140 prevents breakage, it achieved more than twice longer tool life than Conventional.



<Cutting Conditions>

Workpiece Material	: Stainless Steel
Cutter Dia	: 1.575 inch
Cutting Speed	: vc=765 SFM
Feed per Tooth	: fz=.006 IPT
Depth of Cut	: ap=.079 inch ae=.787 inch
Cutting Mode	: Dry Cutting

Application Examples

Cutter Body		ARP6P-050A05AR	ARP6P-050A06AR	ARP6P-050A06AR
Insert (Grade)		**RPHT1248M0E4-M (MC7020)**	**RPMT1248M0E4-R (MP7130)**	**RPMT1248M0E4-L (MP7130)**
Workpiece			Martensitic Stainless Steel 	Martensitic Stainless Steel 
Component		Power Generator Parts	Power Generator Parts	Aerospace Parts
Cutting Conditions	Cutting Speed (SFM)	930	820	655
	Feed per Tooth (IPT)	.01	.018	.01
	Depth of Cut (inch)	ap=.118 ae=1.18	ap=.098 ae=1.58	ap=.039 ae=.787
Cutting Mode		Air Blow	MQL	Dry
Results		Further machining still possible after completing double the normal cutting length.	Machining efficiency increased by 20% and insert life by 30%.	Successfully completed component with improved cutting conditions and some tool life remaining. Cycle time reduced by 47%.

For your safety
●Don't handle inserts and chips without gloves. ●Please machine within the recommended application range and exchange expired tools with new ones in advance of breakage. ●Please use safety covers and wear safety glasses. ●When using compounded cutting oils, please take fire precautions. ●When using rotating tools, please make a trial run to check run-out, vibration and abnormal sounds etc.

DIAEDGE

TOOL NEWS

B268A

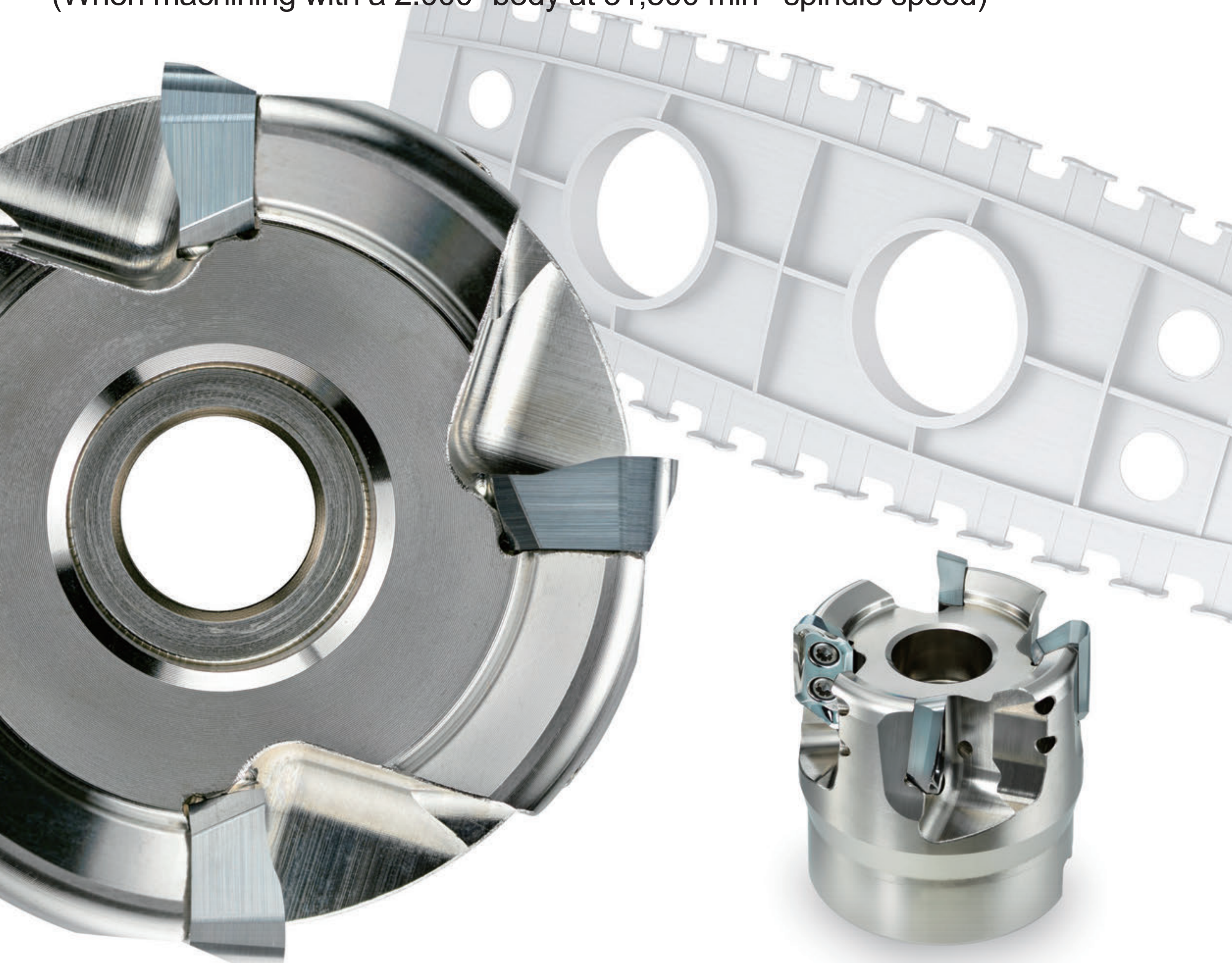
For Continuous High-Speed and Ultra-High-Speed Machining of Aluminum Alloys

AXD4000A

New Products

16,500 SFM Cutting Speed Capability
M.R.R (Metal Removal Rate) up to 600in³/min

(When machining with a 2.000" body at 31,500 min^{-1} spindle speed)



MITSUBISHI MATERIALS CORPORATION

For Continuous High-Speed and Ultra-High-Speed Machining of Aluminum Alloys

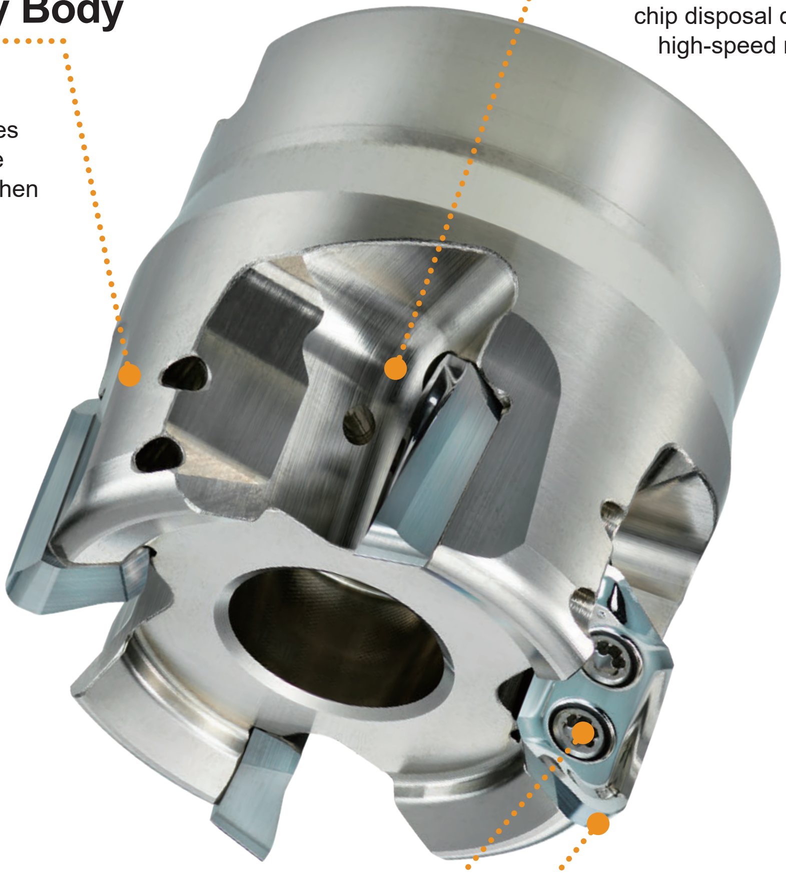
AXD4000A

High Rigidity Body

High rigidity body with modified insert seat withstands high stresses caused by cutting force and centrifugal force when performing high speed machining.

Optimal Designed Chip Pocket

Chip pocket specifically designed for optimal chip disposal during high-speed and ultra-high-speed machining operations.



High Reliability

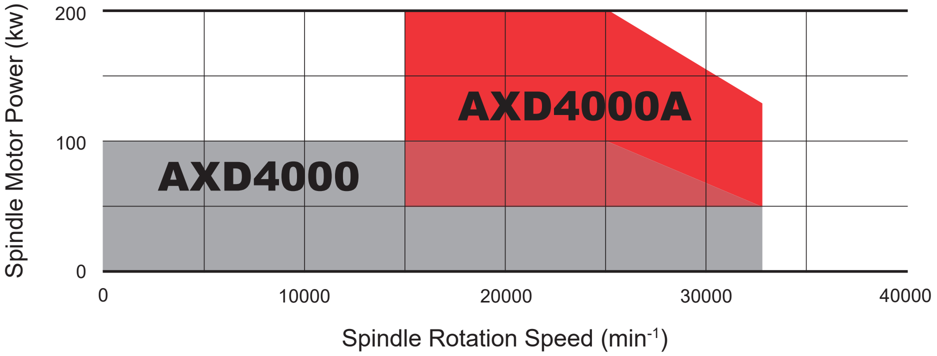
Improved anti-fly screw design ensures 100% contact with insert hole and 2x torque specifications compared to AXD4000 to ensure tightness and prevent loosening of screw during continuous high-speed machining operations.

Stable Machining

Standard and proven AXD4000 insert with sharp edge and tough carbide grade effectuates lower cutting force and substantial fracture resistance.

How to Choose AXD4000A or AXD4000

AXD4000A is specifically engineered for continuous high-speed and ultra-high-speed machining of aluminum alloys, especially over 80kW motor power.



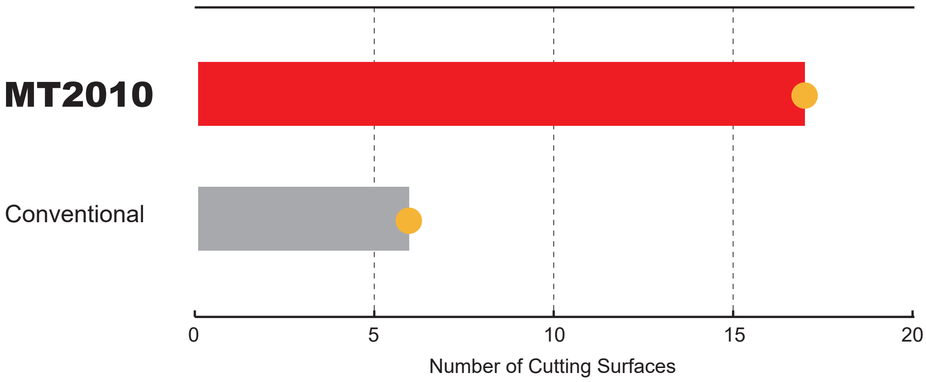
Cemented Carbide for High-speed Processing of Extra Super Duralumin and Aluminum / Lithium alloy

MT2010

High-grade cemented carbide grade suitable for ultra-high speed machining at cutting speeds up to 16,500 SFM combined with excellent wear-resistance and toughness.

Cutting Performance

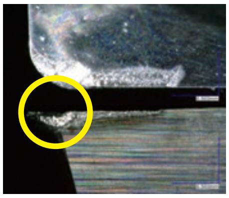
Al-Li Alloy : Comparison of Wear Resistance



Photographed after
17-side machining.

MT2010
Can be used continuously.

Photographed after
6-side machining.



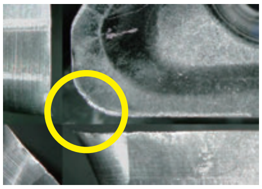
Conventional
Fractured from wear.

<Cutting Conditions>
Workpiece
Material : Al-Li Alloy
Tool : AXD4000A-050A04RD
Inserts (Grade): XDGX175004PDFR-GM
MT2010
Cutting Speed : vc=17000 SFM
Feed per Tooth: fz= .006 IPT
Depth of Cut : ap= .059 inch
Width of Cut : ae= 1.535 inch
Cutting Mode : Wet Cutting
Single Insert

A7050 : Comparison of Fracture Resistance

After machining 90 seconds.

MT2010
Can be used continuously.



Conventional
Chipping occurred.

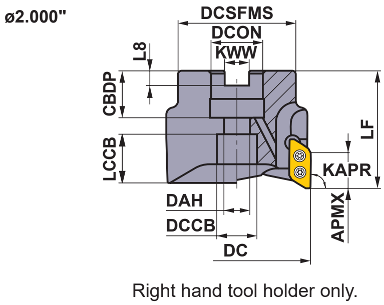
<Cutting Conditions>
Workpiece
Material : A7050
Tool : AXD4000A-050A04RD
Inserts (Grade): XDGX175004PDFR-GM
MT2010
Cutting Speed : vc=17000 SFM
Feed per Tooth: fz= .008 IPT
Depth of Cut : ap= .197 inch
Width of Cut : ae= 1.969 inch
Cutting Mode : Wet Cutting

MULTI FUNCTIONAL MILLING

<ALUMINUM ALLOY MATERIAL CUTTING>

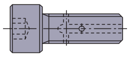
AXD4000A NEW

P M **N** K S H



Right hand tool holder only.

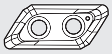
(inch)

DC	Set Bolt	Geometry
ϕ2.000"	HSCU37513H	

Arbor Type

KAPR : 90°
GAMP : +10° GAMF : +21°
DCON = inch size, With Coolant Hole

(inch)

DC	Type	Insert Corner Radius RE	Order Number	Stock R	* No.T	LF	DCON	WT (kg)	APMX	RPMX (min^{-1})	 Insert Type
2.000	D	.016-.126	**AXD4000AUR2.0004AAD**	●	4	2.000	.750	.9	.610	34000	XDGX1750
2.000	E	.157-.197	**AXD4000AUR2.0004AAE**	●	4	2.000	.750	.9	.583	34000	XDGX1750

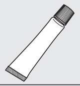
* Number of Teeth
Note 1) The maximum allowable revolutions are set to ensure tool and insert stability.
RPMX (max. rev/min) for holders must also be considered.
Note 2) Tool should be set with balancing quality of G6.3 (ISO1940) or ISO16084, in case over 6000 min^{-1} spindle rotation.
Note 3) When using the tool at high spindle speeds, ensure that the tool and chuck are correctly balanced.
Note 4) Note for inserts with a corner radius of .063 and above, as corner radius increases the LF dimensions decrease.

Mounting Dimensions

(inch)

DC	Order Number	DCON	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8
2.000	**AXD4000AUR2.0004AAD**	.750	.748	.413	.630	.560	1.750	.313	.187
2.000	**AXD4000AUR2.0004AAE**	.750	.748	.413	.630	.527	1.750	.313	.187

Spare Parts

 *		
Clamp Screw	Wrench	Anti-seize Lubricant
TPS3SB	TIP10D	MK1KS

* Clamp Torque (lbf-in) : TPS3SB = 26.6

Note 1) Clamp screw and wrench of AXD4000A are different from AXD4000.

Dimensions and Symbols (ISO 13399 Compliance)

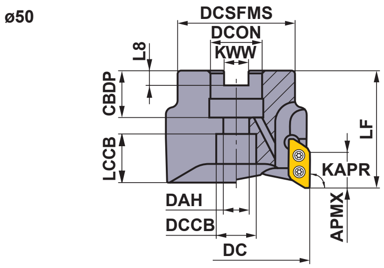
DC = Cutting Diameter
LF = Functional Length
DCON = Connection Diameter
WT = Weight of Item
APMX = Depth of Cut Max.
RPMX = Rotational Speed Max.
CBDP = Connection Bore Depth
DAH = Diameter Access Hole
DCCB = Counterbore Diameter Connection Bore
LCCB = Counterbore Depth Connection Bore
DCSFMS = Contact Surface Diameter Machine Side
KWW = Keyway Width

● : USA Stock ★ : Stocked in Japan (10 inserts in one case)

90° KAPR

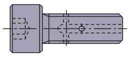
AXD4000A NEW

P M K **N** S H



Right hand tool holder only.

(mm)

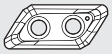
DC	Set Bolt	Geometry
ϕ50	HSC10030H	

Metric Standard

■Arbor Type

KAPR : 90°
GAMP : +10° GAMF : +21°
DCON = inch size, With Coolant Hole

(mm)

DC	Type	Insert Corner Radius RE	Order Number	Stock	* No.T	LF	DCON	WT	APMX	RPMX	
				R				(kg)		(min^{-1})	Insert Type
50	D	0.4–3.2	**AXD4000A-050A04RD**	★	4	50	22	0.4	15.5	34000	XDGX1750
50	E	4.0–5.0	**AXD4000A-050A04RE**	★	4	50	22	0.4	14.8	34000	XDGX1750

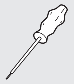
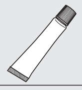
* Number of Teeth
Note 1) The maximum allowable revolutions are set to ensure tool and insert stability.
RPMX (max. rev/min) for holders must also be considered.
Note 2) Tool should be set with balancing quality of G6.3 (ISO1940) or ISO16084, in case over 6000 min^{-1} spindle rotation.
Note 3) When using the tool at high spindle speeds, ensure that the tool and chuck are correctly balanced.
Note 4) Note for inserts with a corner radius of 1.6 and above, as corner radius increases the LF dimensions decrease.

Mounting Dimensions

(mm)

DC	Order Number	DCON	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8
50	**AXD4000A-050A04RD**	22	20	11	17	15.4	45	10.4	6.3
50	**AXD4000A-050A04RE**	22	20	11	17	14.6	45	10.4	6.3

Spare Parts

 *		
Clamp Screw	Wrench	Anti-seize Lubricant
TPS3SB	TIP10D	MK1KS

* Clamp Torque (lbf-in) : TPS3SB = 26.6

Note 1) Clamp screw and wrench of AXD4000A are different from AXD4000.

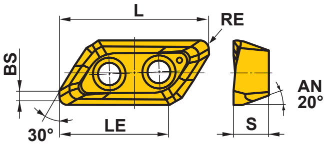
Dimensions and Symbols (ISO 13399 Compliance)

DC = Cutting Diameter
LF = Functional Length
DCON = Connection Diameter
WT = Weight of Item
APMX = Depth of Cut Max.
RPMX = Rotational Speed Max.
CBDP = Connection Bore Depth
DAH = Diameter Access Hole
DCCB = Counterbore Diameter Connection Bore
LCCB = Counterbore Depth Connection Bore
DCSFMS = Contact Surface Diameter Machine Side
KWW = Keyway Width

For Continuous High-Speed and Ultra-High-Speed Machining of Aluminum Alloys

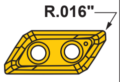
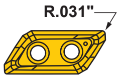
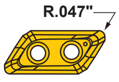
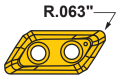
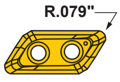
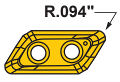
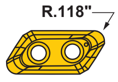
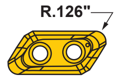
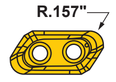
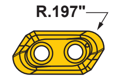
Inserts

(inch)

Workpiece Material	**N** Aluminum Alloys			◐	✣			◐	✣	**Cutting Conditions (Guide):** ● :Stable Cutting ◐ :General Cutting ✣ :Unstable Cutting **Edge Preparation:** **F** :Sharp **E** :Round					
Shape	Order Number	Class	Edge Preparation	Stock						Dimensions					Geometry
				Coated				Carbide							
				LC15TF	MP9120			NEW MT2010	TF15	L	LE	S	BS	RE*	
Strong Cutting Edge **GM** Breaker 	**XDGX175004PDFR-GM**	G	F					●	●	.906	.689	.197	.066	.016	
	XDGX175008PDFR-GM	G	F					●	●	.906	.689	.197	.047	.031	
	XDGX175012PDFR-GM	G	F					●	●	.906	.689	.197	.035	.047	
	XDGX175016PDFR-GM	G	F					●	●	.866	.689	.197	.054	.063	
	XDGX175020PDFR-GM	G	F					●	●	.866	.689	.197	.033	.079	
	XDGX175024PDFR-GM	G	F					●	●	.866	.689	.197	.017	.094	
	XDGX175030PDFR-GM	G	F					●	●	.831	.689	.197	.023	.118	
	XDGX175032PDFR-GM	G	F					●	●	.831	.689	.197	.015	.126	
	XDGX175040PDFR-GM	G	F					●	●	.787	.689	.197	.020	.157	
	XDGX175050PDFR-GM	G	F					●	●	.764	.689	.197	.014	.197	
Strong Cutting Edge Fracture Resistance Type **GM** Breaker 	**XDGX175004PDER-GM**	G	E		●					.906	.689	.197	.066	.016	
	XDGX175008PDER-GM	G	E		●					.906	.689	.197	.047	.031	
	XDGX175012PDER-GM	G	E		●					.906	.689	.197	.035	.047	
	XDGX175016PDER-GM	G	E		●					.866	.689	.197	.054	.063	
	XDGX175020PDER-GM	G	E		●					.866	.689	.197	.033	.079	
	XDGX175024PDER-GM	G	E		●					.866	.689	.197	.017	.094	
	XDGX175030PDER-GM	G	E		●					.831	.689	.197	.023	.118	
	XDGX175032PDER-GM	G	E		●					.831	.689	.197	.015	.126	
	XDGX175040PDER-GM	G	E		●					.787	.689	.197	.020	.157	
	XDGX175050PDER-GM	G	E		●					.764	.689	.197	.014	.197	
Low Cutting Resistance **GL** Breaker 	**XDGX175004PDFR-GL**	G	F	★					●	.906	.689	.197	.067	.016	
	XDGX175008PDFR-GL	G	F	★					●	.906	.689	.197	.052	.031	
	XDGX175012PDFR-GL	G	F	★					●	.906	.689	.197	.037	.047	
	XDGX175016PDFR-GL	G	F	★					●	.866	.689	.197	.056	.063	
	XDGX175020PDFR-GL	G	F	★					●	.866	.689	.197	.041	.079	
	XDGX175024PDFR-GL	G	F	★					●	.866	.689	.197	.026	.094	
	XDGX175030PDFR-GL	G	F	★					●	.831	.689	.197	.033	.118	
	XDGX175032PDFR-GL	G	F	★					●	.831	.689	.197	.026	.126	
	XDGX175040PDFR-GL	G	F	★					●	.787	.689	.197	.033	.157	
	XDGX175050PDFR-GL	G	F	★					●	.764	.689	.197	.016	.197	

* The insert nose R differs from radius form which is remains on workpiece material after machining due to the effects of the axial rake angle at the time of setting.
GM breaker is recommended if stress the dimensional precision of the workpiece shape.

■ Holder And Insert Corner Radius Combination

Holder	**D** Type Holder								**E** Type Holder	
	AXD4000AUR2.0004AAD, AXD4000A–050A04RD								**AXD40000AUR2.0004AAE AXD4000A–050A04RE**	
Applicable Insert Corner R (RE)										
	XDGX 175004PD○R-○○	**XDGX 175008PD○R-○○**	**XDGX 175012PD○R-○○**	**XDGX 175016PD○R-○○**	**XDGX 175020PD○R-○○**	**XDGX 175024PD○R-○○**	**XDGX 175030PD○R-○○**	**XDGX 175032PD○R-○○**	**XDGX 175040PD○R-○○**	**XDGX 175050PD○R-○○**

Note 1) Other combinations of holder and insert corner R are not acceptable.

● : USA Stock ★ : Stocked in Japan (10 inserts in one case)

Inserts to be used with the AXD4000A ,which include clamping screws, must be ordered via Kit-order numbers referenced below.

Insert Kit

Package contents of insert kit (10 inserts and 20 clamp screws)

Workpiece Material	**N** Aluminum Alloys	◐	✤			◐	✤		**Cutting Conditions (Guide):** ● :Stable Cutting ◐ :General Cutting ✤ :Unstable Cutting				
Shape	Order Number	Stock							Inserts		Clamp Screw		Use
		Coated				Carbide			Order Number	Pieces	Order Number	Pieces	
		LC15TF	**MP9120**			**MT2010**	**TF15**						
Strong Cutting Edge **GM** Breaker 	**K-XDGX175004PDFR-GM**					☐	☐		XDGX175004PDFR-GM	10	TPS3SB	20	First Recommendation High Speed, High Efficiency and High Load Machining
	K-XDGX175008PDFR-GM					☐	☐		XDGX175008PDFR-GM	10	TPS3SB	20	
	K-XDGX175012PDFR-GM					☐	☐		XDGX175012PDFR-GM	10	TPS3SB	20	
	K-XDGX175016PDFR-GM					☐	☐		XDGX175016PDFR-GM	10	TPS3SB	20	
	K-XDGX175020PDFR-GM					☐	☐		XDGX175020PDFR-GM	10	TPS3SB	20	
	K-XDGX175024PDFR-GM					☐	☐		XDGX175024PDFR-GM	10	TPS3SB	20	
	K-XDGX175030PDFR-GM					☐	☐		XDGX175030PDFR-GM	10	TPS3SB	20	
	K-XDGX175032PDFR-GM					☐	☐		XDGX175032PDFR-GM	10	TPS3SB	20	
	K-XDGX175040PDFR-GM					☐	☐		XDGX175040PDFR-GM	10	TPS3SB	20	
	K-XDGX175050PDFR-GM					☐	☐		XDGX175050PDFR-GM	10	TPS3SB	20	
Strong Cutting Edge Fracture Resistance Type **GM** Breaker 	**K-XDGX175004PDER-GM**		☐						XDGX175004PDER-GM	10	TPS3SB	20	
	K-XDGX175008PDER-GM		☐						XDGX175008PDER-GM	10	TPS3SB	20	
	K-XDGX175012PDER-GM		☐						XDGX175012PDER-GM	10	TPS3SB	20	
	K-XDGX175016PDER-GM		☐						XDGX175016PDER-GM	10	TPS3SB	20	
	K-XDGX175020PDER-GM		☐						XDGX175020PDER-GM	10	TPS3SB	20	
	K-XDGX175024PDER-GM		☐						XDGX175024PDER-GM	10	TPS3SB	20	
	K-XDGX175030PDER-GM		☐						XDGX175030PDER-GM	10	TPS3SB	20	
	K-XDGX175032PDER-GM		☐						XDGX175032PDER-GM	10	TPS3SB	20	
	K-XDGX175040PDER-GM		☐						XDGX175040PDER-GM	10	TPS3SB	20	
	K-XDGX175050PDER-GM		☐						XDGX175050PDER-GM	10	TPS3SB	20	
Low Cutting Resistance **GL** Breaker 	**K-XDGX175004PDFR-GL**	☐					☐		XDGX175004PDFR-GL	10	TPS3SB	20	General Machining
	K-XDGX175008PDFR-GL	☐					☐		XDGX175008PDFR-GL	10	TPS3SB	20	
	K-XDGX175012PDFR-GL	☐					☐		XDGX175012PDFR-GL	10	TPS3SB	20	
	K-XDGX175016PDFR-GL	☐					☐		XDGX175016PDFR-GL	10	TPS3SB	20	
	K-XDGX175020PDFR-GL	☐					☐		XDGX175020PDFR-GL	10	TPS3SB	20	
	K-XDGX175024PDFR-GL	☐					☐		XDGX175024PDFR-GL	10	TPS3SB	20	
	K-XDGX175030PDFR-GL	☐					☐		XDGX175030PDFR-GL	10	TPS3SB	20	
	K-XDGX175032PDFR-GL	☐					☐		XDGX175032PDFR-GL	10	TPS3SB	20	
	K-XDGX175040PDFR-GL	☐					☐		XDGX175040PDFR-GL	10	TPS3SB	20	
	K-XDGX175050PDFR-GL	☐					☐		XDGX175050PDFR-GL	10	TPS3SB	20	

For safety reasons, clamping screws must be replaced at the same time as inserts.

Note 1) Use the GM type insert when using with a high-speed, high-power spindle machine that is the ideal choice for AXD4000A (spindle RPM of 20000 min^{-1} or more, motor power of 80 kw or more).

Note 2) Clamp screw and wrench of AXD4000A are different from AXD4000.

Note 3) For insert dimensions, refer to page 626.

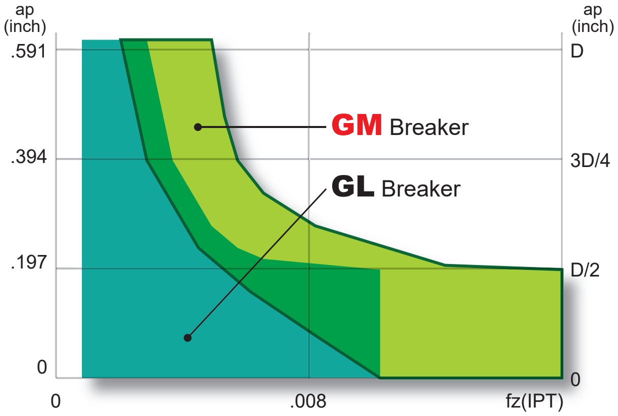
☐ : Non stock, produced to order only.

Please order in the ① insert kit order number and ② insert grades.

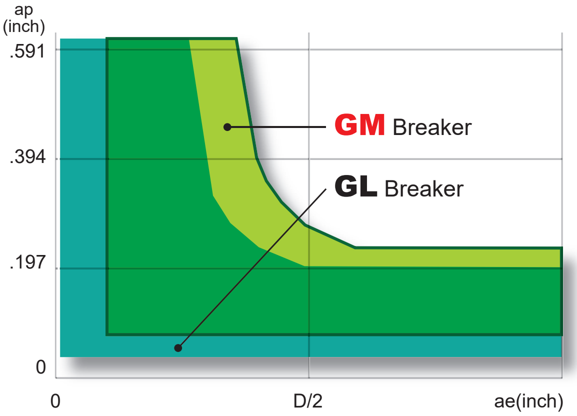
Selection of Insert

It is necessary to choose the best insert according to the cutting conditions. Please select an insert from the tables below.
1st recommendation for High Efficiency and High Load Machining on High-speed Spindles is the GM breaker with a strong cutting edge.

Selection of insert according to the feed per tooth and the required cutting depth



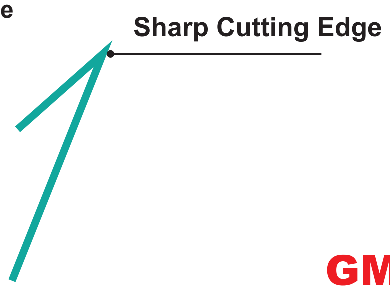
Selection of insert according to the width of cut and the required cutting depth



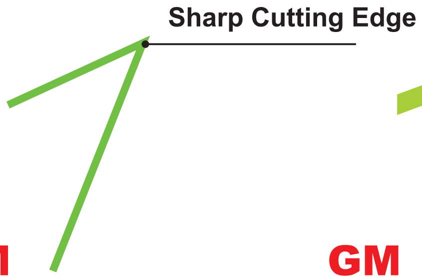
1st recommendation for machining aluminum alloys is GL breaker.
Under high-load conditions such as deep or high feed cutting, it is advisable to use the GM breaker.

Selection of Insert According to Cutting Edge

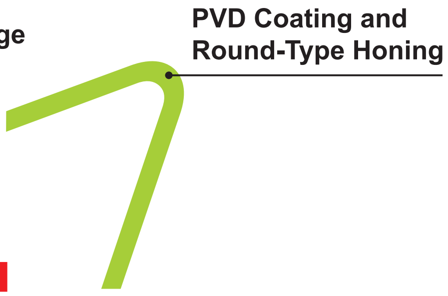
Insert Type



GL
TF15/LC15TF
Low Cutting Resistance
LC15TF : Excellent welding resistance.

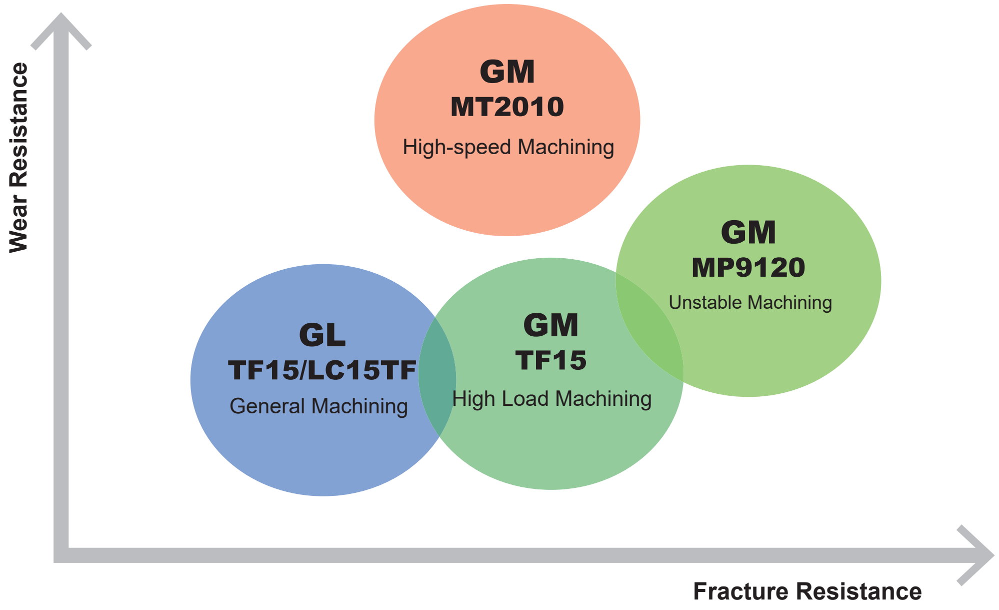


GM
MT2010/TF15
Tougher Cutting Edge



GM
MP9120
Strong Fracture Resistant Cutting Edge

Selection of insert according to wear resistance



Recommended Cutting Conditions

(inch)

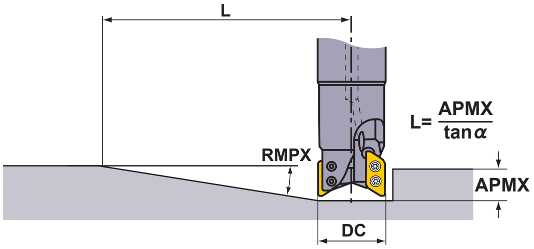
Workpiece Material		Properties	Grade	Breaker	Cutting Speed **vc** (SFM)	Cutting Width **ae**	Depth of Cut **ap**	Feed per Tooth (IPT)
N	Aluminum Alloys	Content Si<5%	MT2010 TF15 MP9120	**GM**	13120(6560—16500)	≤.5 DC	≤ .197	≤ .014
							≤ .394	≤ .012
							≤ .571	≤ .010
						≤.75 DC	≤ .197	≤ .012
							≤ .394	≤ .010
							≤ .571	≤ .008
						DC (Slot)	≤ .197	≤ .012
			TF15 LC15TF	**GL**	13120(6560—16500)	≤.75 DC	≤ .197	≤ .008
							≤ .394	≤ .006
							≤ .571	≤ .004
						DC (Slot)	≤ .197	≤ .008

Note 1) The above cutting conditions are determined based on high workpiece materials and machine rigidity, where no vibration occurred. If vibrations occur make adjustments according to the machining conditions.
Note 2) Note, vibrations may occur in the following conditions.

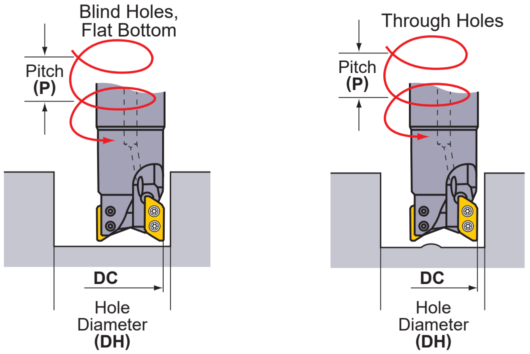
- When using long tool overhang.
- When pocket machining corner radii.
- When the workpiece materials has poor clamping rigidity or when the machine rigidity or workpiece materials rigidity is low, vibrations can occur easily, if so, reduce cutting conditions such as width and depth of cut and feed per tooth.

■ Ramping / Helical Milling / Drilling

● Ramping



● Helical Milling



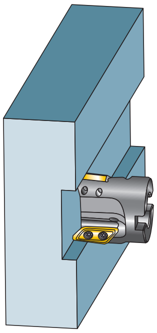
Refer to the table below for cutting conditions. For feed per tooth and cutting speed, follow the cutting conditions for slot milling.

(inch)

DC		Type	Insert Corner R **RE**	Ramping		Helical Milling (Blind Hole, Flat Bottom)				Helical Milling (Through Hole)		Drilling
inch	mm			Max. Ramping Angle **RMPX**	Min. Distance *1 **L**	Max. Hole Diameter **DH max.**	Max. Pitch **P max.**	Min. Hole Diameter **DH min.**	Max. Pitch **P max.**	Min. Hole Diameter **DH min.**	Max. Pitch **P max.**	
1.969	50.0	D	.016–.047	8.2°	4.252	3.811 *2	.551	3.756	.551	3.197	.551	.217
			.063–.094	7.6°	4.606	3.717 *3	.512	3.685	.512	3.197	.512	.197
			.118–.126	6.9°	5.079	3.654 *4	.472	3.622	.472	3.197	.472	.177
		E	.157	6.3°	5.314	3.591	.394	3.543	.394	3.197	.394	.154
			.197	5.8°	5.748	3.512	.354	3.496	.354	3.197	.354	.142
2.000	50.8	D	.016–.047	8.7°	4.016	3.874 *2	.551	3.819	.551	3.260	.551	.217
			.063–.094	8.2°	4.252	3.780 *3	.512	3.748	.512	3.260	.512	.197
			.118–.126	7.6°	4.606	3.717 *4	.472	3.685	.472	3.260	.472	.177
		E	.157	6.9°	4.843	3.654	.394	3.606	.394	3.260	.394	.154
			.197	6.5°	5.118	3.575	.354	3.559	.354	3.260	.354	.142

*1 Using the maximum ramping angle, the distance to reach the maximum depth of cut is as follows:
L= (maximum depth of cut APMX/tan α). Maximum depth of cut D type is .610", E type is .583".
*2 Corner radius of .047". For other corner radii, use the following formula. {(cutting edge diameter DC)–(corner radius RE)–.022"}×2
*3 Corner radius of .094". For other corner radii, use the following formula. {(cutting edge diameter DC)–(corner radius RE)–.022"}×2
*4 Corner radius of .126". For other corner radii, use the following formula. {(cutting edge diameter DC)–(corner radius RE)–.022"}×2
Note 1) The recommended ramping feed is .002 IPT or under.

Application Examples

Tool		Conventional	**AXD4000A-050A04RD**
Insert (Grade)			**XDGX175030PDER-GM(MT2010)**
Workpiece			
Components		Aircraft Fuselage Parts	
Cutting Conditions	Spindle Speed **n** (min^{-1})	30000	32000
	Cutting Speed **vc** (SFM)	15420	16405
	Feed per Tooth **fz** (IPT)	.006	.010
	Depth of Cut **ap** (inch)	.197	.197
	Width of Cut **ae** (inch)	1.969	1.969
	Metal Removal Rate **M.R.R** (in^3/min)	275	490
Cutting Mode		Wet Cutting	Wet Cutting
Machine Spindle Type		High Speed and High Power 5-axis MC	
Result		Compared to conventional grade; MT2010 achieved 1.8 times greater M.R.R while maintaining good machining stability.	

DIA EDGE

TOOL NEWS

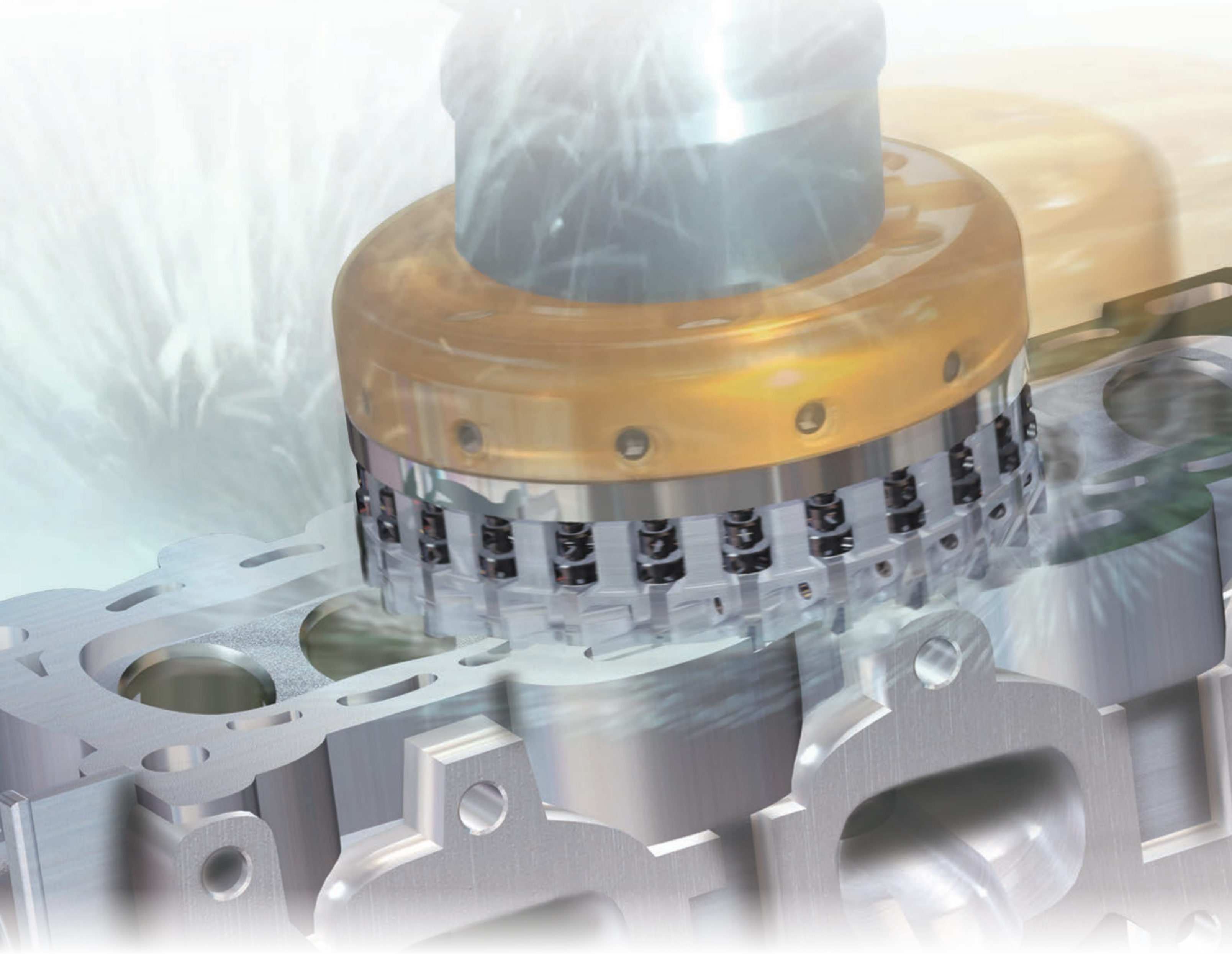
2021.10 Update
B216A

High Feed Finish Milling Cutter for Aluminum Alloys and Cast Irons

FMAX

Series Expansion

Feed Maximum (FMAX) Milling Cutter for Ultra Efficient and Accurate Finishing



MITSUBISHI MATERIALS CORPORATION

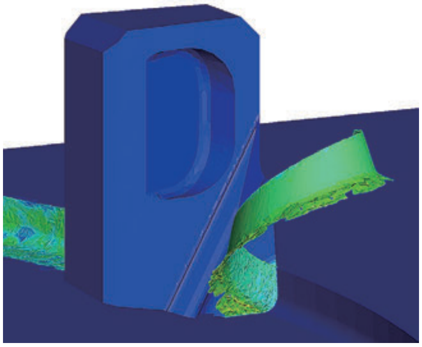
* By CG image

High Feed Finish Milling Cutter for Aluminum Alloys and Cast Irons

FMAX

Ultra High Efficiency Machining

The ultra fine pitch design is ideal for high efficiency machining (vf ≥ 787 IPM).
(Milling for aluminum alloy)
Internal coolant and a special chip breaker wall (body protector) provides ideal chip discharge performance.

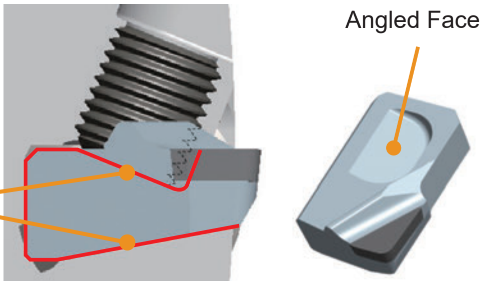


*Graphical Representation.

The body protector on the rake face forms chip shapes ideal for disposal and disperses them away from the body. Internal coolant also aids this process. The body is compatible with all center through coolant arbors.

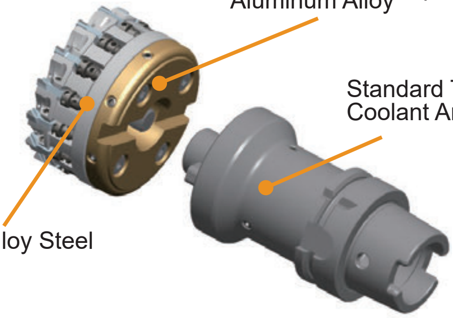
Designed for High Speeds

Anti Fly dovetail clamping mechanism.



Light Weight, High Rigidity Body

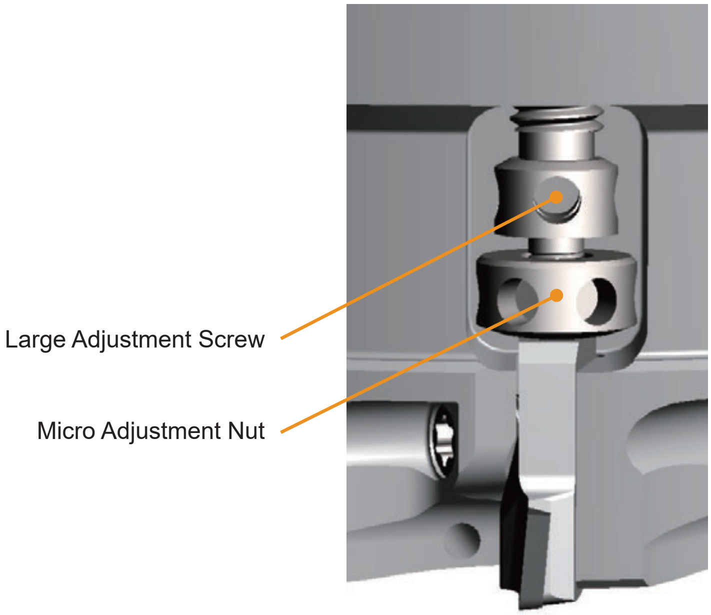
A special alloy steel and aluminum body combine to provide rigidity and light weight.



*1 Except DC=40, 50, 63mm

High Precision, Easy Setting

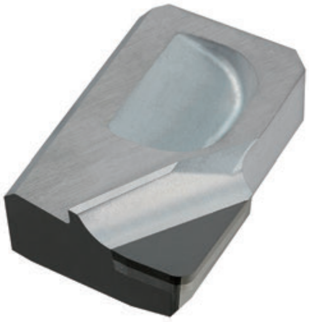
The combination of both a large and micro screw provides precise run-out adjustment and for adjusting new or re-ground inserts (.0002" or better).



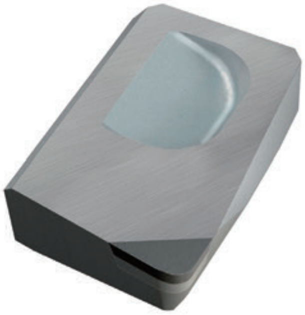
Inserts, PCD Grades and CBN Grades

PCD grade inserts for machining Aluminum Alloys available in two grades for general purpose with focus on fracture or wear resistance.
New CBN grade inserts available for general purpose cast iron machining provide an excellent surface finish, low cutting force and long life.

DC = 40, 50, 63mm



PCD Grades
Milling of Aluminum Alloys
(GAMP: +5°)



CBN Grades
Milling of Cast Irons
(GAMP: 0°)

High Feed Finish Milling Cutter for Aluminum Alloys and Cast Irons

FMAX

Common 1"/25.4mm DCON for BT-30 Holder

Optimized weight for BT-30 Holders

(mm)

DC	For Compact and Smaller Machining Centers		FMAX	
	Number of Teeth	WT (kg)	Number of Teeth	WT (kg)
100	10	1.06	12	1.85
	16	1.11	18	1.81
125	14	1.44	16	3.33
	20	1.48	24	3.27

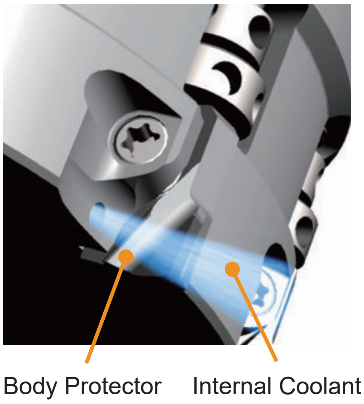
Light Weight, High Rigidity Body

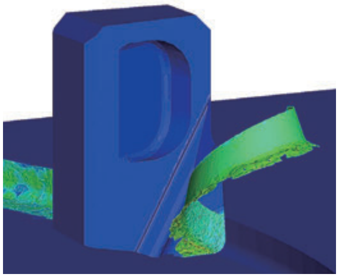
A special alloy steel and aluminum body combine to provide rigidity and light weight.

High Efficiency Machining

Multi-blade design ideal for low power machines.

Internal coolant and a special chip breaker wall (body protector) provides ideal chip discharge performance.





*Graphical Representation.

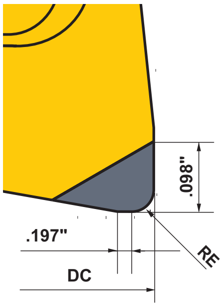
The body protector on the rake face forms chip shapes ideal for disposal and disperses them away from the body. Internal coolant also aids this process. The body is compatible with all center through coolant arbors.

Inserts for Specific Applications

CBN Grades for Milling of Gray Cast Irons

General Purpose Inserts

CBN inserts for gray cast iron reduce the length of the wiper edge and provide excellent surface finish with low cutting forces.
CBN grade insert for cast iron alloys is an economical and disposable insert that does not require re-grinding.

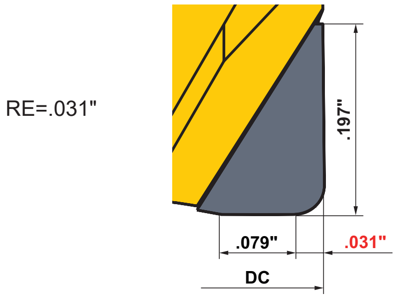


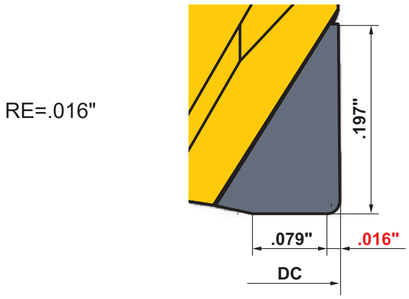
PCD Grades for Milling of Aluminum Alloys

General Purpose Inserts

Inserts with corner R(RE) = .031 inch are excellent for general applications, and can be used in a wide variety of cutting areas. They are able to exhibit outstanding cutting edge stability, particularly under high-load conditions such as heavy interrupted cutting.

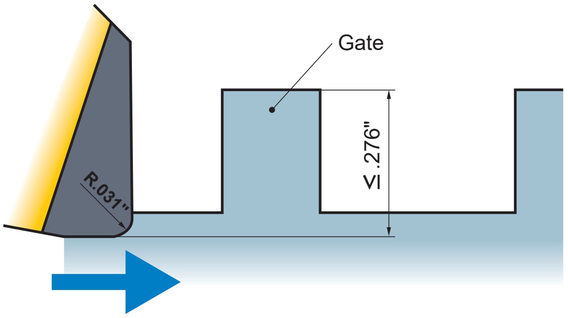
The sharpness of inserts with corner R(RE) = .016 inch is one of their most notable features. Its effectiveness can be demonstrated by the ability to suppress chatter and maintain finished surfaces.

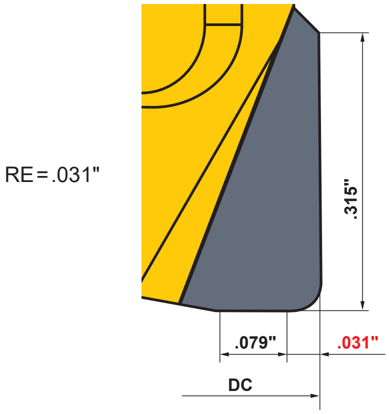




Long Edge Inserts

The long edge insert is capable of finish cutting of castings with a gate. Therefore, it is possible to reduce the number of cutting passes and to shorten the machining time as well.

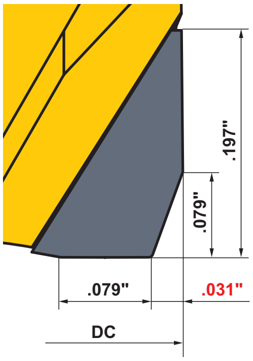




Burr Prevention Inserts

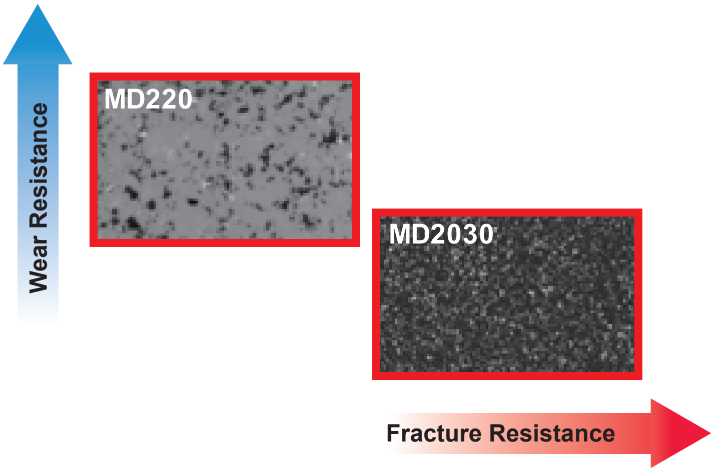
The tool cutting edge angle is effective at reducing the thickness of chips, with minimal; if any burrs generated in comparison to conventional products.
The finely-detailed R shape of the corner portion prevents chipping and enhances both stability and tool life.

Burr Prevention Type

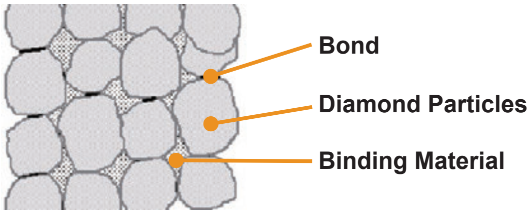


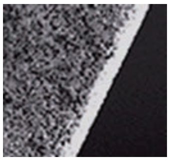
Features of the Grades

PCD Grade Diamond Sintered Segment Containing Ultra Microparticle Diamond



Bond of Diamond Particles





Diamond Particles : Give a highly stable cutting edge performance because of the strong bonding.

Features of MD2030

Intended for milling.
Improved fracture resistance when used in unstable applications.
The stability of the cutting edge can meet a wide variety of workpiece material and cutting conditions.

Features of MD220

Sintered medium grain diamond particles. Wear resistance and fracture resistance are superbly balanced.
MD220 can prevent burr formation and achieve long tool life.

CBN Grade High Fracture Resistance

Features of MB4120

Fine CBN particles increase cutting edge toughness.
The high fracture resistance allows stable performance even during interrupted machining.
Optimized grade prevents fracture, edge chipping and thermal cracks under both dry cutting conditions and when cutting workpiece following wet cut process.

High Feed Finish Milling Cutter for Aluminum Alloys and Cast Irons

FACE MILLING
<HIGH FEED FINISHING>

90° KAPR

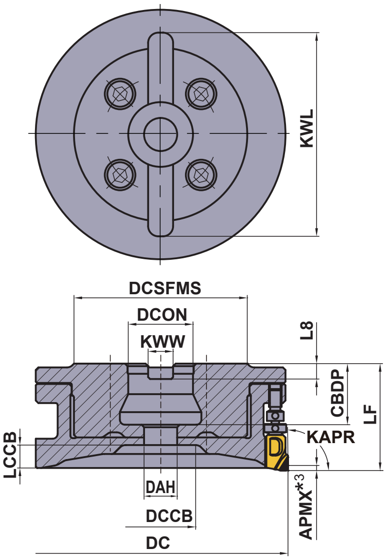
FMAX
For Compact and Smaller Machining Centers

P M **K** **N** S H

Metric Standard

For Inch Arbors

Fig.1
ø100
ø125



Right hand tool holder only.

■Arbor Type

DC = mm, DCON = Inch GAMP: +5° GAMF: 0° (mm)

DC	Order Number	Stock	*1 Coolant Thru	*2 No.T	LF	DCON	WT (kg)	RPMX (min^{-1})	Fig.
100	**FMAXR10010CLW**	★	Y	10	42	25.4	1.06	22000	1
100	**FMAXR10016CLW**	★	Y	16	42	25.4	1.11	22000	1
125	**FMAXR12514CLW**	★	Y	14	42	25.4	1.44	19600	1
125	**FMAXR12520CLW**	★	Y	20	42	25.4	1.48	19600	1

*1 Y=Yes
*2 Number of Teeth
*3 For the maximum depth of cut (**APMX**), please refer to recommended cutting conditions (**ap**).
Note 1) The maximum depth of cut for should be 2mm or less for ultra high efficiency machining with table feed (**vf** ≥ 20000mm/min).

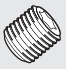
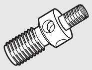
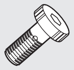
Mounting Dimensions

(mm)

DCON	DC	Order Number	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8	KWL	Fig.
25.4	100	**FMAXR10010CLW**	24	13	27	9	68	9.5	6	80	1
25.4	100	**FMAXR10016CLW**	24	13	27	9	68	9.5	6	80	1
25.4	125	**FMAXR12514CLW**	24	13	52	9	68	9.5	6	80	1
25.4	125	**FMAXR12520CLW**	24	13	52	9	68	9.5	6	80	1

Spare Parts

(mm)

Insert Clamp Screw *	Micro Adjustment Nut	Large Adjustment Screw	Cutter Set Bolt	Wrench T10	Wrench ø2.5
					
TSS04505S	KSN3	KSS2	HSCX12030H	TKY10T	RKY25S

* Clamp Torque (N • m) : TSS04505S = 3.5
Note 1) Refer to the instruction manual included in the cutter body for how to locate the insert and adjust the run-out.
Note 2) The cutter body includes a set bolt for an arbor.

★ : Stocked in Japan

90° KAPR

FMAX-50/63

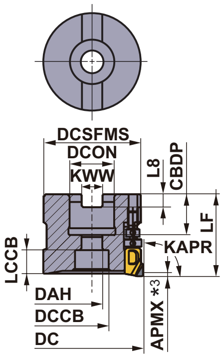
P M **K** **N** S H

Metric Standard

For Metric Arbors

Fig.1

ø40
ø50
ø63



Right hand tool holder only.

■Arbor Type

DC = mm, DCON = mm GAMP: +5° GAMF: -6°— -3° (mm)

DC	Order Number	Stock	*1 Coolant Thru	*2 No.T	LF	DCON	WT (kg)	RPMX (min^{-1})	Fig.
40	**FMAX-040A04R**	★	Y	4	40	16	0.24	30000	1
40	**FMAX-040A06R**	★	Y	6	40	16	0.23	30000	1
50	**FMAX-050A08R**	★	Y	8	40	22	0.37	30000	1
50	**FMAX-050A10R**	★	Y	10	40	22	0.35	30000	1
63	**FMAX-063A10R**	★	Y	10	40	22	0.67	27000	1
63	**FMAX-063A12R**	★	Y	12	40	22	0.66	27000	1

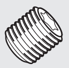
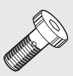
*1 Y=Yes
*2 Number of Teeth
*3 For the maximum depth of cut (**APMX**), please refer to recommended cutting conditions (**ap**).
Note 1) The maximum depth of cut for should be 2mm or less for ultra high efficiency machining with table feed (**vf** ≥ 20000mm/min).

Mounting Dimensions

(mm)

DCON	DC	Order Number	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8	KWL	Fig.
16	40	**FMAX-040**	18	9	14	10	37	8.4	5.6	—	1
16	40	**FMAX-040**	18	9	14	10	37	8.4	5.6	—	1
22	50	**FMAX-050**	20	11	17	12	47	10.4	6.3	—	1
22	50	**FMAX-050**	20	11	17	12	47	10.4	6.3	—	1
22	63	**FMAX-063**	20	11	17	12	60	10.4	6.3	—	1
22	63	**FMAX-063**	20	11	17	12	60	10.4	6.3	—	1

Spare Parts

DC	Tool Holder Type	Insert Clamp Screw *	Micro Adjustment Nut	Cutter Set Bolt	Wrench T10	Wrench ø2.5
						
40	**FMAX-040**	TSS04505S	KSN3	HSC08030H	TKY10T	RKY25S
50	**FMAX-050**	TSS04505S	KSN3	HSC10030H	TKY10T	RKY25S
63	**FMAX-063**	TSS04505S	KSN3	HSC10030H	TKY10T	RKY25S

* Clamp Torque (N • m) : TSS04505S = 3.5
Note 1) Refer to the instruction manual included in the cutter body for how to locate the insert and adjust the run-out.
Note 2) The cutter body includes a set bolt for an arbor.

● : USA Stock ★ : Stocked in Japan

FACE MILLING
<HIGH FEED FINISHING>

90° KAPR

F

FMAX

P M **K** **N** S H

Fig.1

ø3.000"
ø4.000"

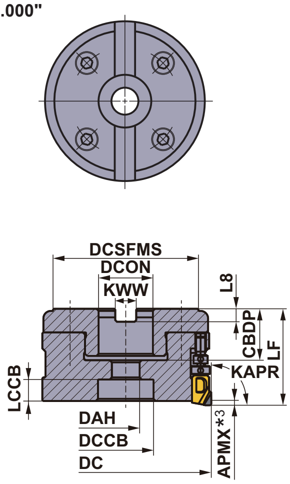
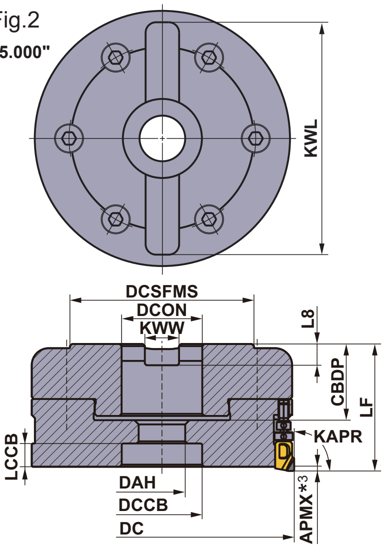


Fig.2

ø5.000"



Arbor Type

DC = Inch, DCON = Inch GAMP: +5° GAMF: 0° Right hand tool holder only. (inch)

DC	Order Number	Stock	*1 Coolant Thru	*2 No.T	LF	DCON	WT (lbs)	RPMX (min^{-1})	Fig.
3.000	**FMAXUR0310C**	●	Y	10	1.772	1.000	2.2	24500	1
3.000	**FMAXUR0314C**	●	Y	14	1.772	1.000	2.1	24500	1
4.000	**FMAXUR0412D**	●	Y	12	1.969	1.250	4.2	22000	1
4.000	**FMAXUR0418D**	●	Y	18	1.969	1.250	4.1	22000	1
5.000	**FMAXUR0516E**	●	Y	16	2.362	1.500	7.6	19600	2
5.000	**FMAXUR0524E**	●	Y	24	2.362	1.500	7.5	19600	2

*1 Y=Yes
*2 Number of Teeth
*3 For the maximum depth of cut (**APMX**), please refer to recommended cutting conditions (**ap**).
Note 1) The maximum depth of cut for should be .079 inch or less for ultra high efficiency machining with table feed (**vf** ≥ 787 IPM).

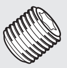
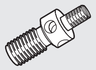
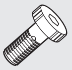
Mounting Dimensions

(inch)

DCON	DC	Tool Holder Type	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8	KWL	Fig.
1.000	3.000	**FMAXUR03**	.945	.539	1.024	.433	2.677	.375	.219	–	1
1.250	4.000	**FMAXUR04**	1.260	.669	1.260	.394	3.465	.500	.281	–	1
1.500	5.000	**FMAXUR05**	1.417	.787	1.496	.472	3.465	.625	.375	4.409	2

Spare Parts

(inch)

DC	Tool Holder Type	Insert Clamp Screw *	Micro Adjustment Nut	Large Adjustment Screw	Cutter Set Bolt	Wrench T10	Wrench ø.098"
							
3.000	**FMAXUR03**	TSS04505S	KSN3	KSS2	HSCXU50012H	TKY10T	RKY25S
4.000	**FMAXUR04**	TSS04505S	KSN3	KSS2	HSCXU62514H	TKY10T	RKY25S
5.000	**FMAXUR05**	TSS04505S	KSN3	KSS2	HSCXU75017H	TKY10T	RKY25S

* Clamp Torque (lbf-in) : TSS04505S = 31
Note 1) Refer to the instruction manual included in the cutter body for how to locate the insert and adjust the run-out.
Note 2) The cutter body includes a set bolt for an arbor.

FACE MILLING

<HIGH FEED FINISHING>

90° KAPR F

FMAX

P M **K** **N** S H

Metric Standard

For Inch Arbors

■Arbor Type

Fig.1

ø80

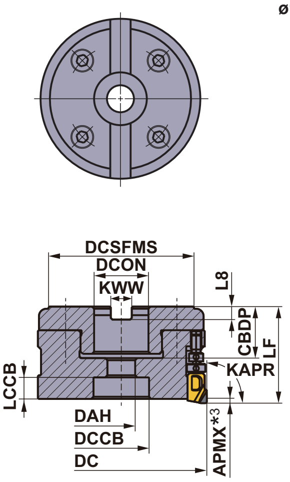
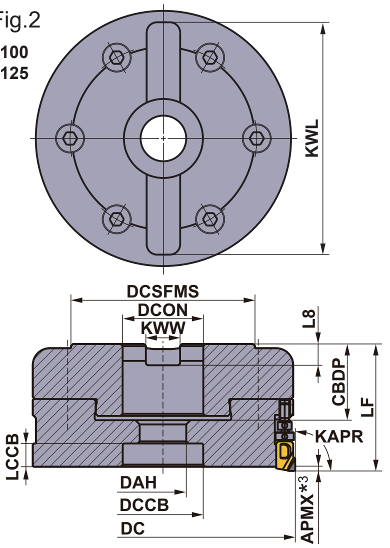


Fig.2

ø100
ø125



Right hand tool holder only.

DC = mm, DCON = Inch GAMP: +5° GAMF: 0° (mm)

DC	Order Number	Stock	*1 Coolant Thru	*2 No.T	LF	DCON	WT (kg)	RPMX (min^{-1})	Fig.
80	**FMAXR08010C**	★	Y	10	45	25.4	1.11	24500	1
80	**FMAXR08014C**	★	Y	14	45	25.4	1.09	24500	1
100	**FMAXR10012D**	★	Y	12	50	31.75	1.85	22000	2
100	**FMAXR10018D**	★	Y	18	50	31.75	1.81	22000	2
125	**FMAXR12516E**	★	Y	16	60	38.1	3.33	19600	2
125	**FMAXR12524E**	★	Y	24	60	38.1	3.27	19600	2
160	**FMAXR16016D**	★	Y	16	63	31.75	3.30	10000	1
160	**FMAXR16024D**	★	Y	24	63	31.75	3.39	10000	1

*1 Y=Yes
*2 Number of Teeth
*3 For the maximum depth of cut (**APMX**), please refer to recommended cutting conditions (**ap**).
Note 1) The maximum depth of cut for should be 2 mm or less for ultra high efficiency machining with table feed (**vf** ≥ 20000 mm/min).

Mounting Dimensions

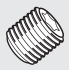
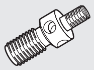
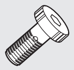
(mm)

DCON	DC	Order Number	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8	KWL	Fig.
25.4	80	**FMAXR08010C**	24	13	26	11	68	9.5	6	—	1
25.4	80	**FMAXR08014C**	24	13	26	11	68	9.5	6	—	1
31.75	100	**FMAXR10012D**	32	17	32	10	79	12.7	8	90	2
31.75	100	**FMAXR10018D**	32	17	32	10	79	12.7	8	90	2
38.1	125	**FMAXR12516E**	36	22	38	12	88	15.9	10	112	2
38.1	125	**FMAXR12524E**	36	22	38	12	88	15.9	10	112	2
31.75	160	**FMAXR16016D**	38	17	53	10	75	12.7	8	—	1
31.75	160	**FMAXR16024D**	38	17	53	10	75	12.7	8	—	1

★ : Stocked in Japan

Spare Parts

(mm)

DC	Tool Holder Type	Insert Clamp Screw *	Micro Adjustment Nut	Large Adjustment Screw	Cutter Set Bolt	Wrench T10	Wrench ø2.5
							
80	**FMAXR080**	TSS04505S	KSN3	KSS2	HSCX12030H	TKY10T	RKY25S
100	**FMAXR100**	TSS04505S	KSN3	KSS2	HSCX16035H	TKY10T	RKY25S
125	**FMAXR125**	TSS04505S	KSN3	KSS2	HSCX20035H	TKY10T	RKY25S
160	**FMAXR160**	TSS04505S	KSN3	KSS2	HSCX16045H	TKY10T	RKY25S

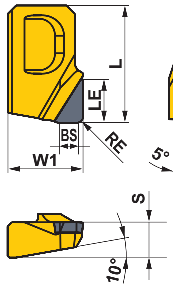
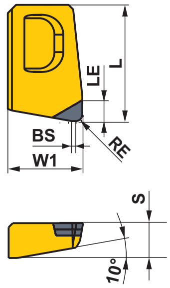
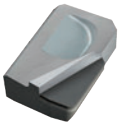
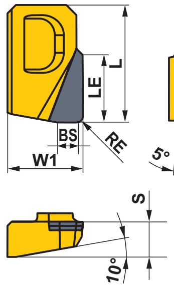
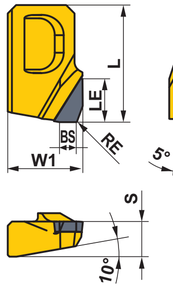
* Clamp Torque (N • m) : TSS04505S = 3.5

Note 1) Refer to the instruction manual included in the cutter body for how to locate the insert and adjust the run-out.

Note 2) The cutter body includes a set bolt for an arbor.

■Inserts

(inch)

Shape	Order Number	MD220	MD2030	MB4120	L	LE	W1	S	BS	RE	Geometry
For Aluminum Alloys  General Purpose	**GOER1404PXFR2**	●	●		.551	.197	.354	.165	.079	.016	
	GOER1408PXFR2	●	●		.551	.197	.354	.165	.079	.031	
NEW For Gray Cast Irons  General Purpose	**NP-GOEN1404PXSR05**			●	.551	.098	.354	.165	.020	.016	
	NP-GOEN1408PXSR05			●	.551	.098	.354	.165	.020	.031	
For Aluminum Alloys  Long Edge	**GOER1408PXFR2-8**	●			.551	.315	.354	.165	.079	.031	
For Aluminum Alloys  Burr Prevention	**GOER1401ZXFR2**	●			.551	.551	.354	.165	.079	.004	

For Aluminum Alloys : Sharp Edge
For Gray Cast Irons : Chamferd and Rounded (0.13mmx15°+R0.01)

Note 1) If general purpose inserts (RE = .016", .031"), burr prevention inserts and long edge inserts are used together, they will not be able to sufficiently display their full performance. Inserts of the same shape should be used according to the application.
Note 2) The cutting diameter will change depending on the shape. Refer to page 635 for details.
Be particularly careful when cutting near vertical walls, since there is a possibility of interference with the holder.
Note 3) The long edge inserts corresponds to the gate remainder and can not be used for constant depth cutting.

● : USA Stock
(PCD inserts are available with 1 piece in one case.)

Recommended Cutting Conditions

(inch)

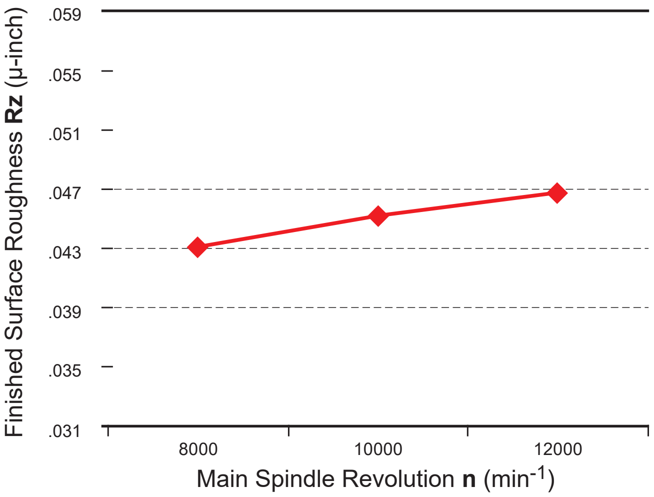
	Workpiece Material	Properties	Grade	Cutting Speed **vc** (SFM)	Depth of Cut		Feed per Tooth **fz** (IPT)	Cutting Mode
					ae	**ap**		
K	Gray Cast Irons	Tensile Strength ≤350MPa	**MB4120**	3280 (2295—4265)	≤ 0.8 DC	≤ .020	.003 (.002—.006)	Dry Cutting
N	Aluminum Alloys	Content Si < 5%	**MD2030** **MD220**	8200 (6560—9840)	≤ 0.2 DC	≤ .118 (.020—.118)	.003 (.002—.008)	Wet Cutting
					≤ 0.5 DC	≤ .098 (.020—.098)		
					≤ 0.8 DC	≤ .079 (.020—.079)		
		Content 5% ≤ Si ≤ 10%	**MD2030** **MD220**	8200 (6560—9840)	≤ 0.2 DC	≤ .118 (.020—.118)	.003 (.002—.008)	Wet Cutting
					≤ 0.5 DC	≤ .098 (.020—.098)		
					≤ 0.8 DC	≤ .079 (.020—.079)		
		Content 10% < Si < 15%	**MD220** **MD2030**	1970 (1310—2625)	≤ 0.2 DC	≤ .118 (.020—.118)	.003 (.002—.008)	Wet Cutting
					≤ 0.5 DC	≤ .098 (.020—.098)		
					≤ 0.8 DC	≤ .079 (.020—.079)		
		Content Si ≥ 15%	**MD220** **MD2030**	1970 (1310—2625)	≤ 0.2 DC	≤ .118 (.020—.118)	.003 (.002—.008)	Wet Cutting
					≤ 0.5 DC	≤ .098 (.020—.098)		
					≤ 0.8 DC	≤ .079 (.020—.079)		

(Note 1) Please adjust the depth of cut **ap** depending on the width of cut **ae**.

(Note 2) When using the long edge insert, please select the conditions depending on depths of cut (**ap**) excluding the length of the gate.

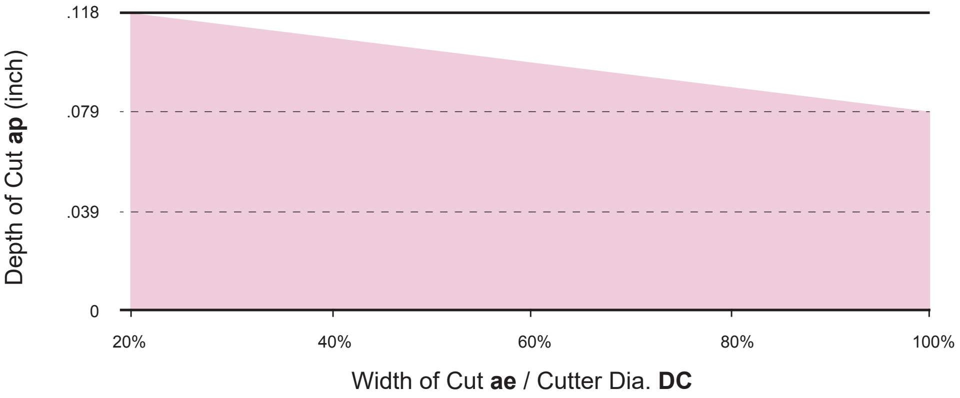
Cutting Performance

Finished Surface Roughness (Rz)

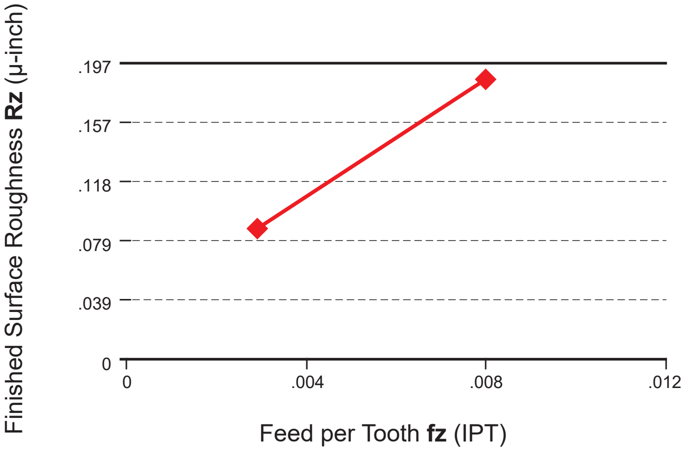


<Cutting Conditions>
Workpiece Material : AISI 383.0 Cylinder Head
Tool : FMAXR12524E
Insert : GOER1408PXFR2
Grade : MD2030
Revolution : n = 8000–12000 min^{-1}
Feed per Tooth : fz = .003 IPT
Depth of Cut : ap = .079 inch
Width of Cut : ae = 2.677 inch x 3
Cutting Mode : Internal Coolant 580 psi

Effective Chip Disposal Range

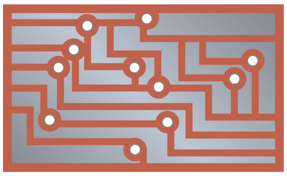
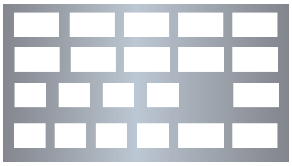


Gray Cast Iron Finished Surface Roughness (Rz) Comparison by CBN Grade



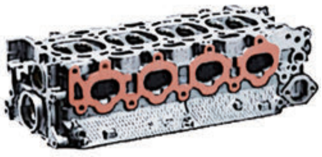
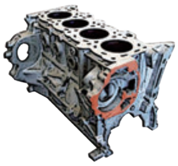
<Cutting Conditions>
Workpiece Material : AISI No.35 B
Tool : FAMXUR0524E
Insert : NP-GOEN1408PXSR05
Grade : MB4120
Revolution : n = 2546 min^{-1}
Feed per Tooth : fz =.003 IPT .008 IPT
Depth of Cut : ap = .020 inch
Cutting Mode : Dry Cutting

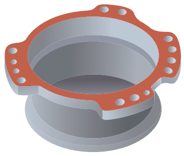
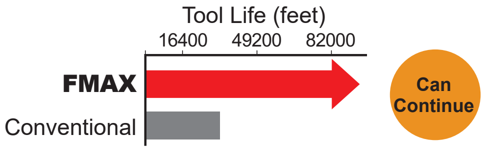
Application Examples

Cutter Body		**FMAXR12520CLW**	**FMAXR16016D**
Insert (Grade)		**GOER1401ZXFR2 (MD220)**	**NP-GOEN1408PXSR05 (MB4120)**
Workpiece		Aluminum Alloy 	AISI No.35 B 
Cutting Conditions	Cutting Speed **vc** (SFM)	12885(Conventional 10305)	2640(Conventional 595)
	Revolution **n** (min^{-1})	10000(Conventional 8000)	1600(Conventional 360)
	Feed per Tooth **fz** (IPT)	.0035	.004(Conventional .028)
	Table Feed **vf** (IPM)	709(Conventional 624)	100(Conventional 39)
	Depth of Cut **ap** (inch)	.020	.008
	Width of Cut **ae** (inch)	–	4.331
Cutting Mode		Wet Cutting	Dry Cutting
Machine		Vertical MC (BT30)	Double Column Type MC
Results		Compared to the conventional cutting conditions, the surface roughness is maintained and the machining efficiency is improved by 15%.	Compared to conventional cemented carbide, machining efficiency is 2.5 times and cutting length is 2.7 times. In addition was the good results for the surface finish.

The above application examples are customer's applications, so it can be different from the recommended conditions.

High Feed Finish Milling Cutter for Aluminum Alloys and Cast Irons

Cutter Body		**FMAXR10018D**	**FMAXR08014C**
Insert (Grade)		**GOER1408PXFR2 (MD2030)**	**GOER1408PXFR2 (MD2030)**
Workpiece		Aluminum Alloy 	Aluminum Alloy 
Cutting Conditions	Cutting Speed **vc** (SFM)	8245	6600
	Revolution **n** (min^{-1})	8000	8000
	Feed per Tooth **fz** (IPT)	.008	.005
	Table Feed **vf** (IPM)	1134	591
	Depth of Cut **ap** (inch)	.059	.098
	Width of Cut **ae** (inch)	1.969	.787
Cutting Mode		Wet Cutting	Wet Cutting
Machine		Horizontal MC	Horizontal MC
Results		Increased efficiency with a table feed increase 2.6X, FMAX achieved good surface finishes and increased machining stability.	Increased efficiency with a table feed increase 2.2X, FMAX achieved good surface finishes and increased machining stability.

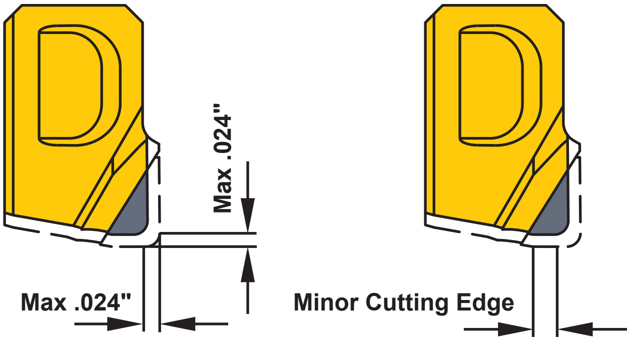
Cutter Body		**FMAX-050A08R**
Insert (Grade)		**GOER1401ZXFR2 (MD220)**
Workpiece		AISI 383.0 
Cutting Conditions	Cutting Speed **vc** (SFM)	3605
	Revolution **n** (min^{-1})	7000
	Feed per Tooth **fz** (IPT)	.002
	Table Feed **vf** (IPM)	138
	Depth of Cut **ap** (inch)	.012
	Width of Cut **ae** (inch)	.787 – 1.181
Cutting Mode		Wet Cutting
Machine		Vertical MC (BT30)
Results		 Burr prevention inserts can ensure smooth finished surfaces and can maintain their effective burr prevention capabilities over long periods of use. As a result, they can achieve tool life which is over triple longer than conventional product.

The above application examples are customer's applications, so it can be different from the recommended conditions.

Re-grinding of a PCD Insert

The maximum material to be re-grinding is .024 inch.
Use similar inserts after re-grinding to maintain balance.
Problems may occur if the cutter isn't balanced correctly.
After re-grinding the minor edge will reduce in size and may affect surface finishes.
Check the diameter offset after fitting re-grinding inserts.

* Please contact us regarding optimum re-grinding conditions.



High Feed Finish Milling Cutter for Aluminum Alloys and Cast Irons

FMAX

For Machining Titanium Alloys

ASPX

New Products

Vibration Control Provides High Efficiency

MITSUBISHI MATERIALS CORPORATION

YouTube

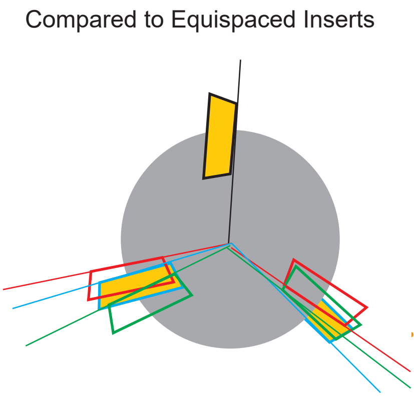
For Machining Titanium Alloys

ASPX

Vibration Control Features + Low Cutting Resistance Equals Extremely Stable, High-Efficiency Cutting

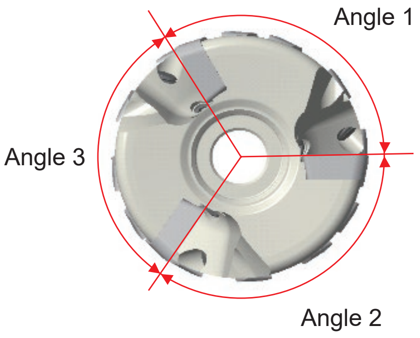
Suppression of Regenerative Chatter

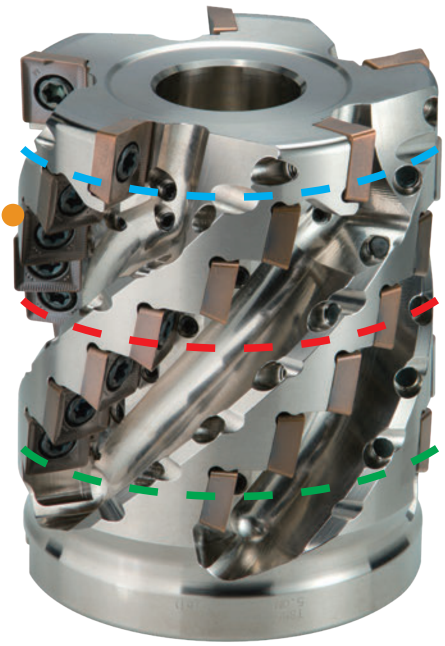
ASPX leads the latest machining theory by adopting irregular flutes and optimally placed inserts to drastically reduce vibration.



Compared to Equispaced Inserts

Concept of Irregular Flutes



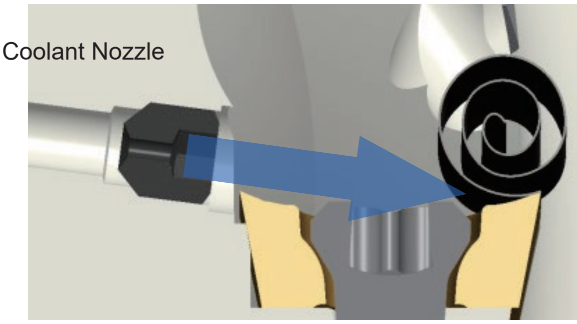


ASPX

Conventional Chatter Mark

Improved Chip Discharge

Coolant applied at the rake angle of the cutting edge enables highly efficient chip discharge.



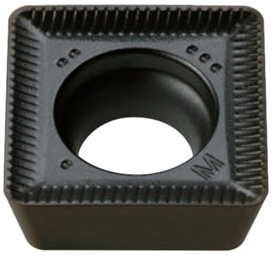
Coolant Discharge Position

Ideal chip shapes.

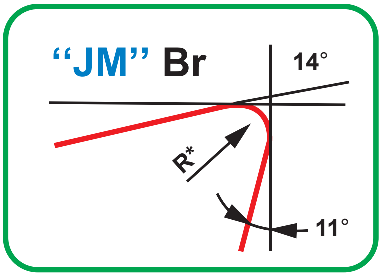
Reduced Cutting Resistance

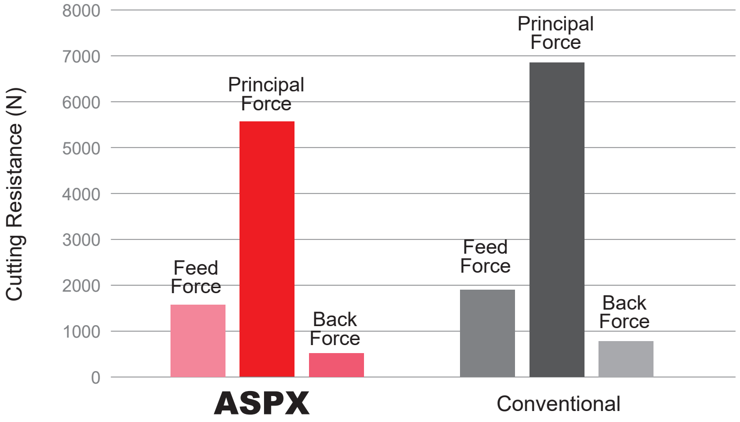
A large rake angle and honing (edge preparation ideal for titanium machining) enhance the low cutting resistance and high fracture resistance.

Bottom Edge Insert



Peripheral Edge Insert



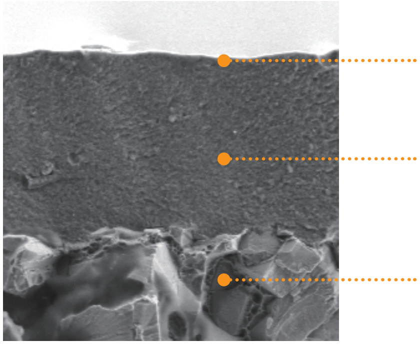


<Cutting Conditions>
Workpiece Material : Ti-6Al-4V
Cutter Dia. : DC=3.000"
Cutting Speed : vc=195 SFM
Feed per Tooth : fz=.006 IPT
Depth of Cut : ap=1.181"
Width of Cut : ae=.917"
Cutting Mode : Single Flute

PVD Coated Grade for Difficult-to-Cut Materials

MP9140

Combination of a cemented carbide material with outstanding fracture resistance plus a smooth coating for excellent welding resistance yields stable processing and long tool life.



Smooth surface provides excellent welding resistance.

The high Al-rich AlTiN coating succeeds in dramatically improving wear and heat resistance.

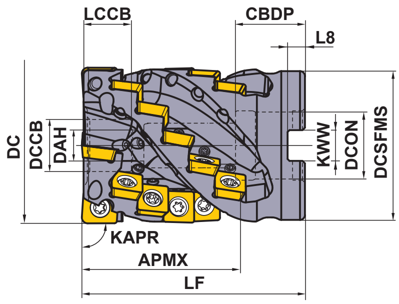
Special cemented carbide substrate with improved fracture resistance.

DEEP SHOULDER MILLING

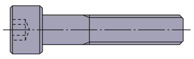
<CUTTING FOR TITANIUM ALLOY>

ASPX NEW

P M K N **S** H



Right hand tool holder only.

Cutter Diameter DC	Set Bolt	Geometry
ϕ2.000	HSCUF37523	
ϕ2.500	HSCUF50028	
ϕ3.000	HSCUF62535	

■Shell Type

KAPR: 90°

With Coolant Hole : Shell type should be combined with a through coolant arbor.

(inch)

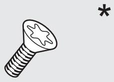
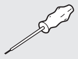
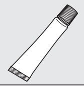
DC	Order Number	Stock	Number of Flutes	Total	LF	DCON	WT	APMX
		R					(lbs)	
2.000	**ASPX4UR2.0003AA21A15**	●	3	15	3.000	.750	1.1	2.126
2.500	**ASPX4UR2.5004CA25A24**	●	4	24	3.500	1.000	2.2	2.520
3.000	**ASPX4UR3.0005DA29A35**	●	5	35	4.250	1.250	4.4	2.953

Mounting Dimensions

(inch)

DC	Order Number	DCON	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8
2.000	**ASPX4UR2.0003AA21A15**	.750	.748	.395	.716	.677	1.750	.313	.187
2.500	**ASPX4UR2.5004CA25A24**	1.000	.945	.520	.850	.709	2.375	.375	.219
3.000	**ASPX4UR3.0005DA29A35**	1.250	1.260	.645	1.063	.750	2.875	.500	.281

Spare Parts

Tool Holder Type	 *						Number of Insert	
	Clamp Screw	Seal Washer	Wrench	Coolant Nozzle	Number	Anti-seize Lubricant	JPGX	SPGX
ASPX4UR2.000	TS55	WU375-S1	TKY25D	HSD04004H08	18	MK1KS	3	12
ASPX4UR2.500	TS55	WU500-S1	TKY25D	HSD04004H08	28	MK1KS	4	20
ASPX4UR3.000	TS55	WU625-S1	TKY25D	HSD04004H08	40	MK1KS	5	30

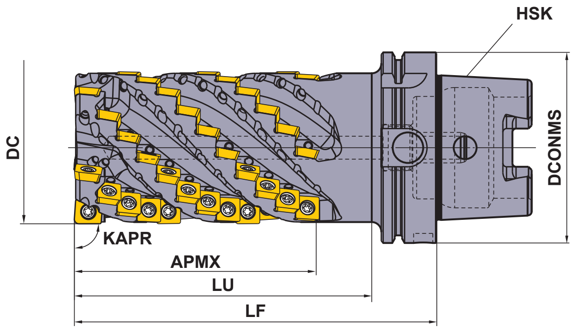
* Clamp Torque (lbf-in) : TS55 = 44.25

	≤140 PSI (≤5.3 gal/min.)	←Standard→	≥720 PSI (≥7.9 gal/min.)	≥1000 PSI (≥13.2 gal/min.)	To Plug a Coolant Hole
Nozzle Dia.	ø.024"	ø.031"	ø.047"	ø.063"	–
Order Number	**HSD04004H06**	**HSD04004H08**	**HSD04004H12**	**HSD04004H16**	**HSS04004**

Note 1) Coolant nozzles are available with varying diameters for adjusting coolant pressure.
Select the correct nozzle according to the specification.

Note 2) Use HSS04004 (JIS B 1177 flat point M4x4, clamp torque 13.28 lbf-in) to plug the coolant hole.

● : USA Stock



The standard type is right-handed (R) only.
The HSK shank type has a built-in movable coolant pipe for installation.

■HSK Shank Type

KAPR: 90°
With Coolant Hole

(inch)

DC	Order Number	Stock	Number of Flutes	Total	LF	LU	DCONMS	HSK	APMX
		R							
3.000	**ASPX4UR485H100A050SA**	●	5	60	7.480	6.142	3.937	HSK-A100	5.000
3.000	**ASPX4UR485H125A050SA**	●	5	60	7.480	6.142	4.921	HSK-A125	5.000

Spare Parts

Tool Holder Type	*					Number of Insert	
	Clamp Screw	Wrench	Coolant Nozzle	Number	Anti-seize Lubricant	JPGX	SPGX
ASPX4UR485H100A	TS55	TKY25D	HSD04004H08	65	MK1KS	5	55
ASPX4UR485H125A	TS55	TKY25D	HSD04004H08	65	MK1KS	5	55

* Clamp Torque (lbf-in) : TS55 = 44.25

Cutting Example

Titanium Alloy Ti-6Al-4V : Ultra High-Efficiency Machining Example

Compared to a conventional tool productivity has been improved by 130% and the tool life has been doubled.

Conventional

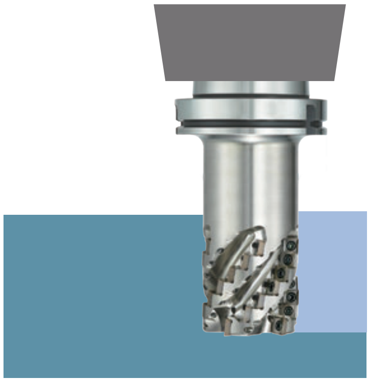
M.R.R. 13.31 in^3/min
Cutting time 50 min / workpiece

Cutting Speed : vc=180 SFM
Feed per Tooth : fz=.005 IPT
Depth of Cut : ap=2.362 inch
Width of Cut : ae=.984 inch

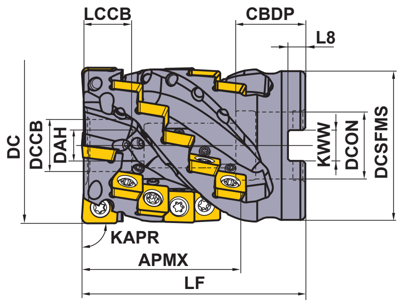
Tool : Integrated Type HSK-A100

M.R.R. 18.13 in^3/min
Cutting time 35 min / workpiece

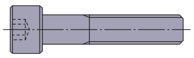
Cutting Speed : vc=245 SFM
Feed per Tooth : fz=.005 IPT
Depth of Cut : ap=2.362 inch
Width of Cut : ae=.984 inch



For Machining Titanium Alloys



Right hand tool holder only.

Cutter Diameter DC	Set Bolt	Geometry
ϕ50	HSC10070	
ϕ63	HSC12070	
ϕ80	HSC16080	

Metric Standard

■Shell Type

KAPR: 90°
With Coolant Hole : Shell type should be combined with a through coolant arbor.

(mm)

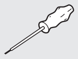
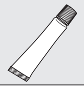
DC	Order Number	Stock	Number of Flutes	Total	LF	DCON	WT (kg)	APMX
		R						
50	**ASPX4-050A03A054RA15**	★	3	15	85	22	0.6	54
63	**ASPX4-063A04A064RA24**	★	4	24	90	27	1.0	64
80	**ASPX4-080A05A075RA35**	★	5	35	100	32	2.0	75

Mounting Dimensions

(mm)

DC	Order Number	DCON	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8
50	**ASPX4-050A03A054RA15**	22	21	10.5	17	14	47	10.4	6.3
63	**ASPX4-063A04A064RA24**	27	28	12.5	21	19	60	12.4	7
80	**ASPX4-080A05A075RA35**	32	28	16.5	27	20	76	14.4	8

Spare Parts

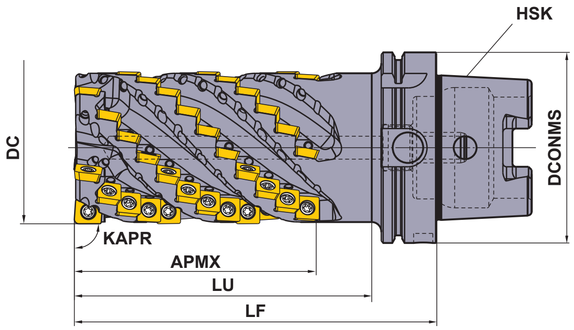
Tool Holder Type	 *						Number of Insert	
	Clamp Screw	Seal Washer	Wrench	Coolant Nozzle	Number	Anti-seize Lubricant	JPGX	SPGX
ASPX4-050A	TS55	W10-S1	TKY25D	HSD04004H08	18	MK1KS	3	12
ASPX4-063A	TS55	W12-S1	TKY25D	HSD04004H08	28	MK1KS	4	20
ASPX4-080A	TS55	W16-S1	TKY25D	HSD04004H08	40	MK1KS	5	30

* Clamp Torque (N • m) : TS55 = 5.0

	≤1Mpa (≤20 l/min.)	←Standard→	**≥5Mpa (≥30 l/min.)**	**≥7Mpa (≥50 l/min.)**	To Plug a Coolant Hole
Nozzle Dia.	ø0.6mm	ø0.8mm	ø1.2mm	ø1.6mm	—
Order Number	**HSD04004H06**	**HSD04004H08**	**HSD04004H12**	**HSD04004H16**	**HSS04004**

Note 1) Coolant nozzles are available with varying diameters for adjusting coolant pressure.
Select the correct nozzle according to the specification.
Note 2) Use HSS04004 (JIS B 1177 flat point M4x4, clamp torque 1.5 Nm) to plug the coolant hole.

★ : Stocked in Japan



The standard type is right-handed (R) only.
The HSK shank type has a built-in movable coolant pipe for installation.

Metric Standard

■HSK Shank Type

KAPR: 90°
With Coolant Hole

(mm)

DC	Order Number	Stock	Number of Flutes	Total	LF	LU	DCONMS	HSK	APMX
		R							
80	**ASPX4R0805H100A127SA**	★	5	60	190	156	100	HSK-A100	127
80	**ASPX4R0805H125A127SA**	★	5	60	190	156	125	HSK-A125	127

Spare Parts

Tool Holder Type	*					Number of Insert	
	Clamp Screw	Wrench	Coolant Nozzle	Number	Anti-seize Lubricant	JPGX	SPGX
ASPX4R0805H100A	TS55	TKY25D	HSD04004H08	65	MK1KS	5	55
ASPX4R0805H125A	TS55	TKY25D	HSD04004H08	65	MK1KS	5	55

* Clamp Torque (N • m) : TS55 = 5.0

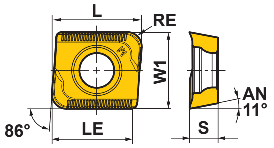
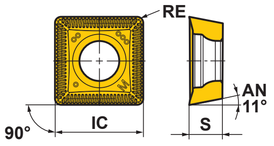
For Machining Titanium Alloys

Inserts

(inch)

Workpiece Material	S	Heat-resistant Alloy, Titanium Alloy	◐			

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✤ : Unstable Cutting
Edge Preparation :
E : Round

Shape		Order Number	Class	Edge Preparation	Coated **MP9140**				L	LE	W1	IC	S	RE	Geometry
Bottom	 2 Corner	**JPGX1404080PPER-JM**	G	E	●				.595	.528	.500	—	.189	.031	
		JPGX1404120PPER-JM	G	E	●				.593	.524	.500	—	.189	.047	
		JPGX1404160PPER-JM	G	E	●				.591	.524	.500	—	.189	.063	
		JPGX1404240PPER-JM	G	E	●				.586	.520	.500	—	.189	.094	
		JPGX1404320PPER-JM	G	E	●				.580	.516	.500	—	.189	.126	
		JPGX1404400PPER-JM	G	E	●				.576	.512	.500	—	.189	.157	
		JPGX1404500PPER-JM	G	E	●				.570	.512	.500	—	.189	.197	
		JPGX1404635PPER-JM	G	E	●				.563	.508	.500	—	.189	.250	
Peripheral	 4 Corner	**SPGX1204100PPER-JM**	G	E	●				—	—	—	.500	.189	.039	

Recommended Cutting Conditions

(inch)

	Workpiece Material	Cutting Width **ae**	Cutting Speed **vc** (SFM)	Feed per Tooth **fz** (IPT)
S	Ti Alloys Ti-6Al-4V,Ti-6Al-4V-ELI Ti-10V-2Fe-3Al Ti-5Al-5V-5Mo-3Cr etc.	ae≦0.5DC	195(165−260)	.005(.004−.006)
		0.5DC<ae<0.8DC	165(130−195)	.004(.003−.005)
		ae≧0.8DC	130(165−195)	.003(.002−.004)

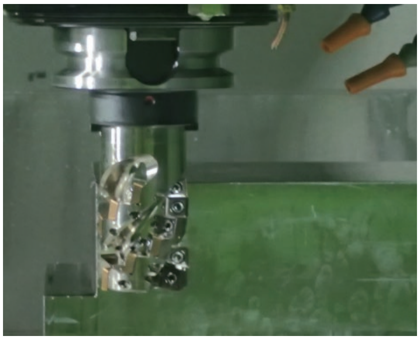
Note 1) The cutting performance depends on machine and clamping rigidity, as well as the supply and pressure of the coolant. Adjust as necessary.
Note 2) Use a machine and spindle size suitable for heavy machining of titanium alloys. (7/24 taper #50 or #60, or high-rigidity HSK-A100 or A125, with an output of 20.1 HP/bhp or higher and torque of 4425 lbf-in or higher for a rotation speed of 500min-1 or less).
Note 3) If chatter and vibration or machine overloading occur, it is recommended to reduce the depth of cut ap.
Note 4) The coolant system combines internal and external lubrication, it is recommended to supply coolant in ample quantities.
Note 5) A gradual roll feed into the workpiece and use of down cutting (climb milling) is recommended. (refer to page 657)

● : USA Stock
(10 inserts in one case)

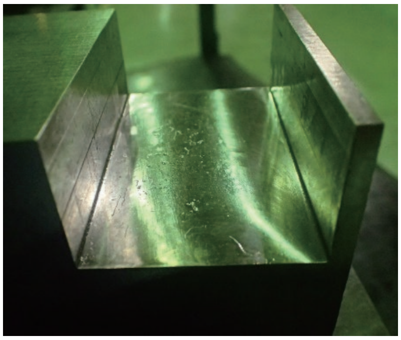
Cutting Performance

High-Efficiency Machining of Ti-6Al-4V

Machined surfaces free of chatter can be realized negating issues with the finish machining process.



<Cutting Conditions for Shoulder Milling>
Workpiece Material : Ti-6Al-4V
Cutter Dia. : DC=2.000"
Cutting Speed : vc=131 SFM
Feed per Tooth : 005 IPT
Depth of Cut : ap=2.126"
Width of Cut : ae=.591"
M.R.R. : **4.825 in³/min**
Cutting Mode : Wet Cutting

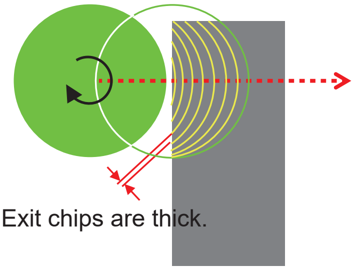
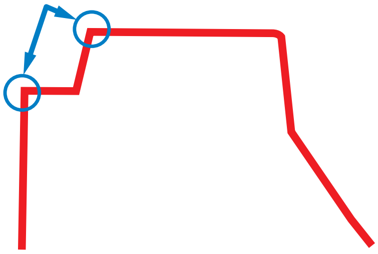
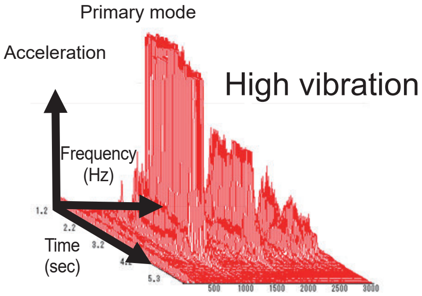
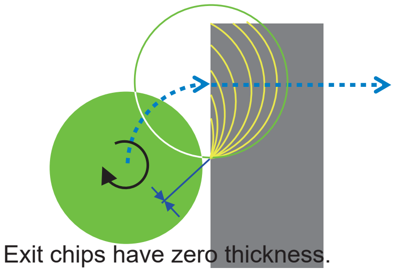
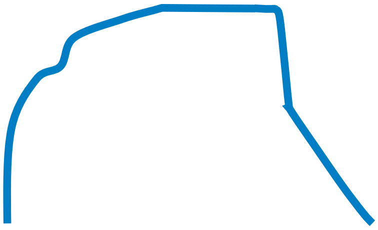
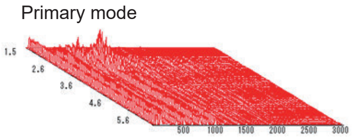


<Cutting Conditions for Grooving>
Workpiece Material : Ti-6Al-4V
Cutter Dia. : DC=2.000"
Cutting Speed : vc=131 SFM
Feed per Tooth : 003 IPT
Depth of Cut : ap=1.181"
Width of Cut : ae=2.000"
M.R.R. : **5.503 in³/min**
Cutting Mode : Wet Cutting

How to Use

Positive Effects of a Roll Feed Into Cutting Approach

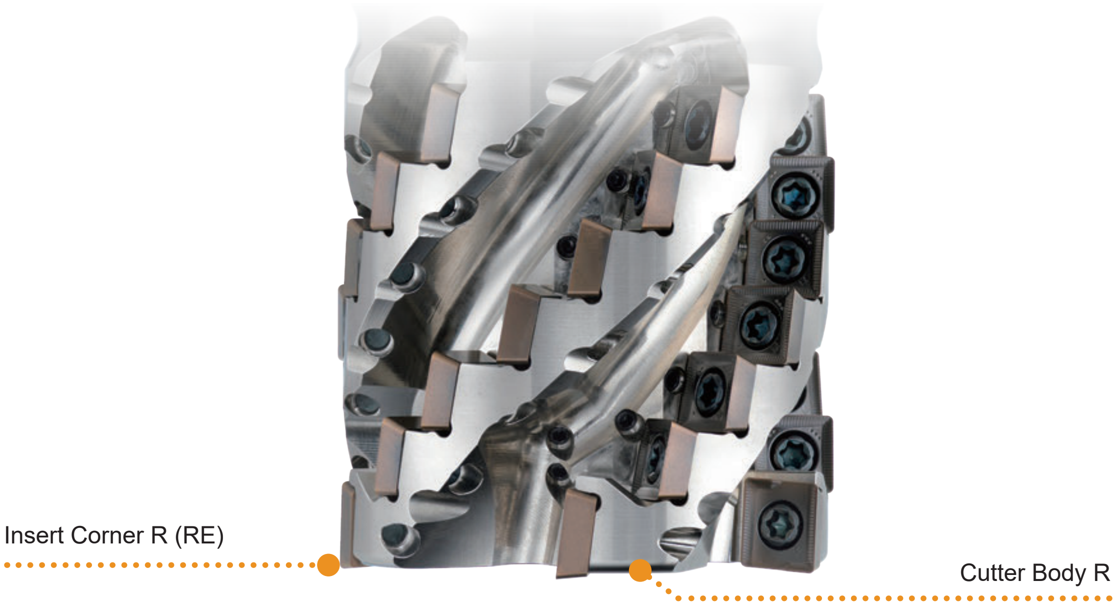
The roll into cutting approach can control sharp increases in cutting loads and prevent sudden chipping of inserts which is likely to occur at the start of machining.

Approach Method	Cutting Load Simulation	Image of Cutting Vibration Frequency
Direct Approach  Exit chips are thick.	Cutting load increases suddenly. High risk of chipping. 	
Roll Into Cutting Approach  Exit chips have zero thickness.	Cutting load increases smoothly. 	Almost no vibration 

Down cutting (climb milling) is recommended.

Note regarding Use of Inserts with Large Corner Radii

When using inserts with corner radius RE≥R.126, please machine the cutter body with a radius form as shown on the table below.



Insert Corner R **RE**	Cutter Body Radius **R**
.126	.118
.157	.157
.197	.197
.250	.244

DIAEDGE

TOOL NEWS

2021.4 Update
B223A

Solid Carbide Drills for Centering and Chamfering

Leading Drill Series DLE

Item addition

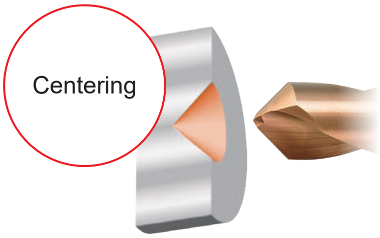
Excellent Sharpness and Fracture Resistance Provides Stable Cutting and Burr Prevention

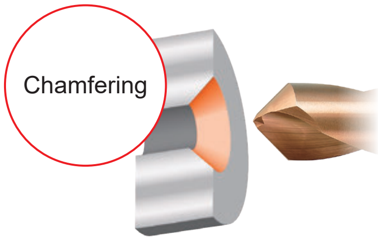
MITSUBISHI MATERIALS CORPORATION

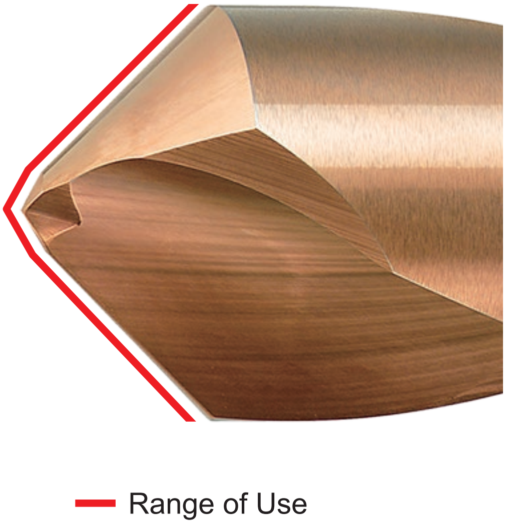
Solid Carbide Drills for Centering and Chamfering

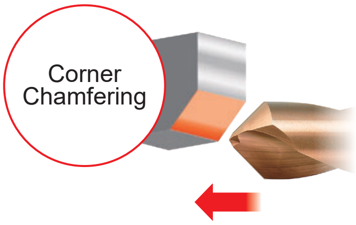
Leading Drill Series DLE

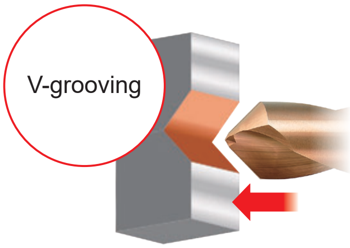
Completes strict standards for centering and chamfering.



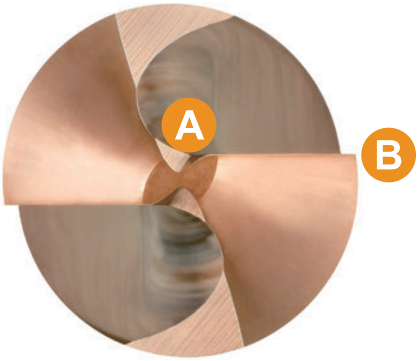




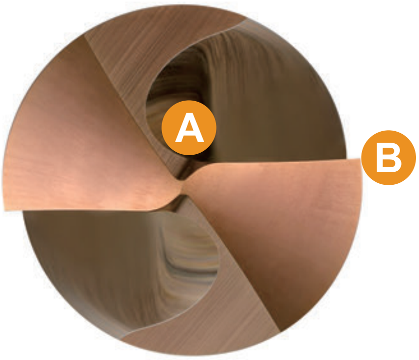




Features



Point Angles SIG 60° 90°



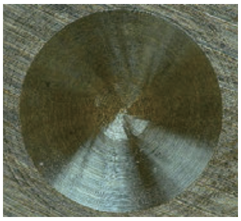
Point Angles SIG 120° 145°

A Thinning Geometry

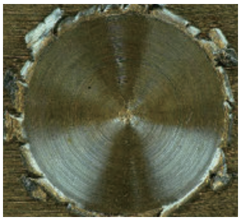
The thinning pocket promotes smooth chip evacuation and provides excellent hole position accuracy. Additionally, the negative cutting edge of the drill point offers high cutting edge strength.

B Sharp Cutting Edge and High Fracture Resistance

Sharp cutting edge and high fracture resistance provides stable cutting and burr prevention.



DLE



Conventional

Two-step Point Angles 60°, 90°

Two-step point angles ensure strength at the center and prevent sudden fracturing.

*The central area will not have a 60°, 90° bottom hole angle.

DLE

High Strength of Center

Conventional

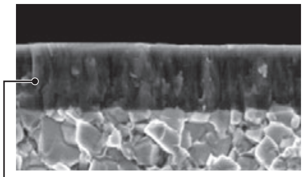
Fractures of Center

One-step Point Angles 120°, 145°

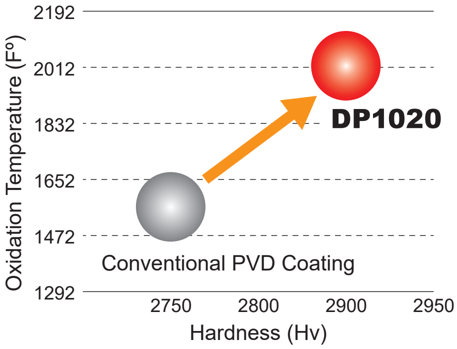
One-step point angles help high-speed steel or carbide drills to bite from the center in next processes.

Coated Grade **DP1020**

DP1020 grade offers excellent wear resistance and reduced friction for longer tool life and a versatile range of applications.



With Accumulated Al-Ti-Cr-N Based PVD Coating



Extensive Support for CNC Automatic Lathes

Diverse lineup of shanks compatible with ER collets.

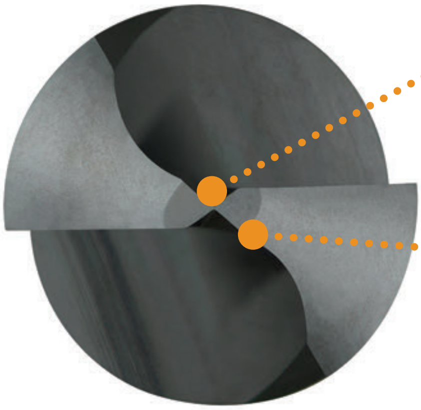
DCON(Connection Diameter)	.197 inch=ER8
DCON	.276 inch=ER11

Solid Carbide Drills for Centering and Chamfering

Leading Drill Series

DLE

SIG 90° Mini Size ø.0394"–ø.0984"



Thinning Geometry

Chip evacuation space in center part improves the bite performance, and ensure for good finished hole position accuracy.

Two-step Point Angles

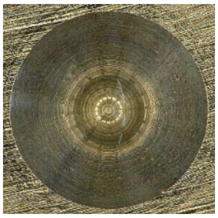
Two-step point angles ensure strength at the center and prevent sudden fracturing.

*The central area will not have a 90° hole bottom.

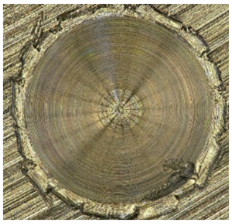
Unique Cutting Edge Shape

Large rake angle and sharp cutting edges can minimize the generation of burrs.

AISI 304
Cutting Example



DLE



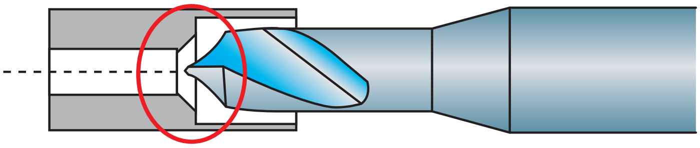
Conventional

New Grade "**DP102A**" Excellent Lubricity and Heat Resistance

The PVD-coated carbide grade DP102A has excellent lubricity and heat resistance, and exhibit outstanding wear resistance particularly under low-speed to medium-speed cutting speed.

Long-neck Design

Long neck length allows to use the chamfering even deep inside holes.



Memo

Solid Carbide Drills for Centering and Chamfering

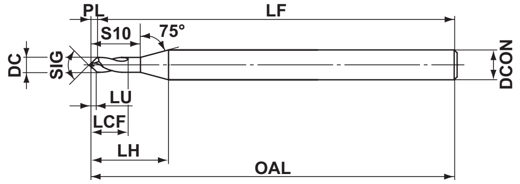
DLE

Leading Drill Series

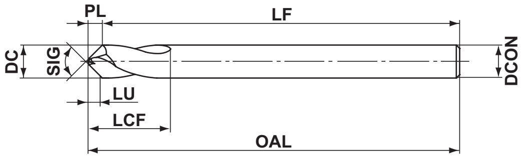
UWC DP1 DP1A 60° 90°

P **M** **K** N S H

External Coolant



Type1



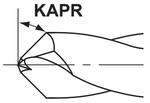
Type2

(mm)

	DCON=3	3 < DCON≦6	6<DCON≦10	10<DCON≦16
h7	0 −0.010	0 −0.012	0 −0.015	0 −0.018

(inch)

	DCON=.1181	.1181 < DCON≦.2362	.2362 < DCON≦.3937	.3937 < DCON≦.6299
h7	0 −.0004	0 −.0005	0 −.0006	0 −.0007



	DC		SIG	Stock		Order Number	LU		LCF		LH	
				DP1020	DP102A							
	(mm)	(inch)					(mm)	(inch)	(mm)	(inch)	(mm)	(inch)
NEW	3.0	.1181	60°	●		**DLE0300S030P060**	2.0	.079	9	.354	—	—
NEW	4.0	.1575	60°	●		**DLE0400S040P060**	2.7	.106	12	.472	—	—
NEW	5.0	.1969	60°	●		**DLE0500S050P060**	3.4	.134	14	.551	—	—
NEW	6.0	.2362	60°	●		**DLE0600S060P060**	4.0	.157	15	.591	—	—
NEW	7.0	.2756	60°	●		**DLE0700S070P060**	4.7	.185	18	.709	—	—
NEW	8.0	.3150	60°	●		**DLE0800S080P060**	5.4	.213	20	.787	—	—
NEW	10.0	.3937	60°	●		**DLE1000S100P060**	6.8	.268	24	.945	—	—
NEW	12.0	.4724	60°	●		**DLE1200S120P060**	8.1	.319	28	1.102		—
NEW	1.0	.0394	90°		●	**DLE0100S030P090**	0.35	.014	2	.079	6.7	.264
NEW	1.5	.0591	90°		●	**DLE0150S030P090**	0.55	.022	3	.118	7.3	.287
NEW	2.0	.0787	90°		●	**DLE0200S030P090**	0.80	.031	4	.157	7.9	.311
NEW	2.5	.0984	90°		●	**DLE0250S030P090**	1.00	.039	5	.197	7.9	.311
	3.0	.1181	90°	●		**DLE0300S030P090**	1.2	.047	9	.354	—	—
	4.0	.1575	90°	●		**DLE0400S040P090**	1.6	.063	12	.472	—	—
	5.0	.1969	90°	●		**DLE0500S050P090**	2.0	.079	14	.551	—	—
	6.0	.2362	90°	●		**DLE0600S060P090**	2.4	.094	15	.591	—	—
	7.0	.2756	90°	●		**DLE0700S070P090**	2.8	.110	18	.709	—	—
	8.0	.3150	90°	●		**DLE0800S080P090**	3.2	.126	20	.787	—	—
	10.0	.3937	90°	●		**DLE1000S100P090**	4.1	.161	24	.945	—	—
	12.0	.4724	90°	●		**DLE1200S120P090**	4.9	.193	28	1.102	—	—
	16.0	.6299	90°	●		**DLE1600S160P090**	6.6	.260	35	1.378	—	—

Note 1) In the region of roughly **DC**/4, which is the region of the two-step point angles, the central area will not have a 60°, 90° bottom hole angle. Chamfering will also not be possible in this region.

Note 2) The centering diameter should be less than the drill diameter (processing diameter) **DC** and the usable length **LU** should be referred to as a guideline.

● : USA Stock

S10		OAL		LF		PL		KAPR	DCON		Fig.
(mm)	(inch)	(mm)	(inch)	(mm)	(inch)	(mm)	(inch)		(mm)	(inch)	
—	—	45	1.772	42.9	1.689	2.1	.083	60°	3	.118	2
—	—	50	1.969	47.2	1.858	2.8	.110	60°	4	.157	2
—	—	60	2.362	56.5	2.224	3.5	.138	60°	5	.197	2
—	—	66	2.598	61.8	2.433	4.2	.165	60°	6	.236	2
—	—	74	2.913	69.1	2.720	4.9	.193	60°	7	.276	2
—	—	74	2.913	68.4	2.693	5.6	.220	60°	8	.315	2
—	—	84	3.307	77	3.031	7.0	.276	60°	10	.394	2
—	—	95	3.740	86.6	3.409	8.4	.331	60°	12	.472	2
3.0	.118	45	1.772	44.6	1.756	0.4	.016	45°	3	.118	1
4.5	.177	45	1.772	44.4	1.748	0.6	.024	45°	3	.118	1
6.1	.240	45	1.772	44.1	1.736	0.9	.035	45°	3	.118	1
7.1	.280	45	1.772	43.9	1.728	1.1	.043	45°	3	.118	1
—	—	45	1.772	43.7	1.720	1.3	.051	45°	3	.118	2
—	—	50	1.969	48.3	1.902	1.7	.067	45°	4	.157	2
—	—	60	2.362	57.9	2.280	2.1	.083	45°	5	.197	2
—	—	66	2.598	63.4	2.496	2.6	.102	45°	6	.236	2
—	—	74	2.913	71.0	2.795	3.0	.118	45°	7	.276	2
—	—	74	2.913	70.6	2.780	3.4	.134	45°	8	.315	2
—	—	84	3.307	79.7	3.138	4.3	.169	45°	10	.394	2
—	—	95	3.740	89.9	3.539	5.1	.201	45°	12	.472	2
—	—	113	4.449	106.2	4.181	6.8	.268	45°	16	.630	2

● = NEW

DC = Cutting Diameter
LU = Usable Length
LCF = Length Chip Flute
LH = Neck Length
OAL = Overall Length
LF = Functional Length
PL = Point Length
DCON = Connection Diameter
SIG = Point Angle

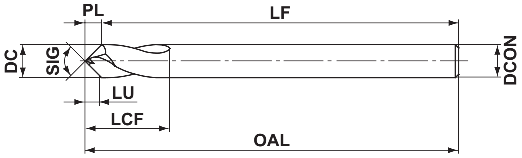
Solid Carbide Drills for Centering and Chamfering

DLE NEW

Leading Drill Series

P M K N S H

External Coolant

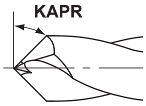


(mm)

	DCON=3	3 < DCON≤6	6<DCON≤10	10<DCON≤16
h7	0 −0.010	0 −0.012	0 −0.015	0 −0.018

(inch)

	DCON=.1181	.1181 < DCON≤.2362	.2362 < DCON≤.3937	.3937 < DCON≤.6299
h7	0 −.0004	0 −.0005	0 −.0006	0 −.0007



DC		SIG	DP1020	Order Number	LU		LCF		OAL		LF		PL		KAPR	DCON	
(mm)	(inch)				(mm)	(inch)	(mm)	(inch)	(mm)	(inch)	(mm)	(inch)	(mm)	(inch)		(mm)	(inch)
3.0	.1181	120°	●	**DLE0300S030P120**	0.8	.031	9	.354	45	1.772	44.1	1.736	0.9	.035	30°	3	.118
4.0	.1575	120°	●	**DLE0400S040P120**	1.1	.043	12	.472	50	1.969	48.8	1.921	1.2	.047	30°	4	.157
5.0	.1969	120°	●	**DLE0500S050P120**	1.3	.051	14	.551	60	2.362	58.6	2.307	1.4	.055	30°	5	.197
6.0	.2362	120°	●	**DLE0600S060P120**	1.6	.063	15	.591	66	2.598	64.3	2.531	1.7	.067	30°	6	.236
7.0	.2756	120°	●	**DLE0700S070P120**	1.9	.075	18	.709	74	2.913	72.0	2.835	2.0	.079	30°	7	.276
8.0	.3150	120°	●	**DLE0800S080P120**	2.2	.087	20	.787	74	2.913	71.7	2.823	2.3	.091	30°	8	.315
10.0	.3937	120°	●	**DLE1000S100P120**	2.8	.110	24	.945	84	3.307	81.1	3.193	2.9	.114	30°	10	.394
12.0	.4724	120°	●	**DLE1200S120P120**	3.3	.130	28	1.102	95	3.740	91.5	3.602	3.5	.138	30°	12	.472
3.0	.1181	145°	●	**DLE0300S030P145**	0.4	.016	9	.354	45	1.772	44.5	1.752	0.5	.020	17.5°	3	.118
4.0	.1575	145°	●	**DLE0400S040P145**	0.5	.020	12	.472	50	1.969	49.4	1.945	0.6	.024	17.5°	4	.157
5.0	.1969	145°	●	**DLE0500S050P145**	0.7	.028	14	.551	60	2.362	59.2	2.331	0.8	.031	17.5°	5	.197
6.0	.2362	145°	●	**DLE0600S060P145**	0.8	.031	15	.591	66	2.598	65.1	2.563	0.9	.035	17.5°	6	.236
7.0	.2756	145°	●	**DLE0700S070P145**	1.0	.039	18	.709	74	2.913	72.9	2.870	1.1	.043	17.5°	7	.276
8.0	.3150	145°	●	**DLE0800S080P145**	1.1	.043	20	.787	74	2.913	72.7	2.862	1.3	.051	17.5°	8	.315
10.0	.3937	145°	●	**DLE1000S100P145**	1.4	.055	24	.945	84	3.307	82.4	3.244	1.6	.063	17.5°	10	.394
12.0	.4724	145°	●	**DLE1200S120P145**	1.7	.067	28	1.102	95	3.740	93.1	3.665	1.9	.075	17.5°	12	.472

Note 1) The centering diameter should be less than the drill diameter (processing diameter) **DC** and the usable length **LU** should be referred to as a guideline.

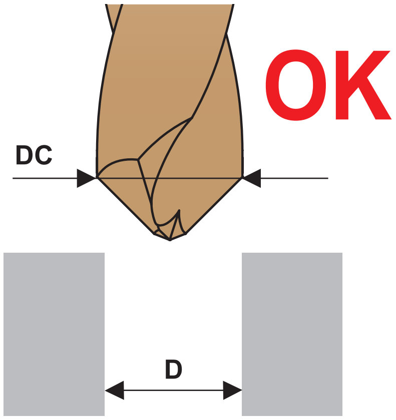
DC = Cutting Diameter
LU = Usable Length
LCF = Length Chip Flute
OAL = Overall Length
LF = Functional Length
PL = Point Length
DCON = Connection Diameter
SIG = Point Angle

● : USA Stock

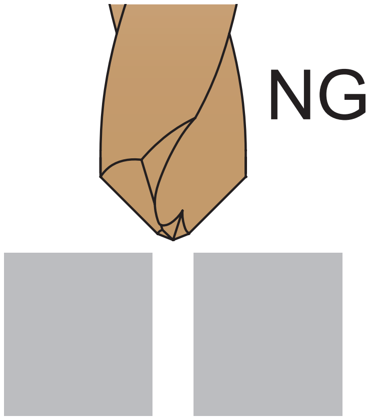
Drill Diameter Selection

When Chamfering

With respect to guide hole diameter **D**, select the drill diameter (cutting diameter) **DC** to be within the range of **D** < **DC** < 2**D**.

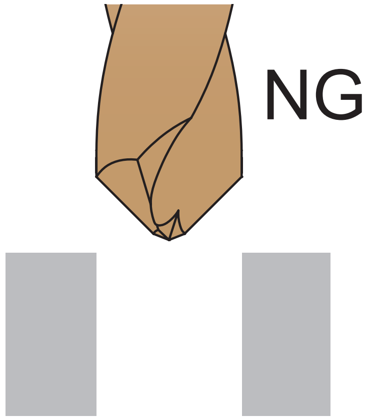


Example) If guide hole diameter **D** is .197": Drill diameter **DC** should be equal to or greater than .236" but less than .394". Select a **DC** of .236", .276", or .315".



If DC is equal to or greater than 2D:

If drill diameter **DC** is too large compared to guide hole diameter **D** (equal to or greater than 2**D**), chamfering cannot be performed.



If DC is a drill diameter equal to D:

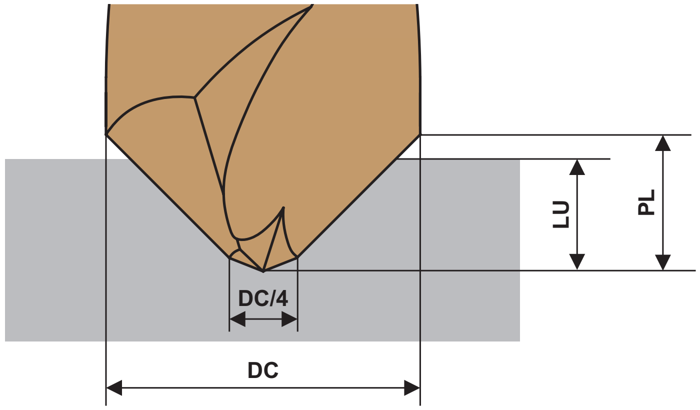
Chamfering cannot be performed if drill diameter **DC** is the same as guide hole diameter **D**.

When Centering

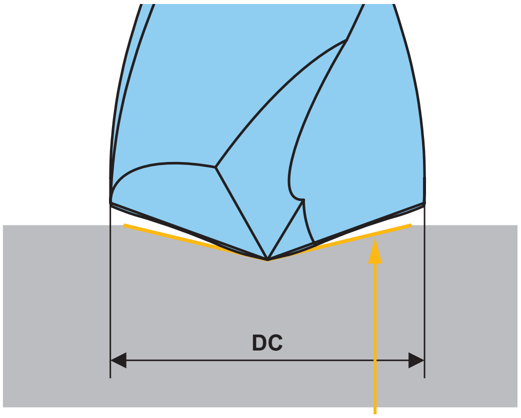
The centering diameter should be less than the drill diameter (processing diameter) **DC** and the usable length **LU** should be referred to as a guideline.

The central area of holes (approx 25% of the full diameter) formed by two step point angles will not have their respective 60º and 90º angles. Chamfering is also not possible in the center areas.

Select a centering drill with a larger point angle than the final hole drill if is desired to make initial contact with the center.



Next Process Drill

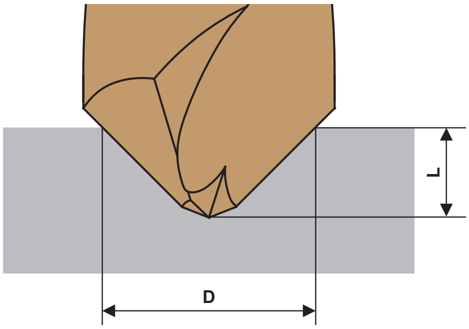


Centering of Point Angle SIG145°

Solid Carbide Drills for Centering and Chamfering

DLE

Drilling Depth (L) Chart by Tool Diameter



(inch)

DC		SIG 90°			
		Min.		Max.	
(mm)	(inch)	D	L	D	L
1.0	**.0394**	.020	.007	.031	.013
1.5	**.0591**	.031	.011	.051	.021
2.0	**.0787**	.039	.014	.075	.031
2.5	**.0984**	.051	.019	.094	.039
3.0	**.1181**	.059	.020	.110	.047
4.0	**.1575**	.079	.028	.150	.063
5.0	**.1969**	.098	.035	.185	.079
6.0	**.2362**	.118	.043	.224	.094
7.0	**.2756**	.138	.047	.260	.110
8.0	**.3150**	.157	.055	.299	.126
10.0	**.3937**	.197	.071	.382	.161
12.0	**.4724**	.236	.083	.457	.193
16.0	**.6299**	.315	.110	.610	.260

DC		SIG 60°				SIG 120°				SIG 145°			
		Min.		Max.		Min.		Max.		Min.		Max.	
(mm)	(inch)	D	L	D	L	D	L	D	L	D	L	D	L
3.0	**.1181**	.059	.031	.114	.079	.059	.016	.110	.031	.059	.008	.098	.016
4.0	**.1575**	.079	.043	.154	.106	.079	.024	.150	.043	.079	.012	.126	.020
5.0	**.1969**	.098	.051	.193	.134	.098	.028	.177	.051	.098	.016	.173	.028
6.0	**.2362**	.118	.063	.228	.157	.118	.035	.217	.063	.118	.020	.201	.031
7.0	**.2756**	.138	.075	.268	.185	.138	.039	.260	.075	.138	.024	.248	.039
8.0	**.3150**	.157	.083	.307	.213	.157	.047	.299	.087	.157	.024	.276	.043
10.0	**.3937**	.197	.106	.386	.268	.197	.055	.382	.110	.197	.031	.350	.055
12.0	**.4724**	.236	.126	.457	.319	.236	.067	.449	.130	.236	.035	.425	.067

Point Angle SIG 60°

Recommended Cutting Conditions

(inch)

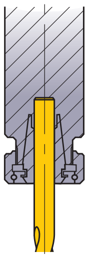
Workpiece Material		Mild Steels (≤180HB) AISI 1010 etc.		Carbon Steels, Alloy Steels (180−280HB) AISI 1045, 4140 etc.		Carbon Steels, Alloy Steels (280−350HB) AISI 4340 etc.	
DC		Cutting Speed (SFM)	Feed (Min.−Max.) (IPR)	Cutting Speed (SFM)	Feed (Min.−Max.) (IPR)	Cutting Speed (SFM)	Feed (Min.−Max.) (IPR)
(mm)	(inch)						
3	**.1181**	245	.0020 (.0012–.0028)	210	.0020 (.0012–.0028)	195	.0016 (.0008–.0024)
4	**.1575**	245	.0020 (.0012–.0028)	210	.0020 (.0012–.0028)	195	.0016 (.0008–.0024)
5	**.1969**	260	.0024 (.0016–.0031)	230	.0024 (.0016–.0031)	210	.0020 (.0012–.0028)
6	**.2362**	260	.0024 (.0016–.0031)	230	.0024 (.0016–.0031)	210	.0020 (.0012–.0028)
7	**.2756**	260	.0028 (.0016–.0035)	230	.0028 (.0016–.0035)	210	.0020 (.0012–.0028)
8	**.3150**	260	.0028 (.0016–.0035)	230	.0028 (.0016–.0035)	210	.0020 (.0012–.0028)
10	**.3937**	280	.0031 (.0016–.0039)	245	.0031 (.0016–.0039)	230	.0024 (.0012–.0031)
12	**.4724**	280	.0031 (.0016–.0039)	245	.0031 (.0016–.0039)	230	.0024 (.0012–.0031)

Workpiece Material		Austenitic Stainless Steels (≤200HB) AISI 304, 316 etc.		Gray Cast Irons (≤350MPa) AISI No45B etc.		Ductile Cast Irons (≤450MPa) AISI 60-40-18 etc.	
DC		Cutting Speed (SFM)	Feed (Min.−Max.) (IPR)	Cutting Speed (SFM)	Feed (Min.−Max.) (IPR)	Cutting Speed (SFM)	Feed (Min.−Max.) (IPR)
(mm)	(inch)						
3	**.1181**	50	.0012 (.0004–.0020)	245	.0020 (.0012–.0028)	180	.0020 (.0012–.0028)
4	**.1575**	50	.0012 (.0004–.0020)	245	.0020 (.0012–.0028)	180	.0020 (.0012–.0028)
5	**.1969**	65	.0016 (.0008–.0024)	260	.0024 (.0016–.0031)	195	.0024 (.0016–.0031)
6	**.2362**	65	.0016 (.0008–.0024)	260	.0024 (.0016–.0031)	195	.0024 (.0016–.0031)
7	**.2756**	65	.0016 (.0008–.0024)	260	.0028 (.0016–.0035)	195	.0024 (.0016–.0031)
8	**.3150**	65	.0016 (.0008–.0024)	260	.0028 (.0016–.0035)	195	.0024 (.0016–.0031)
10	**.3937**	65	.0016 (.0008–.0024)	280	.0031 (.0016–.0039)	195	.0028 (.0016–.0035)
12	**.4724**	65	.0016 (.0008–.0024)	280	.0031 (.0016–.0039)	195	.0028 (.0016–.0035)

Note 1) When chamfering a circumference of a guide hole, make sure that the tool diameter(**DC**) is **D** <**DC** <2**D**.
Note 2) When centering into curved or inclined surfaces, please reduce the feed rate.
Note 3) When V-grooving and chamfering, please reduce cutting conditions.
Note 4) When chatter vibration or abnormal noise is generated, please shorten the time of dwell program or lower the rotation speed.
Note 5) When centering, please do not exceed the **LU** (usable length).

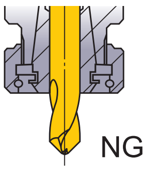
■ Operational Guidance

Drill Holding



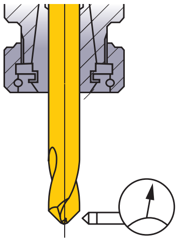
Collet chuck holds the drill securely.

Drill Installation



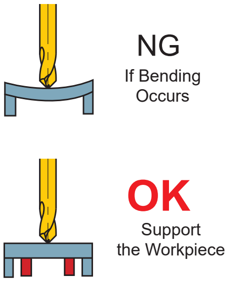
Do not clamp on the flutes.

Installation Tolerance

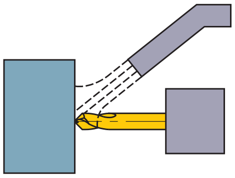


Run-out ≤ .001 inch

Thin Workpiece



Coolant Method



Coolant positions,at the end at the center are ideal.

Point Angle SIG 90°, 120° and 145°

Recommended Cutting Conditions

(inch)

Workpiece Material		Mild Steels (≤180HB) AISI 1010 etc.		Carbon Steels, Alloy Steels (180—280HB) AISI 1045, 4140 etc.		Carbon Steels, Alloy Steels (280—350HB) AISI 4340 etc.	
DC		Cutting Speed (SFM)	Feed (Min.—Max.) (IPR)	Cutting Speed (SFM)	Feed (Min.—Max.) (IPR)	Cutting Speed (SFM)	Feed (Min.—Max.) (IPR)
(mm)	(inch)						
1.0	**.0394**	100	.0008 (.0004—.0012)	65	.0008 (.0004—.0012)	15	.0008 (.0004—.0012)
1.5	**.0591**	150	.0008 (.0004—.0012)	115	.0008 (.0004—.0012)	30	.0008 (.0004—.0012)
2.0	**.0787**	195	.0016 (.0012—.0020)	165	.0016 (.0012—.0020)	45	.0016 (.0012—.0020)
2.5	**.0984**	245	.0016 (.0012—.0020)	210	.0016 (.0012—.0020)	195	.0016 (.0012—.0020)
3.0	**.1181**	245	.0024 (.0016—.0031)	210	.0024 (.0016—.0031)	195	.0020 (.0012—.0028)
4.0	**.1575**	245	.0024 (.0016—.0031)	210	.0024 (.0016—.0031)	195	.0020 (.0012—.0028)
5.0	**.1969**	260	.0028 (.0020—.0035)	230	.0028 (.0020—.0035)	210	.0024 (.0016—.0031)
6.0	**.2362**	260	.0028 (.0020—.0035)	230	.0028 (.0020—.0035)	210	.0024 (.0016—.0031)
7.0	**.2756**	260	.0031 (.0020—.0039)	230	.0031 (.0020—.0039)	210	.0024 (.0016—.0031)
8.0	**.3150**	260	.0031 (.0020—.0039)	230	.0031 (.0020—.0039)	210	.0024 (.0016—.0031)
10.0	**.3937**	280	.0035 (.0020—.0043)	245	.0035 (.0020—.0043)	230	.0028 (.0016—.0035)
12.0	**.4724**	280	.0035 (.0020—.0043)	245	.0035 (.0020—.0043)	230	.0028 (.0016—.0035)
16.0	**.6299**	295	.0047 (.0039—.0055)	260	.0047 (.0039—.0055)	245	.0031 (.0024—.0039)

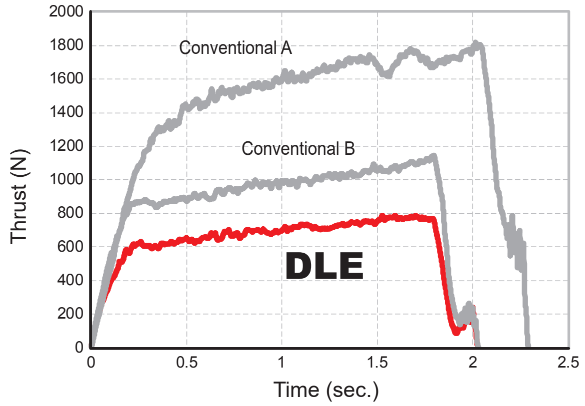
Workpiece Material		Austenitic Stainless Steels (≤200HB) AISI 304, 316 etc.		Gray Cast Irons (≤350MPa) AISI No45B etc.		Ductile Cast Irons (≤450MPa) AISI 60-40-18 etc.	
DC		Cutting Speed (SFM)	Feed (Min.—Max.) (IPR)	Cutting Speed (SFM)	Feed (Min.—Max.) (IPR)	Cutting Speed (SFM)	Feed (Min.—Max.) (IPR)
(mm)	(inch)						
1.0	**.0394**	65	.0004 (.0002—.0006)	100	.0008 (.0004—.0012)	30	.0008 (.0004—.0012)
1.5	**.0591**	65	.0004 (.0002—.0006)	150	.0008 (.0004—.0012)	80	.0008 (.0004—.0012)
2.0	**.0787**	65	.0016 (.0012—.0020)	195	.0016 (.0012—.0020)	130	.0016 (.0012—.0020)
2.5	**.0984**	65	.0016 (.0012—.0020)	245	.0016 (.0012—.0020)	180	.0016 (.0012—.0020)
3.0	**.1181**	65	.0016 (.0008—.0024)	245	.0024 (.0016—.0031)	180	.0024 (.0016—.0031)
4.0	**.1575**	65	.0016 (.0008—.0024)	245	.0024 (.0016—.0031)	180	.0024 (.0016—.0031)
5.0	**.1969**	65	.0024 (.0016—.0031)	260	.0028 (.0020—.0035)	195	.0028 (.0020—.0035)
6.0	**.2362**	65	.0024 (.0016—.0031)	260	.0028 (.0020—.0035)	195	.0028 (.0020—.0035)
7.0	**.2756**	65	.0024 (.0016—.0031)	260	.0031 (.0020—.0039)	195	.0028 (.0020—.0035)
8.0	**.3150**	65	.0024 (.0016—.0031)	260	.0031 (.0020—.0039)	195	.0028 (.0020—.0035)
10.0	**.3937**	65	.0024 (.0016—.0031)	280	.0035 (.0020—.0043)	195	.0031 (.0020—.0039)
12.0	**.4724**	65	.0024 (.0016—.0031)	280	.0035 (.0020—.0043)	195	.0031 (.0020—.0039)
16.0	**.6299**	65	.0031 (.0024—.0039)	295	.0047 (.0039—.0055)	195	.0043 (.0035—.0051)

Note 1) When chamfering a circumference of a guide hole, make sure that the tool diameter(**DC**) is **D** <**DC** <2**D**.
Note 2) When centering into curved or inclined surfaces, please reduce the feed rate.
Note 3) When V-grooving and chamfering, please reduce cutting conditions.
Note 4) When chatter vibration or abnormal noise is generated, please shorten the time of dwell program or lower the rotation speed.
Note 5) When centering, please do not exceed the **LU** (usable length).

Cutting Performance

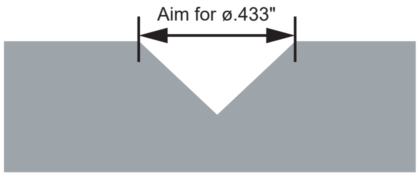
Comparison of Cutting Performance during Centering

Ideal for processing at low power, when compared to conventional products.



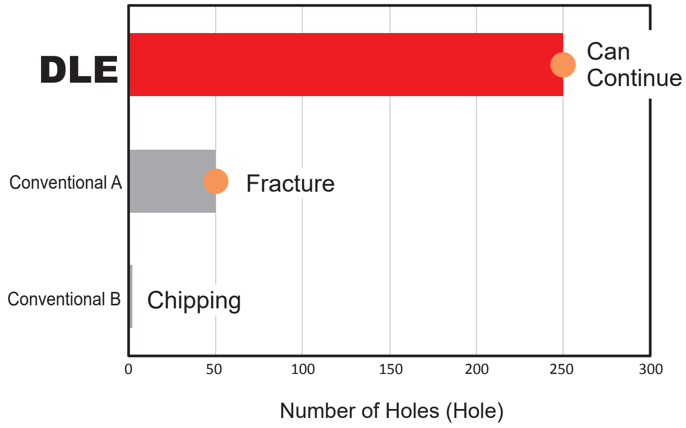
*Differences along the time axis are a result of differences in processing depth.

<Cutting Conditions>
Workpiece
Material : AISI 1045
Drill : DLE1200S120P090
ø.472"
Cutting Speed : vc = 195 SFM
Feed per Rev. : fr = .0024 IPR
Cutting Mode : Wet Cutting
External Coolant
(Chlorine Free Emulsion)
Machine : Vertical MC



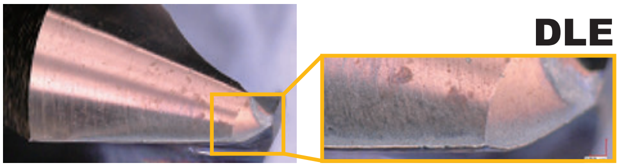
Comparison of Centering Life when Processing AISI 304

The two-step point angles, together with the negative cutting edge shape and cutting edge treatment of the thinning pocket, provide outstandings excellent with no abnormal damage.

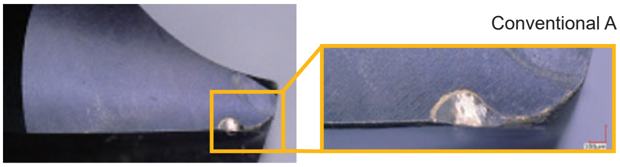


<Cutting Conditions>
Workpiece
Material : AISI 304
Drill : DLE0600S060P090
Cutting Speed : vc = 80 SFM
Feed per Rev. : fr = .0024 IPR
Hole Depth : Aim for hole dia. ø.197"
Cutting Mode : Wet Cutting
External Coolant
(Water-insoluble Coolants)
Machine : Small Automatic Lathes

DLE

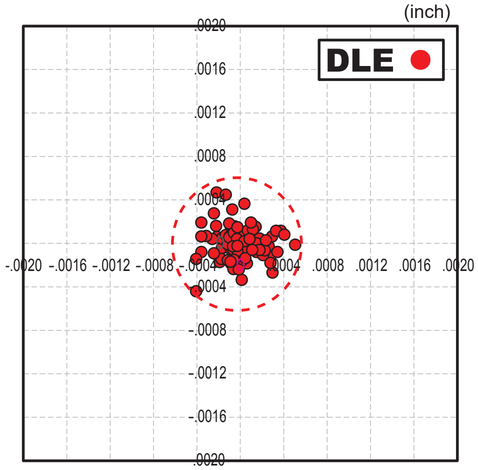


Conventional A



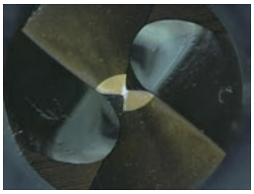
Centering Hole Position Precision for JIS SUS420J2

Stainless steels are likely to experience abnormal damage from build-up edge. Compared to conventional products which often suffered early fractures, the DLE has longer tool life.



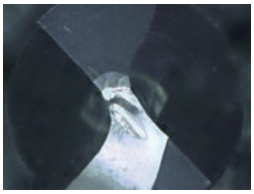
<Cutting Conditions>
Workpiece
Material : JIS SUS420J2
Drill : DLE0600S060P090
Cutting Speed: vc = 50 SFM
Feed per Rev. : fr = .0016 IPR
Hole Depth : Aim for hole dia. ø.217"
Cutting Mode : Wet Cutting
External Coolant
(Chlorine Free Emulsion)
Machine : Vertical MC

DLE



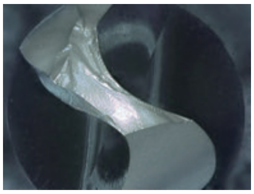
After 90 Holes

Conventional A



Measurement impossible due to early fracture

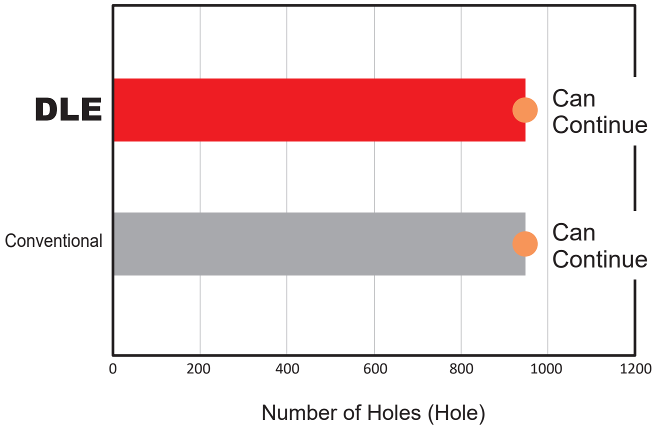
Conventional B



Measurement impossible due to early fracture

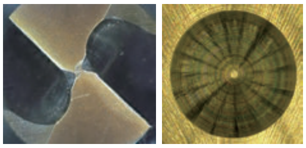
Cutting Performance

Comparison of Centering Life when Processing AISI 304 : Point Angle 120°

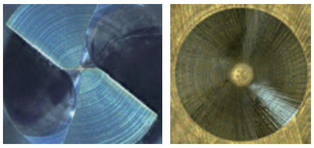


<Cutting Conditions>
Workpiece
Material : AISI 304
Drill : DLE0600S060P120
Cutting Speed : vc=65 SFM
Feed per Rev. : fr=.0024 IPR
Hole Depth : Aim for hole dia. ø.217"
Cutting Mode : Wet Cutting
External Coolant
(Water-insoluble Coolants)
Machine : Vertical MC

DLE

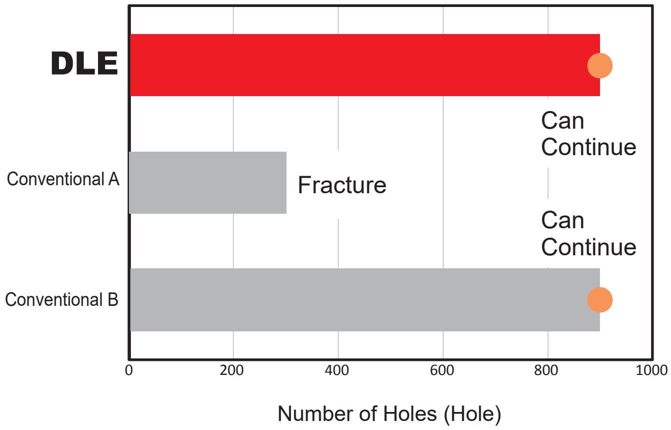


Conventional



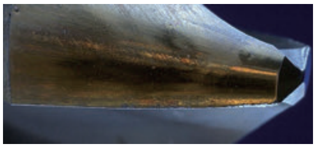
Vibration occurred.
Poor surface quality
(Rough surface).

Comparison of Centering Life when Processing AISI 304 : Point Angle 60°



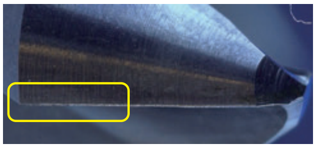
<Cutting Conditions>
Workpiece
Material : AISI 304
Drill : DLE0600S060P060
Cutting Speed : vc=50 SFM
Feed per Rev. : fr=.0008 IPR
Hole Depth : Aim for hole dia. ø.217"
Cutting Mode : Wet Cutting
External Coolant
(Chlorine Free Emulsion)
Machine : Vertical MC

DLE



Initial Wear

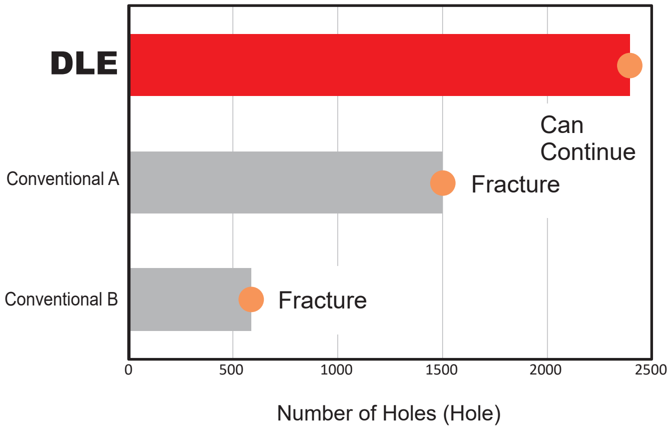
Conventional B



Fine chipping on the outer cutting edge.

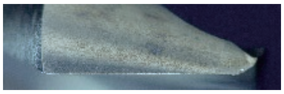
Comparison of Centering Life when Processing AISI 304 : Point Angle 90° (small-diameter ø.0787")

When processing stainless steel, DLE drills can realize longer tool life with outstanding heat resistance, and wear resistance for boundary wear.



<Cutting Conditions>
Work Material : AISI 304
Drill : DLE0200S030P090
Cutting Speed : vc=100 SFM
Feed per Rev. : fr=.0018 IPR
Cutting Mode : Wet Cutting
External Coolant
(Water-soluble Coolants)
Machine : Vertical MC

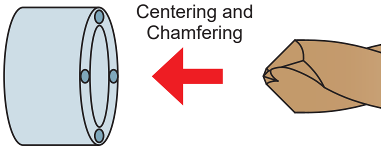
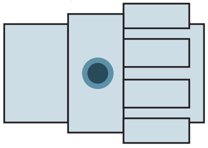
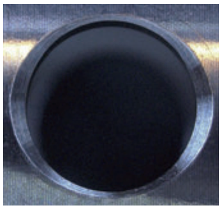
DLE
After 2400 holes machining

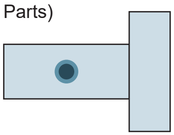
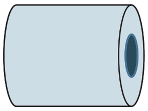
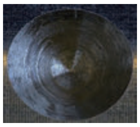


Conventional A
After 1500 holes drilling

Conventional B
After 600 holes drilling

Application Example

Drill		DLE0400S040P090	DLE0600S060P090
Workpiece		AISI 1010 (Equipment Parts)  Centering and Chamfering	AISI 304 (Machine Parts)  Centering and Chamfering
Cutting Conditions	Cutting Speed **vc** (SFM)	100	80
	Feed per Rev. **fr** (IPR)	.0018	.0020
	Guide Hole Dia. (inch)	ø.118	ø.197
Cutting Mode		Wet Cutting Extarnal Coolant (Chlorine Free Emulsion)	Wet Cutting Extarnal Coolant (Water-insoluble)
Machine		NC Lathe, Tool Rotation	CNC Automatic Lathe
Results		 Burrs are suppressed Compared to conventional product, the DLE has smaller burrs and a longer expected life.	 More than 200 holes Good surface finishes and no tool damage While conventional product often caused chipping to occur, the DLE is more stable and has been used to complete drilling of 200 holes with no damage on the cutting edge.

Drill		DLE0300S030P090	DLE0200S030P090
Workpiece		AISI 303 (Engine Parts)   Centerring and Chamfering	AISI 303 (Engine Parts)  Centering of ø.024" hole
Cutting Conditions	Cutting Speed **vc** (SFM)	80	125
	Feed per Rev. **fr** (IPR)	.0016	.0008
	Guide Hole Dia. (inch)	ø.079	ø.024
Cutting Mode		Wet Cutting Extarnal Coolant (Water-insoluble) Curved Surface	Wet Cutting Extarnal Coolant (Water-insoluble)
Machine		CNC Automatic Lathe	CNC Automatic Lathe
Results		**DLE**  After 60 Holes Conventional  After 1 Hole While the conventional product generated burrs after drilling 1 hole, DLE achieve good surface quality with no sudden fractures even after drilling 60 holes.	Comparison of Rake Faces after centering **DLE**  60000 holes Conventional  Fracture 30000 holes DLE had a tool life twice as long as the conventional product, and was able to carry out cutting with no fractures.

The above application examples are customer's applications, so it can be different from the recommended conditions.

Solid Carbide Drills for Centering and Chamfering

Leading Drill Series DLE

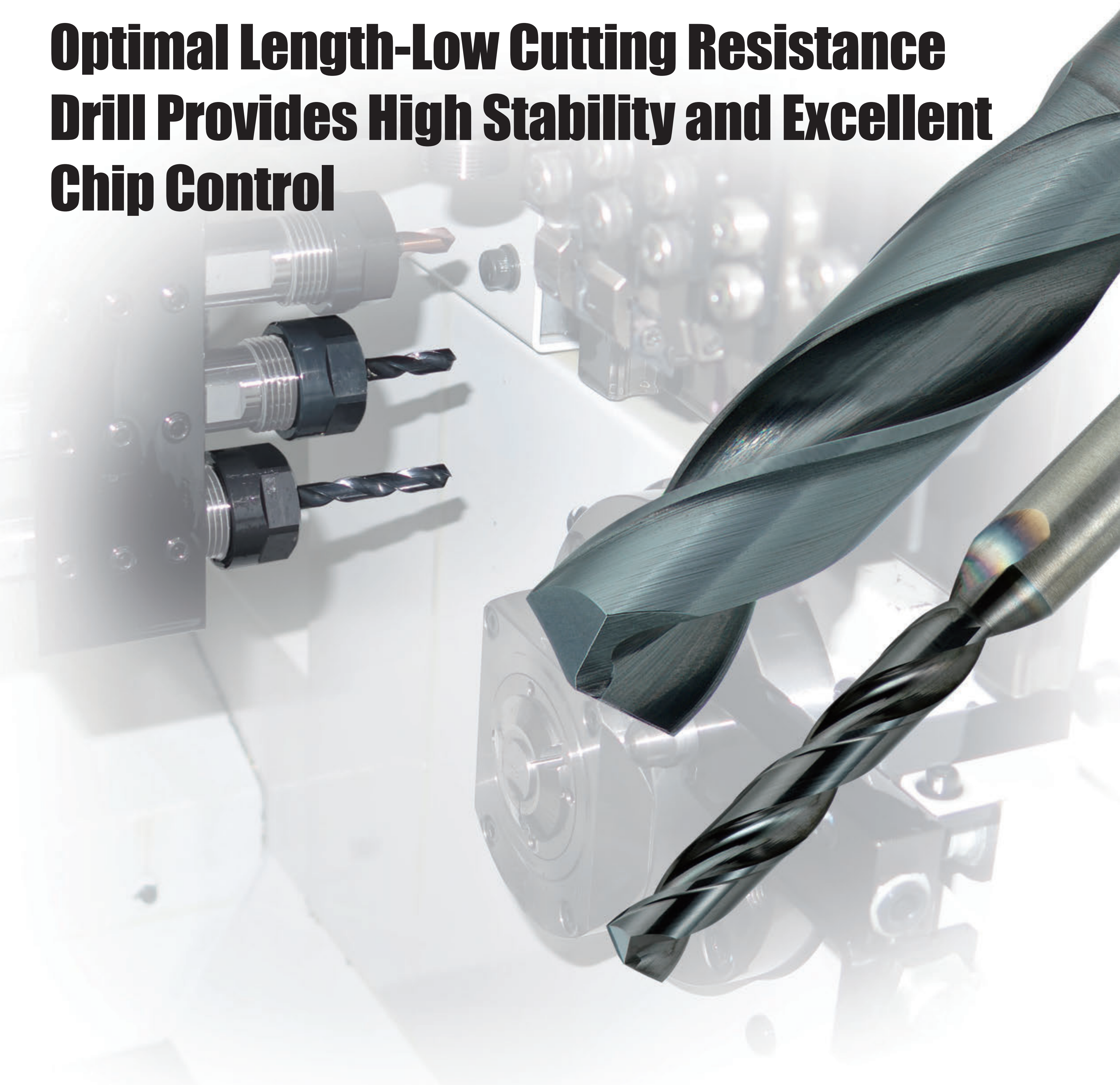
For your safety
●Don't handle inserts and chips without gloves. ●Please machine within the recommended application range and exchange expired tools with new ones in advance of breakage. ●Please use safety covers and wear safety glasses. ●When using compounded cutting oils, please take fire precautions. ●When using rotating tools, please make a trial run to check run-out, vibration and abnormal sounds etc. ●Grinding or heating of cutting tools produces dust and mist. Inhaling large amount of dust or contacting with eyes and skins may harm your body.

Solid Carbide Drill for Swiss-type Automatic & Small CNC Lathes
WSTAR Drill Series

DWAE

New Products

Optimal Length-Low Cutting Resistance Drill Provides High Stability and Excellent Chip Control



MITSUBISHI MATERIALS CORPORATION

Solid Carbide Drill for Swiss-type Automatic & Small CNC Lathes

WSTAR Drill Series

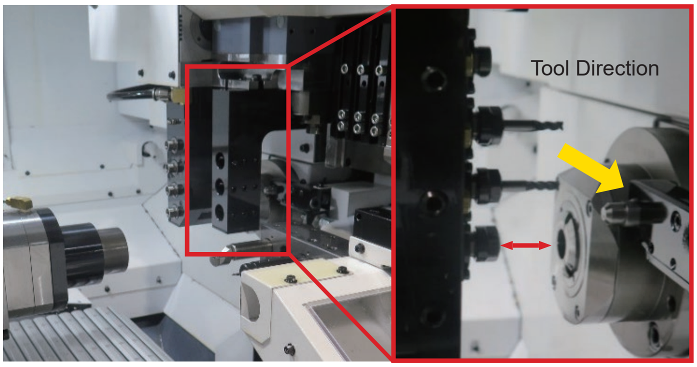
DWAE

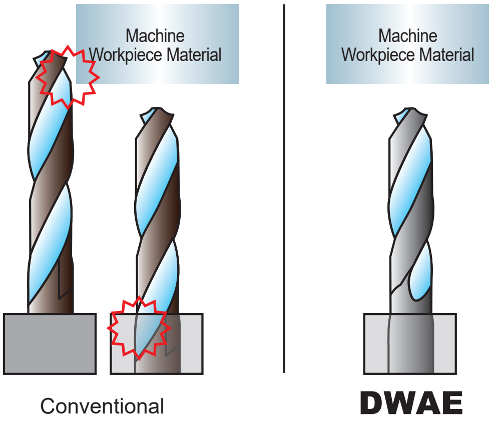
3.0mm–14.0mm (.1181"–.5512")

Features

Optimal Flute Length

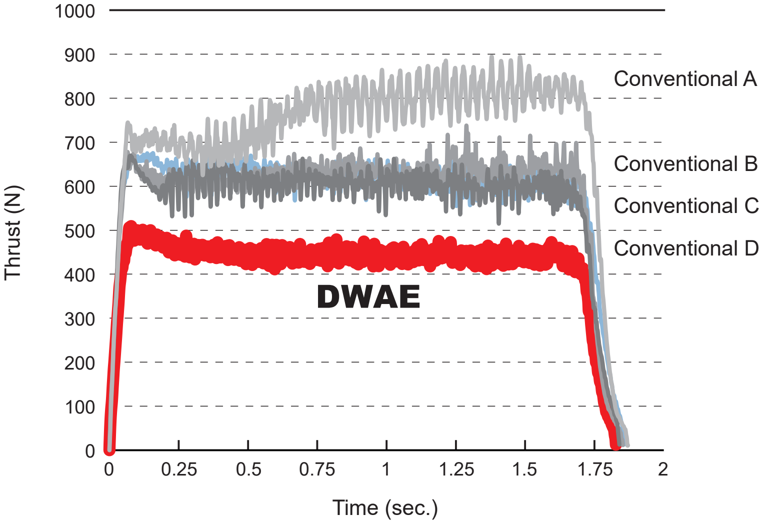
External coolant type carbide drill with ideal tool length for Swiss-type automatic and small CNC lathes.



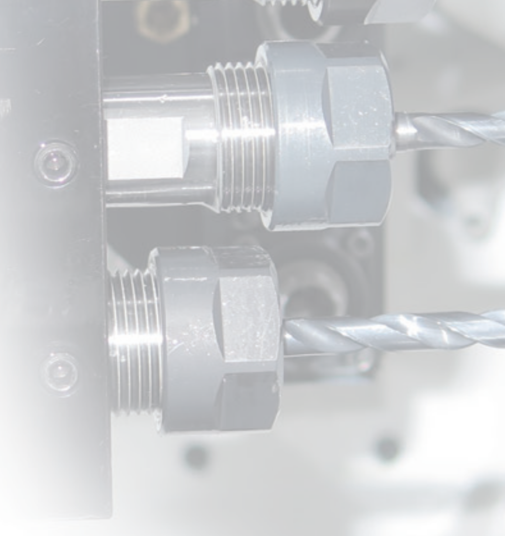


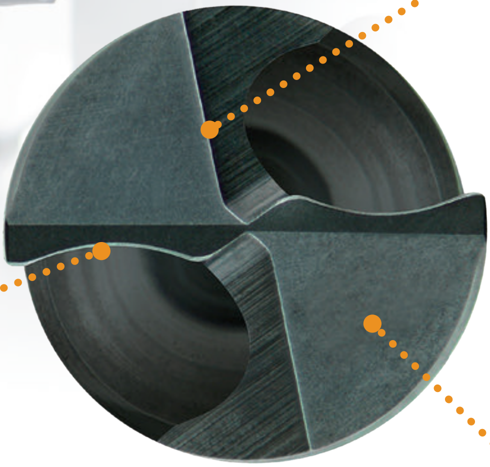
Low Cutting Resistance Design

Low cutting resistance design provides for highly stable drilling even in situations where rigidity of workpiece material and or clamping is difficult to secure.



<Cutting Conditions>
Workpiece Material : AISI 1010
Tool : DWAE0600X04S060
Cutting Speed : vc= 260 SFM
Feed per Rev. : fr= .008 IPR
Hole Depth : .945"
Cutting Mode : Wet Cutting
External Coolant
(Water-soluble Coolants)





Z Thinning

The proprietary web thinning geometry ensures wide space for chip evacuation and offers low cutting resistance.

Wave Cutting Edge

The wave cutting edge provides both sharpness and cutting edge strength, resisting wear to outer cutting edge, which is easily damaged with conventional drills, while efficiently cutting chips into smaller pieces.

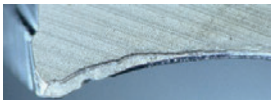
Coated Grade DP102A

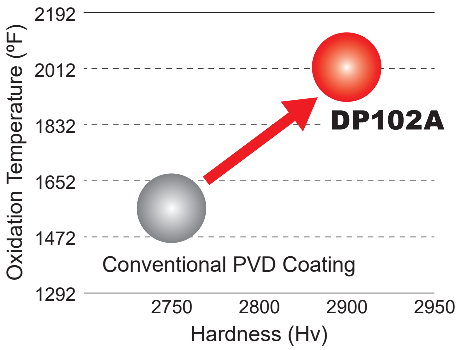
DP102A coated grade provides excellent lubricity and long-term durability, achieving excellent wear resistance at low-medium cutting speeds.

Wear comparison when drilling AISI 1050

DWAE

Conventional





Flute Shape

Specially designed flute shape breaks up chips into smaller pieces preventing them from clogging during drilling operations.

ZERO-μ Surface

A smoothing surface treatment is applied to the drill surface further reducing cutting resistance while facilitating excellent chip evacuation.

Optimal Flute Length for Swiss-type Automatic and Small CNC Lathes

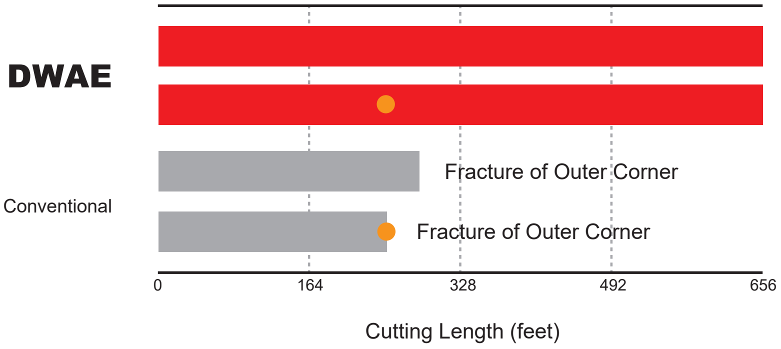
The flute length has been specifically engineered to meet the compact needs and limited machining space requirements of small CNC lathes with a lineup of shanks compatible with ER collet mounting available.

DCON(Connection Diameter)	.197 inch=ER8
DCON	.276 inch=ER11

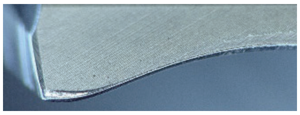
Cutting Performance

AISI 1050 Fracture Resistance Comparison

DP102A offers excellent lubricity and heat resistance, providing more fracture resistance and achieving longer tool life than conventional drills under medium cutting speed conditions making stable machining possible even with external coolant.



Cutting Length
246 feet



DWAE

Conventional

<Cutting Conditions>
Workpiece Material : AISI 1050
Tool : DWAE0600X04S060
Cutting Speed : vc= 260 SFM
Feed per Rev. : fr= .008 IPR
Hole Depth : .945"
Cutting Mode : Wet Cutting
External Coolant
(Water-soluble Coolants)

AISI1010 Chips Comparison

DWAE specially designed to break up chips into smaller pieces to prevent flutes from clogging during machining operations.

DWAE

<Cutting Conditions>
Workpiece Material : AISI 1010
Tool : DWAE0600X04S060
Cutting Speed : vc= 195 SFM
Feed per Rev. : fr= .012 IPR
Hole Depth : .945"
Cutting Mode : Wet Cutting
External Coolant
(Water-soluble Coolants)

Conventional A

Conventional B

Solid Carbide Drills for Swiss-type Automatic & Small CNC Lathes

WSTAR Drill Series

DWAE

Mini Size 1.0mm–2.9mm (.0394"–.1142")

Featuring High Precision and Long Tool Life for Small Diameter Drilling

New Cutting Edge Treatment That Achieves Both Sharpness and Durability

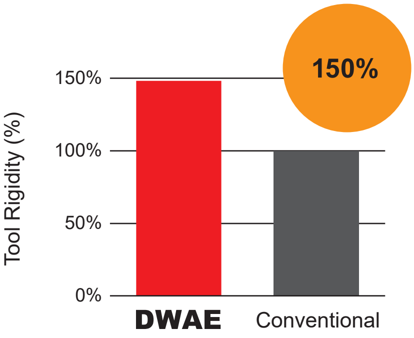
Mitsubishi's new proprietary cutting edge treatment maintains the stability of the cutting edge while exhibiting excellent fracture and wear resistance.

Coated Grade **DP102A**

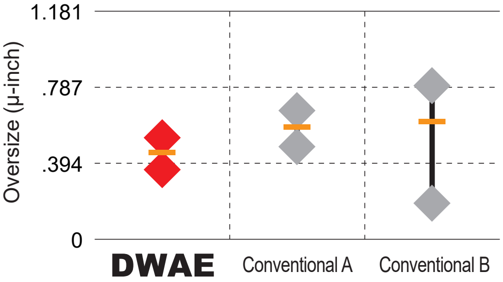
DP102A coated grade provides excellent lubricity and long-term durability, achieving excellent wear resistance at low to medium cutting speeds.

Unique Flute Form for Greater Rigidity

The Mini Size is uniquely designed for rigidity and good chip evacuation by minimizing the neck length. A chip discharge area is provided through the taper neck. This increases tool rigidity by 50% compared to conventional drills and also improves hole positional accuracy.



<Analysis Conditions>
Analysis Model : DC=2mm (.0787"), L/D=4
Overall Length : OAL = 50mm (1.969")
Load : Distributed load of 130N in Z axis direction.

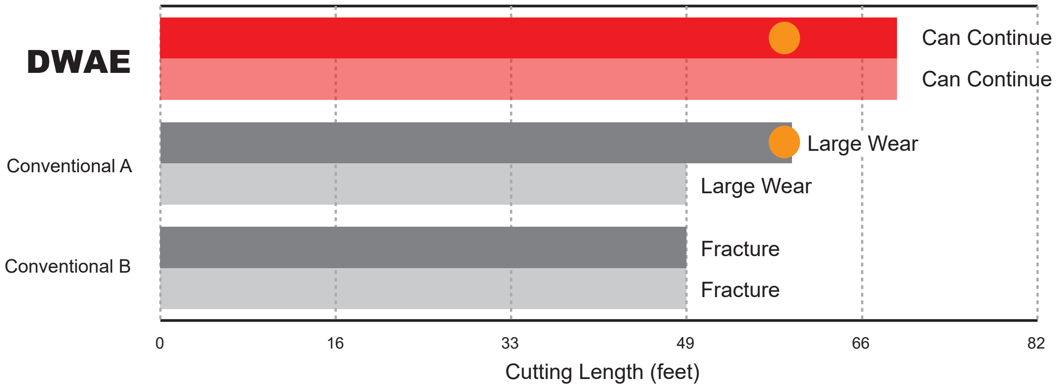


<Cutting Conditions>
Workpiece Material : AISI 1010
Tool : DC=2mm (.0787"), L/D=4
Cutting Speed : vc= 100 SFM
Feed per Rev. : fr= .0016 IPR
Hole Depth : .315 inch
Cutting Mode : Water-soluble Coolants

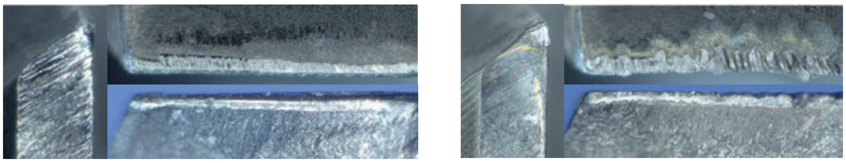
Cutting Performance

Wear Resistance Comparison when drilling AISI 420

By combining DP102A and a new cutting edge treatment, durability and long tool life have been achieved when drilling with an external coolant supply.



Cutting Length 59 feet



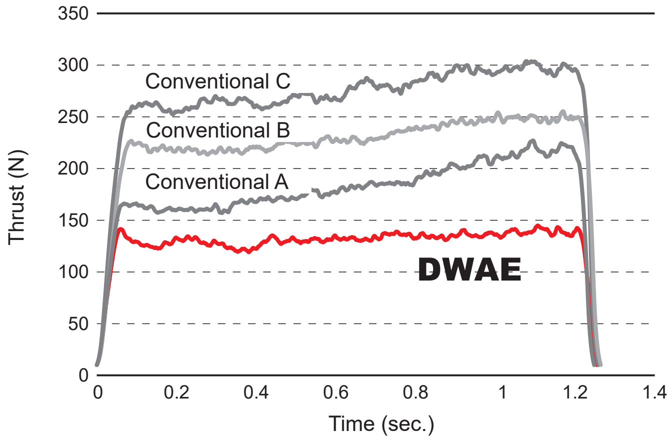
DWAE

Conventional A

<Cutting Conditions>
Workpiece Material : AISI 420
Tool : DWAE0200X04S040
Cutting Speed : vc= 100 SFM
Feed per Rev. : fr= .0018 IPR
Hole Depth : .315 inch
Cutting Mode : Wet Cutting
External Coolant
(Water-soluble Coolants)

Cutting Resistance Comparison when drilling AISI 420

DWAE attains low thrust resistance compared to conventional products.



<Cutting Conditions>
Workpiece Material : AISI 420
Tool : DWAE0200X04S040
Cutting Speed : vc= 130 SFM
Feed per Rev. : fr= .0024 IPR
Hole Depth : .315 inch
Cutting Mode : Wet Cutting
External Coolant
(Water-soluble Coolants)

DWAE Mini Size NEW

UWC DP1A 135° XR X

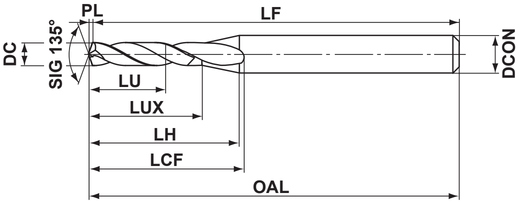
DC<.0787 DC≥.0787

P M K N S H

External Coolant


DC<.0787


DC≥.0787



Type1

	DC≤.1181		
	0 − .00055		
	DCON=.1181	DCON=.1575	
h6	0 − .00024	0 − .00031	

DC				L/D	Coolant (Int./Ext.)	Order Number	Stock	LU		LUX		LCF		LH		OAL		LF		PL		DCON		Type
Metric (mm)	Decimal (inch)	Wire / Letter	Thread Size				DP102A	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	
1.0	.0394			2	Ext.	DWAE0100X02S030	●	2.2	.087	5.0	.197	7.7	.303	8.7	.343	45	1.772	44.8	1.764	0.2	.008	3	.118	1
				4	Ext.	DWAE0100X04S030	●	4.2	.165	7.0	.276	9.9	.390	10.7	.421	45	1.772	44.8	1.764	0.2	.008	3	.118	1
1.1	.0433			2	Ext.	DWAE0110X02S030	●	2.4	.094	5.4	.213	8.1	.319	8.9	.350	45	1.772	44.8	1.764	0.2	.008	3	.118	1
				4	Ext.	DWAE0110X04S030	●	4.6	.181	7.6	.299	10.5	.413	11.1	.437	45	1.772	44.8	1.764	0.2	.008	3	.118	1
1.2	.0472			2	Ext.	DWAE0120X02S030	●	2.6	.102	5.8	.228	8.5	.335	9.2	.362	45	1.772	44.8	1.764	0.2	.008	3	.118	1
				4	Ext.	DWAE0120X04S030	●	5.0	.197	8.2	.323	11.1	.437	11.6	.457	45	1.772	44.8	1.764	0.2	.008	3	.118	1
1.3	.0512			2	Ext.	DWAE0130X02S030	●	2.9	.114	6.3	.248	9.0	.354	9.5	.374	45	1.772	44.7	1.760	0.3	.012	3	.118	1
				4	Ext.	DWAE0130X04S030	●	5.5	.217	8.9	.350	11.9	.469	12.1	.476	45	1.772	44.7	1.760	0.3	.012	3	.118	1
1.4	.0551			2	Ext.	DWAE0140X02S030	●	3.1	.122	6.7	.264	9.4	.370	9.7	.382	45	1.772	44.7	1.760	0.3	.012	3	.118	1
				4	Ext.	DWAE0140X04S030	●	5.9	.232	9.5	.374	12.5	.492	12.5	.492	45	1.772	44.7	1.760	0.3	.012	3	.118	1
1.5	.0591		#1-64	2	Ext.	DWAE0150X02S030	●	3.3	.130	7.1	.280	9.8	.386	9.9	.390	45	1.772	44.7	1.760	0.3	.012	3	.118	1
				4	Ext.	DWAE0150X04S030	●	6.3	.248	10.1	.398	13.1	.516	12.9	.508	45	1.772	44.7	1.760	0.3	.012	3	.118	1
1.6	.0630			2	Ext.	DWAE0160X02S030	●	3.5	.138	7.5	.295	10.2	.402	10.1	.398	45	1.772	44.7	1.760	0.3	.012	3	.118	1
				4	Ext.	DWAE0160X04S030	●	6.7	.264	10.7	.421	13.7	.539	13.3	.524	45	1.772	44.7	1.760	0.3	.012	3	.118	1
1.7	.0669			2	Ext.	DWAE0170X02S030	●	3.8	.150	8.0	.315	10.7	.421	10.4	.409	45	1.772	44.6	1.756	0.4	.016	3	.118	1
				4	Ext.	DWAE0170X04S030	●	7.2	.283	11.4	.449	14.4	.567	13.8	.543	45	1.772	44.6	1.756	0.4	.016	3	.118	1
1.8	.0709			2	Ext.	DWAE0180X02S030	●	4.0	.157	8.4	.331	11.1	.437	10.6	.417	45	1.772	44.6	1.756	0.4	.016	3	.118	1
				4	Ext.	DWAE0180X04S030	●	7.6	.299	12.0	.472	15.1	.594	14.2	.559	45	1.772	44.6	1.756	0.4	.016	3	.118	1
1.9	.0748			2	Ext.	DWAE0190X02S030	●	4.2	.165	8.8	.346	11.5	.453	10.9	.429	45	1.772	44.6	1.756	0.4	.016	3	.118	1
				4	Ext.	DWAE0190X04S030	●	8.0	.315	12.6	.496	15.7	.618	14.7	.579	45	1.772	44.6	1.756	0.4	.016	3	.118	1
2.0	.0787		#3-48	2	Ext.	DWAE0200X02S040	●	4.4	.173	9.2	.362	12.8	.504	12.9	.508	50	1.969	49.6	1.953	0.4	.016	4	.157	1
				4	Ext.	DWAE0200X04S040	●	8.4	.331	13.2	.520	17.2	.677	16.9	.665	50	1.969	49.6	1.953	0.4	.016	4	.157	1
2.1	.0827			2	Ext.	DWAE0210X02S040	●	4.6	.181	9.6	.378	13.2	.520	13.1	.516	50	1.969	49.6	1.953	0.4	.016	4	.157	1
				4	Ext.	DWAE0210X04S040	●	8.8	.346	13.8	.543	17.8	.701	17.3	.681	50	1.969	49.6	1.953	0.4	.016	4	.157	1
2.2	.0866			2	Ext.	DWAE0220X02S040	●	4.9	.193	10.1	.398	13.7	.539	13.5	.531	50	1.969	49.5	1.949	0.5	.020	4	.157	1
				4	Ext.	DWAE0220X04S040	●	9.3	.366	14.5	.571	18.5	.728	17.9	.705	50	1.969	49.5	1.949	0.5	.020	4	.157	1
2.3	.0906			2	Ext.	DWAE0230X02S040	●	5.1	.201	10.5	.413	14.1	.555	13.7	.539	50	1.969	49.5	1.949	0.5	.020	4	.157	1
				4	Ext.	DWAE0230X04S040	●	9.7	.382	15.1	.594	19.2	.756	18.3	.720	50	1.969	49.5	1.949	0.5	.020	4	.157	1
2.4	.0945			2	Ext.	DWAE0240X02S040	●	5.3	.209	10.9	.429	14.5	.571	13.9	.547	50	1.969	49.5	1.949	0.5	.020	4	.157	1
				4	Ext.	DWAE0240X04S040	●	10.1	.398	15.7	.618	19.8	.780	18.7	.736	50	1.969	49.5	1.949	0.5	.020	4	.157	1
2.5	.0984			2	Ext.	DWAE0250X02S040	●	5.5	.217	11.3	.445	14.9	.587	14.1	.555	50	1.969	49.5	1.949	0.5	.020	4	.157	1
				4	Ext.	DWAE0250X04S040	●	10.5	.413	16.3	.642	20.4	.803	19.1	.752	50	1.969	49.5	1.949	0.5	.020	4	.157	1
2.6	.1024			2	Ext.	DWAE0260X02S040	●	5.7	.224	11.7	.461	15.3	.602	14.3	.563	50	1.969	49.5	1.949	0.5	.020	4	.157	1
				4	Ext.	DWAE0260X04S040	●	10.9	.429	16.9	.665	21.0	.827	19.5	.768	50	1.969	49.5	1.949	0.5	.020	4	.157	1
2.7	.1063	36	#6-32	2	Ext.	DWAE0270X02S040	●	6.0	.236	12.2	.480	15.8	.622	14.6	.575	50	1.969	49.4	1.945	0.6	.024	4	.157	1
				4	Ext.	DWAE0270X04S040	●	11.4	.449	17.6	.693	21.7	.854	20.0	.787	50	1.969	49.4	1.945	0.6	.024	4	.157	1
2.8	.1102	35		2	Ext.	DWAE0280X02S040	●	6.2	.244	12.6	.496	16.2	.638	14.8	.583	50	1.969	49.4	1.945	0.6	.024	4	.157	1
				4	Ext.	DWAE0280X04S040	●	11.8	.465	18.2	.717	22.4	.882	20.4	.803	50	1.969	49.4	1.945	0.6	.024	4	.157	1
2.9	.1142			2	Ext.	DWAE0290X02S040	●	6.4	.252	13.0	.512	16.6	.654	15.1	.594	50	1.969	49.4	1.945	0.6	.024	4	.157	1
				4	Ext.	DWAE0290X04S040	●	12.2	.480	18.8	.740	23.0	.906	20.9	.823	50	1.969	49.4	1.945	0.6	.024	4	.157	1

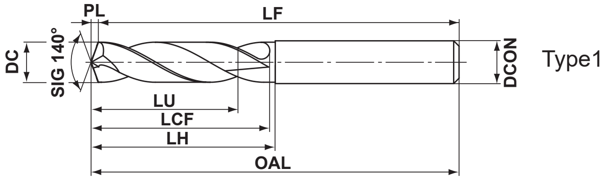
DC = Cutting Diameter
LU = Usable Length
LUX = Max. Usable Length
LCF = Length Chip Flute
LH = Neck Length
OAL = Overall Length
LF = Functional Length
PL = Point Length
DCON = Connection Diameter

● : **USA Stock**

DWAE NEW

UWC DP1A 140° Z

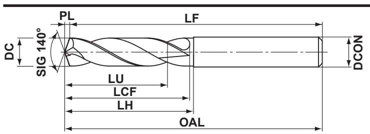
P M K N S H



	DC=.1181	.1181<DC≤.2362	.2362<DC≤.3937	.3937<DC≤.5512
	0 − .00055	0 − .00071	0 − .00087	0 − .00106
	DCON=.1181	.1181<DCON≤.2362	.2362<DCON≤.3937	.3937<DCON≤.5512
h6	0 − .00024	0 − .00031	0 − .00035	0 − .00043

DC					L/D	Coolant (Int./Ext.)	Order Number	Stock	LU		LCF		LH		OAL		LF		PL		DCON		Type
Metric (mm)	Decimal	Fraction	Wire / Letter	Thread Size				DP102A	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	
	(inch)																						
3.0	**.1181**				2	Ext.	**DWAE0300X02S030**	●	6.5	.256	12.5	.492	14.5	.571	45.5	1.791	45	1.772	0.5	.020	3	.118	1
					4	Ext.	**DWAE0300X04S030**	●	12.5	.492	21.5	.846	23.5	.925	55.5	2.185	55	2.165	0.5	.020	3	.118	1
3.1	**.1220**				2	Ext.	**DWAE0310X02S040**	●	6.8	.268	12.6	.496	14.6	.575	55.6	2.189	55	2.165	0.6	.024	4	.157	1
					4	Ext.	**DWAE0310X04S040**	●	13.0	.512	21.6	.850	23.6	.929	60.6	2.386	60	2.362	0.6	.024	4	.157	1
3.2	**.1260**				2	Ext.	**DWAE0320X02S040**	●	7.0	.276	13.6	.535	15.6	.614	55.6	2.189	55	2.165	0.6	.024	4	.157	1
					4	Ext.	**DWAE0320X04S040**	●	13.4	.528	22.6	.890	24.6	.969	60.6	2.386	60	2.362	0.6	.024	4	.157	1
3.3	**.1299**			**M4x.7**	2	Ext.	**DWAE0330X02S040**	●	7.2	.283	13.6	.535	15.6	.614	55.6	2.189	55	2.165	0.6	.024	4	.157	1
					4	Ext.	**DWAE0330X04S040**	●	13.8	.543	23.6	.929	25.6	1.008	60.6	2.386	60	2.362	0.6	.024	4	.157	1
3.4	**.1339**				2	Ext.	**DWAE0340X02S040**	●	7.4	.291	13.6	.535	15.6	.614	55.6	2.189	55	2.165	0.6	.024	4	.157	1
					4	Ext.	**DWAE0340X04S040**	●	14.2	.559	23.6	.929	25.6	1.008	60.6	2.386	60	2.362	0.6	.024	4	.157	1
3.5	**.1378**				2	Ext.	**DWAE0350X02S040**	●	7.6	.299	14.6	.575	16.6	.654	55.6	2.189	55	2.165	0.6	.024	4	.157	1
					4	Ext.	**DWAE0350X04S040**	●	14.6	.575	24.6	.969	26.6	1.047	60.6	2.386	60	2.362	0.6	.024	4	.157	1
3.6	**.1417**				2	Ext.	**DWAE0360X02S040**	●	7.9	.311	14.7	.579	16.7	.657	55.7	2.193	55	2.165	0.7	.028	4	.157	1
					4	Ext.	**DWAE0360X04S040**	●	15.1	.594	25.7	1.012	27.7	1.091	60.7	2.390	60	2.362	0.7	.028	4	.157	1
3.7	**.1457**			**M4.5x.75**	2	Ext.	**DWAE0370X02S040**	●	8.1	.319	14.7	.579	16.7	.657	55.7	2.193	55	2.165	0.7	.028	4	.157	1
					4	Ext.	**DWAE0370X04S040**	●	15.5	.610	25.7	1.012	27.7	1.091	60.7	2.390	60	2.362	0.7	.028	4	.157	1
3.8	**.1496**		**25**	**#10-24**	2	Ext.	**DWAE0380X02S040**	●	8.3	.327	15.7	.618	17.7	.697	55.7	2.193	55	2.165	0.7	.028	4	.157	1
					4	Ext.	**DWAE0380X04S040**	●	15.9	.626	26.7	1.051	28.7	1.130	60.7	2.390	60	2.362	0.7	.028	4	.157	1
3.9	**.1535**				2	Ext.	**DWAE0390X02S040**	●	8.5	.335	15.7	.618	17.7	.697	55.7	2.193	55	2.165	0.7	.028	4	.157	1
					4	Ext.	**DWAE0390X04S040**	●	16.3	.642	27.7	1.091	29.7	1.169	60.7	2.390	60	2.362	0.7	.028	4	.157	1
4.0	**.1575**				2	Ext.	**DWAE0400X02S040**	●	8.7	.343	15.7	.618	17.7	.697	55.7	2.193	55	2.165	0.7	.028	4	.157	1
					4	Ext.	**DWAE0400X04S040**	●	16.7	.657	27.7	1.091	29.7	1.169	60.7	2.390	60	2.362	0.7	.028	4	.157	1
4.1	**.1614**				2	Ext.	**DWAE0410X02S050**	●	8.9	.350	16.7	.657	18.7	.736	62.7	2.469	62	2.441	0.7	.028	5	.197	1
					4	Ext.	**DWAE0410X04S050**	●	17.1	.673	28.7	1.130	30.7	1.209	80.7	3.177	80	3.150	0.7	.028	5	.197	1
4.2	**.1654**			**M5x.8**	2	Ext.	**DWAE0420X02S050**	●	9.2	.362	16.8	.661	18.8	.740	62.8	2.472	62	2.441	0.8	.031	5	.197	1
					4	Ext.	**DWAE0420X04S050**	●	17.6	.693	29.8	1.173	31.8	1.252	80.8	3.181	80	3.150	0.8	.031	5	.197	1
4.3	**.1693**				2	Ext.	**DWAE0430X02S050**	●	9.4	.370	17.8	.701	19.8	.780	62.8	2.472	62	2.441	0.8	.031	5	.197	1
					4	Ext.	**DWAE0430X04S050**	●	18.0	.709	30.8	1.213	32.8	1.291	80.8	3.181	80	3.150	0.8	.031	5	.197	1
4.4	**.1732**		**17**		2	Ext.	**DWAE0440X02S050**	●	9.6	.378	17.8	.701	19.8	.780	62.8	2.472	62	2.441	0.8	.031	5	.197	1
					4	Ext.	**DWAE0440X04S050**	●	18.4	.724	30.8	1.213	32.8	1.291	80.8	3.181	80	3.150	0.8	.031	5	.197	1
4.5	**.1772**		**16**	**#12-24**	2	Ext.	**DWAE0450X02S050**	●	9.8	.386	17.8	.701	19.8	.780	62.8	2.472	62	2.441	0.8	.031	5	.197	1
					4	Ext.	**DWAE0450X04S050**	●	18.8	.740	31.8	1.252	33.8	1.331	80.8	3.181	80	3.150	0.8	.031	5	.197	1

● : USA Stock



Type1

DC					L/D	Coolant (Int./Ext.)	Order Number	Stock	LU		LCF		LH		OAL		LF		PL		DCON		Type
Metric (mm)	Decimal (inch)	Fraction (inch)	Wire / Letter	Thread Size				DP102A	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	
4.6	**.1811**				2	Ext.	**DWAE0460X02S050**	●	10.0	.394	18.8	.740	20.8	.819	62.8	2.472	62	2.441	0.8	.031	5	.197	1
					4	Ext.	**DWAE0460X04S050**	●	19.2	.756	32.8	1.291	34.8	1.370	80.8	3.181	80	3.150	0.8	.031	5	.197	1
4.7	**.1850**		**13**		2	Ext.	**DWAE0470X02S050**	●	10.3	.406	18.9	.744	20.9	.823	62.9	2.476	62	2.441	0.9	.035	5	.197	1
					4	Ext.	**DWAE0470X04S050**	●	19.7	.776	32.9	1.295	34.9	1.374	80.9	3.185	80	3.150	0.9	.035	5	.197	1
4.8	**.1890**		**12**		2	Ext.	**DWAE0480X02S050**	●	10.5	.413	18.9	.744	20.9	.823	62.9	2.476	62	2.441	0.9	.035	5	.197	1
					4	Ext.	**DWAE0480X04S050**	●	20.1	.791	33.9	1.335	35.9	1.413	80.9	3.185	80	3.150	0.9	.035	5	.197	1
4.9	**.1929**				2	Ext.	**DWAE0490X02S050**	●	10.7	.421	19.9	.783	21.9	.862	62.9	2.476	62	2.441	0.9	.035	5	.197	1
					4	Ext.	**DWAE0490X04S050**	●	20.5	.807	34.9	1.374	36.9	1.453	80.9	3.185	80	3.150	0.9	.035	5	.197	1
5.0	**.1969**			**M6x1.0**	2	Ext.	**DWAE0500X02S050**	●	10.9	.429	19.9	.783	21.9	.862	62.9	2.476	62	2.441	0.9	.035	5	.197	1
					4	Ext.	**DWAE0500X04S050**	●	20.9	.823	34.9	1.374	36.9	1.453	80.9	3.185	80	3.150	0.9	.035	5	.197	1
5.1	**.2008**		**7**	**1/4-20**	2	Ext.	**DWAE0510X02S060**	●	11.1	.437	21.9	.862	23.9	.941	66.9	2.634	66	2.598	0.9	.035	6	.236	1
					4	Ext.	**DWAE0510X04S060**	●	21.3	.839	35.9	1.413	37.9	1.492	80.9	3.185	80	3.150	0.9	.035	6	.236	1
5.2	**.2047**				2	Ext.	**DWAE0520X02S060**	●	11.3	.445	21.9	.862	23.9	.941	66.9	2.634	66	2.598	0.9	.035	6	.236	1
					4	Ext.	**DWAE0520X04S060**	●	21.7	.854	36.9	1.453	38.9	1.531	80.9	3.185	80	3.150	0.9	.035	6	.236	1
5.3	**.2087**		**4**		2	Ext.	**DWAE0530X02S060**	●	11.6	.457	22.0	.866	24.0	.945	67.0	2.638	66	2.598	1.0	.039	6	.236	1
					4	Ext.	**DWAE0530X04S060**	●	22.2	.874	37.0	1.457	39.0	1.535	81.0	3.189	80	3.150	1.0	.039	6	.236	1
5.4	**.2126**		**3**	**1/4-28**	2	Ext.	**DWAE0540X02S060**	●	11.8	.465	22.0	.866	24.0	.945	67.0	2.638	66	2.598	1.0	.039	6	.236	1
					4	Ext.	**DWAE0540X04S060**	●	22.6	.890	38.0	1.496	40.0	1.575	81.0	3.189	80	3.150	1.0	.039	6	.236	1
5.5	**.2165**				2	Ext.	**DWAE0550X02S060**	●	12.0	.472	22.0	.866	24.0	.945	67.0	2.638	66	2.598	1.0	.039	6	.236	1
					4	Ext.	**DWAE0550X04S060**	●	23.0	.906	39.0	1.535	41.0	1.614	81.0	3.189	80	3.150	1.0	.039	6	.236	1
5.6	**.2205**		**2**		2	Ext.	**DWAE0560X02S060**	●	12.2	.480	24.0	.945	26.0	1.024	67.0	2.638	66	2.598	1.0	.039	6	.236	1
					4	Ext.	**DWAE0560X04S060**	●	23.4	.921	39.0	1.535	41.0	1.614	81.0	3.189	80	3.150	1.0	.039	6	.236	1
5.7	**.2244**				2	Ext.	**DWAE0570X02S060**	●	12.4	.488	24.0	.945	26.0	1.024	67.0	2.638	66	2.598	1.0	.039	6	.236	1
					4	Ext.	**DWAE0570X04S060**	●	23.8	.937	39.0	1.535	41.0	1.614	81.0	3.189	80	3.150	1.0	.039	6	.236	1
5.8	**.2283**		**1**		2	Ext.	**DWAE0580X02S060**	●	12.7	.500	24.1	.949	26.1	1.028	67.1	2.642	66	2.598	1.1	.043	6	.236	1
					4	Ext.	**DWAE0580X04S060**	●	24.3	.957	41.1	1.618	43.1	1.697	81.1	3.193	80	3.150	1.1	.043	6	.236	1
5.9	**.2323**				2	Ext.	**DWAE0590X02S060**	●	12.9	.508	24.1	.949	26.1	1.028	67.1	2.642	66	2.598	1.1	.043	6	.236	1
					4	Ext.	**DWAE0590X04S060**	●	24.7	.972	41.1	1.618	43.1	1.697	81.1	3.193	80	3.150	1.1	.043	6	.236	1
6.0	**.2362**			**M7x1.0**	2	Ext.	**DWAE0600X02S060**	●	13.1	.516	24.1	.949	26.1	1.028	67.1	2.642	66	2.598	1.1	.043	6	.236	1
					4	Ext.	**DWAE0600X04S060**	●	25.1	.988	42.1	1.657	44.1	1.736	81.1	3.193	80	3.150	1.1	.043	6	.236	1
6.1	**.2402**				2	Ext.	**DWAE0610X02S070**	●	13.3	.524	26.1	1.028	28.1	1.106	75.1	2.957	74	2.913	1.1	.043	7	.276	1
					4	Ext.	**DWAE0610X04S070**	●	25.5	1.004	44.1	1.736	46.1	1.815	84.1	3.311	83	3.268	1.1	.043	7	.276	1
6.2	**.2441**				2	Ext.	**DWAE0620X02S070**	●	13.5	.531	26.1	1.028	28.1	1.106	75.1	2.957	74	2.913	1.1	.043	7	.276	1
					4	Ext.	**DWAE0620X04S070**	●	25.9	1.020	44.1	1.736	46.1	1.815	84.1	3.311	83	3.268	1.1	.043	7	.276	1
6.3	**.2480**				2	Ext.	**DWAE0630X02S070**	●	13.7	.539	26.1	1.028	28.1	1.106	75.1	2.957	74	2.913	1.1	.043	7	.276	1
					4	Ext.	**DWAE0630X04S070**	●	26.3	1.035	44.1	1.736	46.1	1.815	84.1	3.311	83	3.268	1.1	.043	7	.276	1
6.4	**.2520**				2	Ext.	**DWAE0640X02S070**	●	14.0	.551	26.2	1.031	28.2	1.110	75.2	2.961	74	2.913	1.2	.047	7	.276	1
					4	Ext.	**DWAE0640X04S070**	●	26.8	1.055	44.2	1.740	46.2	1.819	84.2	3.315	83	3.268	1.2	.047	7	.276	1
6.5	**.2559**				2	Ext.	**DWAE0650X02S070**	●	14.2	.559	26.2	1.031	28.2	1.110	75.2	2.961	74	2.913	1.2	.047	7	.276	1
					4	Ext.	**DWAE0650X04S070**	●	27.2	1.071	44.2	1.740	46.2	1.819	84.2	3.315	83	3.268	1.2	.047	7	.276	1
6.6	**.2598**				2	Ext.	**DWAE0660X02S070**	●	14.4	.567	28.2	1.110	30.2	1.189	75.2	2.961	74	2.913	1.2	.047	7	.276	1
					4	Ext.	**DWAE0660X04S070**	●	27.6	1.087	46.2	1.819	48.2	1.898	84.2	3.315	83	3.268	1.2	.047	7	.276	1
6.7	**.2638**				2	Ext.	**DWAE0670X02S070**	●	14.6	.575	28.2	1.110	30.2	1.189	75.2	2.961	74	2.913	1.2	.047	7	.276	1
					4	Ext.	**DWAE0670X04S070**	●	28.0	1.102	46.2	1.819	48.2	1.898	84.2	3.315	83	3.268	1.2	.047	7	.276	1
6.8	**.2677**				2	Ext.	**DWAE0680X02S070**	●	14.8	.583	28.2	1.110	30.2	1.189	75.2	2.961	74	2.913	1.2	.047	7	.276	1
					4	Ext.	**DWAE0680X04S070**	●	28.4	1.118	46.2	1.819	48.2	1.898	84.2	3.315	83	3.268	1.2	.047	7	.276	1
6.9	**.2717**		**I**	**5/16-24**	2	Ext.	**DWAE0690X02S070**	●	15.1	.594	28.3	1.114	30.3	1.193	75.3	2.965	74	2.913	1.3	.051	7	.276	1
					4	Ext.	**DWAE0690X04S070**	●	28.9	1.138	46.3	1.823	48.3	1.902	84.3	3.319	83	3.268	1.3	.051	7	.276	1
7.0	**.2756**			**M8x1.0**	2	Ext.	**DWAE0700X02S070**	●	15.3	.602	28.3	1.114	30.3	1.193	75.3	2.965	74	2.913	1.3	.051	7	.276	1
					4	Ext.	**DWAE0700X04S070**	●	29.3	1.154	46.3	1.823	48.3	1.902	84.3	3.319	83	3.268	1.3	.051	7	.276	1

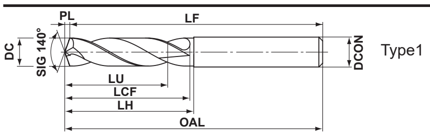
DC = Cutting Diameter
LU = Usable Length
LCF = Length Chip Flute
LH = Neck Length
OAL = Overall Length
LF = Functional Length
PL = Point Length
DCON = Connection Diameter

Solid Carbide Drill for Swiss-type Automatic & Small CNC Lathes

DWAE

DC					L/D	Coolant (Int./Ext.)	Order Number	Stock	LU		LCF		LH		OAL		LF		PL		DCON		Type
Metric (mm)	Decimal (inch)	Fraction (inch)	Wire / Letter	Thread Size				DP102A	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	
7.1	**.2795**				2	Ext.	**DWAE0710X02S080**	●	15.5	.610	29.3	1.154	31.3	1.232	80.3	3.161	79	3.110	1.3	.051	8	.315	1
					4	Ext.	**DWAE0710X04S080**	●	29.7	1.169	51.3	2.020	53.3	2.098	91.3	3.594	90	3.543	1.3	.051	8	.315	1
7.2	**.2835**				2	Ext.	**DWAE0720X02S080**	●	15.7	.618	29.3	1.154	31.3	1.232	80.3	3.161	79	3.110	1.3	.051	8	.315	1
					4	Ext.	**DWAE0720X04S080**	●	30.1	1.185	51.3	2.020	53.3	2.098	91.3	3.594	90	3.543	1.3	.051	8	.315	1
7.3	**.2874**				2	Ext.	**DWAE0730X02S080**	●	15.9	.626	29.3	1.154	31.3	1.232	80.3	3.161	79	3.110	1.3	.051	8	.315	1
					4	Ext.	**DWAE0730X04S080**	●	30.5	1.201	51.3	2.020	53.3	2.098	91.3	3.594	90	3.543	1.3	.051	8	.315	1
7.4	**.2913**				2	Ext.	**DWAE0740X02S080**	●	16.1	.634	29.3	1.154	31.3	1.232	80.3	3.161	79	3.110	1.3	.051	8	.315	1
					4	Ext.	**DWAE0740X04S080**	●	30.9	1.217	51.3	2.020	53.3	2.098	91.3	3.594	90	3.543	1.3	.051	8	.315	1
7.5	**.2953**		**M**		2	Ext.	**DWAE0750X02S080**	●	16.4	.646	29.4	1.157	31.4	1.236	80.4	3.165	79	3.110	1.4	.055	8	.315	1
					4	Ext.	**DWAE0750X04S080**	●	31.4	1.236	51.4	2.024	53.4	2.102	91.4	3.598	90	3.543	1.4	.055	8	.315	1
7.6	**.2992**				2	Ext.	**DWAE0760X02S080**	●	16.6	.654	31.4	1.236	33.4	1.315	80.4	3.165	79	3.110	1.4	.055	8	.315	1
					4	Ext.	**DWAE0760X04S080**	●	31.8	1.252	53.4	2.102	55.4	2.181	91.4	3.598	90	3.543	1.4	.055	8	.315	1
7.7	**.3031**				2	Ext.	**DWAE0770X02S080**	●	16.8	.661	31.4	1.236	33.4	1.315	80.4	3.165	79	3.110	1.4	.055	8	.315	1
					4	Ext.	**DWAE0770X04S080**	●	32.2	1.268	53.4	2.102	55.4	2.181	91.4	3.598	90	3.543	1.4	.055	8	.315	1
7.8	**.3071**				2	Ext.	**DWAE0780X02S080**	●	17.0	.669	31.4	1.236	33.4	1.315	80.4	3.165	79	3.110	1.4	.055	8	.315	1
					4	Ext.	**DWAE0780X04S080**	●	32.6	1.283	53.4	2.102	55.4	2.181	91.4	3.598	90	3.543	1.4	.055	8	.315	1
7.9	**.3110**				2	Ext.	**DWAE0790X02S080**	●	17.2	.677	31.4	1.236	33.4	1.315	80.4	3.165	79	3.110	1.4	.055	8	.315	1
					4	Ext.	**DWAE0790X04S080**	●	33.0	1.299	53.4	2.102	55.4	2.181	91.4	3.598	90	3.543	1.4	.055	8	.315	1
8.0	**.3150**				2	Ext.	**DWAE0800X02S080**	●	17.5	.689	31.5	1.240	33.5	1.319	80.5	3.169	79	3.110	1.5	.059	8	.315	1
					4	Ext.	**DWAE0800X04S080**	●	33.5	1.319	53.5	2.106	55.5	2.185	91.5	3.602	90	3.543	1.5	.059	8	.315	1
8.1	**.3189**				2	Ext.	**DWAE0810X02S090**	●	17.7	.697	33.5	1.319	35.5	1.398	85.5	3.366	84	3.307	1.5	.059	9	.354	1
					4	Ext.	**DWAE0810X04S090**	●	33.9	1.335	57.5	2.264	59.5	2.343	99.5	3.917	98	3.858	1.5	.059	9	.354	1
8.2	**.3228**		**P**		2	Ext.	**DWAE0820X02S090**	●	17.9	.705	33.5	1.319	35.5	1.398	85.5	3.366	84	3.307	1.5	.059	9	.354	1
					4	Ext.	**DWAE0820X04S090**	●	34.3	1.350	57.5	2.264	59.5	2.343	99.5	3.917	98	3.858	1.5	.059	9	.354	1
8.3	**.3268**				2	Ext.	**DWAE0830X02S090**	●	18.1	.713	33.5	1.319	35.5	1.398	85.5	3.366	84	3.307	1.5	.059	9	.354	1
					4	Ext.	**DWAE0830X04S090**	●	34.7	1.366	57.5	2.264	59.5	2.343	99.5	3.917	98	3.858	1.5	.059	9	.354	1
8.4	**.3307**				2	Ext.	**DWAE0840X02S090**	●	18.3	.720	33.5	1.319	35.5	1.398	85.5	3.366	84	3.307	1.5	.059	9	.354	1
					4	Ext.	**DWAE0840X04S090**	●	35.1	1.382	57.5	2.264	59.5	2.343	99.5	3.917	98	3.858	1.5	.059	9	.354	1
8.5	**.3346**			**M10x1.5**	2	Ext.	**DWAE0850X02S090**	●	18.5	.728	33.5	1.319	35.5	1.398	85.5	3.366	84	3.307	1.5	.059	9	.354	1
					4	Ext.	**DWAE0850X04S090**	●	35.5	1.398	57.5	2.264	59.5	2.343	99.5	3.917	98	3.858	1.5	.059	9	.354	1
8.6	**.3386**		**R**		2	Ext.	**DWAE0860X02S090**	●	18.8	.740	34.6	1.362	36.6	1.441	85.6	3.370	84	3.307	1.6	.063	9	.354	1
					4	Ext.	**DWAE0860X04S090**	●	36.0	1.417	61.6	2.425	63.6	2.504	99.6	3.921	98	3.858	1.6	.063	9	.354	1
8.7	**.3425**			**M10x1.25**	2	Ext.	**DWAE0870X02S090**	●	19.0	.748	34.6	1.362	36.6	1.441	85.6	3.370	84	3.307	1.6	.063	9	.354	1
					4	Ext.	**DWAE0870X04S090**	●	36.4	1.433	61.6	2.425	63.6	2.504	99.6	3.921	98	3.858	1.6	.063	9	.354	1
8.8	**.3465**				2	Ext.	**DWAE0880X02S090**	●	19.2	.756	34.6	1.362	36.6	1.441	85.6	3.370	84	3.307	1.6	.063	9	.354	1
					4	Ext.	**DWAE0880X04S090**	●	36.8	1.449	61.6	2.425	63.6	2.504	99.6	3.921	98	3.858	1.6	.063	9	.354	1
8.9	**.3504**				2	Ext.	**DWAE0890X02S090**	●	19.4	.764	34.6	1.362	36.6	1.441	85.6	3.370	84	3.307	1.6	.063	9	.354	1
					4	Ext.	**DWAE0890X04S090**	●	37.2	1.465	61.6	2.425	63.6	2.504	99.6	3.921	98	3.858	1.6	.063	9	.354	1
9.0	**.3543**				2	Ext.	**DWAE0900X02S090**	●	19.6	.772	34.6	1.362	36.6	1.441	85.6	3.370	84	3.307	1.6	.063	9	.354	1
					4	Ext.	**DWAE0900X04S090**	●	37.6	1.480	61.6	2.425	63.6	2.504	99.6	3.921	98	3.858	1.6	.063	9	.354	1
9.1	**.3583**		**T**		2	Ext.	**DWAE0910X02S100**	●	19.9	.783	36.7	1.445	38.7	1.524	90.7	3.571	89	3.504	1.7	.067	10	.394	1
					4	Ext.	**DWAE0910X04S100**	●	38.1	1.500	63.7	2.508	65.7	2.587	106.7	4.201	105	4.134	1.7	.067	10	.394	1
9.2	**.3622**				2	Ext.	**DWAE0920X02S100**	●	20.1	.791	36.7	1.445	38.7	1.524	90.7	3.571	89	3.504	1.7	.067	10	.394	1
					4	Ext.	**DWAE0920X04S100**	●	38.5	1.516	63.7	2.508	65.7	2.587	106.7	4.201	105	4.134	1.7	.067	10	.394	1
9.3	**.3661**				2	Ext.	**DWAE0930X02S100**	●	20.3	.799	36.7	1.445	38.7	1.524	90.7	3.571	89	3.504	1.7	.067	10	.394	1
					4	Ext.	**DWAE0930X04S100**	●	38.9	1.531	63.7	2.508	65.7	2.587	106.7	4.201	105	4.134	1.7	.067	10	.394	1
9.4	**.3701**				2	Ext.	**DWAE0940X02S100**	●	20.5	.807	36.7	1.445	38.7	1.524	90.7	3.571	89	3.504	1.7	.067	10	.394	1
					4	Ext.	**DWAE0940X04S100**	●	39.3	1.547	63.7	2.508	65.7	2.587	106.7	4.201	105	4.134	1.7	.067	10	.394	1
9.5	**.3740**				2	Ext.	**DWAE0950X02S100**	●	20.7	.815	36.7	1.445	38.7	1.524	90.7	3.571	89	3.504	1.7	.067	10	.394	1
					4	Ext.	**DWAE0950X04S100**	●	39.7	1.563	63.7	2.508	65.7	2.587	106.7	4.201	105	4.134	1.7	.067	10	.394	1

● : USA Stock



DC								Stock																
Metric (mm)	Decimal	Fraction	Wire / Letter	Thread Size	L/D	Coolant (Int./Ext.)	Order Number	DP102A	LU		LCF		LH		OAL		LF		PL		DCON		Type
	(inch)								mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	
9.6	**.3780**				2	Ext.	**DWAE0960X02S100**	●	20.9	.823	37.7	1.484	39.7	1.563	90.7	3.571	89	3.504	1.7	.067	10	.394	1
					4	Ext.	**DWAE0960X04S100**	●	40.1	1.579	66.7	2.626	68.7	2.705	106.7	4.201	105	4.134	1.7	.067	10	.394	1
9.7	**.3819**		Tube Sheet		2	Ext.	**DWAE0970X02S100**	●	21.2	.835	37.8	1.488	39.8	1.567	90.8	3.575	89	3.504	1.8	.071	10	.394	1
					4	Ext.	**DWAE0970X04S100**	●	40.6	1.598	66.8	2.630	68.8	2.709	106.8	4.205	105	4.134	1.8	.071	10	.394	1
9.8	**.3858**		**W**		2	Ext.	**DWAE0980X02S100**	●	21.4	.843	37.8	1.488	39.8	1.567	90.8	3.575	89	3.504	1.8	.071	10	.394	1
					4	Ext.	**DWAE0980X04S100**	●	41.0	1.614	66.8	2.630	68.8	2.709	106.8	4.205	105	4.134	1.8	.071	10	.394	1
9.9	**.3898**				2	Ext.	**DWAE0990X02S100**	●	21.6	.850	37.8	1.488	39.8	1.567	90.8	3.575	89	3.504	1.8	.071	10	.394	1
					4	Ext.	**DWAE0990X04S100**	●	41.4	1.630	66.8	2.630	68.8	2.709	106.8	4.205	105	4.134	1.8	.071	10	.394	1
10.0	**.3937**				2	Ext.	**DWAE1000X02S100**	●	21.8	.858	37.8	1.488	39.8	1.567	90.8	3.575	89	3.504	1.8	.071	10	.394	1
					4	Ext.	**DWAE1000X04S100**	●	41.8	1.646	66.8	2.630	68.8	2.709	106.8	4.205	105	4.134	1.8	.071	10	.394	1
10.1	**.3976**				2	Ext.	**DWAE1010X02S110**	●	22.0	.866	40.8	1.606	42.8	1.685	101.8	4.008	100	3.937	1.8	.071	11	.433	1
					4	Ext.	**DWAE1010X04S110**	●	42.2	1.661	71.8	2.827	73.8	2.906	115.8	4.559	114	4.488	1.8	.071	11	.433	1
10.2	**.4016**			M12x1.75	2	Ext.	**DWAE1020X02S110**	●	22.3	.878	40.9	1.610	42.9	1.689	101.9	4.012	100	3.937	1.9	.075	11	.433	1
					4	Ext.	**DWAE1020X04S110**	●	42.7	1.681	71.9	2.831	73.9	2.909	115.9	4.563	114	4.488	1.9	.075	11	.433	1
10.3	**.4055**				2	Ext.	**DWAE1030X02S110**	●	22.5	.886	40.9	1.610	42.9	1.689	101.9	4.012	100	3.937	1.9	.075	11	.433	1
					4	Ext.	**DWAE1030X04S110**	●	43.1	1.697	71.9	2.831	73.9	2.909	115.9	4.563	114	4.488	1.9	.075	11	.433	1
10.4	**.4094**				2	Ext.	**DWAE1040X02S110**	●	22.7	.894	40.9	1.610	42.9	1.689	101.9	4.012	100	3.937	1.9	.075	11	.433	1
					4	Ext.	**DWAE1040X04S110**	●	43.5	1.713	71.9	2.831	73.9	2.909	115.9	4.563	114	4.488	1.9	.075	11	.433	1
10.5	**.4134**		**Z**		2	Ext.	**DWAE1050X02S110**	●	22.9	.902	40.9	1.610	42.9	1.689	101.9	4.012	100	3.937	1.9	.075	11	.433	1
					4	Ext.	**DWAE1050X04S110**	●	43.9	1.728	71.9	2.831	73.9	2.909	115.9	4.563	114	4.488	1.9	.075	11	.433	1
10.6	**.4173**				2	Ext.	**DWAE1060X02S110**	●	23.1	.909	41.9	1.650	43.9	1.728	101.9	4.012	100	3.937	1.9	.075	11	.433	1
					4	Ext.	**DWAE1060X04S110**	●	44.3	1.744	72.9	2.870	74.9	2.949	115.9	4.563	114	4.488	1.9	.075	11	.433	1
10.7	**.4213**				2	Ext.	**DWAE1070X02S110**	●	23.3	.917	41.9	1.650	43.9	1.728	101.9	4.012	100	3.937	1.9	.075	11	.433	1
					4	Ext.	**DWAE1070X04S110**	●	44.7	1.760	72.9	2.870	74.9	2.949	115.9	4.563	114	4.488	1.9	.075	11	.433	1
10.8	**.4252**			M12x1.25	2	Ext.	**DWAE1080X02S110**	●	23.6	.929	42.0	1.654	44.0	1.732	102.0	4.016	100	3.937	2.0	.079	11	.433	1
					4	Ext.	**DWAE1080X04S110**	●	45.2	1.780	73.0	2.874	75.0	2.953	116.0	4.567	114	4.488	2.0	.079	11	.433	1
10.9	**.4291**				2	Ext.	**DWAE1090X02S110**	●	23.8	.937	42.0	1.654	44.0	1.732	102.0	4.016	100	3.937	2.0	.079	11	.433	1
					4	Ext.	**DWAE1090X04S110**	●	45.6	1.795	73.0	2.874	75.0	2.953	116.0	4.567	114	4.488	2.0	.079	11	.433	1
11.0	**.4331**				2	Ext.	**DWAE1100X02S110**	●	24.0	.945	42.0	1.654	44.0	1.732	102.0	4.016	100	3.937	2.0	.079	11	.433	1
					4	Ext.	**DWAE1100X04S110**	●	46.0	1.811	73.0	2.874	75.0	2.953	116.0	4.567	114	4.488	2.0	.079	11	.433	1
11.1	**.4370**				2	Ext.	**DWAE1110X02S120**	●	24.2	.953	45.0	1.772	47.0	1.850	102.0	4.016	100	3.937	2.0	.079	12	.472	1
					4	Ext.	**DWAE1110X04S120**	●	46.4	1.827	77.0	3.031	79.0	3.110	123.0	4.843	121	4.764	2.0	.079	12	.472	1
11.2	**.4409**				2	Ext.	**DWAE1120X02S120**	●	24.4	.961	45.0	1.772	47.0	1.850	102.0	4.016	100	3.937	2.0	.079	12	.472	1
					4	Ext.	**DWAE1120X04S120**	●	46.8	1.843	77.0	3.031	79.0	3.110	123.0	4.843	121	4.764	2.0	.079	12	.472	1
11.3	**.4449**				2	Ext.	**DWAE1130X02S120**	●	24.7	.972	45.1	1.776	47.1	1.854	102.1	4.020	100	3.937	2.1	.083	12	.472	1
					4	Ext.	**DWAE1130X04S120**	●	47.3	1.862	77.1	3.035	79.1	3.114	123.1	4.846	121	4.764	2.1	.083	12	.472	1
11.4	**.4488**				2	Ext.	**DWAE1140X02S120**	●	24.9	.980	45.1	1.776	47.1	1.854	102.1	4.020	100	3.937	2.1	.083	12	.472	1
					4	Ext.	**DWAE1140X04S120**	●	47.7	1.878	77.1	3.035	79.1	3.114	123.1	4.846	121	4.764	2.1	.083	12	.472	1
11.5	**.4528**				2	Ext.	**DWAE1150X02S120**	●	25.1	.988	45.1	1.776	47.1	1.854	102.1	4.020	100	3.937	2.1	.083	12	.472	1
					4	Ext.	**DWAE1150X04S120**	●	48.1	1.894	77.1	3.035	79.1	3.114	123.1	4.846	121	4.764	2.1	.083	12	.472	1
11.6	**.4567**				2	Ext.	**DWAE1160X02S120**	●	25.3	.996	47.1	1.854	49.1	1.933	102.1	4.020	100	3.937	2.1	.083	12	.472	1
					4	Ext.	**DWAE1160X04S120**	●	48.5	1.909	79.1	3.114	81.1	3.193	123.1	4.846	121	4.764	2.1	.083	12	.472	1
11.7	**.4606**				2	Ext.	**DWAE1170X02S120**	●	25.5	1.004	47.1	1.854	49.1	1.933	102.1	4.020	100	3.937	2.1	.083	12	.472	1
					4	Ext.	**DWAE1170X04S120**	●	48.9	1.925	79.1	3.114	81.1	3.193	123.1	4.846	121	4.764	2.1	.083	12	.472	1
11.8	**.4646**				2	Ext.	**DWAE1180X02S120**	●	25.7	1.012	47.1	1.854	49.1	1.933	102.1	4.020	100	3.937	2.1	.083	12	.472	1
					4	Ext.	**DWAE1180X04S120**	●	49.3	1.941	79.1	3.114	81.1	3.193	123.1	4.846	121	4.764	2.1	.083	12	.472	1
11.9	**.4685**				2	Ext.	**DWAE1190X02S120**	●	26.0	1.024	47.2	1.858	49.2	1.937	102.2	4.024	100	3.937	2.2	.087	12	.472	1
					4	Ext.	**DWAE1190X04S120**	●	49.8	1.961	79.2	3.118	81.2	3.197	123.2	4.850	121	4.764	2.2	.087	12	.472	1
12.0	**.4724**			M14x2.0	2	Ext.	**DWAE1200X02S120**	●	26.2	1.031	47.2	1.858	49.2	1.937	102.2	4.024	100	3.937	2.2	.087	12	.472	1
					4	Ext.	**DWAE1200X04S120**	●	50.2	1.976	79.2	3.118	81.2	3.197	123.2	4.850	121	4.764	2.2	.087	12	.472	1

DC = Cutting Diameter
LU = Usable Length
LCF = Length Chip Flute
LH = Neck Length
OAL = Overall Length
LF = Functional Length
PL = Point Length
DCON = Connection Diameter

DWAE

DC			Wire / Letter	Thread Size	L/D	Coolant (Int./Ext.)	Order Number	Stock	LU		LCF		LH		OAL		LF		PL		DCON		Type
Metric (mm)	Decimal	Fraction						DP102A	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	
	(inch)																						
12.1	**.4764**				2	Ext.	**DWAE1210X02S130**	●	26.4	1.039	49.2	1.937	51.2	2.016	102.2	4.024	100	3.937	2.2	.087	13	.512	1
					4	Ext.	**DWAE1210X04S130**	●	50.6	1.992	82.2	3.236	84.2	3.315	139.2	5.480	137	5.394	2.2	.087	13	.512	1
12.2	**.4803**				2	Ext.	**DWAE1220X02S130**	●	26.6	1.047	49.2	1.937	51.2	2.016	102.2	4.024	100	3.937	2.2	.087	13	.512	1
					4	Ext.	**DWAE1220X04S130**	●	51.0	2.008	82.2	3.236	84.2	3.315	139.2	5.480	137	5.394	2.2	.087	13	.512	1
12.3	**.4843**			**9/16-12**	2	Ext.	**DWAE1230X02S130**	●	26.8	1.055	49.2	1.937	51.2	2.016	102.2	4.024	100	3.937	2.2	.087	13	.512	1
					4	Ext.	**DWAE1230X04S130**	●	51.4	2.024	82.2	3.236	84.2	3.315	139.2	5.480	137	5.394	2.2	.087	13	.512	1
12.4	**.4882**				2	Ext.	**DWAE1240X02S130**	●	27.1	1.067	49.3	1.941	51.3	2.020	102.3	4.028	100	3.937	2.3	.091	13	.512	1
					4	Ext.	**DWAE1240X04S130**	●	51.9	2.043	82.3	3.240	84.3	3.319	139.3	5.484	137	5.394	2.3	.091	13	.512	1
12.5	**.4921**			**M14x1.5**	2	Ext.	**DWAE1250X02S130**	●	27.3	1.075	49.3	1.941	51.3	2.020	102.3	4.028	100	3.937	2.3	.091	13	.512	1
					4	Ext.	**DWAE1250X04S130**	●	52.3	2.059	82.3	3.240	84.3	3.319	139.3	5.484	137	5.394	2.3	.091	13	.512	1
12.6	**.4961**				2	Ext.	**DWAE1260X02S130**	●	27.5	1.083	52.3	2.059	54.3	2.138	102.3	4.028	100	3.937	2.3	.091	13	.512	1
					4	Ext.	**DWAE1260X04S130**	●	52.7	2.075	84.3	3.319	86.3	3.398	139.3	5.484	137	5.394	2.3	.091	13	.512	1
12.7	**.5000**	**1/2**			2	Ext.	**DWAE1270X02S130**	●	27.7	1.091	52.3	2.059	54.3	2.138	102.3	4.028	100	3.937	2.3	.091	13	.512	1
					4	Ext.	**DWAE1270X04S130**	●	53.1	2.091	84.3	3.319	86.3	3.398	139.3	5.484	137	5.394	2.3	.091	13	.512	1
12.8	**.5039**				2	Ext.	**DWAE1280X02S130**	●	27.9	1.098	52.3	2.059	54.3	2.138	102.3	4.028	100	3.937	2.3	.091	13	.512	1
					4	Ext.	**DWAE1280X04S130**	●	53.5	2.106	84.3	3.319	86.3	3.398	139.3	5.484	137	5.394	2.3	.091	13	.512	1
12.9	**.5079**				2	Ext.	**DWAE1290X02S130**	●	28.1	1.106	52.3	2.059	54.3	2.138	102.3	4.028	100	3.937	2.3	.091	13	.512	1
					4	Ext.	**DWAE1290X04S130**	●	53.9	2.122	84.3	3.319	86.3	3.398	139.3	5.484	137	5.394	2.3	.091	13	.512	1
13.0	**.5118**				2	Ext.	**DWAE1300X02S130**	●	28.4	1.118	52.4	2.063	54.4	2.142	102.4	4.031	100	3.937	2.4	.094	13	.512	1
					4	Ext.	**DWAE1300X04S130**	●	54.4	2.142	84.4	3.323	86.4	3.402	139.4	5.488	137	5.394	2.4	.094	13	.512	1
13.1	**.5157**			**9/16-18**	2	Ext.	**DWAE1310X02S140**	●	28.6	1.126	55.4	2.181	57.4	2.260	102.4	4.031	100	3.937	2.4	.094	14	.551	1
					4	Ext.	**DWAE1310X04S140**	●	54.8	2.157	92.4	3.638	94.4	3.717	149.4	5.882	147	5.787	2.4	.094	14	.551	1
13.2	**.5197**				2	Ext.	**DWAE1320X02S140**	●	28.8	1.134	55.4	2.181	57.4	2.260	102.4	4.031	100	3.937	2.4	.094	14	.551	1
					4	Ext.	**DWAE1320X04S140**	●	55.2	2.173	92.4	3.638	94.4	3.717	149.4	5.882	147	5.787	2.4	.094	14	.551	1
13.3	**.5236**				2	Ext.	**DWAE1330X02S140**	●	29.0	1.142	55.4	2.181	57.4	2.260	102.4	4.031	100	3.937	2.4	.094	14	.551	1
					4	Ext.	**DWAE1330X04S140**	●	55.6	2.189	92.4	3.638	94.4	3.717	149.4	5.882	147	5.787	2.4	.094	14	.551	1
13.4	**.5276**				2	Ext.	**DWAE1340X02S140**	●	29.2	1.150	55.4	2.181	57.4	2.260	102.4	4.031	100	3.937	2.4	.094	14	.551	1
					4	Ext.	**DWAE1340X04S140**	●	56.0	2.205	92.4	3.638	94.4	3.717	149.4	5.882	147	5.787	2.4	.094	14	.551	1
13.5	**.5315**			**5/8-11**	2	Ext.	**DWAE1350X02S140**	●	29.5	1.161	55.5	2.185	57.5	2.264	102.5	4.035	100	3.937	2.5	.098	14	.551	1
					4	Ext.	**DWAE1350X04S140**	●	56.5	2.224	92.5	3.642	94.5	3.720	149.5	5.886	147	5.787	2.5	.098	14	.551	1
13.6	**.5354**				2	Ext.	**DWAE1360X02S140**	●	29.7	1.169	57.5	2.264	59.5	2.343	102.5	4.035	100	3.937	2.5	.098	14	.551	1
					4	Ext.	**DWAE1360X04S140**	●	56.9	2.240	97.5	3.839	99.5	3.917	149.5	5.886	147	5.787	2.5	.098	14	.551	1
13.7	**.5394**				2	Ext.	**DWAE1370X02S140**	●	29.9	1.177	57.5	2.264	59.5	2.343	102.5	4.035	100	3.937	2.5	.098	14	.551	1
					4	Ext.	**DWAE1370X04S140**	●	57.3	2.256	97.5	3.839	99.5	3.917	149.5	5.886	147	5.787	2.5	.098	14	.551	1
13.8	**.5433**				2	Ext.	**DWAE1380X02S140**	●	30.1	1.185	57.5	2.264	59.5	2.343	102.5	4.035	100	3.937	2.5	.098	14	.551	1
					4	Ext.	**DWAE1380X04S140**	●	57.7	2.272	97.5	3.839	99.5	3.917	149.5	5.886	147	5.787	2.5	.098	14	.551	1
13.9	**.5472**				2	Ext.	**DWAE1390X02S140**	●	30.3	1.193	57.5	2.264	59.5	2.343	102.5	4.035	100	3.937	2.5	.098	14	.551	1
					4	Ext.	**DWAE1390X04S140**	●	58.1	2.287	97.5	3.839	99.5	3.917	149.5	5.886	147	5.787	2.5	.098	14	.551	1
14.0	**.5512**			**M16x2.0**	2	Ext.	**DWAE1400X02S140**	●	30.5	1.201	57.5	2.264	59.5	2.343	102.5	4.035	100	3.937	2.5	.098	14	.551	1
					4	Ext.	**DWAE1400X04S140**	●	58.5	2.303	97.5	3.839	99.5	3.917	149.5	5.886	147	5.787	2.5	.098	14	.551	1

DC = Cutting Diameter
LU = Usable Length
LCF = Length Chip Flute
LH = Neck Length
OAL = Overall Length
LF = Functional Length
PL = Point Length
DCON = Connection Diameter

● : USA Stock

Recommended Cutting Conditions

(inch)

Workpiece Material			Mild Steels (≤180HB) AISI 1010 etc.		Carbon Steels, Alloy Steels (180—250HB) AISI 1045,4140 etc.	
DC		L/D	Cutting Speed **vc** (SFM)	Feed **fr** (Min.—Max.) (IPR)	Cutting Speed **vc** (SFM)	Feed **fr** (Min.—Max.) (IPR)
mm	inch					
1.0	**.0394**	**2, 4**	100	.0012 (.0008—.0016)	100	.0012 (.0008—.0016)
1.5	**.0591**	**2, 4**	100	.0020 (.0012—.0024)	100	.0020 (.0012—.0024)
2.0	**.0787**	**2, 4**	180	.0024 (.0016—.0031)	180	.0024 (.0016—.0031)
2.5	**.0984**	**2, 4**	180	.0031 (.0020—.0039)	180	.0031 (.0020—.0039)
3.0	**.1181**	**2, 4**	210	.0035 (.0028—.0043)	195	.0035 (.0028—.0043)
4.0	**.1575**	**2, 4**	230	.0045 (.0035—.0055)	210	.0045 (.0035—.0055)
5.0	**.1969**	**2, 4**	230	.0057 (.0043—.0071)	210	.0057 (.0043—.0071)
6.0	**.2362**	**2, 4**	260	.0069 (.0055—.0083)	245	.0069 (.0055—.0083)
7.0	**.2756**	**2, 4**	260	.0081 (.0063—.0098)	245	.0081 (.0063—.0098)
8.0	**.3150**	**2, 4**	280	.0091 (.0071—.0110)	260	.0091 (.0071—.0110)
10.0	**.3937**	**2, 4**	295	.0104 (.0083—.0126)	280	.0104 (.0083—.0126)
12.0	**.4724**	**2, 4**	310	.0110 (.0087—.0134)	295	.0110 (.0087—.0134)
14.0	**.5512**	**2, 4**	310	.0114 (.0091—.0138)	295	.0114 (.0091—.0138)

Workpiece Material			Carbon Steels, Alloy Steels (280—350HB) AISI 4340 etc.		Austenitic Stainless Steels (≤200HB) Ferritic, Precipitation Hardening Stainless Steels (>200HB) with water-insoluble coolant AISI 304, 431 etc.	
DC		L/D	Cutting Speed **vc** (SFM)	Feed **fr** (Min.—Max.) (IPR)	Cutting Speed **vc** (SFM)	Feed **fr** (Min.—Max.) (IPR)
mm	inch					
1.0	**.0394**	**2, 4**	80	.0008 (.0004—.0012)	100	.0008 (.0004—.0012)
1.5	**.0591**	**2, 4**	80	.0016 (.0008—.0020)	100	.0016 (.0008—.0020)
2.0	**.0787**	**2, 4**	165	.0020 (.0012—.0028)	115	.0016 (.0008—.0024)
2.5	**.0984**	**2, 4**	165	.0028 (.0016—.0035)	115	.0024 (.0012—.0031)
3.0	**.1181**	**2, 4**	180	.0030 (.0024—.0035)	130	.0028 (.0016—.0039)
4.0	**.1575**	**2, 4**	195	.0041 (.0031—.0051)	130	.0030 (.0020—.0039)
5.0	**.1969**	**2, 4**	195	.0051 (.0039—.0063)	130	.0039 (.0020—.0059)
6.0	**.2362**	**2, 4**	230	.0061 (.0047—.0075)	130	.0041 (.0024—.0059)
7.0	**.2756**	**2, 4**	230	.0071 (.0055—.0087)	130	.0047 (.0024—.0071)
8.0	**.3150**	**2, 4**	245	.0081 (.0063—.0098)	130	.0051 (.0024—.0079)
10.0	**.3937**	**2, 4**	260	.0094 (.0079—.0110)	130	.0055 (.0031—.0079)
12.0	**.4724**	**2, 4**	280	.0098 (.0079—.0118)	130	.0069 (.0039—.0098)
14.0	**.5512**	**2, 4**	280	.0098 (.0079—.0118)	130	.0069 (.0039—.0098)

Note 1) The above cutting conditions is with the water soluble coolant is used. For stainless steels, water-insoluble coolant is recommended.
Note 2) When using a water-insoluble coolant, reduce the cutting speed by 20% to ensure adequate lubrication.
Note 3) Check the condition of chips and perform step machining if necessary. * Reference of step length: .2 to 1.0 DC
Note 4) Adjust the cutting conditions according to machine tool and workpiece clamp rigidity and machining geometry, etc.
Note 5) Machining depths exceeding flute length (LU) are not recommended.
Note 6) Clamp the drill so that the drill runout is within .0012”.
Note 7) Do not clamp the flute part of the drill.

DWAE

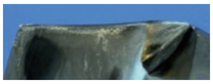
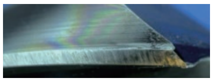
Recommended Cutting Conditions

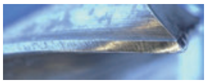
(inch)

Workpiece Material			Gray Cast Irons (≤350MPa) AISI No.45B etc.		Ductile Cast Irons (≤450MPa) AISI 60-40-18 etc.	
DC		L/D	Cutting Speed **vc** (SFM)	Feed **fr** (Min.—Max.) (IPR)	Cutting Speed **vc** (SFM)	Feed **fr** (Min.—Max.) (IPR)
mm	inch					
1.0	**.0394**	**2, 4**	100	.0012 (.0008—.0016)	80	.0008 (.0004—.0012)
1.5	**.0591**	**2, 4**	100	.0020 (.0012—.0024)	80	.0016 (.0008—.0020)
2.0	**.0787**	**2, 4**	180	.0024 (.0016—.0031)	165	.0020 (.0012—.0028)
2.5	**.0984**	**2, 4**	180	.0031 (.0020—.0039)	165	.0028 (.0016—.0035)
3.0	**.1181**	**2, 4**	195	.0041 (.0024—.0059)	180	.0033 (.0020—.0047)
4.0	**.1575**	**2, 4**	210	.0051 (.0031—.0071)	195	.0047 (.0028—.0067)
5.0	**.1969**	**2, 4**	210	.0059 (.0039—.0079)	195	.0055 (.0031—.0079)
6.0	**.2362**	**2, 4**	245	.0069 (.0047—.0091)	230	.0059 (.0039—.0079)
7.0	**.2756**	**2, 4**	245	.0069 (.0047—.0091)	230	.0069 (.0047—.0091)
8.0	**.3150**	**2, 4**	260	.0083 (.0067—.0098)	245	.0079 (.0059—.0098)
10.0	**.3937**	**2, 4**	280	.0091 (.0071—.0110)	260	.0091 (.0071—.0110)
12.0	**.4724**	**2, 4**	295	.0098 (.0079—.0118)	280	.0098 (.0079—.0118)
14.0	**.5512**	**2, 4**	295	.0098 (.0079—.0118)	280	.0098 (.0079—.0118)

Note 1) The above cutting conditions is with the water soluble coolant is used. For stainless steels, water-insoluble coolant is recommended.
Note 2) When using a water-insoluble coolant, reduce the cutting speed by 20% to ensure adequate lubrication.
Note 3) Check the condition of chips and perform step machining if necessary. * Reference of step length: .2 to 1.0 DC
Note 4) Adjust the cutting conditions according to machine tool and workpiece clamp rigidity and machining geometry, etc.
Note 5) Machining depths exceeding flute length (LU) are not recommended.
Note 6) Clamp the drill so that the drill runout is within .0012”.
Note 7) Do not clamp the flute part of the drill.

Application Example

Drill		Conventional	**DWAE1080X02S110**
Workpiece		KM-62F Electromagnetic Stainless Steel	
Cutting Conditions	Cutting Speed **vc**(SFM)	235	
	Feed per Rev. **fr**(IPR)	.010	
	Guide Hole Dia. (inch)	.425	
	Hole Depth (inch)	.551	
Cutting Mode		Wet Cutting Extarnal Coolant (Water-insoluble)	
Machine		CNC Automatic Lathe	
Number of Holes		4000 Holes	8000 Holes
Results		Rake Face  Flank  Material welded on the cutting edge  Margin 	Rake Face  Flank  Margin 
		As compared with conventional drill, the cutting resistance of DWAE was lower therefore it didn't have chipping on the cutting edge and achieved double long tool life.	

Drill		Conventional	**DWAE0300X04S030**
Workpiece		AISI 1010 Mild Steel	
Cutting Conditions	Cutting Speed **vc**(SFM)	155	170
	Feed per Rev. **fr**(IPR)	.0024	.0031
	Guide Hole Dia. (inch)	.118	
	Hole Depth (inch)	.276	
Cutting Mode		Wet Cutting Extarnal Coolant (Water-soluble)	
Machine		—	
Number of Holes		2000 Holes	4800 Holes
Results		Rake Face  Chipping Flank  Margin 	Rake Face  Flank  Margin 
		Compared to conventional drill, cutting resistance is lower and cutting conditions have been improved about 1.5 times more efficiently, while achieving a 2.4 times longer life.	

The above application examples are customer's applications, so it can be different from the recommended conditions.

Solid Carbide Drill for Swiss-type Automatic & Small CNC Lathes
WSTAR Drill Series

DWAE

DIAEDGE

TOOL NEWS

2022.4 Update
B256A

Solid Carbide Drill for Machining Heat Resistant Alloys

DSA Series

New Products

For Long Tool Life when Machining Heat Resistant Super Alloys

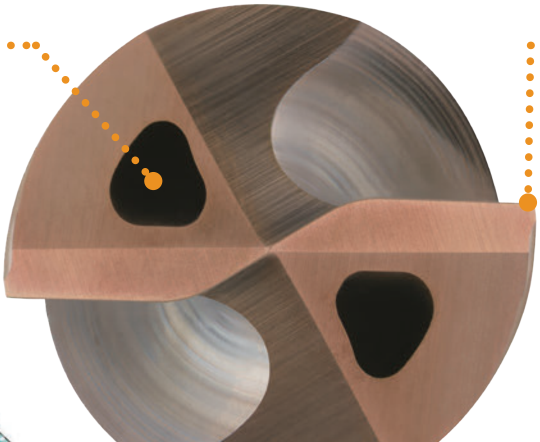
MITSUBISHI MATERIALS CORPORATION

Solid Carbide Drill for Machining Heat Resistant Alloys

DSA Series

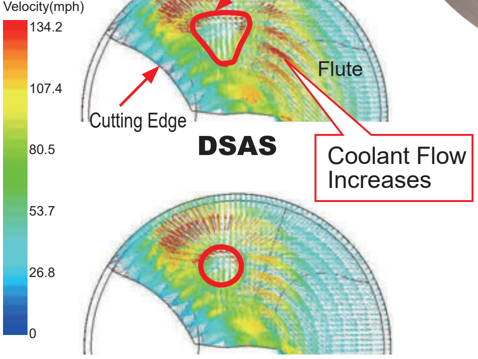
TRI-Cooling Technology

The unique hole geometry increases the coolant flow rate, resulting in high lubricity and cooling effect. (available in sizes over : ø.1969 inch or ø 5 mm)

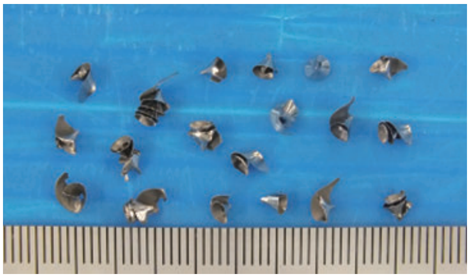


Straight Cutting Edge with Single-Pass Honing

The tough straight cutting edge with single-pass honing enables stable chip formation as well as preventing the cutting edge from chipping.



Comparison of Coolant Flow Rate
(Spindle Speed 4700 min^{-1})



DSAS

Conventional

New Grade for Machining of Heat Resistant Alloys DP9020

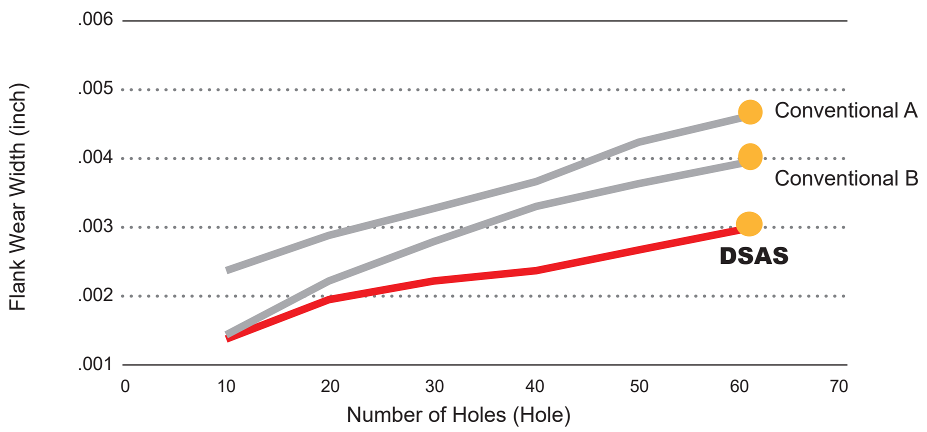
New hard grade provides both high wear and fracture resistance, leading to longer tool life.

Special Margin

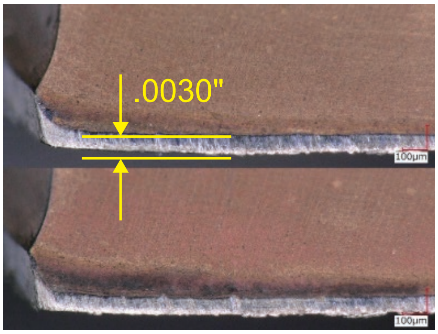
The specially designed thin margin minimizes contact area with hole surface and workpiece materials in combination with tri-cooling technology to reduce cutting heat and prevent the generation of work-hardening making it especially suited for the machining of heat resistant alloys.

Cutting Performance

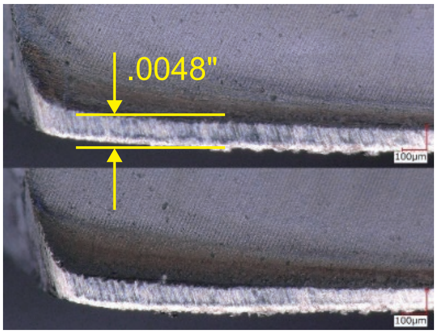
Comparison of Flank Wear Width by Inconel 718



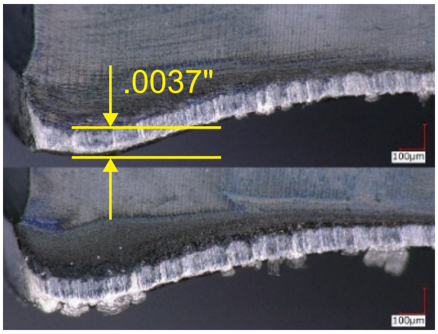
<Cutting Conditions>
Workpiece Material : Inconel 718
Tool : DSAS0700X03S080
Drill Dia. : DC= .2756 inch
Hole Depth : .470 inch (l= DCx 1.7)
Cutting Speed : vc= 50 SFM
Feed per Rev. : fr= .0039 IPR
Cutting Mode : Internal Coolant (Water-soluble Coolants)
Machine : Vertical MC



DSAS

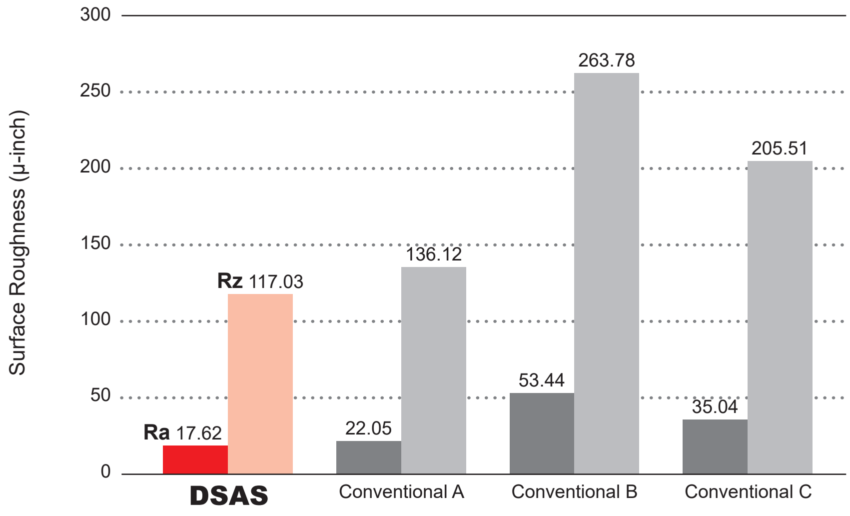


Conventional A



Conventional B

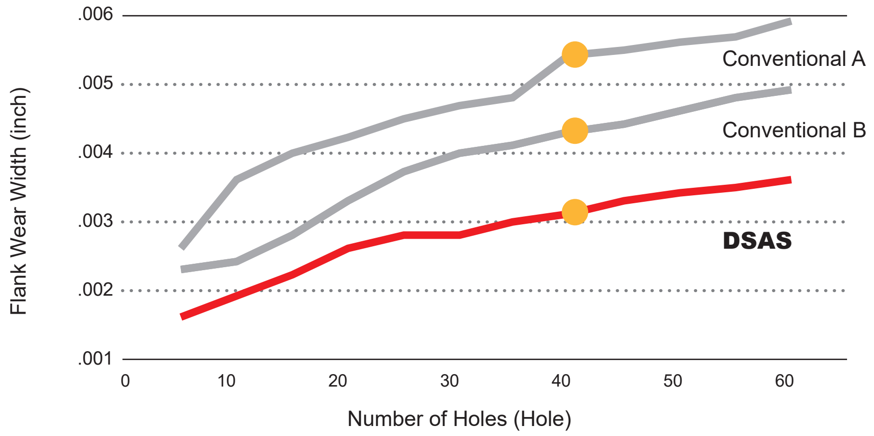
Comparison of Wall Surface Roughness by Inconel 718



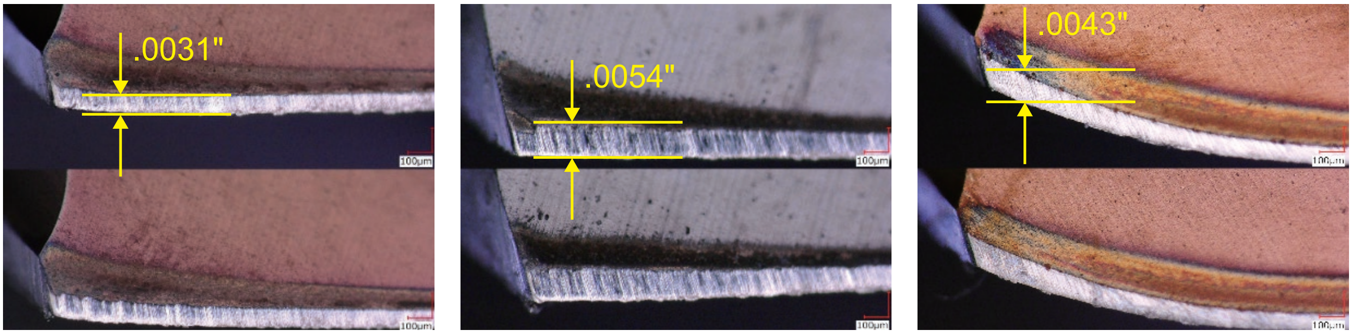
<Cutting Conditions>
Workpiece Material : Inconel 718
Tool : DSAS0700X03S080
Drill Dia. : DC= .2756 inch
Hole Depth : .390 inch (l= DCx 1.4)
Cutting Speed : vc= 50 SFM
Feed per Rev. : fr= .0039 IPR
Cutting Mode : Internal Coolant (Water-soluble Coolants)
Machine : Vertical MC

Cutting Performance

Comparison of Flank Wear Width by RENE 41

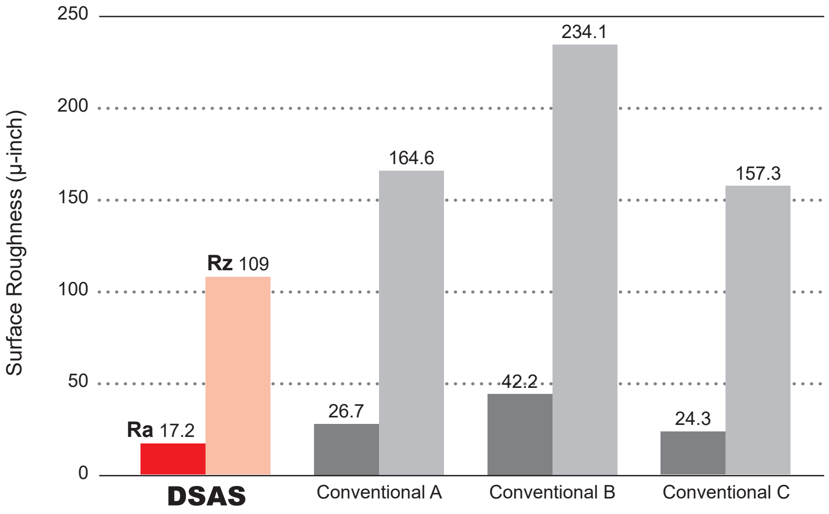


<Cutting Conditions>
Workpiece Material : RENE 41
Tool : DSAS0690X03S080
Drill Dia. : DC= .2717 inch
Hole Depth : .390 inch (l= DCx 1.4)
Cutting Speed : vc= 50 SFM
Feed per Rev. : fr= .0039 IPR
Cutting Mode : Internal Coolant (Water-soluble Coolants)
Machine : Vertical MC



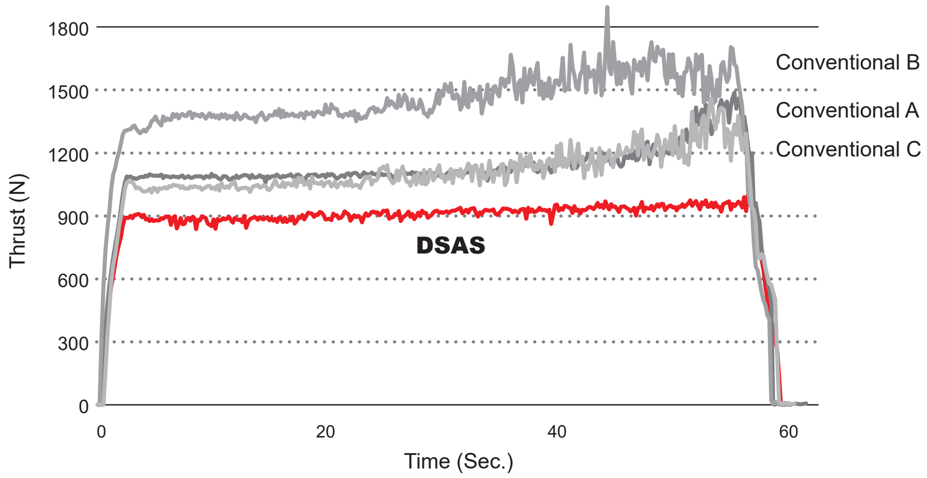
DSAS Conventional A Conventional B

Comparison of Wall Surface Roughness by RENE 41



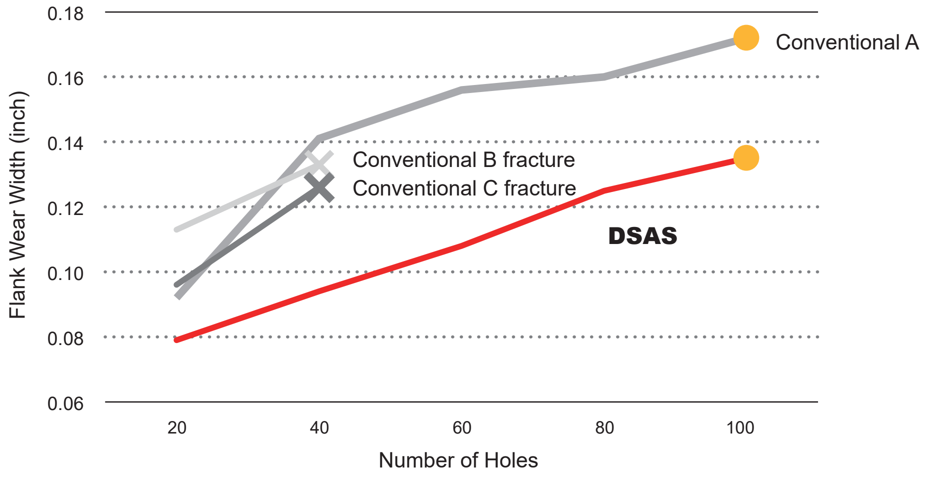
<Cutting Conditions>
Workpiece Material : RENE 41
Tool : DSAS0690X03S080
Drill Dia. : DC= .2717"
Hole Depth : .390 inch (l= DCx 1.4)
Cutting Speed : vc= 50 SFM
Feed per Rev. : fr= .0039 IPR
Cutting Mode : Internal Coolant (Water-soluble Coolants)
Machine : Vertical MC

Comparison of Cutting Resistance by Inconel 718 : L/D = 5



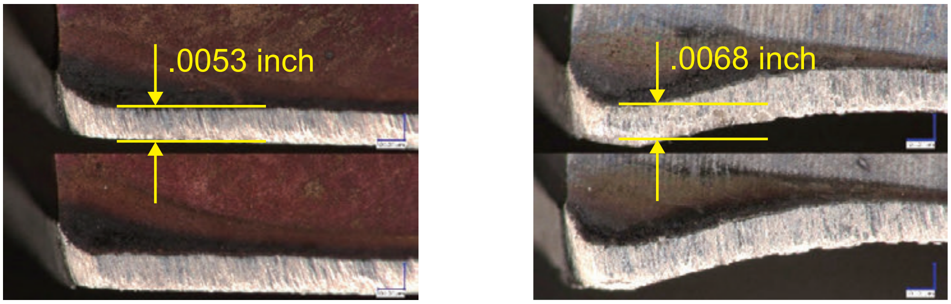
<Cutting Conditions>
Workpiece Material : Inconel 718
Tool : DSAS0600X05S060
Drill Dia. : DC= .2756 inch
Hole Depth : 1.181 inch (l= DCx 5)
Cutting Speed : vc= 30 SFM
Feed per Rev. : fr= .0024 IPR
Cutting Mode : Internal Coolant (Water-soluble Coolants)
Machine : Vertical MC

Comparison of Flank Wear Width by Inconel 718 : L/D = 5



<Cutting Conditions>
Workpiece Material : Inconel 718
Tool : DSAS0600X05S060
Drill Dia. : DC= .2756 inch
Hole Depth : 1.181 inch (l= DCx 5)
Cutting Speed : vc= 65 SFM
Feed per Rev. : fr= .0039 IPR
Cutting Mode : Internal Coolant (Water-soluble Coolants)
Machine : Vertical MC

After 100 Hole



DSAS Conventional A

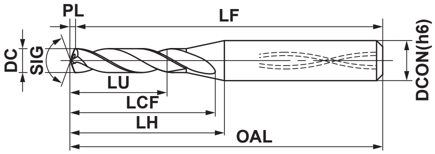
Solid Carbide Drill for Machining Heat Resistant Alloys

DSA NEW

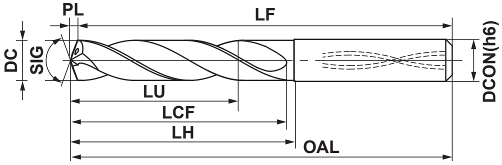
Only DSAS

P M K N **S** H

DSAS

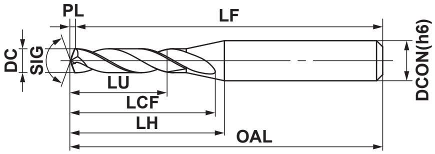


Type1

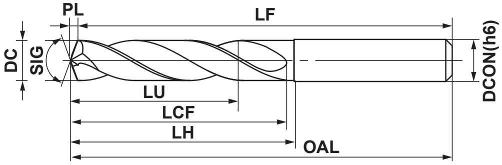


Type2

DSAE



Type3



Type4

∗ When looking at coating the color can vary depending on the direction of viewing.This does not have any effect on the performance of the drill.

(inch)

Type	Tolerance	DC=.1181	.1181<DC≤.2362	.2362<DC≤.3937	.3937<DC≤.4724
Type1,2,3,4	DC	0 − .00071	0 − .00071	0 − .00087	0 − .00106
	DCON	0 − .00031	0 − .00031	0 − .00035	0 − .00043

(mm)

Type	Tolerance	DC=3	3<DC≤6	6<DC≤10	10<DC≤12
Type1,2,3,4	DC	0 −0.018	0 −0.018	0 −0.022	0 −0.027
	DCON	0 −0.008	0 −0.008	0 −0.009	0 −0.011

DC					L/D	Coolant (Int./Ext.)	Order Number	Stock	LU		LCF		LH		OAL		LF		PL		DCON		Type
Metric (mm)	Decimal	Fraction	Wire / Letter	Thread Size				DP9020															
	(inch)								mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	
3.000	**.1181**				3	Ext.	**DSAE0300X03S060**	★	9.5	.374	21.5	.846	23.5	.925	70.5	2.776	70	2.756	0.5	.020	6	.236	3
					3	Int.	**DSAS0300X03S060**	●	9.5	.374	21.5	.846	23.5	.925	70.5	2.776	70	2.756	0.5	.020	6	.236	1
					5	Int.	**DSAS0300X05S060**	●	15.5	.610	28.5	1.122	31.5	1.240	78.5	3.091	78	3.071	0.5	.020	6	.236	1
3.100	**.1220**				3	Int.	**DSAS0310X03S060**	●	9.9	.390	21.6	.850	23.6	.929	70.6	2.780	70	2.756	0.6	.024	6	.236	1
					5	Int.	**DSAS0310X05S060**	●	16.1	.634	28.6	1.126	31.6	1.244	78.6	3.094	78	3.071	0.6	.024	6	.236	1
3.175	**.1250**	**1/8**			3	Int.	**DSAS0318X03S060**	●	10.1	.398	21.6	.850	23.6	.929	70.6	2.780	70	2.756	0.6	.024	6	.236	1
					5	Int.	**DSAS0318X05S060**	●	16.5	.650	28.6	1.126	31.6	1.244	78.6	3.094	78	3.071	0.6	.024	6	.236	1
3.200	**.1260**				3	Int.	**DSAS0320X03S060**	●	10.2	.402	21.6	.850	23.6	.929	70.6	2.780	70	2.756	0.6	.024	6	.236	1
					5	Int.	**DSAS0320X05S060**	●	16.6	.654	28.6	1.126	31.6	1.244	78.6	3.094	78	3.071	0.6	.024	6	.236	1
3.260	**.1283**				3	Int.	**DSAS0326X03S060**	●	10.4	.409	21.6	.850	23.6	.929	70.6	2.780	70	2.756	0.6	.024	6	.236	1
					5	Int.	**DSAS0326X05S060**	★	16.9	.665	28.6	1.126	31.6	1.244	78.6	3.094	78	3.071	0.6	.024	6	.236	1
3.300	**.1299**			**M4x.7**	3	Int.	**DSAS0330X03S060**	●	10.5	.413	21.6	.850	23.6	.929	70.6	2.780	70	2.756	0.6	.024	6	.236	1
					5	Int.	**DSAS0330X05S060**	●	17.1	.673	28.6	1.126	31.6	1.244	78.6	3.094	78	3.071	0.6	.024	6	.236	1
3.400	**.1339**				3	Ext.	**DSAE0340X03S060**	★	10.8	.425	21.6	.850	23.6	.929	70.6	2.780	70	2.756	0.6	.024	6	.236	3
					3	Int.	**DSAS0340X03S060**	●	10.8	.425	21.6	.850	23.6	.929	70.6	2.780	70	2.756	0.6	.024	6	.236	1
					5	Int.	**DSAS0340X05S060**	●	17.6	.693	28.6	1.126	31.6	1.244	78.6	3.094	78	3.071	0.6	.024	6	.236	1
3.500	**.1378**				3	Int.	**DSAS0350X03S060**	●	11.1	.437	21.6	.850	23.6	.929	70.6	2.780	70	2.756	0.6	.024	6	.236	1
					5	Int.	**DSAS0350X05S060**	●	18.1	.713	28.6	1.126	31.6	1.244	78.6	3.094	78	3.071	0.6	.024	6	.236	1

Note 1) The coolant hole of ø.1875" (ø4.763mm) or less will be round shape.

● : USA Stock ★ : Stocked in Japan

DC					L/D	Coolant (Int./Ext.)	Order Number	Stock	LU		LCF		LH		OAL		LF		PL		DCON		Type
Metric (mm)	Decimal	Fraction	Wire / Letter	Thread Size				DP9020															
	(inch)								mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	
3.572	**.1407**	**9/64**			3	Int.	**DSAS0357X03S060**	●	11.4	.449	22.7	.894	23.7	.933	70.7	2.783	70	2.756	0.7	.028	6	.236	1
					5	Int.	**DSAS0357X05S060**	●	18.6	.732	30.7	1.209	31.7	1.248	78.7	3.098	78	3.071	0.7	.028	6	.236	1
3.600	**.1417**				3	Int.	**DSAS0360X03S060**	●	11.5	.453	22.7	.894	23.7	.933	70.7	2.783	70	2.756	0.7	.028	6	.236	1
					5	Int.	**DSAS0360X05S060**	★	18.7	.736	30.7	1.209	31.7	1.248	78.7	3.098	78	3.071	0.7	.028	6	.236	1
3.700	**.1457**			**M4.5x.75**	3	Int.	**DSAS0370X03S060**	●	11.8	.465	22.7	.894	23.7	.933	70.7	2.783	70	2.756	0.7	.028	6	.236	1
					5	Int.	**DSAS0370X05S060**	●	19.2	.756	30.7	1.209	31.7	1.248	78.7	3.098	78	3.071	0.7	.028	6	.236	1
3.800	**.1496**		**25**	**#10-24**	3	Int.	**DSAS0380X03S060**	●	12.1	.476	22.7	.894	23.7	.933	70.7	2.783	70	2.756	0.7	.028	6	.236	1
					5	Int.	**DSAS0380X05S060**	●	19.7	.776	30.7	1.209	31.7	1.248	78.7	3.098	78	3.071	0.7	.028	6	.236	1
3.900	**.1535**				3	Int.	**DSAS0390X03S060**	●	12.4	.488	22.7	.894	23.7	.933	70.7	2.783	70	2.756	0.7	.028	6	.236	1
					5	Int.	**DSAS0390X05S060**	●	20.2	.795	30.7	1.209	31.7	1.248	78.7	3.098	78	3.071	0.7	.028	6	.236	1
3.969	**.1563**	**5/32**			3	Int.	**DSAS0397X03S060**	●	12.6	.496	22.7	.894	23.7	.933	70.7	2.783	70	2.756	0.7	.028	6	.236	1
					5	Int.	**DSAS0397X05S060**	●	20.5	.807	30.7	1.209	31.7	1.248	78.7	3.098	78	3.071	0.7	.028	6	.236	1
4.000	**.1575**				3	Ext.	**DSAE0400X03S060**	★	12.7	.500	22.7	.894	23.7	.933	70.7	2.783	70	2.756	0.7	.028	6	.236	3
					3	Int.	**DSAS0400X03S060**	●	12.7	.500	22.7	.894	23.7	.933	70.7	2.783	70	2.756	0.7	.028	6	.236	1
					5	Int.	**DSAS0400X05S060**	●	20.7	.815	30.7	1.209	31.7	1.248	78.7	3.098	78	3.071	0.7	.028	6	.236	1
4.100	**.1614**				3	Int.	**DSAS0410X03S060**	●	13.0	.512	24.7	.972	26.7	1.051	73.7	2.902	73	2.874	0.7	.028	6	.236	1
					5	Int.	**DSAS0410X05S060**	●	21.2	.835	33.7	1.327	35.7	1.406	82.7	3.256	82	3.228	0.7	.028	6	.236	1
4.200	**.1654**			**M5x.8**	3	Int.	**DSAS0420X03S060**	●	13.4	.528	24.8	.976	26.8	1.055	73.8	2.906	73	2.874	0.8	.031	6	.236	1
					5	Int.	**DSAS0420X05S060**	●	21.8	.858	33.8	1.331	35.8	1.409	82.8	3.260	82	3.228	0.8	.031	6	.236	1
4.300	**.1693**				3	Ext.	**DSAE0430X03S060**	★	13.7	.539	24.8	.976	26.8	1.055	73.8	2.906	73	2.874	0.8	.031	6	.236	3
					3	Int.	**DSAS0430X03S060**	●	13.7	.539	24.8	.976	26.8	1.055	73.8	2.906	73	2.874	0.8	.031	6	.236	1
					5	Int.	**DSAS0430X05S060**	●	22.3	.878	33.8	1.331	35.8	1.409	82.8	3.260	82	3.228	0.8	.031	6	.236	1
4.366	**.1719**	**11/64**			3	Int.	**DSAS0437X03S060**	●	13.9	.547	24.8	.976	26.8	1.055	73.8	2.906	73	2.874	0.8	.031	6	.236	1
					5	Int.	**DSAS0437X05S060**	●	22.6	.890	33.8	1.331	35.8	1.409	82.8	3.260	82	3.228	0.8	.031	6	.236	1
4.400	**.1732**		**17**		3	Int.	**DSAS0440X03S060**	●	14.0	.551	24.8	.976	26.8	1.055	73.8	2.906	73	2.874	0.8	.031	6	.236	1
					5	Int.	**DSAS0440X05S060**	●	22.8	.898	33.8	1.331	35.8	1.409	82.8	3.260	82	3.228	0.8	.031	6	.236	1
4.500	**.1772**		**16**	**#12-24**	3	Ext.	**DSAE0450X03S060**	★	14.3	.563	24.8	.976	26.8	1.055	73.8	2.906	73	2.874	0.8	.031	6	.236	3
					3	Int.	**DSAS0450X03S060**	●	14.3	.563	24.8	.976	26.8	1.055	73.8	2.906	73	2.874	0.8	.031	6	.236	1
					5	Int.	**DSAS0450X05S060**	●	23.3	.917	33.8	1.331	35.8	1.409	82.8	3.260	82	3.228	0.8	.031	6	.236	1
4.600	**.1811**				3	Int.	**DSAS0460X03S060**	●	14.6	.575	25.8	1.016	28.8	1.134	75.8	2.984	75	2.953	0.8	.031	6	.236	1
					5	Int.	**DSAS0460X05S060**	●	23.8	.937	35.8	1.409	38.8	1.528	85.8	3.378	85	3.346	0.8	.031	6	.236	1
4.700	**.1850**		**13**		3	Int.	**DSAS0470X03S060**	●	15.0	.591	25.9	1.020	28.9	1.138	75.9	2.988	75	2.953	0.9	.035	6	.236	1
					5	Int.	**DSAS0470X05S060**	●	24.4	.961	35.9	1.413	38.9	1.531	85.9	3.382	85	3.346	0.9	.035	6	.236	1
4.763	**.1875**	**3/16**			3	Int.	**DSAS0476X03S060**	●	15.2	.598	25.9	1.020	28.9	1.138	75.9	2.988	75	2.953	0.9	.035	6	.236	1
					5	Int.	**DSAS0476X05S060**	●	24.7	.972	35.9	1.413	38.9	1.531	85.9	3.382	85	3.346	0.9	.035	6	.236	1
4.800	**.1890**		**12**		3	Int.	**DSAS0480X03S060**	●	15.3	.602	25.9	1.020	28.9	1.138	75.9	2.988	75	2.953	0.9	.035	6	.236	1
					5	Int.	**DSAS0480X05S060**	●	24.9	.980	35.9	1.413	38.9	1.531	85.9	3.382	85	3.346	0.9	.035	6	.236	1
4.865	**.1915**				3	Int.	**DSAS0486X03S060**	●	15.5	.610	25.9	1.020	28.9	1.138	75.9	2.988	75	2.953	0.9	.035	6	.236	1
					5	Int.	**DSAS0486X05S060**	★	25.2	.992	35.9	1.413	38.9	1.531	85.9	3.382	85	3.346	0.9	.035	6	.236	1
4.900	**.1929**				3	Int.	**DSAS0490X03S060**	●	15.6	.614	25.9	1.020	28.9	1.138	75.9	2.988	75	2.953	0.9	.035	6	.236	1
					5	Int.	**DSAS0490X05S060**	★	25.4	1.000	35.9	1.413	38.9	1.531	85.9	3.382	85	3.346	0.9	.035	6	.236	1
5.000	**.1969**			**M6x1.0**	3	Ext.	**DSAE0500X03S060**	★	15.9	.626	28.9	1.138	29.9	1.177	81.9	3.224	81	3.189	0.9	.035	6	.236	4
					3	Int.	**DSAS0500X03S060**	●	15.9	.626	28.9	1.138	29.9	1.177	81.9	3.224	81	3.189	0.9	.035	6	.236	2
					5	Int.	**DSAS0500X05S060**	●	25.9	1.020	39.9	1.571	42.9	1.689	89.9	3.539	89	3.504	0.9	.035	6	.236	2
5.100	**.2008**		**7**	**1/4-20**	3	Ext.	**DSAE0510X03S060**	★	16.2	.638	28.9	1.138	29.9	1.177	81.9	3.224	81	3.189	0.9	.035	6	.236	4
					3	Int.	**DSAS0510X03S060**	●	16.2	.638	28.9	1.138	29.9	1.177	81.9	3.224	81	3.189	0.9	.035	6	.236	2
					5	Int.	**DSAS0510X05S060**	●	26.4	1.039	39.9	1.571	42.9	1.689	89.9	3.539	89	3.504	0.9	.035	6	.236	2
5.160	**.2032**	**13/64**			3	Int.	**DSAS0516X03S060**	●	16.5	.650	29.0	1.142	30.0	1.181	82.0	3.228	81	3.189	1.0	.039	6	.236	2
					5	Int.	**DSAS0516X05S060**	●	26.8	1.055	40.0	1.575	43.0	1.693	90.0	3.543	89	3.504	1.0	.039	6	.236	2
5.200	**.2047**				3	Int.	**DSAS0520X03S060**	●	16.6	.654	29.0	1.142	30.0	1.181	82.0	3.228	81	3.189	1.0	.039	6	.236	2
					5	Int.	**DSAS0520X05S060**	●	27.0	1.063	40.0	1.575	43.0	1.693	90.0	3.543	89	3.504	1.0	.039	6	.236	2
5.300	**.2087**		**4**		3	Int.	**DSAS0530X03S060**	●	16.9	.665	29.0	1.142	30.0	1.181	82.0	3.228	81	3.189	1.0	.039	6	.236	2
					5	Int.	**DSAS0530X05S060**	●	27.5	1.083	40.0	1.575	43.0	1.693	90.0	3.543	89	3.504	1.0	.039	6	.236	2

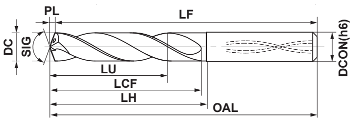
Note 1) The coolant hole of ø.1875" (ø4.763mm) or less will be round shape.

DSA

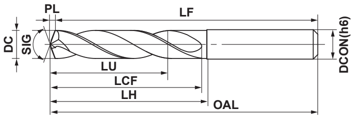
DC					L/D	Coolant (Int./Ext.)	Order Number	Stock	LU		LCF		LH		OAL		LF		PL		DCON		Type
Metric (mm)	Decimal (inch)	Fraction (inch)	Wire / Letter	Thread Size				DP9020	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	
5.400	**.2126**		**3**	**1/4-28**	3	Ext.	**DSAE0540X03S060**	★	17.2	.677	29.0	1.142	30.0	1.181	82.0	3.228	81	3.189	1.0	.039	6	.236	4
					3	Int.	**DSAS0540X03S060**	●	17.2	.677	29.0	1.142	30.0	1.181	82.0	3.228	81	3.189	1.0	.039	6	.236	2
					5	Int.	**DSAS0540X05S060**	●	28.0	1.102	40.0	1.575	43.0	1.693	90.0	3.543	89	3.504	1.0	.039	6	.236	2
5.500	**.2165**				3	Ext.	**DSAE0550X03S060**	★	17.5	.689	29.0	1.142	30.0	1.181	82.0	3.228	81	3.189	1.0	.039	6	.236	4
					3	Int.	**DSAS0550X03S060**	●	17.5	.689	29.0	1.142	30.0	1.181	82.0	3.228	81	3.189	1.0	.039	6	.236	2
					5	Int.	**DSAS0550X05S060**	●	28.5	1.122	40.0	1.575	43.0	1.693	90.0	3.543	89	3.504	1.0	.039	6	.236	2
5.557	**.2188**	**7/32**			3	Int.	**DSAS0556X03S060**	●	17.8	.701	31.1	1.224	31.1	1.224	82.1	3.232	81	3.189	1.1	.043	6	.236	2
					5	Int.	**DSAS0556X05S060**	●	28.9	1.138	43.1	1.697	43.1	1.697	90.1	3.547	89	3.504	1.1	.043	6	.236	2
5.600	**.2205**		**2**		3	Ext.	**DSAE0560X03S060**	★	17.9	.705	31.1	1.224	31.1	1.224	82.1	3.232	81	3.189	1.1	.043	6	.236	4
					3	Int.	**DSAS0560X03S060**	●	17.9	.705	31.1	1.224	31.1	1.224	82.1	3.232	81	3.189	1.1	.043	6	.236	2
					5	Int.	**DSAS0560X05S060**	●	29.1	1.146	43.1	1.697	43.1	1.697	90.1	3.547	89	3.504	1.1	.043	6	.236	2
5.700	**.2244**				3	Int.	**DSAS0570X03S060**	●	18.2	.717	31.1	1.224	31.1	1.224	82.1	3.232	81	3.189	1.1	.043	6	.236	2
					5	Int.	**DSAS0570X05S060**	●	29.6	1.165	43.1	1.697	43.1	1.697	90.1	3.547	89	3.504	1.1	.043	6	.236	2
5.800	**.2283**		**1**		3	Int.	**DSAS0580X03S060**	●	18.5	.728	31.1	1.224	31.1	1.224	82.1	3.232	81	3.189	1.1	.043	6	.236	2
					5	Int.	**DSAS0580X05S060**	●	30.1	1.185	43.1	1.697	43.1	1.697	90.1	3.547	89	3.504	1.1	.043	6	.236	2
5.900	**.2323**				3	Ext.	**DSAE0590X03S060**	★	18.8	.740	31.1	1.224	31.1	1.224	82.1	3.232	81	3.189	1.1	.043	6	.236	4
					3	Int.	**DSAS0590X03S060**	●	18.8	.740	31.1	1.224	31.1	1.224	82.1	3.232	81	3.189	1.1	.043	6	.236	2
					5	Int.	**DSAS0590X05S060**	●	30.6	1.205	43.1	1.697	43.1	1.697	90.1	3.547	89	3.504	1.1	.043	6	.236	2
5.954	**.2344**	**15/64**	**A**		3	Int.	**DSAS0595X03S060**	●	19.0	.748	31.1	1.224	31.1	1.224	82.1	3.232	81	3.189	1.1	.043	6	.236	2
					5	Int.	**DSAS0595X05S060**	●	30.9	1.217	43.1	1.697	43.1	1.697	90.1	3.547	89	3.504	1.1	.043	6	.236	2
6.000	**.2362**			**M7x1.0**	3	Ext.	**DSAE0600X03S060**	★	19.1	.752	31.1	1.224	31.1	1.224	82.1	3.232	81	3.189	1.1	.043	6	.236	4
					3	Int.	**DSAS0600X03S060**	●	19.1	.752	31.1	1.224	31.1	1.224	82.1	3.232	81	3.189	1.1	.043	6	.236	2
					5	Int.	**DSAS0600X05S060**	●	31.1	1.224	43.1	1.697	43.1	1.697	90.1	3.547	89	3.504	1.1	.043	6	.236	2
6.100	**.2402**				3	Ext.	**DSAE0610X03S080**	★	19.5	.768	34.2	1.346	37.2	1.465	87.2	3.433	86	3.386	1.2	.047	8	.315	4
					3	Int.	**DSAS0610X03S080**	●	19.5	.768	34.2	1.346	37.2	1.465	87.2	3.433	86	3.386	1.2	.047	8	.315	2
					5	Int.	**DSAS0610X05S080**	●	31.7	1.248	47.2	1.858	49.2	1.937	96.2	3.787	95	3.740	1.2	.047	8	.315	2
6.200	**.2441**				3	Ext.	**DSAE0620X03S080**	★	19.8	.780	34.2	1.346	37.2	1.465	87.2	3.433	86	3.386	1.2	.047	8	.315	4
					3	Int.	**DSAS0620X03S080**	●	19.8	.780	34.2	1.346	37.2	1.465	87.2	3.433	86	3.386	1.2	.047	8	.315	2
					5	Int.	**DSAS0620X05S080**	●	32.2	1.268	47.2	1.858	49.2	1.937	96.2	3.787	95	3.740	1.2	.047	8	.315	2
6.300	**.2480**				3	Int.	**DSAS0630X03S080**	●	20.1	.791	34.2	1.346	37.2	1.465	87.2	3.433	86	3.386	1.2	.047	8	.315	2
					5	Int.	**DSAS0630X05S080**	★	32.7	1.287	47.2	1.858	49.2	1.937	96.2	3.787	95	3.740	1.2	.047	8	.315	2
6.350	**.2500**	**1/4**	**E**		3	Int.	**DSAS0635X03S080**	●	20.3	.799	34.2	1.346	37.2	1.465	87.2	3.433	86	3.386	1.2	.047	8	.315	2
					5	Int.	**DSAS0635X05S080**	●	33.0	1.299	47.2	1.858	49.2	1.937	96.2	3.787	95	3.740	1.2	.047	8	.315	2
6.400	**.2520**				3	Ext.	**DSAE0640X03S080**	★	20.4	.803	34.2	1.346	37.2	1.465	87.2	3.433	86	3.386	1.2	.047	8	.315	4
					3	Int.	**DSAS0640X03S080**	●	20.4	.803	34.2	1.346	37.2	1.465	87.2	3.433	86	3.386	1.2	.047	8	.315	2
					5	Int.	**DSAS0640X05S080**	●	33.2	1.307	47.2	1.858	49.2	1.937	96.2	3.787	95	3.740	1.2	.047	8	.315	2
6.500	**.2559**				3	Int.	**DSAS0650X03S080**	●	20.7	.815	34.2	1.346	37.2	1.465	87.2	3.433	86	3.386	1.2	.047	8	.315	2
					5	Int.	**DSAS0650X05S080**	●	33.7	1.327	47.2	1.858	49.2	1.937	96.2	3.787	95	3.740	1.2	.047	8	.315	2
6.600	**.2598**				3	Int.	**DSAS0660X03S080**	●	21.1	.831	36.3	1.429	38.3	1.508	91.3	3.594	90	3.543	1.3	.051	8	.315	2
					5	Int.	**DSAS0660X05S080**	●	34.3	1.350	50.3	1.980	52.3	2.059	99.3	3.909	98	3.858	1.3	.051	8	.315	2
6.700	**.2638**			**M8x1.25**	3	Int.	**DSAS0670X03S080**	●	21.4	.843	36.3	1.429	38.3	1.508	91.3	3.594	90	3.543	1.3	.051	8	.315	2
					5	Int.	**DSAS0670X05S080**	★	34.8	1.370	50.3	1.980	52.3	2.059	99.3	3.909	98	3.858	1.3	.051	8	.315	2
6.747	**.2657**	**17/64**			3	Int.	**DSAS0675X03S080**	●	21.5	.846	36.3	1.429	38.3	1.508	91.3	3.594	90	3.543	1.3	.051	8	.315	2
					5	Int.	**DSAS0675X05S080**	●	35.0	1.378	50.3	1.980	52.3	2.059	99.3	3.909	98	3.858	1.3	.051	8	.315	2
6.800	**.2677**				3	Ext.	**DSAE0680X03S080**	★	21.7	.854	36.3	1.429	38.3	1.508	91.3	3.594	90	3.543	1.3	.051	8	.315	4
					3	Int.	**DSAS0680X03S080**	●	21.7	.854	36.3	1.429	38.3	1.508	91.3	3.594	90	3.543	1.3	.051	8	.315	2
					5	Int.	**DSAS0680X05S080**	●	35.3	1.390	50.3	1.980	52.3	2.059	99.3	3.909	98	3.858	1.3	.051	8	.315	2
6.900	**.2717**		**I**	**5/16-24**	3	Ext.	**DSAE0690X03S080**	★	22.0	.866	36.3	1.429	38.3	1.508	91.3	3.594	90	3.543	1.3	.051	8	.315	4
					3	Int.	**DSAS0690X03S080**	●	22.0	.866	36.3	1.429	38.3	1.508	91.3	3.594	90	3.543	1.3	.051	8	.315	2
					5	Int.	**DSAS0690X05S080**	●	35.8	1.409	50.3	1.980	52.3	2.059	99.3	3.909	98	3.858	1.3	.051	8	.315	2
6.950	**.2736**				3	Int.	**DSAS0695X03S080**	●	22.2	.874	36.3	1.429	38.3	1.508	91.3	3.594	90	3.543	1.3	.051	8	.315	2
					5	Int.	**DSAS0695X05S080**	★	36.1	1.421	50.3	1.980	52.3	2.059	99.3	3.909	98	3.858	1.3	.051	8	.315	2

● : USA Stock ★ : Stocked in Japan

Type2



Type4



DC					L/D	Coolant (Int./Ext.)	Order Number	Stock	LU		LCF		LH		OAL		LF		PL		DCON		Type
Metric (mm)	Decimal	Fraction	Wire / Letter	Thread Size				DP9020															
	(inch)								mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	
7.000	**.2756**			**M8x1.0**	3	Ext.	**DSAE0700X03S080**	★	22.3	.878	36.3	1.429	38.3	1.508	91.3	3.594	90	3.543	1.3	.051	8	.315	4
					3	Int.	**DSAS0700X03S080**	●	22.3	.878	36.3	1.429	38.3	1.508	91.3	3.594	90	3.543	1.3	.051	8	.315	2
					5	Int.	**DSAS0700X05S080**	●	36.3	1.429	50.3	1.980	52.3	2.059	99.3	3.909	98	3.858	1.3	.051	8	.315	2
7.100	**.2795**				3	Ext.	**DSAE0710X03S080**	★	22.7	.894	39.4	1.551	40.4	1.591	91.4	3.598	90	3.543	1.4	.055	8	.315	4
					3	Int.	**DSAS0710X03S080**	●	22.7	.894	39.4	1.551	40.4	1.591	91.4	3.598	90	3.543	1.4	.055	8	.315	2
					5	Int.	**DSAS0710X05S080**	●	36.9	1.453	54.4	2.142	57.4	2.260	104.4	4.110	103	4.055	1.4	.055	8	.315	2
7.144	**.2813**	**9/32**	**K**		3	Int.	**DSAS0714X03S080**	●	22.8	.898	39.4	1.551	40.4	1.591	91.4	3.598	90	3.543	1.4	.055	8	.315	2
					5	Int.	**DSAS0714X05S080**	●	37.1	1.461	54.4	2.142	57.4	2.260	104.4	4.110	103	4.055	1.4	.055	8	.315	2
7.200	**.2835**				3	Int.	**DSAS0720X03S080**	●	23.0	.906	39.4	1.551	40.4	1.591	91.4	3.598	90	3.543	1.4	.055	8	.315	2
					5	Int.	**DSAS0720X05S080**	●	37.4	1.472	54.4	2.142	57.4	2.260	104.4	4.110	103	4.055	1.4	.055	8	.315	2
7.300	**.2874**				3	Int.	**DSAS0730X03S080**	●	23.3	.917	39.4	1.551	40.4	1.591	91.4	3.598	90	3.543	1.4	.055	8	.315	2
					5	Int.	**DSAS0730X05S080**	★	37.9	1.492	54.4	2.142	57.4	2.260	104.4	4.110	103	4.055	1.4	.055	8	.315	2
7.400	**.2913**				3	Int.	**DSAS0740X03S080**	●	23.6	.929	39.4	1.551	40.4	1.591	91.4	3.598	90	3.543	1.4	.055	8	.315	2
					5	Int.	**DSAS0740X05S080**	●	38.4	1.512	54.4	2.142	57.4	2.260	104.4	4.110	103	4.055	1.4	.055	8	.315	2
7.500	**.2953**		**M**		3	Int.	**DSAS0750X03S080**	●	23.9	.941	39.4	1.551	40.4	1.591	91.4	3.598	90	3.543	1.4	.055	8	.315	2
					5	Int.	**DSAS0750X05S080**	●	38.9	1.531	54.4	2.142	57.4	2.260	104.4	4.110	103	4.055	1.4	.055	8	.315	2
7.541	**.2969**	**19/64**			3	Int.	**DSAS0754X03S080**	●	24.1	.949	41.5	1.634	41.5	1.634	91.5	3.602	90	3.543	1.5	.059	8	.315	2
					5	Int.	**DSAS0754X05S080**	●	39.2	1.543	57.5	2.264	57.5	2.264	104.5	4.114	103	4.055	1.5	.059	8	.315	2
7.600	**.2992**				3	Int.	**DSAS0760X03S080**	●	24.3	.957	41.5	1.634	41.5	1.634	91.5	3.602	90	3.543	1.5	.059	8	.315	2
					5	Int.	**DSAS0760X05S080**	★	39.5	1.555	57.5	2.264	57.5	2.264	104.5	4.114	103	4.055	1.5	.059	8	.315	2
7.700	**.3031**				3	Int.	**DSAS0770X03S080**	●	24.6	.969	41.5	1.634	41.5	1.634	91.5	3.602	90	3.543	1.5	.059	8	.315	2
					5	Int.	**DSAS0770X05S080**	●	40.0	1.575	57.5	2.264	57.5	2.264	104.5	4.114	103	4.055	1.5	.059	8	.315	2
7.800	**.3071**				3	Ext.	**DSAE0780X03S080**	★	24.9	.980	41.5	1.634	41.5	1.634	91.5	3.602	90	3.543	1.5	.059	8	.315	4
					3	Int.	**DSAS0780X03S080**	●	24.9	.980	41.5	1.634	41.5	1.634	91.5	3.602	90	3.543	1.5	.059	8	.315	2
					5	Int.	**DSAS0780X05S080**	●	40.5	1.594	57.5	2.264	57.5	2.264	104.5	4.114	103	4.055	1.5	.059	8	.315	2
7.900	**.3110**				3	Int.	**DSAS0790X03S080**	●	25.2	.992	41.5	1.634	41.5	1.634	91.5	3.602	90	3.543	1.5	.059	8	.315	2
					5	Int.	**DSAS0790X05S080**	●	41.0	1.614	57.5	2.264	57.5	2.264	104.5	4.114	103	4.055	1.5	.059	8	.315	2
7.938	**.3125**	**5/16**		**3/8-16**	3	Int.	**DSAS0794X03S080**	●	25.3	.996	41.5	1.634	41.5	1.634	91.5	3.602	90	3.543	1.5	.059	8	.315	2
					5	Int.	**DSAS0794X05S080**	●	41.2	1.622	57.5	2.264	57.5	2.264	104.5	4.114	103	4.055	1.5	.059	8	.315	2
8.000	**.3150**				3	Ext.	**DSAE0800X03S080**	★	25.5	1.004	41.5	1.634	41.5	1.634	91.5	3.602	90	3.543	1.5	.059	8	.315	4
					3	Int.	**DSAS0800X03S080**	●	25.5	1.004	41.5	1.634	41.5	1.634	91.5	3.602	90	3.543	1.5	.059	8	.315	2
					5	Int.	**DSAS0800X05S080**	●	41.5	1.634	57.5	2.264	57.5	2.264	104.5	4.114	103	4.055	1.5	.059	8	.315	2
8.100	**.3189**				3	Ext.	**DSAE0810X03S100**	★	25.8	1.016	44.5	1.752	47.5	1.870	97.5	3.839	96	3.780	1.5	.059	10	.394	4
					3	Int.	**DSAS0810X03S100**	●	25.8	1.016	44.5	1.752	47.5	1.870	97.5	3.839	96	3.780	1.5	.059	10	.394	2
					5	Int.	**DSAS0810X05S100**	★	42.0	1.654	61.5	2.421	63.5	2.500	114.5	4.508	113	4.449	1.5	.059	10	.394	2
8.200	**.3228**		**P**		3	Ext.	**DSAE0820X03S100**	★	26.1	1.028	44.5	1.752	47.5	1.870	97.5	3.839	96	3.780	1.5	.059	10	.394	4
					3	Int.	**DSAS0820X03S100**	●	26.1	1.028	44.5	1.752	47.5	1.870	97.5	3.839	96	3.780	1.5	.059	10	.394	2
					5	Int.	**DSAS0820X05S100**	★	42.5	1.673	61.5	2.421	63.5	2.500	114.5	4.508	113	4.449	1.5	.059	10	.394	2
8.300	**.3268**				3	Int.	**DSAS0830X03S100**	●	26.4	1.039	44.5	1.752	47.5	1.870	97.5	3.839	96	3.780	1.5	.059	10	.394	2
					5	Int.	**DSAS0830X05S100**	●	43.0	1.693	61.5	2.421	63.5	2.500	114.5	4.508	113	4.449	1.5	.059	10	.394	2
8.335	**.3282**	**21/64**			3	Int.	**DSAS0833X03S100**	●	26.5	1.043	44.5	1.752	47.5	1.870	97.5	3.839	96	3.780	1.5	.059	10	.394	2
					5	Int.	**DSAS0833X05S100**	●	43.2	1.701	61.5	2.421	63.5	2.500	114.5	4.508	113	4.449	1.5	.059	10	.394	2
8.400	**.3307**				3	Ext.	**DSAE0840X03S100**	★	26.7	1.051	44.5	1.752	47.5	1.870	97.5	3.839	96	3.780	1.5	.059	10	.394	4
					3	Int.	**DSAS0840X03S100**	●	26.7	1.051	44.5	1.752	47.5	1.870	97.5	3.839	96	3.780	1.5	.059	10	.394	2
					5	Int.	**DSAS0840X05S100**	★	43.5	1.713	61.5	2.421	63.5	2.500	114.5	4.508	113	4.449	1.5	.059	10	.394	2
8.500	**.3346**			**M10x1.5**	3	Ext.	**DSAE0850X03S100**	★	27.0	1.063	44.5	1.752	47.5	1.870	97.5	3.839	96	3.780	1.5	.059	10	.394	4
					3	Int.	**DSAS0850X03S100**	●	27.0	1.063	44.5	1.752	47.5	1.870	97.5	3.839	96	3.780	1.5	.059	10	.394	2
					5	Int.	**DSAS0850X05S100**	●	44.0	1.732	61.5	2.421	63.5	2.500	114.5	4.508	113	4.449	1.5	.059	10	.394	2
8.600	**.3386**		**R**		3	Int.	**DSAS0860X03S100**	●	27.4	1.079	46.6	1.835	48.6	1.913	102.6	4.039	101	3.976	1.6	.063	10	.394	2
					5	Int.	**DSAS0860X05S100**	●	44.6	1.756	64.6	2.543	66.6	2.622	117.6	4.630	116	4.567	1.6	.063	10	.394	2
8.700	**.3425**			**M10x1.25**	3	Int.	**DSAS0870X03S100**	●	27.7	1.091	46.6	1.835	48.6	1.913	102.6	4.039	101	3.976	1.6	.063	10	.394	2
					5	Int.	**DSAS0870X05S100**	●	45.1	1.776	64.6	2.543	66.6	2.622	117.6	4.630	116	4.567	1.6	.063	10	.394	2

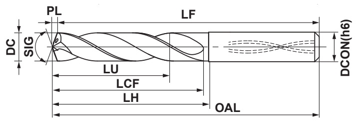
Solid Carbide Drill for Machining Heat Resistant Alloys

DSA

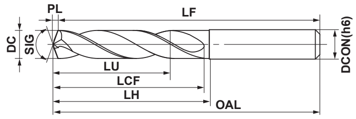
DC					L/D	Coolant (Int./Ext.)	Order Number	Stock	LU		LCF		LH		OAL		LF		PL		DCON		Type
Metric (mm)	Decimal	Fraction	Wire / Letter	Thread Size				DP9020															
	(inch)								mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	
8.732	.3438	11/32			3	Int.	DSAS0873X03S100	●	27.8	1.094	46.6	1.835	48.6	1.913	102.6	4.039	101	3.976	1.6	.063	10	.394	2
					5	Int.	DSAS0873X05S100	●	45.3	1.783	64.6	2.543	66.6	2.622	117.6	4.630	116	4.567	1.6	.063	10	.394	2
8.800	.3465				3	Int.	DSAS0880X03S100	●	28.0	1.102	46.6	1.835	48.6	1.913	102.6	4.039	101	3.976	1.6	.063	10	.394	2
					5	Int.	DSAS0880X05S100	●	45.6	1.795	64.6	2.543	66.6	2.622	117.6	4.630	116	4.567	1.6	.063	10	.394	2
8.900	.3504				3	Int.	DSAS0890X03S100	●	28.3	1.114	46.6	1.835	48.6	1.913	102.6	4.039	101	3.976	1.6	.063	10	.394	2
					5	Int.	DSAS0890X05S100	●	46.1	1.815	64.6	2.543	66.6	2.622	117.6	4.630	116	4.567	1.6	.063	10	.394	2
9.000	.3543				3	Ext.	DSAE0900X03S100	★	28.6	1.126	46.6	1.835	48.6	1.913	102.6	4.039	101	3.976	1.6	.063	10	.394	4
					3	Int.	DSAS0900X03S100	●	28.6	1.126	46.6	1.835	48.6	1.913	102.6	4.039	101	3.976	1.6	.063	10	.394	2
					5	Int.	DSAS0900X05S100	●	46.6	1.835	64.6	2.543	66.6	2.622	117.6	4.630	116	4.567	1.6	.063	10	.394	2
9.100	.3583		T		3	Int.	DSAS0910X03S100	●	29.1	1.146	49.8	1.961	50.8	2.000	102.8	4.047	101	3.976	1.8	.071	10	.394	2
					5	Int.	DSAS0910X05S100	★	47.3	1.862	68.8	2.709	71.8	2.827	122.8	4.835	121	4.764	1.8	.071	10	.394	2
9.200	.3622				3	Int.	DSAS0920X03S100	●	29.4	1.157	49.8	1.961	50.8	2.000	102.8	4.047	101	3.976	1.8	.071	10	.394	2
					5	Int.	DSAS0920X05S100	★	47.8	1.882	68.8	2.709	71.8	2.827	122.8	4.835	121	4.764	1.8	.071	10	.394	2
9.300	.3661				3	Int.	DSAS0930X03S100	●	29.7	1.169	49.8	1.961	50.8	2.000	102.8	4.047	101	3.976	1.8	.071	10	.394	2
					5	Int.	DSAS0930X05S100	★	48.3	1.902	68.8	2.709	71.8	2.827	122.8	4.835	121	4.764	1.8	.071	10	.394	2
9.400	.3701				3	Int.	DSAS0940X03S100	●	30.0	1.181	49.8	1.961	50.8	2.000	102.8	4.047	101	3.976	1.8	.071	10	.394	2
					5	Int.	DSAS0940X05S100	★	48.8	1.921	68.8	2.709	71.8	2.827	122.8	4.835	121	4.764	1.8	.071	10	.394	2
9.500	.3740				3	Int.	DSAS0950X03S100	●	30.3	1.193	49.8	1.961	50.8	2.000	102.8	4.047	101	3.976	1.8	.071	10	.394	2
					5	Int.	DSAS0950X05S100	●	49.3	1.941	68.8	2.709	71.8	2.827	122.8	4.835	121	4.764	1.8	.071	10	.394	2
9.525	.3750	3/8			3	Int.	DSAS0953X03S100	●	30.4	1.197	49.8	1.961	50.8	2.000	102.8	4.047	101	3.976	1.8	.071	10	.394	2
					5	Int.	DSAS0953X05S100	●	49.4	1.945	68.8	2.709	71.8	2.827	122.8	4.835	121	4.764	1.8	.071	10	.394	2
9.600	.3780				3	Int.	DSAS0960X03S100	●	30.6	1.205	49.8	1.961	50.8	2.000	102.8	4.047	101	3.976	1.8	.071	10	.394	2
					5	Int.	DSAS0960X05S100	★	49.8	1.961	68.8	2.709	71.8	2.827	122.8	4.835	121	4.764	1.8	.071	10	.394	2
9.700	.3819		Tube Sheet		3	Int.	DSAS0970X03S100	●	30.9	1.217	49.8	1.961	50.8	2.000	102.8	4.047	101	3.976	1.8	.071	10	.394	2
					5	Int.	DSAS0970X05S100	★	50.3	1.980	68.8	2.709	71.8	2.827	122.8	4.835	121	4.764	1.8	.071	10	.394	2
9.800	.3858		W		3	Int.	DSAS0980X03S100	●	31.2	1.228	51.8	2.039	51.8	2.039	102.8	4.047	101	3.976	1.8	.071	10	.394	2
					5	Int.	DSAS0980X05S100	●	50.8	2.000	71.8	2.827	71.8	2.827	122.8	4.835	121	4.764	1.8	.071	10	.394	2
9.900	.3898				3	Int.	DSAS0990X03S100	●	31.5	1.240	51.8	2.039	51.8	2.039	102.8	4.047	101	3.976	1.8	.071	10	.394	2
					5	Int.	DSAS0990X05S100	★	51.3	2.020	71.8	2.827	71.8	2.827	122.8	4.835	121	4.764	1.8	.071	10	.394	2
9.922	.3907	25/64		7/16-20	3	Int.	DSAS0992X03S100	●	31.6	1.244	51.8	2.039	51.8	2.039	102.8	4.047	101	3.976	1.8	.071	10	.394	2
					5	Int.	DSAS0992X05S100	●	51.4	2.024	71.8	2.827	71.8	2.827	122.8	4.835	121	4.764	1.8	.071	10	.394	2
10.000	.3937				3	Ext.	DSAE1000X03S100	★	31.8	1.252	51.8	2.039	51.8	2.039	102.8	4.047	101	3.976	1.8	.071	10	.394	4
					3	Int.	DSAS1000X03S100	●	31.8	1.252	51.8	2.039	51.8	2.039	102.8	4.047	101	3.976	1.8	.071	10	.394	2
					5	Int.	DSAS1000X05S100	●	51.8	2.039	71.8	2.827	71.8	2.827	122.8	4.835	121	4.764	1.8	.071	10	.394	2
10.100	.3976				3	Int.	DSAS1010X03S120	●	32.2	1.268	54.9	2.161	57.9	2.280	112.9	4.445	111	4.370	1.9	.075	12	.472	2
					5	Int.	DSAS1010X05S120	★	52.4	2.063	75.9	2.988	79.9	3.146	135.9	5.350	134	5.276	1.9	.075	12	.472	2
10.200	.4016			M12x1.75	3	Int.	DSAS1020X03S120	●	32.5	1.280	54.9	2.161	57.9	2.280	112.9	4.445	111	4.370	1.9	.075	12	.472	2
					5	Int.	DSAS1020X05S120	★	52.9	2.083	75.9	2.988	79.9	3.146	135.9	5.350	134	5.276	1.9	.075	12	.472	2
10.300	.4055				3	Int.	DSAS1030X03S120	●	32.8	1.291	54.9	2.161	57.9	2.280	112.9	4.445	111	4.370	1.9	.075	12	.472	2
					5	Int.	DSAS1030X05S120	★	53.4	2.102	75.9	2.988	79.9	3.146	135.9	5.350	134	5.276	1.9	.075	12	.472	2
10.319	.4063	13/32			3	Int.	DSAS1032X03S120	●	32.9	1.295	54.9	2.161	57.9	2.280	112.9	4.445	111	4.370	1.9	.075	12	.472	2
					5	Int.	DSAS1032X05S120	●	53.5	2.106	75.9	2.988	79.9	3.146	135.9	5.350	134	5.276	1.9	.075	12	.472	2
10.400	.4094				3	Int.	DSAS1040X03S120	●	33.1	1.303	54.9	2.161	57.9	2.280	112.9	4.445	111	4.370	1.9	.075	12	.472	2
					5	Int.	DSAS1040X05S120	★	53.9	2.122	75.9	2.988	79.9	3.146	135.9	5.350	134	5.276	1.9	.075	12	.472	2
10.500	.4134		Z		3	Ext.	DSAE1050X03S120	★	33.4	1.315	54.9	2.161	57.9	2.280	112.9	4.445	111	4.370	1.9	.075	12	.472	4
					3	Int.	DSAS1050X03S120	●	33.4	1.315	54.9	2.161	57.9	2.280	112.9	4.445	111	4.370	1.9	.075	12	.472	2
					5	Int.	DSAS1050X05S120	●	54.4	2.142	75.9	2.988	79.9	3.146	135.9	5.350	134	5.276	1.9	.075	12	.472	2
10.600	.4173				3	Int.	DSAS1060X03S120	●	33.7	1.327	54.9	2.161	57.9	2.280	112.9	4.445	111	4.370	1.9	.075	12	.472	2
					5	Int.	DSAS1060X05S120	★	54.9	2.161	75.9	2.988	79.9	3.146	135.9	5.350	134	5.276	1.9	.075	12	.472	2
10.700	.4213				3	Ext.	DSAE1070X03S120	★	34.0	1.339	54.9	2.161	57.9	2.280	112.9	4.445	111	4.370	1.9	.075	12	.472	4
					3	Int.	DSAS1070X03S120	●	34.0	1.339	54.9	2.161	57.9	2.280	112.9	4.445	111	4.370	1.9	.075	12	.472	2
					5	Int.	DSAS1070X05S120	★	55.4	2.181	75.9	2.988	79.9	3.146	135.9	5.350	134	5.276	1.9	.075	12	.472	2

●: USA Stock ★: Stocked in Japan

Type2



Type4



DC					L/D	Coolant (Int./Ext.)	Order Number	Stock	LU		LCF		LH		OAL		LF		PL		DCON		Type
Metric (mm)	Decimal	Fraction	Wire / Letter	Thread Size				DP9020	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	
	(inch)																						
10.716	**.4219**	**27/64**		**1/2-13**	3	Int.	**DSAS1072X03S120**	●	34.1	1.343	57.0	2.244	59.0	2.323	118.0	4.646	116	4.567	2.0	.079	12	.472	2
					5	Int.	**DSAS1072X05S120**	●	55.6	2.189	79.0	3.110	80.0	3.150	136.0	5.354	134	5.276	2.0	.079	12	.472	2
10.800	**.4252**			**M12x1.25**	3	Int.	**DSAS1080X03S120**	●	34.4	1.354	57.0	2.244	59.0	2.323	118.0	4.646	116	4.567	2.0	.079	12	.472	2
					5	Int.	**DSAS1080X05S120**	★	56.0	2.205	79.0	3.110	80.0	3.150	136.0	5.354	134	5.276	2.0	.079	12	.472	2
10.900	**.4291**				3	Int.	**DSAS1090X03S120**	●	34.7	1.366	57.0	2.244	59.0	2.323	118.0	4.646	116	4.567	2.0	.079	12	.472	2
					5	Int.	**DSAS1090X05S120**	★	56.5	2.224	79.0	3.110	80.0	3.150	136.0	5.354	134	5.276	2.0	.079	12	.472	2
11.000	**.4331**				3	Ext.	**DSAE1100X03S120**	★	35.0	1.378	57.0	2.244	59.0	2.323	118.0	4.646	116	4.567	2.0	.079	12	.472	4
					3	Int.	**DSAS1100X03S120**	●	35.0	1.378	57.0	2.244	59.0	2.323	118.0	4.646	116	4.567	2.0	.079	12	.472	2
					5	Int.	**DSAS1100X05S120**	●	57.0	2.244	79.0	3.110	80.0	3.150	136.0	5.354	134	5.276	2.0	.079	12	.472	2
11.100	**.4370**				3	Int.	**DSAS1110X03S120**	●	35.4	1.394	60.1	2.366	61.1	2.406	118.1	4.650	116	4.567	2.1	.083	12	.472	2
					5	Int.	**DSAS1110X05S120**	★	57.6	2.268	83.1	3.272	86.1	3.390	142.1	5.594	140	5.512	2.1	.083	12	.472	2
11.113	**.4375**	**7/16**			3	Int.	**DSAS1111X03S120**	●	35.4	1.394	60.1	2.366	61.1	2.406	118.1	4.650	116	4.567	2.1	.083	12	.472	2
					5	Int.	**DSAS1111X05S120**	●	57.7	2.272	83.1	3.272	86.1	3.390	142.1	5.594	140	5.512	2.1	.083	12	.472	2
11.200	**.4409**				3	Int.	**DSAS1120X03S120**	●	35.7	1.406	60.1	2.366	61.1	2.406	118.1	4.650	116	4.567	2.1	.083	12	.472	2
					5	Int.	**DSAS1120X05S120**	★	58.1	2.287	83.1	3.272	86.1	3.390	142.1	5.594	140	5.512	2.1	.083	12	.472	2
11.300	**.4449**				3	Int.	**DSAS1130X03S120**	●	36.0	1.417	60.1	2.366	61.1	2.406	118.1	4.650	116	4.567	2.1	.083	12	.472	2
					5	Int.	**DSAS1130X05S120**	★	58.6	2.307	83.1	3.272	86.1	3.390	142.1	5.594	140	5.512	2.1	.083	12	.472	2
11.400	**.4488**				3	Int.	**DSAS1140X03S120**	●	36.3	1.429	60.1	2.366	61.1	2.406	118.1	4.650	116	4.567	2.1	.083	12	.472	2
					5	Int.	**DSAS1140X05S120**	★	59.1	2.327	83.1	3.272	86.1	3.390	142.1	5.594	140	5.512	2.1	.083	12	.472	2
11.500	**.4528**				3	Ext.	**DSAE1150X03S120**	★	36.6	1.441	60.1	2.366	61.1	2.406	118.1	4.650	116	4.567	2.1	.083	12	.472	4
					3	Int.	**DSAS1150X03S120**	●	36.6	1.441	60.1	2.366	61.1	2.406	118.1	4.650	116	4.567	2.1	.083	12	.472	2
					5	Int.	**DSAS1150X05S120**	●	59.6	2.346	83.1	3.272	86.1	3.390	142.1	5.594	140	5.512	2.1	.083	12	.472	2
11.510	**.4532**	**29/64**		**1/2-20**	3	Int.	**DSAS1151X03S120**	●	36.7	1.445	62.2	2.449	62.2	2.449	118.2	4.654	116	4.567	2.2	.087	12	.472	2
					5	Int.	**DSAS1151X05S120**	★	59.7	2.350	86.2	3.394	86.2	3.394	142.2	5.598	140	5.512	2.2	.087	12	.472	2
11.600	**.4567**				3	Int.	**DSAS1160X03S120**	●	37.0	1.457	62.2	2.449	62.2	2.449	118.2	4.654	116	4.567	2.2	.087	12	.472	2
					5	Int.	**DSAS1160X05S120**	★	60.2	2.370	86.2	3.394	86.2	3.394	142.2	5.598	140	5.512	2.2	.087	12	.472	2
11.700	**.4606**				3	Int.	**DSAS1170X03S120**	●	37.3	1.469	62.2	2.449	62.2	2.449	118.2	4.654	116	4.567	2.2	.087	12	.472	2
					5	Int.	**DSAS1170X05S120**	★	60.7	2.390	86.2	3.394	86.2	3.394	142.2	5.598	140	5.512	2.2	.087	12	.472	2
11.800	**.4646**				3	Int.	**DSAS1180X03S120**	●	37.6	1.480	62.2	2.449	62.2	2.449	118.2	4.654	116	4.567	2.2	.087	12	.472	2
					5	Int.	**DSAS1180X05S120**	★	61.2	2.409	86.2	3.394	86.2	3.394	142.2	5.598	140	5.512	2.2	.087	12	.472	2
11.900	**.4685**				3	Int.	**DSAS1190X03S120**	●	37.9	1.492	62.2	2.449	62.2	2.449	118.2	4.654	116	4.567	2.2	.087	12	.472	2
					5	Int.	**DSAS1190X05S120**	★	61.7	2.429	86.2	3.394	86.2	3.394	142.2	5.598	140	5.512	2.2	.087	12	.472	2
12.000	**.4724**			**M14x2.0**	3	Ext.	**DSAE1200X03S120**	★	38.2	1.504	62.2	2.449	62.2	2.449	118.2	4.654	116	4.567	2.2	.087	12	.472	4
					3	Int.	**DSAS1200X03S120**	●	38.2	1.504	62.2	2.449	62.2	2.449	118.2	4.654	116	4.567	2.2	.087	12	.472	2
					5	Int.	**DSAS1200X05S120**	●	62.2	2.449	86.2	3.394	86.2	3.394	142.2	5.598	140	5.512	2.2	.087	12	.472	2

Recommended Cutting Conditions

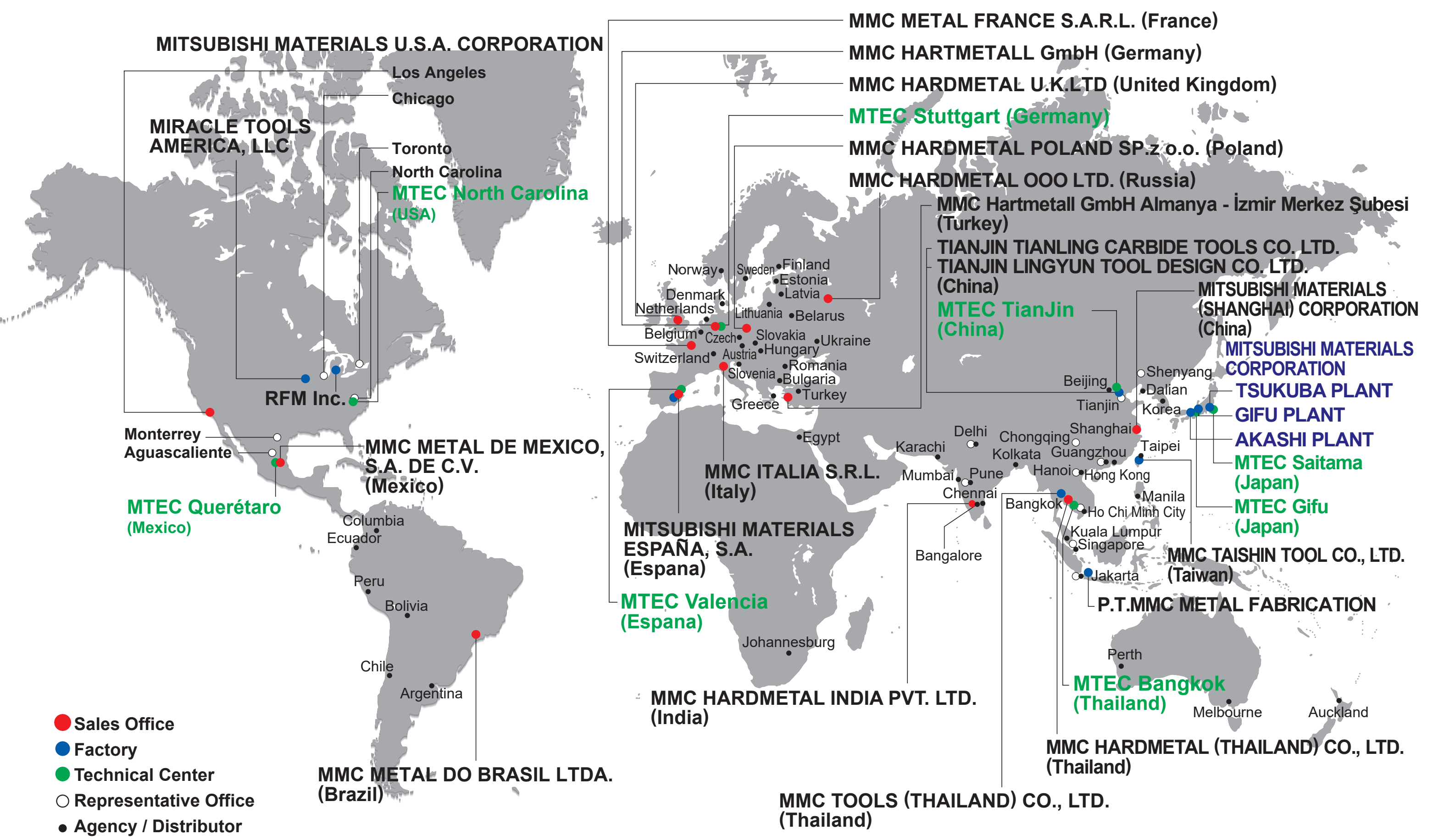
(inch)

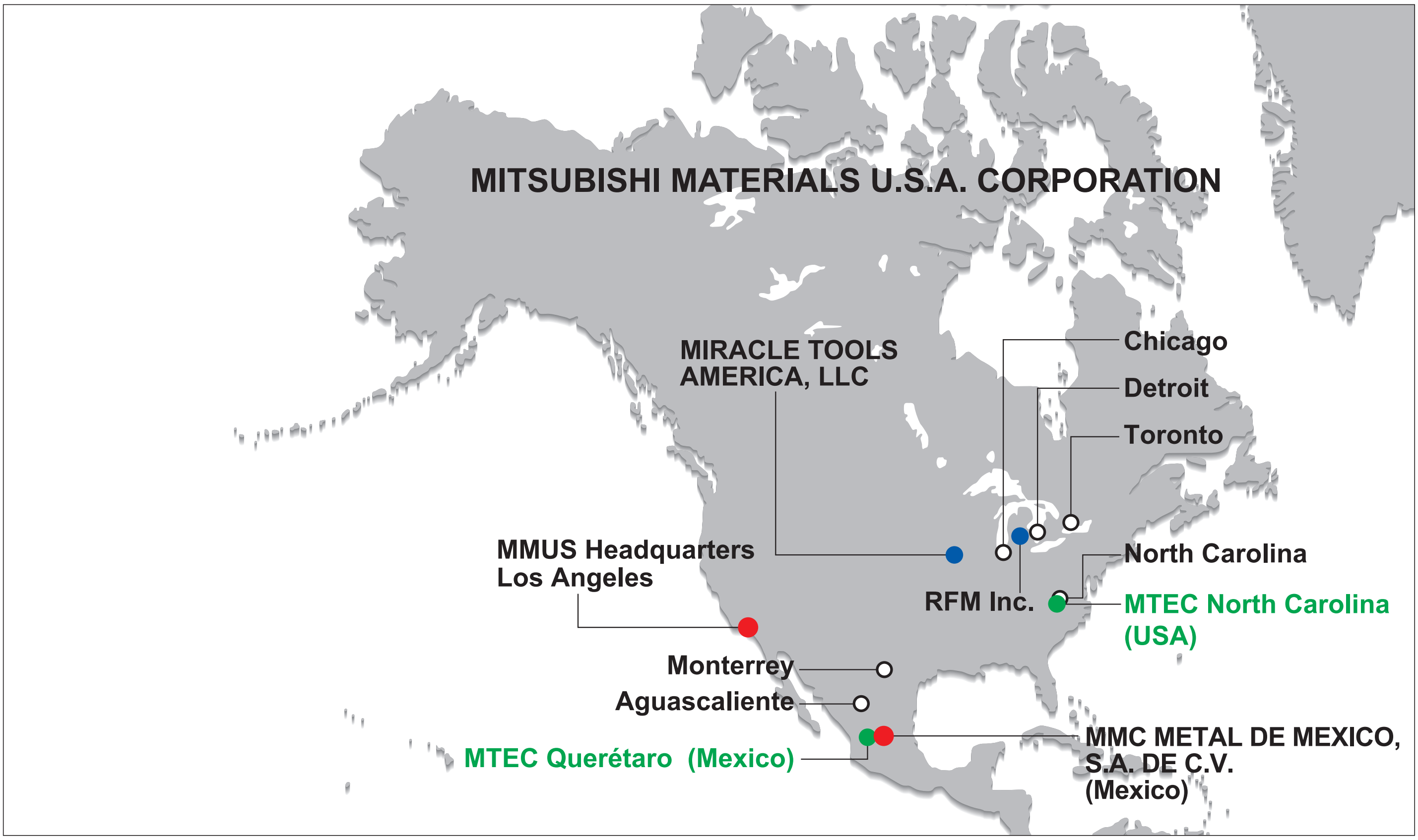
Workpiece Material			Heat Resistant Alloys Inconel718 etc.		Titanium Alloys Ti-6Al-4V etc.	
DC		L/D	Cutting Speed **vc** (SFM)	Feed **fr** (Min.—Max.) (IPR)	Cutting Speed **vc** (SFM)	Feed **fr** (Min.—Max.) (IPR)
inch	mm					
.1181	**3.000**	**≤ 5**	30	.002 (.002—.004)	130	.003 (.002—.005)
.1575	**4.000**	**≤ 5**	30	.002 (.002—.004)	130	.004 (.003—.006)
.1969	**5.000**	**≤ 5**	40	.003 (.002—.005)	130	.005 (.003—.008)
.2362	**6.000**	**≤ 5**	50	.004 (.003—.006)	130	.006 (.004—.008)
.3150	**8.000**	**≤ 5**	50	.004 (.003—.006)	140	.007 (.006—.010)
.3937	**10.000**	**≤ 5**	60	.004 (.003—.006)	140	.009 (.007—.011)
.4724	**12.000**	**≤ 5**	65	.005 (.003—.006)	150	.009 (.008—.012)

Note 1) Spindle through & high pressure coolant system is recommended to make stable holes.
Note 2) Emulsion type of water-soluble coolant is recommended.
Note 3) In non water-insoluble coolant, reduce the cutting speed by 10%-20%.
Note 4) When drilling length of DCx1 or more with the use of external coolant system, step drilling is recommended in every DCx0.5 to encourage chips to break.

Memo

MITSUBISHI MATERIALS





www.mitsubishicarbide.com

Overseas Sales Offices

JAPAN
MITSUBISHI MATERIALS CORPORATION
Metalworking Solutions Company
Sales Div. Overseas Sales Department
Marunouchi Nijubashi Building 22F, 3-2-3, Marunouchi,
Chiyoda-ku, Tokyo 100-8117, Japan

CHINA
MITSUBISHI MATERIALS (SHANGHAI) CORPORATION
2101 Tower 1, Raffles City, 1133 Changning road,
Changning District, Shanghai, 200051, CHINA
TEL +86-21-6289-0022 FAX +86-21-6279-1180

THAILAND
MMC HARDMETAL (THAILAND) CO., LTD.
622 Emporium Tower, Floor 22/1-4, Sukhumvit Road,Klongton,
Klongtoey, Bangkok 10110 Thailand
TEL +66-2661-8170 FAX +66-2258-1790

INDIA
MMC HARDMETAL INDIA PVT. LTD.
PRASAD ENCLAVE, Site #118/119,
1st Floor Industrial Suburb 2nd Stage, 5th Main, BBMP Ward
#11 Yeshwanthpura Bangalore North Taluk-560 022, INDIA
TEL +91-80-2204-3600

GERMANY
MMC HARTMETALL GmbH
Comeniusstr. 2, 40670 Meerbusch GERMANY
TEL +49-2159-91890 FAX +49-2159-918966

BRAZIL
MMC METAL DO BRASIL LTDA.
Rua Cincinato Braga, 340, 13° Andar,Conj.131/132,
Bela Vista,CEP 01333-010, Sâo Paulo-SP, BRAZIL
TEL +55-11-3506-5600 FAX +55-11-3506-5688

NORTH AMERICAN OFFICES

MITSUBISHI MATERIALS U.S.A. CORPORATION

Customer Service : 800-523-0800
Technical Service : 800-486-2341

LOS ANGELES HEADQUARTERS
3535 Hyland Avenue, Suite 200, Costa Mesa, California 92626, USA
TEL : 714-352-6100 FAX : 714-352-6190
e-mail : LAHeadOffice@mmus.com

DETROIT OFFICE
41700 Gardenbrook Road, Suite 120, Novi, MI 48375-1320, USA
TEL 248-308-2620 FAX 248-308-2627

MMC METAL DE MEXICO, S.A. DE C.V.
Av. La Cañada No.16, Parque Industrial Bernardo Quintana El Marqués,
Querétaro, CP 76246, México
TEL : +52-442-192-6800 FAX : +52-442-221-6134

Technical Center
MITSUBISHI MATERIALS U.S.A. CORPORATION (MTEC North Carolina)
105 Corporate Center Drive, Suite A, Mooresville, North Carolina 28117, USA
TEL : 980-312-3100 FAX : 704-746-9292

MMC METAL DE MEXICO, S.A. DE C.V. (MTEC Querétaro)
Av. La Cañada No.16, Parque Industrial Bernardo Quintana El Marqués,
Querétaro, CP 76246, México
TEL : +52-442-192-6800 FAX : +52-442-221-6134

MITSUBISHI MATERIALS CORPORATION
TSUKUBA PLANT (JAPAN)

QMS.EMS
ISO 9001 , ISO 14001
(JSAQ080) (JSAE036)
The Scope of the Registration:
Design, Development and
Production of Cemented
Carbide Tools and Carbide
Blanks

MITSUBISHI MATERIALS U.S.A. CORPORATION
LOS ANGELES HEAD OFFICE

MITSUBISHI MATERIALS CORPORATION
GIFU PLANT (JAPAN)

QMS.EMS
ISO 9001 , ISO 14001
(JSAQ094) (JSAE1545)
The Scope of the Registration:
Design, Development, and
Production of Cutting Tools,
Cemented Carbide Blanks,
and Coated Products

MITSUBISHI MATERIALS CORPORATION
AKASHI PLANT (JAPAN)

ISO 9001
ISO 14001
JQA-2522
JQA-EM0941

DIAEDGE

YOUR GLOBAL CRAFTSMAN STUDIO

MITSUBISHI MATERIALS U.S.A. CORPORATION

Customer Service : 800-523-0800
Technical Service : 800-486-2341

LOS ANGELES HEAD OFFICE
3535 Hyland Avenue, Suite 200
Costa Mesa, California 92626, USA
TEL: 714-352-6100
E-mail: LAHeadOffice@mmus.com

NORTH CAROLINA OFFICE
105 Corporate Center Drive, Suite A
Mooresville, North Carolina 28117, USA
TEL : 980-312-3100

DETROIT OFFICE
41700 Gardenbrook Road, Suite 120,
Novi, MI 48375-1320, USA
TEL: 248-308-2620 FAX: 248-308-2627

MMC METAL DE MEXICO, S.A. DE C.V.
Av. La Cañada No.16, Parque Industrial Bernardo Quintana
El Marqués, Querétaro, CP 76246, México
TEL: +52-442-192-6800 FAX: +52-442-221-6134

CHICAGO OFFICE
300 N Martingale Road, Suite 500,
Schaumburg IL 60173, USA
TEL: 847-252-6300
E-mail: Chicago@mmus.com

TORONTO OFFICE
3535 Laird Road, Units 15 & 16 Mississauga, Ontario,
L5L 5Y7, CANADA
TEL: 905-814-0240
E-mail: Toronto@mmus.com

TECHNICAL CENTER
MITSUBISHI MATERIALS U.S.A. CORPORATION
(MTEC North Carolina)
105 Corporate Center Drive, Suite A
Mooresville, North Carolina 28117, USA
TEL: 980-312-3100 FAX: 704-746-9292

TECHNICAL CENTER
MMC METAL DE MEXICO, S.A. DE C.V.
(MTEC Querétaro)
Av. La Cañada No.16, Parque Industrial Bernardo Quintana
El Marqués, Querétaro, CP 76246, México
TEL: +52-442-192-6800 FAX: +52-442-221-6134

---

http://www.mmus-carbide.com/
marketingservices@mmus.com

EXP-22-B002
2022.6.E (3.0C)