Strong X Geometry

DIA EDGE

WWX SERIES

DOUBLE SIDED
INSERT TYPE
SHOULDER MILL

ABOUT OUR BRAND

Your manufacturing success is our success.

It's simple. We want to provide high-quality cutting tool products that help deliver unparalleled performance and control for you to manufacture precisely perfect products every day.

Our long heritage of building partnerships through cutting tool solutions to metal working manufacturers, like yours, has given Mitsubishi Materials USA a solid 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 to improve machining processes.

Your success is our success and is the driving force behind our innovative products. Our product brands, DIAEDGE and MOLDINO, are trusted globally in the metal manufacturing and die & mold industries for delivering expertly-designed manufactured tools of the trade for highly specialized industries like yours.

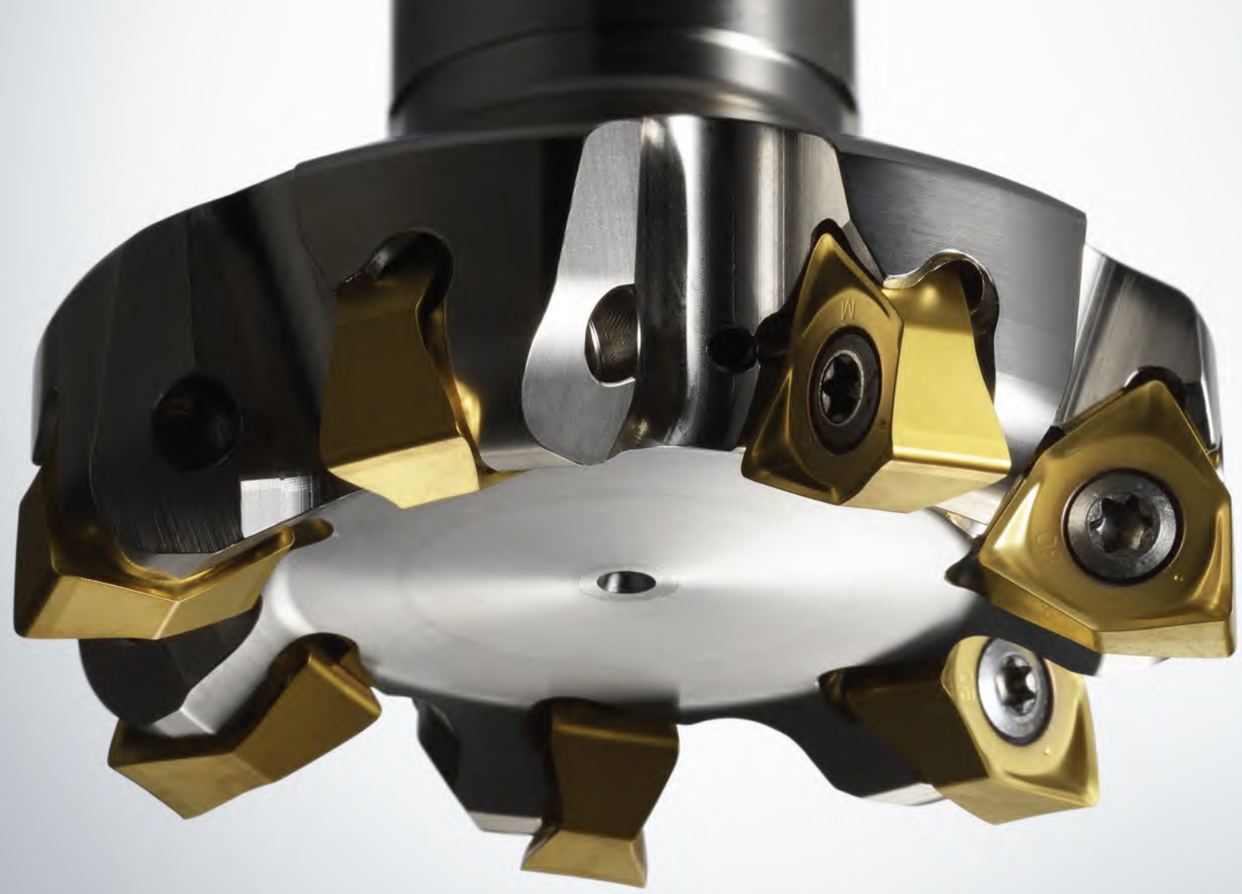
With the acquisition of MOLDINO Tool Engineering, Ltd, our traditional Mitsubishi Materials USA cutting tool product line is now sold under the DIAEDGE product brand name.

Brands you can trust:

MITSUBISHI MATERIALS U.S.A.

TRUSTED PRODUCT BRANDS

DIAEDGE MOLDINO



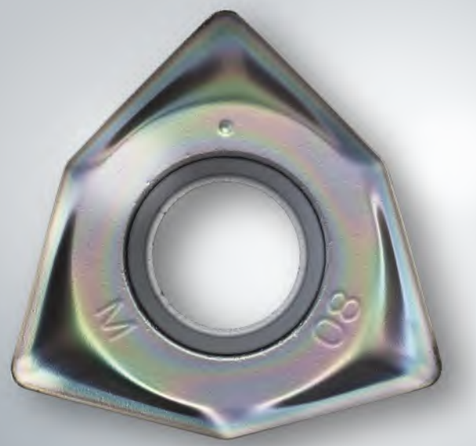
Double Sided Insert Type Shoulder Mill

WWX Series

Stable and Reliable

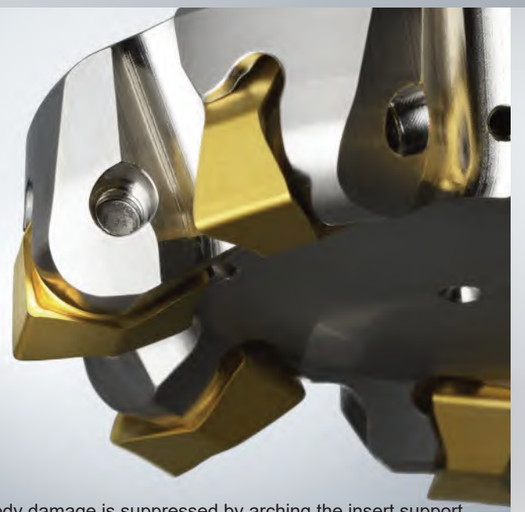
The optimized “X-type” insert realizes stable and high-quality machining.

Strong X Geometry



Economical double sided insert with 6 corners.

The insert thickness was greatly increased to markedly improve the fracture resistance (MMC comparison).



Body damage is suppressed by arching the insert support.

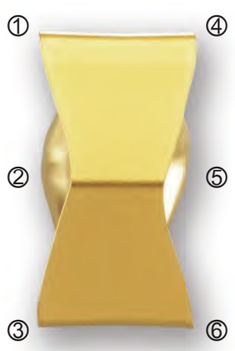
Wide variety of holder sizes and insert grades available covering most all machined workpiece material applications.

The optimized “X-type” insert meets the demand for greater strength.

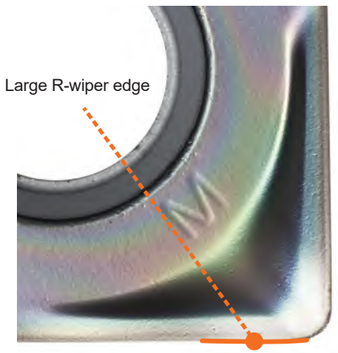
The “X-Type” insert shape achieves both high quality surface finish and economic efficiency.

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.



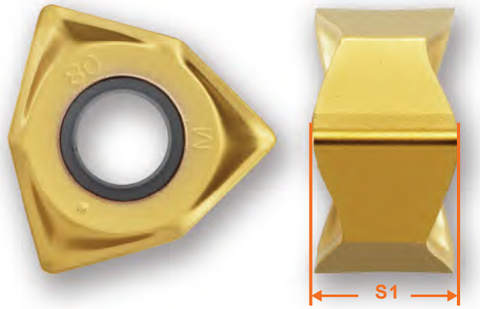
Economical double sided 6 corners.



Large R-wiper edge achieves a good surface finish.

The generous thickness of the insert provides high rigidity.

The WWX200 insert is 1.5 times thicker, and the WWX400 is 2.2 times thicker than the conventional ASX400 insert, achieving high rigidity and excellent fracture resistance. In addition, the increased rigidity eliminates the need for a seat component as direct clamping provides stable insert fixation.



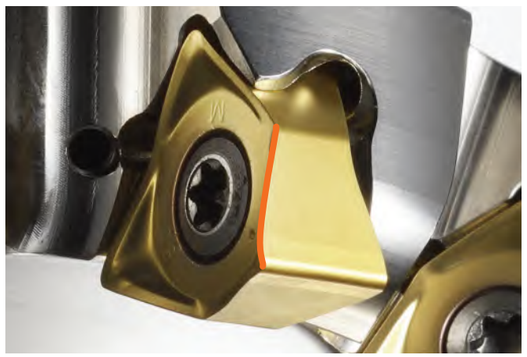
WWX200=.236 inch
WWX400=.354 inch

Strong X Geometry

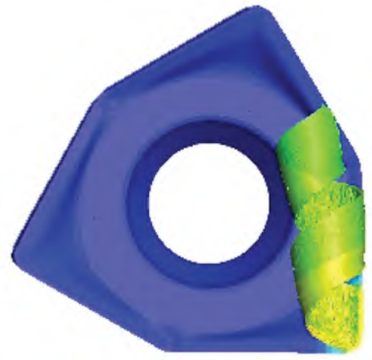
Excellent control and chip abrasion prevention.

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 Engineering



Curved cutting edge shape designed with an optimum rake face.



Chips are created with a good helical shape.

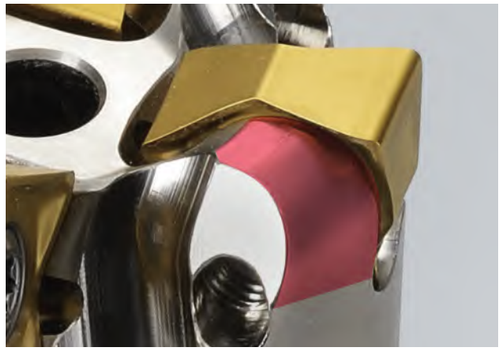
Comments from Developer

The WWX series was developed under the concept of “Stable and Worry-free” using an optimized insert shape with a maximum thickness of WWX200=.234",WWX400=.354” 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.

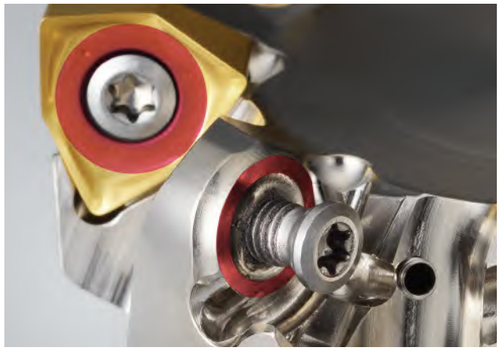
High-stability clamping and high-quality machining.

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.

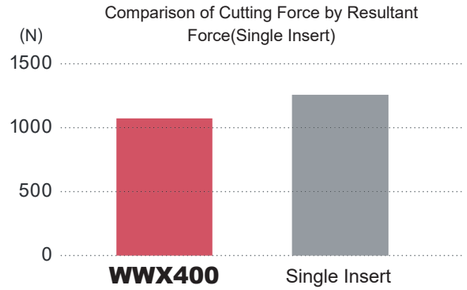


The conical seat surface and the M5 screw for WWX400, and the M3 screw for WWX200 provide a great clamping force.

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 WWX Series 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°



<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.”

WWX Series Classification

■ Arbor Type

The table feed is calculated from the recommended conditions of a M breaker for mild steel, during dry, stable cutting and with a cutting width of .5DC. APMX is the maximum depth of cut which differs from the recommended cutting conditions.

DC		WWX200 APMX= .197 inch						WWX400 APMX= .323 inch					
(inch)	(mm)	* No.T	Table Feed (IPM)	* No.T	Table Feed (IPM)	* No.T	Table Feed (IPM)	* No.T	Table Feed (IPM)	* No.T	Table Feed (IPM)	* No.T	Table Feed (IPM)
1.500	40	3	29.3	4	39.1	–	–	–	–	–	–	–	–
2.000	50	4	31.3	5	39.1	6	46.9	3	23.5	4	31.3	–	–
2.500	63	5	31.1	6	37.2	7	43.5	3	18.6	4	24.8	5	31.1
3.000	80	5	24.4	7	34.2	9	44.0	4	19.6	5	24.4	7	34.2
4.000	100	6	23.5	8	31.3	11	43.0	5	19.6	7	27.4	9	35.2
5.000	125	7	21.9	11	34.4	14	43.8	6	18.8	8	25.0	12	37.6
6.000	160	9	22.0	12	29.3	16	39.1	8	19.6	10	24.4	14	34.2
8.000	200	–	–	–	–	–	–	10	19.6	12	23.5	16	31.3
10.000	250	–	–	–	–	–	–	12	18.8	14	21.9	18	28.1

* Number of Teeth

■ Shank Type

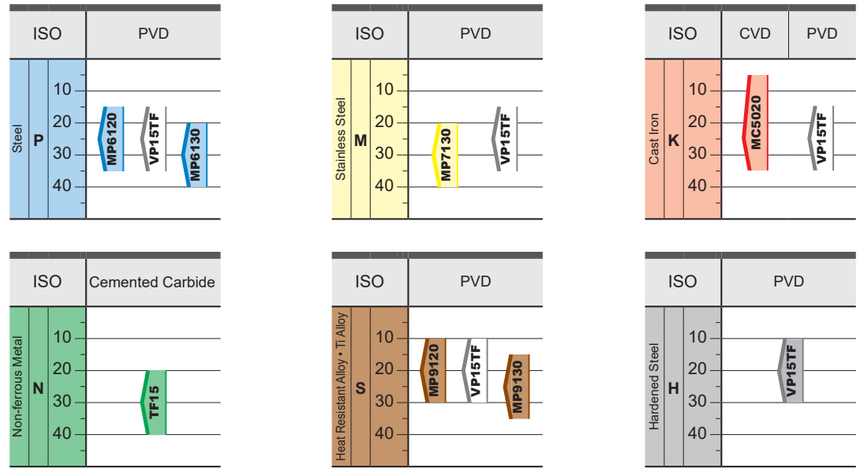
(inch)

DC	WWX200 APMX= .197 inch						WWX400 APMX= .323 inch				
(inch)	DCONMS	Functional Length LF		Number of Teeth			DCONMS	Functional Length LF	Number of Teeth		
1.000	1.000	4.750	8.500	2	–	–	–	–	–	–	–
1.125	1.000	8.500	–	2	–	–	–	–	–	–	–
1.250	1.000	5.125	–	2	3	–	–	–	–	–	–
	1.000	9.000	–	3	–	–	–	–	–	–	–
	1.250	5.125	–	2	3	–	–	–	–	–	–
	1.250	9.000	–	3	–	–	–	–	–	–	–
1.500	1.250	5.125	–	3	4	–	–	–	–	–	–
	1.250	9.000	–	4	–	–	–	–	–	–	–
2.000	–	–	–	–	–	–	1.250	4.750	3	4	–
2.500	–	–	–	–	–	–	1.250	4.750	3	4	5
3.000	–	–	–	–	–	–	1.250	4.750	4	5	7

(mm)

DC	WWX200 APMX 5.0 mm						WWX400 APMX 8.2 mm				
(mm)	DCONMS	Functional Length LF		Number of Teeth			DCONMS	Functional Length LF	Number of Teeth		
25	20	115	–	2	–	–	–	–	–	–	–
	25	115	170	2	–	–	–	–	–	–	–
28	25	115	170	2	–	–	–	–	–	–	–
30	25	125	–	2	–	–	–	–	–	–	–
32	32	125	–	2	3	–	–	–	–	–	–
	32	190	–	3	–	–	–	–	–	–	–
35	32	190	–	3	–	–	–	–	–	–	–
40	32	125	–	3	4	–	–	–	–	–	–
50	32	125	–	4	5	6	32	125	3	4	–
63	–	–	–	–	–	–	32	125	3	4	5
80	–	–	–	–	–	–	32	125	4	5	7

Insert Grades for a Wide Range of Materials



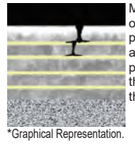
MP6100/MP7100/MP9100 Series

TOUGH-Σ Technology

A fusion of the separate coating technologies; PVD and multi-layering provides extra toughness.

Base Layer
High Al-(Al, Ti)N

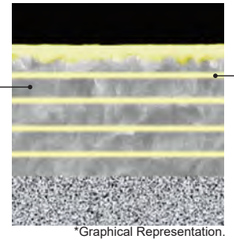
The new technology Al-(Al, Ti)N coating provides stabilisation of the high hardness phase and succeeds in dramatically improving wear, crater and welding resistance.



Multi-layering of the coating prevents any cracks penetrating through to the substrate.

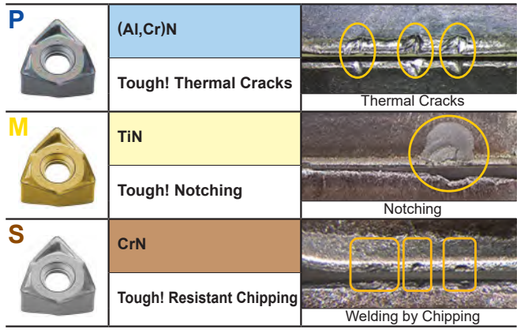
*Graphical Representation.

Al-Ti-Cr-N Based PVD Coating



*Graphical Representation.

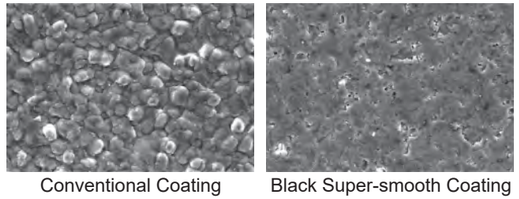
Best Layer of Each Work Material



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

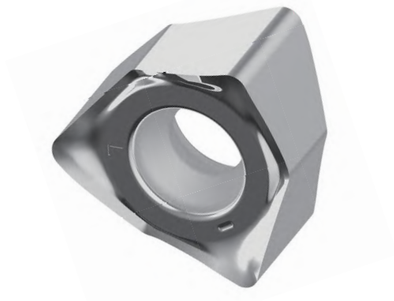
Black super-smooth coating prevents abnormal damage such as weld chipping.

Chip Breaker System

Workpiece Material	Cutting Conditions		
	Stable Cutting	General Cutting	Unstable Cutting
P	L	M	R
M	L	M	
K	L	M	R
N	L		
S	L	M	R
H	L	M	R

L chip breaker ideal for machining aluminum alloys and non-ferrous metals

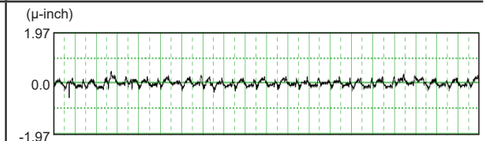
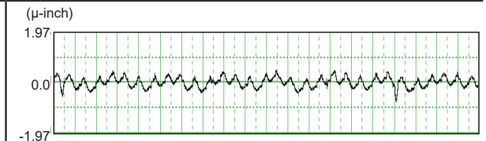
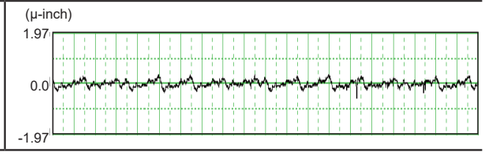
Cost advantage of using 6 corners.
Precision grade provides high adhesion resistance and excellent machined surface quality.
Low cutting force and good chip control.



Cutting Performance

AISI 4140 Finished Surface Comparison by Single Insert Cutting

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	

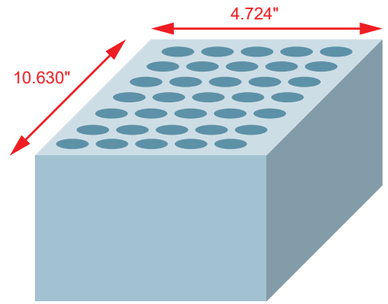
<Cutting Conditions>
Workpiece Material : AISI 4140
Cutter Dia. : DC=ø3.150"
Cutting Speed : vc = 720 SFM
Feed per Tooth : fz = .004 IPT
Depth of Cut : ap = .039"
Width of Cut : ae = 2.520" (.8DC)
Cutting Mode : Dry Cutting

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



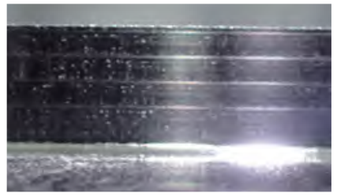
2.66 feet x 2 = 5.32 feet

<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

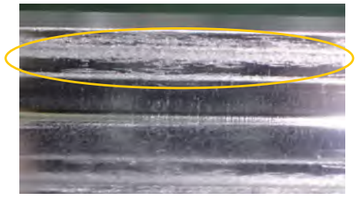
Cutting Performance

Comparison of Wall after Shoulder Milling Alloy Steel AISI 4140

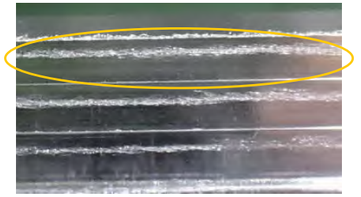
Excels in chip control and achieves a great, scratch-free wall surfaces.



WWX200



Biting of Chips Occurs
Conventional A

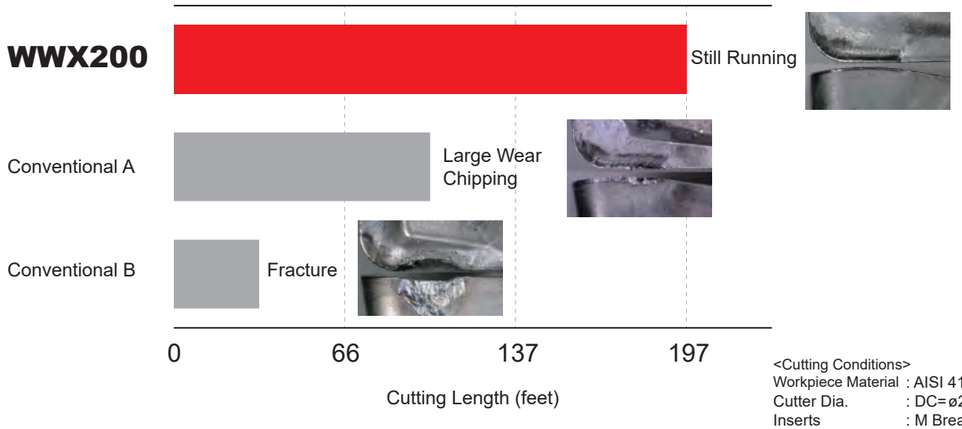


Biting of Chips Occurs
Conventional B

<Cutting Conditions>
Workpiece Material : AISI 4140
Cutter Dia. : DC=ø2.000 inch
Cutting Speed : vc = 590 SFM
Feed per Tooth : fz = .004 IPT
Depth of Cut : ap = .039 inch
Width of Cut : ae = 1.575 inch
Cutting Mode : Dry Cutting
Single Insert

Comparison of Alloy Steel AISI 4140 Cutting Length

It has excellent wear and fracture resistance, and contributes to the extension of cutting length.



<Cutting Conditions>
Workpiece Material : AISI 4140
Cutter Dia. : DC=ø2.000 inch
Inserts : M Breaker, MP6120
Cutting Speed : vc = 590 SFM
Feed per Tooth : fz = .006 IPT
Depth of Cut : ap = .079 inch
Width of Cut : ae = 1.575 inch
Cutting Mode : Dry Cutting
Single Insert

SHOULDER MILLING
<GENERAL CUTTING>

90° KAPR F R

WWX200

P M K N S H

Fig.1
ø1.500"
ø2.000"

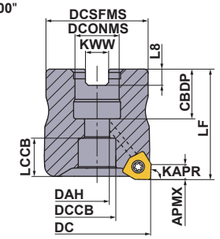
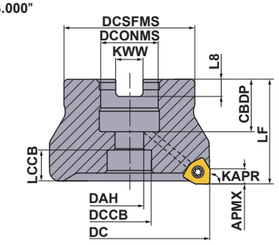


Fig.2
ø2.500"
ø3.000"



Right hand tool holder only.

■Arbor Type

DCONMS=inch size (inch)

DC	Order Number	Stock R	*1 Coolant Thru	*2 No.T	LF	DCONMS	WT (lbs)	APMX	RPMX (min^{-1})	Fig.
1.500	**WWX200UR1.5003SA**	●	Y	3	1.750	.500	.6	.197	21600	1
1.500	**WWX200UR1.5004SA**	●	Y	4	1.750	.500	.5	.197	21600	1
2.000	**WWX200UR2.0004AA**	●	Y	4	1.750	.750	.9	.197	18600	1
2.000	**WWX200UR2.0005AA**	●	Y	5	1.750	.750	.9	.197	18600	1
2.000	**WWX200UR2.0006AA**	●	Y	6	1.750	.750	.9	.197	18600	1
2.500	**WWX200UR2.5005CA**	●	Y	5	2.000	1.000	1.7	.197	16000	2
2.500	**WWX200UR2.5006CA**	●	Y	6	2.000	1.000	1.6	.197	16000	2
2.500	**WWX200UR2.5007CA**	●	Y	7	2.000	1.000	1.6	.197	16000	2
3.000	**WWX200UR3.0005CA**	●	Y	5	2.000	1.000	2.2	.197	13600	2
3.000	**WWX200UR3.0007CA**	●	Y	7	2.000	1.000	2.2	.197	13600	2
3.000	**WWX200UR3.0009CA**	●	Y	9	2.000	1.000	2.1	.197	13600	2
4.000	**WWX200UR4.0006EA**	●	Y	6	2.500	1.500	5.1	.197	11700	3
4.000	**WWX200UR4.0008EA**	●	Y	8	2.500	1.500	5.0	.197	11700	3
4.000	**WWX200UR4.0011EA**	●	Y	11	2.500	1.500	4.9	.197	11700	3
5.000	**WWX200UR5.0007EA**	●	Y	7	2.500	1.500	7.8	.197	10100	3
5.000	**WWX200UR5.0011EA**	●	Y	11	2.500	1.500	7.6	.197	10100	3
5.000	**WWX200UR5.0014EA**	●	Y	14	2.500	1.500	7.6	.197	10100	3
6.000	**WWX200UR6.0009EA**	●	N	9	2.500	1.500	10.0	.197	8600	3
6.000	**WWX200UR6.0012EA**	●	N	12	2.500	1.500	9.8	.197	8600	3
6.000	**WWX200UR6.0016EA**	●	N	16	2.500	1.500	9.8	.197	8600	3

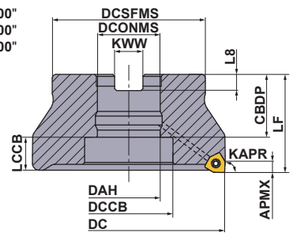
*1 Y=Yes, N=No
*2 Number of Teeth

● : **USA Stock**

WWX200

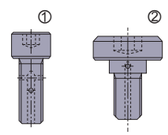
Fig.3

ø4.000"
ø5.000"
ø6.000"



Right hand tool holder only.

DC	Set Bolt	Geometry
1.500	HSCU25011H	①
2.000	HSCU37513H	①
2.500	HSCU50014H	①
3.000	HSCU50014H	①
4.000	MBAU75016H	②
5.000	MBAU75016H	②
6.000	MBAU75016H	②



Mounting Dimensions

(inch)

DC	Order Number	DCONMS	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8	Fig.
1.500	**WWX200UR1.5003SA**	.500	.630	.276	.433	.680	1.438	.250	.156	1
1.500	**WWX200UR1.5004SA**	.500	.630	.276	.433	.680	1.438	.250	.156	1
2.000	**WWX200UR2.0004AA**	.750	.748	.413	.630	.561	1.750	.313	.187	1
2.000	**WWX200UR2.0005AA**	.750	.748	.413	.630	.561	1.750	.313	.187	1
2.000	**WWX200UR2.0006AA**	.750	.748	.413	.630	.561	1.750	.313	.187	1
2.500	**WWX200UR2.5005CA**	1.000	.945	.539	.787	.680	2.188	.375	.219	2
2.500	**WWX200UR2.5006CA**	1.000	.945	.539	.787	.680	2.188	.375	.219	2
2.500	**WWX200UR2.5007CA**	1.000	.945	.539	.787	.680	2.188	.375	.219	2
3.000	**WWX200UR3.0005CA**	1.000	.945	.539	.787	.693	2.188	.375	.219	2
3.000	**WWX200UR3.0007CA**	1.000	.945	.539	.787	.693	2.188	.375	.219	2
3.000	**WWX200UR3.0009CA**	1.000	.945	.539	.787	.693	2.188	.375	.219	2
4.000	**WWX200UR4.0006EA**	1.500	1.654	1.500	2.205	.800	3.500	.625	.375	3
4.000	**WWX200UR4.0008EA**	1.500	1.654	1.500	2.205	.800	3.500	.625	.375	3
4.000	**WWX200UR4.0011EA**	1.500	1.654	1.500	2.205	.800	3.500	.625	.375	3
5.000	**WWX200UR5.0007EA**	1.500	1.654	1.500	2.205	.800	3.813	.625	.375	3
5.000	**WWX200UR5.0011EA**	1.500	1.654	1.500	2.205	.800	3.813	.625	.375	3
5.000	**WWX200UR5.0014EA**	1.500	1.654	1.500	2.205	.800	3.813	.625	.375	3
6.000	**WWX200UR6.0009EA**	1.500	1.654	1.500	2.205	.800	3.813	.625	.375	3
6.000	**WWX200UR6.0012EA**	1.500	1.654	1.500	2.205	.800	3.813	.625	.375	3
6.000	**WWX200UR6.0016EA**	1.500	1.654	1.500	2.205	.800	3.813	.625	.375	3

Spare Parts

(inch)

Tool Holder Type	* Clamp Screw	Wrench (Insert)	Anti-seize Lubricant
WWX200	TPS3R	TIP10D	MK1KS

* Clamp Torque (lbf-in) : TPS3R = 17.7

● : USA Stock

Fig.1

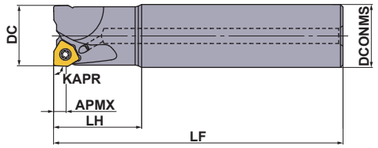


Fig.3

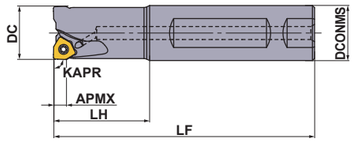


Fig.2

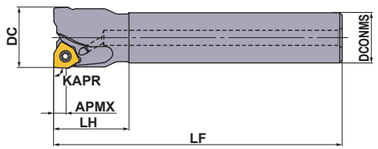
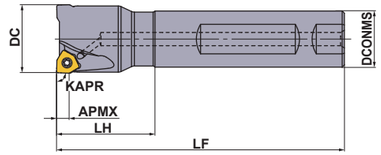


Fig.4



Right hand tool holder only.

■Shank Type

With Air / Coolant through

(inch)

DC	Order Number	Stock R	* No.T	LF	DCONMS	LH	WT (lbs)	APMX	RPMX (min^{-1})	Fig.
1.000	**WWX200UR1602FA16S**	●	2	4.750	1.000	1.750	.9	.197	29600	3
1.000	**WWX200UR1602SA16L**	●	2	8.500	1.000	2.500	1.7	.197	29600	1
1.125	**WWX200UR1802SA16L**	●	2	8.500	1.000	1.750	1.8	.197	27400	2
1.250	**WWX200UR2002FA16S**	●	2	5.125	1.000	1.750	1.1	.197	25100	4
1.250	**WWX200UR2003FA16S**	●	3	5.125	1.000	1.750	1.1	.197	25100	4
1.250	**WWX200UR2003SA16L**	●	3	9.000	1.000	1.750	1.9	.197	25100	2
1.250	**WWX200UR2002FA20S**	●	2	5.125	1.250	2.000	1.5	.197	25100	3
1.250	**WWX200UR2003FA20S**	●	3	5.125	1.250	2.000	1.5	.197	25100	3
1.250	**WWX200UR2003SA20L**	●	3	9.000	1.250	3.000	2.8	.197	25100	1
1.500	**WWX200UR2403FA20S**	●	3	5.125	1.250	2.000	1.7	.197	21600	4
1.500	**WWX200UR2404FA20S**	●	4	5.125	1.250	2.000	1.7	.197	21600	4
1.500	**WWX200UR2404SA20L**	●	4	9.000	1.250	2.000	3.0	.197	21600	2

* Number of Teeth

Spare Parts

(inch)

Tool Holder Type	* Clamp Screw	Wrench (Insert)	Anti-seize Lubricant
WWX200	TPS3R	TIP10D	MK1KS

* Clamp Torque (lbf-in) : TPS3R = 17.7

SHOULDER MILLING
<GENERAL CUTTING>

90° KAPR

WWX200

P M K N S H

Fig.1
ø40
ø50

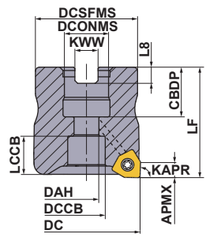
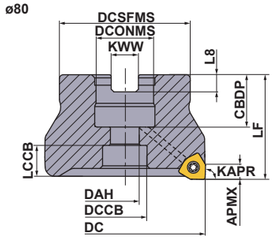


Fig.2
ø63
ø80



Right hand tool holder only.

Metric Standard

■Arbor Type

DCONMS=inch size

(mm)

DC	Order Number	Stock R	*1 Coolant Thru	*2 No.T	LF	DCONMS	WT (kg)	APMX	RPMX (min-1)	Fig.
80	**WWX200R08005CA**	★	Y	5	50	25.4	1.1	5.0	13600	2
80	**WWX200R08007CA**	★	Y	7	50	25.4	1.1	5.0	13600	2
80	**WWX200R08009CA**	★	Y	9	50	25.4	1.0	5.0	13600	2
100	**WWX200R10006DA**	★	Y	6	50	31.75	1.6	5.0	11700	3
100	**WWX200R10008DA**	★	Y	8	50	31.75	1.5	5.0	11700	3
100	**WWX200R10011DA**	★	Y	11	50	31.75	1.5	5.0	11700	3
125	**WWX200R12507EA**	★	Y	7	63	38.1	2.8	5.0	10100	3
125	**WWX200R12511EA**	★	Y	11	63	38.1	2.8	5.0	10100	3
125	**WWX200R12514EA**	★	Y	14	63	38.1	2.8	5.0	10100	3
160	**WWX200R16009FA**	★	Y	9	63	50.8	4.6	5.0	8600	3
160	**WWX200R16012FA**	★	Y	12	63	50.8	4.5	5.0	8600	3
160	**WWX200R16016FA**	★	Y	16	63	50.8	4.5	5.0	8600	3

*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 20, when ordering.
Note2) Please use a set bolt of the FMA type on the cutter body from 80 to 160 in diameter(DC).

★ : Stocked in Japan

Fig.3
ø100
ø125
ø160

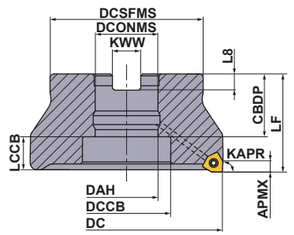
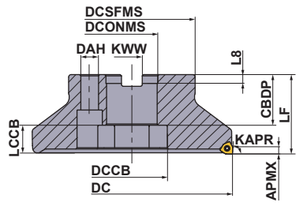


Fig.4
ø160



Right hand tool holder only.

Metric Standard

■Arbor Type

DCONMS=mm size

(mm)

DC	Order Number	Stock R	*1 Coolant Thru	*2 No.T	LF	DCONMS	WT (kg)	APMX	RPMX (min-1)	Fig.
40	**WWX200-040A03AR**	★	Y	3	40	16	0.2	5.0	21600	1
40	**WWX200-040A04AR**	★	Y	4	40	16	0.2	5.0	21600	1
50	**WWX200-050A04AR**	★	Y	4	40	22	0.4	5.0	18600	1
50	**WWX200-050A05AR**	★	Y	5	40	22	0.4	5.0	18600	1
50	**WWX200-050A06AR**	★	Y	6	40	22	0.3	5.0	18600	1
63	**WWX200-063A05AR**	★	Y	5	40	22	0.5	5.0	16000	2
63	**WWX200-063A06AR**	★	Y	6	40	22	0.5	5.0	16000	2
63	**WWX200-063A07AR**	★	Y	7	40	22	0.5	5.0	16000	2
80	**WWX200-080A05AR**	★	Y	5	50	27	1.1	5.0	13600	2
80	**WWX200-080A07AR**	★	Y	7	50	27	1.0	5.0	13600	2
80	**WWX200-080A09AR**	★	Y	9	50	27	1.0	5.0	13600	2
100	**WWX200-100B06AR**	★	Y	6	50	32	1.7	5.0	11700	3
100	**WWX200-100B08AR**	★	Y	8	50	32	1.7	5.0	11700	3
100	**WWX200-100B11AR**	★	Y	11	50	32	1.7	5.0	11700	3
125	**WWX200-125B07AR**	★	Y	7	63	40	3.1	5.0	10100	3
125	**WWX200-125B11AR**	★	Y	11	63	40	3.0	5.0	10100	3
125	**WWX200-125B14AR**	★	Y	14	63	40	3.0	5.0	10100	3
160	**WWX200-160C09NR**	★	N	9	63	40	4.6	5.0	8600	4
160	**WWX200-160C12NR**	★	N	12	63	40	4.6	5.0	8600	4
160	**WWX200-160C16NR**	★	N	16	63	40	4.6	5.0	8600	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 20, when ordering.
Note2) Please use a set bolt of the FMC type on the cutter body from 40 to 100 in diameter(DC).
Note3) Please use a set bolt of the FMA type on the cutter body from 125 to 160 in diameter(DC).

Spare Parts

(mm)

Tool Holder Type	*  Clamp Screw	 Wrench (Insert)	 Anti-seize Lubricant
WWX200	TPS3R	TIP10D	MK1KS

★ Clamp Torque (N • m) : TPS3R = 2.0

WWX200

Mounting Dimensions

(mm)

DC	Order Number	DCONMS	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8	Fig.
40	**WWX200-040A03AR**	16	18	9	13.6	13.8	37	8.4	5.6	1
40	**WWX200-040A04AR**	16	18	9	13.6	13.8	37	8.4	5.6	1
50	**WWX200-050A04AR**	22	20	11	17	11.8	47	10.4	6.3	1
50	**WWX200-050A05AR**	22	20	11	17	11.8	47	10.4	6.3	1
50	**WWX200-050A06AR**	22	20	11	17	11.8	47	10.4	6.3	1
63	**WWX200-063A05AR**	22	20	11	17	11.8	50	10.4	6.3	2
63	**WWX200-063A06AR**	22	20	11	17	11.8	50	10.4	6.3	2
63	**WWX200-063A07AR**	22	20	11	17	11.8	50	10.4	6.3	2
80	**WWX200R08005CA**	25.4	26	13	20	11.8	56	9.5	6	2
80	**WWX200R08007CA**	25.4	26	13	20	11.8	56	9.5	6	2
80	**WWX200R08009CA**	25.4	26	13	20	11.8	56	9.5	6	2
80	**WWX200-080A05AR**	27	23	13	20	11.8	56	12.4	7	2
80	**WWX200-080A07AR**	27	23	13	20	11.8	56	12.4	7	2
80	**WWX200-080A09AR**	27	23	13	20	11.8	56	12.4	7	2
100	**WWX200R10006DA**	31.75	37	31.75	45	16.8	70	12.7	8	3
100	**WWX200R10008DA**	31.75	37	31.75	45	16.8	70	12.7	8	3
100	**WWX200R10011DA**	31.75	37	31.75	45	16.8	70	12.7	8	3
100	**WWX200-100B06AR**	32	26	32	45	16.8	78	14.4	8	3
100	**WWX200-100B08AR**	32	26	32	45	16.8	78	14.4	8	3
100	**WWX200-100B11AR**	32	26	32	45	16.8	78	14.4	8	3
125	**WWX200R12507EA**	38.1	42	38.1	56	21.8	80	15.9	10	3
125	**WWX200R12511EA**	38.1	42	38.1	56	21.8	80	15.9	10	3
125	**WWX200R12514EA**	38.1	42	38.1	56	21.8	80	15.9	10	3
125	**WWX200-125B07AR**	40	35	42	56	21.8	89	16.4	9	3
125	**WWX200-125B11AR**	40	35	42	56	21.8	89	16.4	9	3
125	**WWX200-125B14AR**	40	35	42	56	21.8	89	16.4	9	3
160	**WWX200-160C09NR**	40	40	–	56	21.8	100	16.4	9	4
160	**WWX200-160C12NR**	40	40	–	56	21.8	100	16.4	9	4
160	**WWX200-160C16NR**	40	40	–	56	21.8	100	16.4	9	4
160	**WWX200R16009FA**	50.8	45	50.8	72	21.8	100	19.1	11	3
160	**WWX200R16012FA**	50.8	45	50.8	72	21.8	100	19.1	11	3
160	**WWX200R16016FA**	50.8	45	50.8	72	21.8	100	19.1	11	3

Parts Sold Separately
Set Bolt

(mm)

Tool Holder Type	Set Bolt: With Coolant Thru	Set Bolt: Without Coolant Thru	Fig.	Reference Dimensions							Geometry
	Order Number	Order Number		a	b	c	d	e	f	g	
WWX200R080○○CA	HSC12035H	HSC12035	1	18	M12x1.75	47	12	10	–	–	Fig.1
WWX200R100○○DA	MBA16033H	–	2	40	M16x2	43	10	14	6	23	
WWX200R125○○EA	MBA20040H	–	2	50	M20x2.5	54	14	17	6	27	
WWX200R160○○FA	MBA24045H	–	2	65	M24x3	59	14	17	10	37	
WWX200-040A○○AR	HSC08025H	–	1	13	M8x1.25	33	8	5	–	–	Fig.2
WWX200-050A○○AR	HSC10030H	HSC10035	1	16	M10x1.5	40(45)	10	6	–	–	
WWX200-063A○○AR	HSC10030H	HSC10035	1	16	M10x1.5	40(45)	10	6	–	–	
WWX200-080A○○AR	HSC12035H	HSC12035	1	18	M12x1.75	47	12	10	–	–	
WWX200-100B○○AR	MBA16033H	–	2	40	M16x2	43	10	14	6	23	
WWX200-125B○○AR	MBA20040H	–	2	50	M20x2.5	54	14	17	6	27	
WWX200-160C○○NR	No Coolant Thru	–	2	50	M20x2.5	54	14	17	6	27	

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.

Note 2) Internal coolant is necessary with the set bolt.

★ : Stocked in Japan

Fig.1

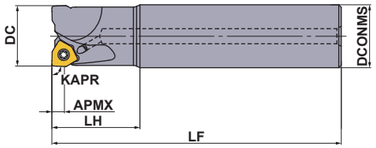
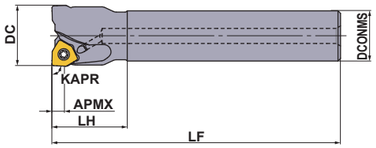


Fig.2



Right hand tool holder only.

Metric Standard

■Shank Type

With Air / Coolant through

(mm)

DC	Order Number	Stock R	* No.T	LF	DCONMS	LH	WT (kg)	APMX	RPMX (min^{-1})	Fig.
25	**WWX200R2502SA20S**	★	2	115	20	30	0.3	5	29600	2
25	**WWX200R2502SA25S**	★	2	115	25	35	0.4	5	29600	1
25	**WWX200R2502SA25L**	★	2	170	25	70	0.6	5	29600	1
28	**WWX200R2802SA25S**	★	2	115	25	35	0.4	5	27400	2
28	**WWX200R2802SA25L**	★	2	170	25	35	0.6	5	27400	2
30	**WWX200R3002SA25S**	★	2	125	25	35	0.5	5	26200	2
32	**WWX200R3202SA32S**	★	2	125	32	45	0.7	5	26200	1
32	**WWX200R3203SA32S**	★	3	125	32	45	0.7	5	26200	1
32	**WWX200R3203SA32L**	★	3	190	32	90	1.0	5	26200	1
35	**WWX200R3503SA32L**	★	3	190	32	45	1.1	5	25100	2
40	**WWX200R4003SA32S**	★	3	125	32	45	0.8	5	21600	2
40	**WWX200R4004SA32S**	★	4	125	32	45	0.8	5	21600	2
50	**WWX200R5004SA32S**	★	4	125	32	45	0.9	5	18600	2
50	**WWX200R5005SA32S**	★	5	125	32	45	0.9	5	18600	2
50	**WWX200R5006SA32S**	★	6	125	32	45	0.9	5	18600	2

* Number of Teeth

Spare Parts

(mm)

Tool Holder Type	*  Clamp Screw	 Wrench (Insert)	 Anti-seize Lubricant
WWX200	TPS3R	TIP10D	MK1KS

* Clamp Torque (N • m) : TPS3R = 2.0

WWX200

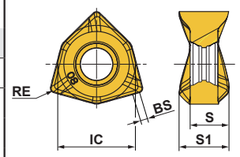
Inserts

(inch)

Workpiece Material			MC5020	MP6120	MP6130	MP7130	MP9120	MP9130	VP15TF	TF15
	P	Steel		◆	◆				◆	
	M	Stainless Steel				◇			◇	
	K	Cast Iron	◆						◆	
	N	Non-ferrous Metals								◆
	S	Heat Resistant Alloys, Titanium Alloys					◆	◆		
	H	Hardened Steel							◆	

This is the selection guideline for WWX200.
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						
	6NGU0906040PNFR-L	G	F								●	.354	.209	.240	.063	.016	
	6NGU0906080PNFR-L	G	F								●	.354	.209	.240	.047	.031	
	6NMU0906040PNER-M	M	E	●	●	●	●	●	●	●		.354	.209	.240	.063	.016	
	6NMU0906080PNER-M	M	E	●	●	●	●	●	●	●		.354	.209	.240	.047	.031	
	6NMU0906080PNER-R	M	E	●	●	●		●	●	●		.354	.209	.240	.047	.031	

● = NEW

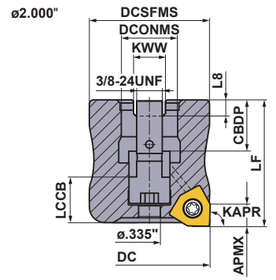
● : USA Stock (10 inserts in one case)

SHOULDER MILLING
<GENERAL CUTTING>

90° KAPR

WWX400 2.000"

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

DCONMS=inch size

(inch)

DC	Order Number	Stock R	*1 Coolant Thru	*2 No.T	LF	DCONMS	WT (lbs)	APMX	RMPX	RPMX (min-1)
2.000	**WWX400UR2.0003AA**	●	Y	3	2.125	.750	1.1	.323	.4°	5000
2.000	**WWX400UR2.0004AA**	●	Y	4	2.125	.750	1.1	.323	.4°	5000

*1 Y=Yes, N=No
*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.
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	DCONMS	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

SHOULDER MILLING
<GENERAL CUTTING>

90° KAPR

WWX400

P M K N S H

Fig.1

ø2.500"

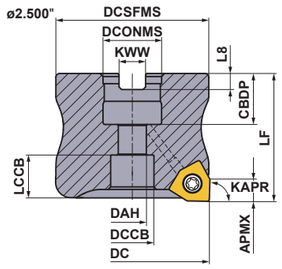
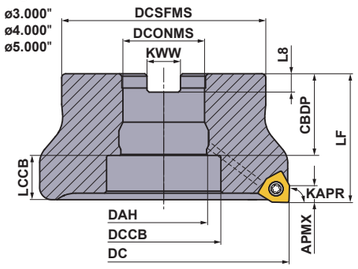


Fig.2

ø3.000"
ø4.000"
ø5.000"



Right hand tool holder only.

■Arbor Type

DCONMS = inch size (inch)

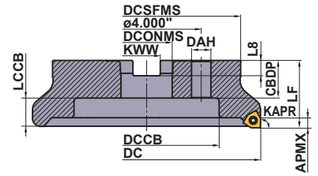
DC	Order Number	Stock R	*1 Coolant thru	*2 No.T	LF	DCONMS	WT (lbs)	APMX	RMPX	RPMX (min⁻¹)	Fig.
2.500	**WWX400UR2.5003CA**	●	Y	3	2.000	1.000	1.6	.323	.26°	14000	1
2.500	**WWX400UR2.5004CA**	●	Y	4	2.000	1.000	1.5	.323	.26°	14000	1
2.500	**WWX400UR2.5005CA**	●	Y	5	2.000	1.000	1.5	.323	.26°	14000	1
3.000	**WWX400UR3.0004CA**	●	Y	4	2.000	1.000	2.1	.323	.16°	12600	2
3.000	**WWX400UR3.0005CA**	●	Y	5	2.000	1.000	2.1	.323	.16°	12600	2
3.000	**WWX400UR3.0007CA**	●	Y	7	2.000	1.000	1.9	.323	.16°	12600	2
4.000	**WWX400UR4.0005EA**	●	Y	5	2.500	1.500	4.9	.323	–	10700	2
4.000	**WWX400UR4.0007EA**	●	Y	7	2.500	1.500	4.8	.323	–	10700	2
4.000	**WWX400UR4.0009EA**	●	Y	9	2.500	1.500	4.7	.323	–	10700	2
5.000	**WWX400UR5.0006EA**	●	Y	6	2.500	1.500	7.6	.323	–	9400	2
5.000	**WWX400UR5.0008EA**	●	Y	8	2.500	1.500	7.5	.323	–	9400	2
5.000	**WWX400UR5.0012EA**	●	Y	12	2.500	1.500	7.3	.323	–	9400	2
6.000	**WWX400UR6.0008EA**	●	Y	8	2.500	1.500	9.9	.323	–	8500	2
6.000	**WWX400UR6.0010EA**	●	Y	10	2.500	1.500	9.8	.323	–	8500	2
6.000	**WWX400UR6.0014EA**	●	Y	14	2.500	1.500	9.7	.323	–	8500	2
8.000	**WWX400UR8.0010MN**	●	N	10	2.500	2.500	17.3	.323	–	7200	3
8.000	**WWX400UR8.0012MN**	●	N	12	2.500	2.500	17.2	.323	–	7200	3
8.000	**WWX400UR8.0016MN**	●	N	16	2.500	2.500	17	.323	–	7200	3
10.000	**WWX400UR10.0012MN**	●	N	12	2.500	2.500	29.3	.323	–	6400	3
10.000	**WWX400UR10.0014MN**	●	N	14	2.500	2.500	29.3	.323	–	6400	3
10.000	**WWX400UR10.0018MN**	●	N	18	2.500	2.500	29	.323	–	6400	3

*1 Y=Yes, N=No
*2 Number of Teeth

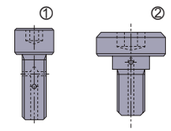
● : USA Stock

Fig.3

ø8.000"
ø10.000"



Right hand tool holder only.

DC	Set Bolt	Geometry	
2.500	HSCU50014H	①	
3.000	HSCU50014H		
4.000	MBAU75016H	②	
5.000	MBAU75016H		
6.000	MBAU75016H		
8.000	–	–	
10.000	–		

Mounting Dimensions

(inch)

DC	Order Number	DCONMS	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

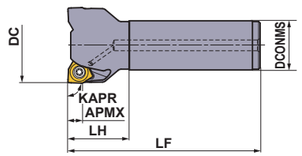
Spare Parts

(inch)

Tool Holder Type	*  Clamp Screw	 Wrench (Insert)	 Anti-seize Lubricant
WWX400	TS5R	TKY20T	MK1KS

* Clamp Torque (lbf-in) : TS5R = 44

WWX400



Right hand tool holder only.

■Shank Type

With Air / Coolant through

(inch)

DC	Order Number	Stock R	* No.T	LF	DCONMS	LH	WT (lbs)	APMX	RMPX	RPMX (min^{-1})
2.000	**WWX400UR3203FA20M**	●	3	4.750	1.250	1.500	1.7	.323	.4°	15800
2.000	**WWX400UR3204FA20M**	●	4	4.750	1.250	1.500	1.7	.323	.4°	15800
2.500	**WWX400UR4003FA20M**	●	3	4.750	1.250	1.500	2.1	.323	.26°	14000
2.500	**WWX400UR4004FA20M**	●	4	4.750	1.250	1.500	2	.323	.26°	14000
2.500	**WWX400UR4005FA20M**	●	5	4.750	1.250	1.500	2	.323	.26°	14000
3.000	**WWX400UR4804FA20M**	●	4	4.750	1.250	1.500	2.5	.323	.16°	12600
3.000	**WWX400UR4805FA20M**	●	5	4.750	1.250	1.500	2.4	.323	.16°	12600
3.000	**WWX400UR4807FA20M**	●	7	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

● : USA Stock ★ : Stocked in Japan

SHOULDER MILLING
<GENERAL CUTTING>

90° KAPR F R

WWX400

P M K N S H

ø50

Fig.1 ø50

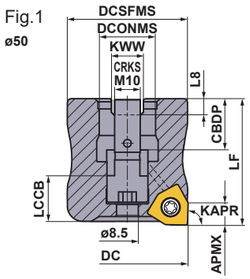
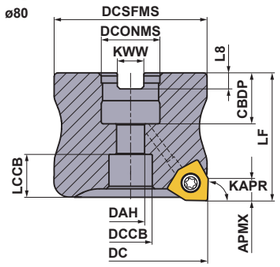


Fig.2 ø80



Right hand tool holder only.

Metric Standard

■Arbor Type

DCONMS = inch size

(mm)

DC	Order Number	Stock R	*1 Coolant Thru	*2 No.T	LF	DCONMS	WT (kg)	APMX	RMPX	RPMX (min^{-1})	Fig.
80	**WWX400R08004CA**	★	Y	4	50	25.4	1.0	8.2	0.16°	12200	2
80	**WWX400R08005CA**	★	Y	5	50	25.4	1.0	8.2	0.16°	12200	2
80	**WWX400R08007CA**	★	Y	7	50	25.4	0.9	8.2	0.16°	12200	2
100	**WWX400R10005DA**	★	Y	5	50	31.75	1.4	8.2	—	10700	3
100	**WWX400R10007DA**	★	Y	7	50	31.75	1.4	8.2	—	10700	3
100	**WWX400R10009DA**	★	Y	9	50	31.75	1.3	8.2	—	10700	3
125	**WWX400R12506EA**	★	Y	6	63	38.1	2.8	8.2	—	9500	3
125	**WWX400R12508EA**	★	Y	8	63	38.1	2.8	8.2	—	9500	3
125	**WWX400R12512EA**	★	Y	12	63	38.1	2.7	8.2	—	9500	3
160	**WWX400R16008FA**	★	Y	8	63	50.8	4.5	8.2	—	8300	3
160	**WWX400R16010FA**	★	Y	10	63	50.8	4.4	8.2	—	8300	3
160	**WWX400R16014FA**	★	Y	14	63	50.8	4.3	8.2	—	8300	3
200	**WWX400R20010KN**	★	N	10	63	47.625	8.1	8.2	—	7300	5
200	**WWX400R20012KN**	★	N	12	63	47.625	8.1	8.2	—	7300	5
200	**WWX400R20016KN**	★	N	16	63	47.625	8.0	8.2	—	7300	5
250	**WWX400R25012KN**	★	N	12	63	47.625	12.1	8.2	—	6400	5
250	**WWX400R25014KN**	★	N	14	63	47.625	12.1	8.2	—	6400	5
250	**WWX400R25018KN**	★	N	18	63	47.625	12.0	8.2	—	6400	5

★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 29, when ordering.
Note2) Please use a set bolt of the FMA type on the cutter body from 80 to 250 in diameter(DC).

Double Sided Insert Type Shoulder Mill

WWX400

Fig.3

ø100
ø125
ø160

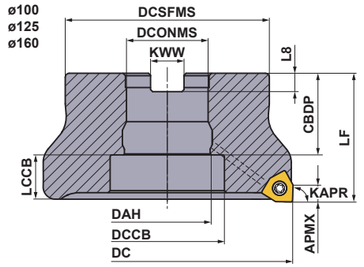


Fig.4

ø160

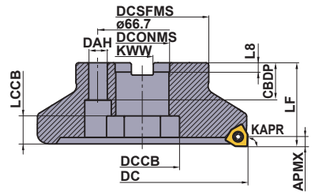
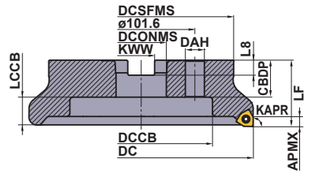


Fig.5

ø200
ø250



Right hand tool holder only.

Metric Standard

■Arbor Type

DCONMS = mm size

(mm)

DC	Order Number	Stock R	*1 Coolant Thru	*2 No.T	LF	DCONMS	WT (kg)	APMX	RMPX	RPMX (min^{-1})	Fig.
50	**WWX400-050A03AR**	★	Y	3	55	22	0.5	8.2	0.4°	5000	1
50	**WWX400-050A04AR**	★	Y	4	55	22	0.5	8.2	0.4°	5000	1
63	**WWX400-063A03AR**	★	Y	3	40	22	0.5	8.2	0.26°	14100	2
63	**WWX400-063A04AR**	★	Y	4	40	22	0.5	8.2	0.26°	14100	2
63	**WWX400-063A05AR**	★	Y	5	40	22	0.5	8.2	0.26°	14100	2
80	**WWX400-080A04AR**	★	Y	4	50	27	1.0	8.2	0.16°	12200	2
80	**WWX400-080A05AR**	★	Y	5	50	27	1.0	8.2	0.16°	12200	2
80	**WWX400-080A07AR**	★	Y	7	50	27	0.9	8.2	0.16°	12200	2
100	**WWX400-100B05AR**	★	Y	5	50	32	1.6	8.2	—	10700	3
100	**WWX400-100B07AR**	★	Y	7	50	32	1.5	8.2	—	10700	3
100	**WWX400-100B09AR**	★	Y	9	50	32	1.5	8.2	—	10700	3
125	**WWX400-125B06AR**	★	Y	6	63	40	3.0	8.2	—	9500	3
125	**WWX400-125B08AR**	★	Y	8	63	40	3.0	8.2	—	9500	3
125	**WWX400-125B12AR**	★	Y	12	63	40	2.9	8.2	—	9500	3
160	**WWX400-160C08NR**	★	N	8	63	40	4.5	8.2	—	8300	4
160	**WWX400-160C10NR**	★	N	10	63	40	4.4	8.2	—	8300	4
160	**WWX400-160C14NR**	★	N	14	63	40	4.4	8.2	—	8300	4
200	**WWX400-200C10NR**	★	N	10	63	60	6.7	8.2	—	7300	5
200	**WWX400-200C12NR**	★	N	12	63	60	6.7	8.2	—	7300	5
200	**WWX400-200C16NR**	★	N	16	63	60	6.6	8.2	—	7300	5
250	**WWX400-250C12NR**	★	N	12	63	60	11.5	8.2	—	6400	5
250	**WWX400-250C14NR**	★	N	14	63	60	11.5	8.2	—	6400	5
250	**WWX400-250C18NR**	★	N	18	63	60	11.4	8.2	—	6400	5

*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 29, when ordering.
Note2) The milling cutter with cutting diameter DC=50 mm has a built-in set bolt. The set bolt cannot be replaced. Therefore, do not disassemble the milling cutter.
Note3) Please use a set bolt of the FMC type on the cutter body from 63 to 100 in diameter(DC).
Note4) Please use a set bolt of the FMA type on the cutter body from 125 to 250 in diameter(DC).

Spare Parts

(mm)

Tool Holder Type	* 		
	Clamp Screw	Wrench (Insert)	Anti-seize Lubricant
WWX400	TS5R	TKY20T	MK1KS

* Clamp Torque (N • m) : TS5R = 5.0

★ : **Stocked in Japan**

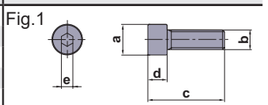
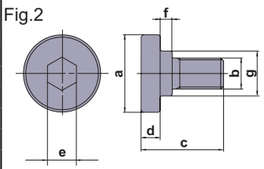
Mounting Dimensions

(mm)

DC	Order Number	DCONMS	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8	Fig.
50	**WWX400-050A03AR**	22	20	—	—	12.2	47	10.4	6.3	1
50	**WWX400-050A04AR**	22	20	—	—	12.2	47	10.4	6.3	1
63	**WWX400-063A03AR**	22	20	11	17	11.2	50	10.4	6.3	2
63	**WWX400-063A04AR**	22	20	11	17	11.2	50	10.4	6.3	2
63	**WWX400-063A05AR**	22	20	11	17	11.2	50	10.4	6.3	2
80	**WWX400R08004CA**	25.4	26	13	20	14.2	56	9.5	6	2
80	**WWX400R08005CA**	25.4	26	13	20	14.2	56	9.5	6	2
80	**WWX400R08007CA**	25.4	26	13	20	14.2	56	9.5	6	2
80	**WWX400-080A04AR**	27	23	13	20	14.2	56	12.4	7	2
80	**WWX400-080A05AR**	27	23	13	20	14.2	56	12.4	7	2
80	**WWX400-080A07AR**	27	23	13	20	14.2	56	12.4	7	2
100	**WWX400R10005DA**	31.75	37	31.75	45	11.2	70	12.7	8	3
100	**WWX400R10007DA**	31.75	37	31.75	45	11.2	70	12.7	8	3
100	**WWX400R10009DA**	31.75	37	31.75	45	11.2	70	12.7	8	3
100	**WWX400-100B05AR**	32	32	32	45	16.2	78	14.4	8	3
100	**WWX400-100B07AR**	32	32	32	45	16.2	78	14.4	8	3
100	**WWX400-100B09AR**	32	32	32	45	16.2	78	14.4	8	3
125	**WWX400R12506EA**	38.1	42	38.1	56	19.2	80	15.9	10	3
125	**WWX400R12508EA**	38.1	42	38.1	56	19.2	80	15.9	10	3
125	**WWX400R12512EA**	38.1	42	38.1	56	19.2	80	15.9	10	3
125	**WWX400-125B06AR**	40	40	40	56	21.2	89	16.4	9	3
125	**WWX400-125B08AR**	40	40	40	56	21.2	89	16.4	9	3
125	**WWX400-125B12AR**	40	40	40	56	21.2	89	16.4	9	3
160	**WWX400-160C08NR**	40	40	14	56	21.2	100	16.4	9	4
160	**WWX400-160C10NR**	40	40	14	56	21.2	100	16.4	9	4
160	**WWX400-160C14NR**	40	40	14	56	21.2	100	16.4	9	4
160	**WWX400R16008FA**	50.8	45	50.8	72	16.2	100	19.1	11	3
160	**WWX400R16010FA**	50.8	45	50.8	72	16.2	100	19.1	11	3
160	**WWX400R16014FA**	50.8	45	50.8	72	16.2	100	19.1	11	3
200	**WWX400R20010KN**	47.625	35	18	135	26.2	175	25.4	14.22	5
200	**WWX400R20012KN**	47.625	35	18	135	26.2	175	25.4	14.22	5
200	**WWX400R20016KN**	47.625	35	18	135	26.2	175	25.4	14.22	5
200	**WWX400-200C10NR**	60	32	18	135	29.2	160	25.7	14.22	5
200	**WWX400-200C12NR**	60	32	18	135	29.2	160	25.7	14.22	5
200	**WWX400-200C16NR**	60	32	18	135	29.2	160	25.7	14.22	5
250	**WWX400R25012KN**	47.625	35	18	180	26.2	210	25.4	14.22	5
250	**WWX400R25014KN**	47.625	35	18	180	26.2	210	25.4	14.22	5
250	**WWX400R25018KN**	47.625	35	18	180	26.2	210	25.4	14.22	5
250	**WWX400-250C12NR**	60	32	18	180	29.2	210	25.7	14.22	5
250	**WWX400-250C14NR**	60	32	18	180	29.2	210	25.7	14.22	5
250	**WWX400-250C18NR**	60	32	18	180	29.2	210	25.7	14.22	5

■Parts Sold Separately
Set Bolt

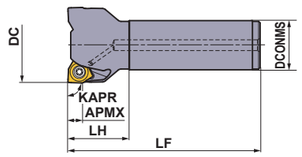
(mm)

Tool Holder Type	Set Bolt: With Coolant Thru Order Number	Set Bolt: Without Coolant Thru Order Number	Fig.	Reference Dimensions a	b	c	d	e	f	g	Geometry
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	No Coolant Thru	–	1	24	M16×2	43	16	14	–	–	
WWX400R250○○KN	No Coolant Thru	–	1	24	M16×2	43	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	No Coolant Thru	–	2	50	M20×2.5	54	14	17	6	27	
WWX400-200C○○NR	No Coolant Thru	–	1	24	M16×2	43	16	14	–	–	
WWX400-250C○○NR	No Coolant Thru	–	1	24	M16×2	43	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.
Note 2) Internal coolant is necessary with the set bolt.
Note 3) The milling cutter with cutting diameter DC=50 mm has a built-in set bolt. Please use a 7 mm Allen wrench to tighten/loosen the set bolt.

Double Sided Insert Type Shoulder Mill

WWX400



Right hand tool holder only.

Metric Standard

■ Shank Type

With Air / Coolant through

(mm)

DC	Order Number	Stock R	* No.T	LF	DCONMS	LH	WT (kg)	APMX	RMPX	RPMX (min^{-1})
50	**WWX400R5003SA32M**	★	3	125	32	40	0.8	8.2	0.4°	16000
50	**WWX400R5004SA32M**	★	4	125	32	40	0.8	8.2	0.4°	16000
63	**WWX400R6303SA32M**	★	3	125	32	40	1.0	8.2	0.26°	14100
63	**WWX400R6304SA32M**	★	4	125	32	40	1.0	8.2	0.26°	14100
63	**WWX400R6305SA32M**	★	5	125	32	40	1.0	8.2	0.26°	14100
80	**WWX400R8004SA32M**	★	4	125	32	40	1.3	8.2	0.16°	12200
80	**WWX400R8005SA32M**	★	5	125	32	40	1.3	8.2	0.16°	12200
80	**WWX400R8007SA32M**	★	7	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 (N • m) : TS5R = 5.0

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

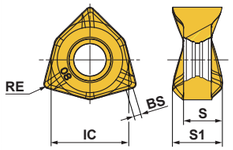
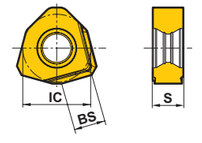
■ Inserts

(inch)

Workpiece Material		
P	Steel	◆ ◆ ◆ ◆
M	Stainless Steel	◆ ◆ ◆ ◆
K	Cast Iron	◆ ◆ ◆ ◆
N	Non-ferrous Metals	◆
S	Heat Resistant Alloys, Titanium Alloys	◆ ◆ ◆
H	Hardened Steel	◆

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 MC5020	MP6120	MP6130	MP7130	MP9120	MP9130	VP15TF	Carbide TF15		IC	S	S1	BS	RE	Geometry
	**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	
	6NMU1409160PNER-M	M	E	●	●	●	●	●	●	●			.551	.276	.354	.002	.063	
	6NMU1409200PNER-M	M	E	●	●	●	●	●	●	●			.551	.276	.354	.002	.079	
	6NMU1409080PNER-R	M	E	●	●	●		●	●	●			.551	.276	.354	.051	.031	
	6NMU1409160PNER-R	M	E	●	●	●		●	●	●			.551	.276	.354	.002	.063	
	6NMU1409200PNER-R	M	E	●	●	●		●	●	●			.551	.276	.354	.002	.079	
 Wiper	**2NGU1406ZNER6C-M**	G	E	●	●					●			.551	.248	–	.256	–	

Instructions for Use of Wiper Inserts

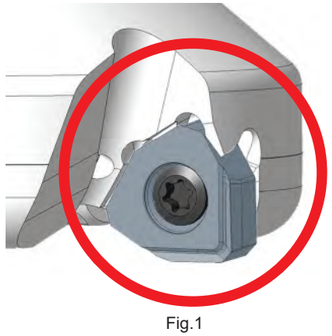


Fig.1

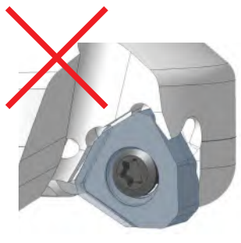


Fig.2

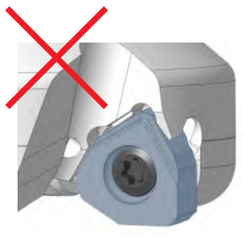


Fig.3

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 .256 IPR.
When choosing a wiper insert select a general grade that is similar to the ideal cutting conditions.

Memo

WWX200/400

Cutting Conditions (Guide) :
● : Stable Cutting ◕ : General Cutting ✲ : Unstable Cutting

Recommended Cutting Conditions

■ Dry Cutting

Cutting Speed

(inch)

	Workpiece Material	Properties	Cutting Conditions	Grade	Width of Cut **ae** .5DC≥	Width of Cut **ae** .8DC≥	Width of Cut **ae** DC(Slot)
					Cutting Speed **vc** (SFM)		
P	Mild Steel	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 Steel Alloy Steel	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 Steel Alloy Steel Alloy Tool Steel	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 Steel	Hardness 35–45HRC	●	MP6120	460(395–525)	–	–
			◕	MP6130	395(330–460)	–	–
			✲	MP6130,VP15TF	360(295–425)	–	–
M	Austenitic Stainless Steel	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 Steel	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 Steel	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 Steel	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 Steel	Hardness <450HB	●	MP7130	460(395–525)	–	–
			◕	MP7130,VP15TF	425(360–490)	–	–
			✲	MP7130,VP15TF	360(295–425)	–	–
K	Gray Cast Iron	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 Iron	Tensile Strength ≤450MPa	●	MC5020	720(590–525)	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 Iron	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 Steel	Hardness 40–55HRC	● ◕	VP15TF	165(100–230)	–	–
			◕	MP6120	130(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.

WWX200/400

Recommended Cutting Conditions

■ Wet Cutting

Cutting Speed

(inch)

	Workpiece Material	Properties	Cutting Conditions	Grade	Width of Cut **ae** .5DC≥ Cutting Speed **vc** (SFM)	Width of Cut **ae** .8DC≥ Cutting Speed **vc** (SFM)	Width of Cut **ae** DC(Slot) Cutting Speed **vc** (SFM)
P	Mild Steel	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 Steel Alloy Steel	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 Steel Alloy Steel Alloy Tool Steel	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 Steel	Hardness 35–45HRC	●	MP6120	360(330–395)	–	–
			◐	MP6130	330(295–360)	–	–
			✲	MP6130,VP15TF	260(230–295)	–	–
M	Austenitic Stainless Steel	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 Steel	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 Steel	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 Steel	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 Steel	Hardness <450HB	●	MP7130	395(360–425)	–	–
			◐	MP7130,VP15TF	360(330–395)	–	–
			✲	MP7130,VP15TF	295(260–330)	–	–
K	Gray Cast Iron	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 Iron	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 Iron	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 Steel	Hardness 40–55HRC	● ◐	VP15TF	165(100–230)	–	–
			◐	MP6120	130(100–230)	–	–

Note 1) Refer to the above table and set up cutting conditions according to the application.

WWX200

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

Depth of Cut / Feed per Tooth

(inch)

	Workpiece Material	Properties	Cutting Conditions	Cutting Mode	Grade	Width of Cut **ae** .5DC≥ Breaker	Width of Cut **ae** .5DC≥ Width of Cut **ap**	Width of Cut **ae** .5DC≥ Feed per Tooth **fz** (IPT)
P	Mild Steel	Hardness ≤180HB	●	Dry, Wet	MP6120	M	≤.118	.005(.004–.006)
			◐	Dry, Wet	MP6130	M	≤.118	.005(.004–.006)
			◐	Dry, Wet		R	≤.118	.006(.004–.008)
			✲	Dry, Wet	MP6130,VP15TF	R	≤.118	.005(.004–.006)
	Carbon Steel Alloy Steel	Hardness 180–280HB	●	Dry, Wet	MP6120	M	≤.118	.005(.004–.006)
			◐	Dry, Wet	MP6130	M	≤.118	.005(.004–.006)
			◐	Dry, Wet		R	≤.118	.006(.004–.008)
			✲	Dry, Wet	MP6130,VP15TF	R	≤.118	.005(.004–.006)
	Carbon Steel Alloy Steel Alloy Tool Steel	Hardness 280–350HB ≤350HB (Annealing)	●	Dry, Wet	MP6120	M	≤.118	.005(.004–.006)
			◐	Dry, Wet	MP6130	M	≤.118	.005(.004–.006)
			◐	Dry, Wet		R	≤.118	.006(.004–.008)
			✲	Dry, Wet	MP6130,VP15TF	R	≤.118	.005(.004–.006)
	Pre-hardened Steel	Hardness 35–45HRC	●	Dry, Wet	MP6120	M	≤.078	.005(.004–.006)
			◐	Dry, Wet	MP6130	M	≤.078	.005(.004–.006)
			◐	Dry, Wet		R	≤.078	.006(.004–.008)
			✲	Dry, Wet	MP6130,VP15TF	R	≤.078	.005(.004–.006)
M	Austenitic Stainless Steel	Hardness ≤200HB	● ◐	Dry, Wet	MP7130	M	≤.118	.005(.004–.006)
			◐	Dry, Wet	VP15TF	M	≤.118	.006(.004–.008)
			✲	Dry, Wet	MP7130,VP15TF	M	≤.118	.005(.004–.006)
	Austenitic Stainless Steel	Hardness >200HB	●	Dry	MP7130	M	≤.078	.005(.004–.006)
			●	Wet		M	≤.118	.005(.004–.006)
			◐	Dry		M	≤.078	.005(.004–.006)
			◐	Wet		M	≤.118	.005(.004–.006)
			◐	Dry	VP15TF	M	≤.078	.006(.004–.008)
			◐	Wet		M	≤.118	.006(.004–.008)
			✲	Dry	MP7130,VP15TF	M	≤.078	.005(.004–.006)
			✲	Wet		M	≤.118	.005(.004–.006)
	Ferritic and Martensitic Stainless Steel	Hardness ≤200HB	● ◐	Dry, Wet	MP7130	M	≤.118	.005(.004–.006)
			◐	Dry, Wet	VP15TF	M	≤.118	.006(.004–.008)
			✲	Dry, Wet	MP7130,VP15TF	M	≤.118	.005(.004–.006)
	Duplex Stainless Steel	Hardness ≤280HB	● ◐	Dry	MP7130	M	≤.078	.005(.004–.006)
			● ◐	Wet		M	≤.118	.005(.004–.006)
			◐	Dry	VP15TF	M	≤.078	.006(.004–.008)
			◐	Wet		M	≤.118	.006(.004–.008)
			✲	Dry	MP7130,VP15TF	M	≤.078	.005(.004–.006)
			✲	Wet		M	≤.118	.005(.004–.006)
	Precipitation Hardening Stainless Steel	Hardness <450HB	● ◐	Dry, Wet	MP7130	M	≤.078	.005(.004–.006)
			◐	Dry, Wet	VP15TF	M	≤.078	.006(.004–.008)
			✲	Dry, Wet	MP7130,VP15TF	M	≤.078	.005(.004–.006)
K	Gray Cast Iron	Tensile Strength ≤350MPa	● ◐	Dry, Wet	MC5020	M	≤.118	.005(.004–.006)
			◐	Dry, Wet	VP15TF	R	≤.118	.006(.004–.008)
			✲	Dry, Wet	MC5020,VP15TF	R	≤.118	.005(.004–.006)
	Ductile Cast Iron	Tensile Strength ≤800MPa	● ◐	Dry, Wet	MC5020	M	≤.118	.005(.004–.006)
			◐	Dry, Wet	VP15TF	R	≤.118	.006(.004–.008)
			✲	Dry, Wet	MC5020,VP15TF	R	≤.118	.005(.004–.006)
N	Aluminum Alloys	Content Si<5%	●	Wet	TF15	L	≤.118	.005(.004–.006)
			◐	Wet				
			✲	Wet				
S	Titanium Alloys	–	● ◐	Wet	MP9120	M	≤.078	.004(.002–.005)
			✲	Wet	MP9130	M	≤.078	.004(.002–.005)
	Heat Resistant Alloys	–	● ◐	Wet	MP9120	M	≤.078	.004(.002–.005)
			✲	Wet	MP9130	M	≤.078	.004(.002–.005)
H	Hardened Steel	Hardness 40–55HRC	●	Dry, Wet	VP15TF	M	≤.078	.002(.002–.004)
			◐	Dry, Wet	VP15TF,MP6120	R	≤.078	.002(.002–.004)

Note 1) Refer to the above table and set up cutting conditions according to the application.

WWX200

Recommended Cutting Conditions

Depth of Cut / Feed per Tooth

(inch)

	Workpiece Material	Properties	Cutting Conditions	Cutting Mode	Grade	Width of Cut **ae** .8DC≥ Breaker	Width of Cut **ap**	Feed per Tooth **fz** (IPT)
P	Mild Steel	Hardness ≤180HB	●	Dry, Wet	MP6120	M	≤.118	.005(.004—.006)
			◕	Dry, Wet	MP6130	M	≤.118	.005(.004—.006)
			◕	Dry, Wet		R	≤.118	.006(.004—.008)
			✲	Dry, Wet	MP6130,VP15TF	R	≤.118	.005(.004—.006)
	Carbon Steel Alloy Steel	Hardness 180—280HB	●	Dry, Wet	MP6120	M	≤.118	.005(.004—.006)
			◕	Dry, Wet	MP6130	M	≤.118	.005(.004—.006)
			◕	Dry, Wet		R	≤.118	.006(.004—.008)
			✲	Dry, Wet	MP6130,VP15TF	R	≤.118	.005(.004—.006)
	Carbon Steel Alloy Steel Alloy Tool Steel	Hardness 280—350HB ≤350HB (Annealing)	●	Dry, Wet	MP6120	M	≤.118	.005(.004—.006)
			◕	Dry, Wet	MP6130	M	≤.118	.005(.004—.006)
			◕	Dry, Wet		R	≤.118	.006(.004—.008)
			✲	Dry, Wet	MP6130,VP15TF	R	≤.118	.005(.004—.006)
	Pre-hardened Steel	Hardness 35—45HRC	●	Dry, Wet	MP6120	—	—	—
			◕	Dry, Wet	MP6130	—	—	—
			◕	Dry, Wet		—	—	—
			✲	Dry, Wet	MP6130,VP15TF	—	—	—
M	Austenitic Stainless Steel	Hardness ≤200HB	● ◕	Dry, Wet	MP7130	M	≤.118	.005(.004—.006)
			◕	Dry, Wet	VP15TF	M	≤.118	.006(.004—.008)
			❋	Dry, Wet	MP7130,VP15TF	M	≤.118	.005(.004—.006)
	Austenitic Stainless Steel	Hardness >200HB	●	Dry	MP7130	M	≤.118	.005(.004—.006)
			●	Wet		M	≤.118	.005(.004—.006)
			◕	Dry		M	≤.118	.005(.004—.006)
			◕	Wet		M	≤.118	.005(.004—.006)
			◕	Dry	VP15TF	M	≤.118	.006(.004—.008)
			◕	Wet		M	≤.118	.006(.004—.008)
			❋	Dry	MP7130,VP15TF	M	≤.118	.005(.004—.006)
			❋	Wet		M	≤.118	.005(.004—.006)
	Ferritic and Martensitic Stainless Steel	Hardness ≤200HB	● ◕	Dry, Wet	MP7130	M	≤.118	.005(.004—.006)
			◕	Dry, Wet	VP15TF	M	≤.118	.006(.004—.008)
			❋	Dry, Wet	MP7130,VP15TF	M	≤.118	.005(.004—.006)
	Duplex Stainless Steel	Hardness ≤280HB	● ◕	Dry	MP7130	M	≤.118	.005(.004—.006)
			● ◕	Wet		M	≤.118	.005(.004—.006)
			◕	Dry	VP15TF	M	≤.118	.006(.004—.008)
			◕	Wet		M	≤.118	.006(.004—.008)
			❋	Dry	MP7130,VP15TF	M	≤.118	.006(.004—.008)
			❋	Wet		M	≤.118	.005(.004—.006)
	Precipitation Hardening Stainless Steel	Hardness <450HB	● ◕	Dry, Wet	MP7130	—	—	—
			◕	Dry, Wet	VP15TF	—	—	—
			❋	Dry, Wet	MP7130,VP15TF	—	—	—
K	Gray Cast Iron	Tensile Strength ≤350MPa	● ◕	Dry, Wet	MC5020	M	≤.118	.005(.004—.006)
			◕	Dry, Wet	VP15TF	R	≤.118	.006(.004—.008)
			✲	Dry, Wet	MC5020,VP15TF	R	≤.118	.005(.004—.006)
	Ductile Cast Iron	Tensile Strength ≤800MPa	● ◕	Dry, Wet	MC5020	M	≤.118	.005(.004—.006)
			◕	Dry, Wet	VP15TF	R	≤.118	.006(.004—.008)
			✲	Dry, Wet	MC5020,VP15TF	R	≤.118	.005(.004—.006)
N	Aluminum Alloys	Content Si<5%	●	Wet	TF15	L	≤.118	.005(.004—.006)
			◕	Wet				
			❋	Wet				
S	Titanium Alloys	—	● ◕	Wet	MP9120		—	—
			✲	Wet	MP9130	—	—	—
	Heat Resistant Alloys	—	● ◕	Wet	MP9120	—	—	—
			✲	Wet	MP9130	—	—	—
H	Hardened Steel	Hardness 40—55HRC	●	Dry, Wet	VP15TF	—	—	—
			◕	Dry, Wet	VP15TF,MP6120	—	—	—

Note 1) Refer to the above table and set up cutting conditions according to the application.

Cutting Conditions (Guide) :
● : Stable Cutting ◕ : General Cutting ✲ : Unstable Cutting

Depth of Cut / Feed per Tooth

(inch)

	Workpiece Material	Properties	Cutting Conditions	Cutting Mode	Grade	Width of Cut **ae** DC(Slot) Breaker	Width of Cut **ap**	Feed per Tooth **fz** (IPT)
P	Mild Steel	Hardness ≤180HB	●	Dry, Wet	MP6120	M	≤.078	.005(.004—.006)
			◕	Dry, Wet	MP6130	M	≤.078	.005(.004—.006)
			◕	Dry, Wet		—	—	—
			✲	Dry, Wet	MP6130,VP15TF	M	≤.078	.005(.004—.006)
	Carbon Steel Alloy Steel	Hardness 180—280HB	●	Dry, Wet	MP6120	M	≤.078	.005(.004—.006)
			◕	Dry, Wet	MP6130	M	≤.078	.005(.004—.006)
			◕	Dry, Wet		—	—	—
			✲	Dry, Wet	MP6130,VP15TF	M	≤.078	.005(.004—.006)
	Carbon Steel Alloy Steel Alloy Tool Steel	Hardness 280—350HB ≤350HB (Annealing)	●	Dry, Wet	MP6120	M	≤.078	.005(.004—.006)
			◕	Dry, Wet	MP6130	M	≤.078	.005(.004—.006)
			◕	Dry, Wet		—	—	—
			✲	Dry, Wet	MP6130,VP15TF	M	≤.078	.005(.004—.006)
	Pre-hardened Steel	Hardness 35—45HRC	●	Dry, Wet	MP6120	—	—	—
			◕	Dry, Wet	MP6130	—	—	—
			◕	Dry, Wet		—	—	—
			✲	Dry, Wet	MP6130,VP15TF	—	—	—
M	Austenitic Stainless Steel	Hardness ≤200HB	● ◕	Dry, Wet	MP7130	—	—	—
			◕	Dry, Wet	VP15TF	—	—	—
			❋	Dry, Wet	MP7130,VP15TF	—	—	—
	Austenitic Stainless Steel	Hardness >200HB	●	Dry	MP7130	—	—	—
			●	Wet		—	—	—
			◕	Dry		—	—	—
			◕	Wet		—	—	—
			◕	Dry	VP15TF	—	—	—
			◕	Wet		—	—	—
			❋	Dry	MP7130,VP15TF	—	—	—
			❋	Wet		—	—	—
	Ferritic and Martensitic Stainless Steel	Hardness ≤200HB	● ◕	Dry, Wet	MP7130	—	—	—
			◕	Dry, Wet	VP15TF	—	—	—
			❋	Dry, Wet	MP7130,VP15TF	—	—	—
	Duplex Stainless Steel	Hardness ≤280HB	● ◕	Dry	MP7130	—	—	—
			● ◕	Wet		—	—	—
			◕	Dry	VP15TF	—	—	—
			◕	Wet		—	—	—
			❋	Dry	MP7130,VP15TF	—	—	—
			❋	Wet		—	—	—
	Precipitation Hardening Stainless Steel	Hardness <450HB	● ◕	Dry, Wet	MP7130	—	—	—
			◕	Dry, Wet	VP15TF	—	—	—
			❋	Dry, Wet	MP7130,VP15TF	—	—	—
K	Gray Cast Iron	Tensile Strength ≤350MPa	● ◕	Dry, Wet	MC5020	M	≤.078	.005(.004—.006)
			◕	Dry, Wet	VP15TF	—	—	—
			✲	Dry, Wet	MC5020,VP15TF	R	≤.078	.005(.004—.006)
	Ductile Cast Iron	Tensile Strength ≤800MPa	● ◕	Dry, Wet	MC5020	M	≤.078	.005(.004—.006)
			◕	Dry, Wet	VP15TF	—	—	—
			✲	Dry, Wet	MC5020,VP15TF	R	≤.078	.005(.004—.006)
N	Aluminum Alloys	Content Si<5%	●	Wet	TF15	L	≤.078	.005(.004—.006)
			◕	Wet				
			❋	Wet				
S	Titanium Alloys	—	● ◕	Wet	MP9120	—	—	—
			✲	Wet	MP9130	—	—	—
	Heat Resistant Alloys	—	● ◕	Wet	MP9120	—	—	—
			✲	Wet	MP9130	—	—	—
H	Hardened Steel	Hardness 40—55HRC	●	Dry, Wet	VP15TF	—	—	—
			◕	Dry, Wet	VP15TF,MP6120	—	—	—

Note 1) Refer to the above table and set up cutting conditions according to the application.

WWX400

Cutting Conditions (Guide) :
● : Stable Cutting ◕ : General Cutting ✲ : Unstable Cutting

Recommended Cutting Conditions

Depth of Cut / Feed per Tooth

(inch)

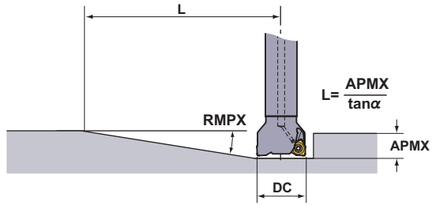
	Workpiece Material	Properties	Cutting Conditions	Grade	Width of Cut ae .5DC≥ Breaker	Depth of Cut ap	Feed per Tooth fz (IPT)	Width of Cut ae .8DC≥ Breaker	Depth of Cut ap	Feed per Tooth fz (IPT)	Width of Cut ae DC(Slot) Breaker	Depth of Cut ap	Feed per Tooth fz (IPT)	Cutting Mode
P	Mild Steel	Hardness ≤180HB	●	MP6120	L,M	≤.157	.005(.004–.006)	L,M	≤.118	.005(.004–.006)	L,M	≤.079	.005(.004–.006)	Dry, Wet
			◕	MP6130	L,M	≤.157	.005(.004–.006)	L,M	≤.118	.005(.004–.006)	L,M	≤.079	.005(.004–.006)	Dry, Wet
			◕		M,R	≤.157	.006(.004–.008)	M,R	≤.118	.006(.004–.008)	–	–	–	Dry, Wet
			✲	MP6130,VP15TF	M,R	≤.157	.005(.004–.006)	M,R	≤.118	.005(.004–.006)	M	≤.079	.005(.004–.006)	Dry, Wet
	Carbon Steel Alloy Steel	Hardness 180–280HB	●	MP6120	L,M	≤.157	.005(.004–.006)	L,M	≤.118	.005(.004–.006)	L,M	≤.079	.005(.004–.006)	Dry, Wet
			◕	MP6130	L,M	≤.157	.005(.004–.006)	L,M	≤.118	.005(.004–.006)	L,M	≤.079	.005(.004–.006)	Dry, Wet
			◕		M,R	≤.157	.006(.004–.008)	M,R	≤.118	.006(.004–.008)	–	–	–	Dry, Wet
			✲	MP6130,VP15TF	M,R	≤.157	.005(.004–.006)	M,R	≤.118	.005(.004–.006)	M	≤.079	.005(.004–.006)	Dry, Wet
	Carbon Steel Alloy Steel Alloy Tool Steel	Hardness 280–350HB ≤350HB (Annealing)	●	MP6120	L,M	≤.118	.005(.004–.006)	L,M	≤.118	.005(.004–.006)	L,M	≤.118	.005(.004–.006)	Dry, Wet
			◕	MP6130	L,M	≤.118	.005(.004–.006)	L,M	≤.118	.005(.004–.006)	L,M	≤.079	.005(.004–.006)	Dry, Wet
			◕		M,R	≤.118	.006(.004–.008)	M,R	≤.118	.006(.004–.008)	–	–	–	Dry, Wet
			✲	MP6130,VP15TF	M,R	≤.118	.005(.004–.006)	M,R	≤.118	.005(.004–.006)	M	≤.079	.005(.004–.006)	Dry, Wet
	Pre-hardened Steel	Hardness 35–45HRC	●	MP6120	L,M	≤.079	.005(.004–.006)	–	–	–	–	–	–	Dry, Wet
			◕	MP6130	L,M	≤.079	.005(.004–.006)	–	–	–	–	–	–	Dry, Wet
			◕		M,R	≤.079	.006(.004–.008)	–	–	–	–	–	–	Dry, Wet
			✲	MP6130,VP15TF	M,R	≤.079	.005(.004–.006)	–	–	–	–	–	–	Dry, Wet
M	Austenitic Stainless Steel	Hardness ≤200HB	● ◕	MP7130	L,M	≤.157	.005(.004–.006)	L,M	≤.118	.005(.004–.006)	–	–	–	Dry, Wet
			◕	VP15TF	M	≤.157	.006(.004–.008)	M	≤.118	.006(.004–.008)	–	–	–	Dry, Wet
			✲	MP7130,VP15TF	M	≤.157	.005(.004–.006)	M	≤.118	.005(.004–.006)	–	–	–	Dry, Wet
	Austenitic Stainless Steel	Hardness >200HB	●	MP7130	L,M	≤.157	.005(.004–.006)	L,M	≤.118	.005(.004–.006)	–	–	–	Dry, Wet
			◕	MP7130	L,M	≤.118	.005(.004–.006)	L,M	≤.118	.005(.004–.006)	–	–	–	Dry, Wet
			◕	VP15TF	M	≤.118	.006(.004–.008)	M	≤.118	.006(.004–.008)	–	–	–	Dry, Wet
			✲	MP7130,VP15TF	M	≤.118	.005(.004–.006)	M	≤.118	.005(.004–.006)	–	–	–	Dry, Wet
	Ferritic and Martensitic Stainless Steel	Hardness ≤200HB	● ◕	MP7130	L,M	≤.157	.005(.004–.006)	L,M	≤.118	.005(.004–.006)	–	–	–	Dry, Wet
			◕	VP15TF	M	≤.157	.006(.004–.008)	M	≤.118	.006(.004–.008)	–	–	–	Dry, Wet
			✲	MP7130,VP15TF	M	≤.118	.005(.004–.006)	M	≤.118	.005(.004–.006)	–	–	–	Dry, Wet
	Duplex Stainless Steel	Hardness ≤280HB	● ◕	MP7130	L,M	≤.118	.005(.004–.006)	L,M	≤.118	.005(.004–.006)	–	–	–	Dry
			● ◕	MP7130	L,M	≤.157	.005(.004–.006)	L,M	≤.118	.005(.004–.006)	–	–	–	Wet
			◕	VP15TF	M	≤.118	.006(.004–.008)	M	≤.118	.006(.004–.008)	–	–	–	Dry
			◕	VP15TF	M	≤.157	.006(.004–.008)	M	≤.118	.006(.004–.008)	–	–	–	Wet
			✲	MP7130,VP15TF	M	≤.118	.005(.004–.006)	M	≤.118	.006(.004–.008)	–	–	–	Dry
			✲	MP7130,VP15TF	M	≤.157	.005(.004–.006)	M	≤.118	.005(.004–.006)	–	–	–	Wet
	Precipitation Hardening Stainless Steel	Hardness <450HB	●	MP7130	L,M	≤.079	.005(.004–.006)	–	–	–	–	–	–	Dry, Wet
			◕	MP7130	L,M	≤.079	.005(.004–.006)	–	–	–	–	–	–	Dry, Wet
			◕	VP15TF	M	≤.079	.006(.004–.008)	–	–	–	–	–	–	Dry, Wet
			✲	MP7130,VP15TF	M	≤.079	.005(.004–.006)	–	–	–	–	–	–	Dry, Wet
K	Gray Cast Iron	Tensile Strength ≤350MPa	● ◕	MC5020	L,M	≤.157	.005(.004–.006)	L,M	≤.118	.005(.004–.006)	L,M	≤.079	.005(.004–.006)	Dry, Wet
			◕	VP15TF	M,R	≤.157	.006(.004–.008)	M,R	≤.118	.006(.004–.008)	–	–	–	Dry, Wet
			✲	MC5020,VP15TF	M,R	≤.157	.005(.004–.006)	M,R	≤.118	.005(.004–.006)	M,R	≤.079	.005(.004–.006)	Dry, Wet
	Ductile Cast Iron	Tensile Strength ≤800MPa	● ◕	MC5020	L,M	≤.157	.005(.004–.006)	L,M	≤.118	.005(.004–.006)	L,M	≤.079	.005(.004–.006)	Dry, Wet
			◕	VP15TF	M,R	≤.157	.006(.004–.008)	M,R	≤.118	.006(.004–.008)	–	–	–	Dry, Wet
			✲	MC5020,VP15TF	M,R	≤.157	.005(.004–.006)	M,R	≤.118	.005(.004–.006)	M,R	≤.079	.005(.004–.006)	Dry, Wet
N	Aluminum Alloys	Content Si<5%	● ◕ ✲	TF15	L	≤.157	.005(.004–.006)	L	≤.118	.005(.004–.006)	L	≤.079	.005(.004–.006)	Wet
S	Titanium Alloys	–	● ◕	MP9120	L,M	≤.079	.004(.002–.005)	–	–	–	–	–	–	Wet
			✲	MP9130	L,M	≤.079	.004(.002–.005)	–	–	–	–	–	–	Wet
	Heat Resistant Alloys	–	● ◕	MP9120	L,M	≤.079	.004(.002–.005)	–	–	–	–	–	–	Wet
			✲	MP9130	L,M	≤.079	.004(.002–.005)	–	–	–	–	–	–	Wet
H	Hardened Steel	Hardness 40–55HRC	●	VP15TF	M	≤.079	.002(.002–.004)	–	–	–	–	–	–	Dry, Wet
			◕	VP15TF	M,R	≤.079	.002(.002–.004)	–	–	–	–	–	–	Dry, Wet

Note 1) Refer to the above table and set up cutting conditions according to cutting applications.

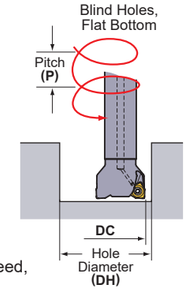
WWX400

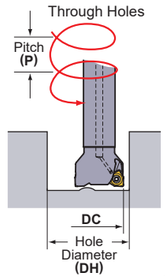
Ramping / Helical Milling

● **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)

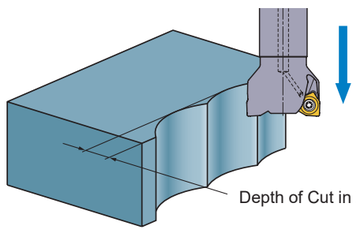
DC		RE	APMX	Ramping		Helical Milling (Blind Hole, Flat Bottom)				Helical Milling (Through Hole)	
inch	mm			Maximum Ramping Angle **RMPX**	Minimum Distance * **L**	Maximum Hole Diameter **DH max.**	Maximum Pitch **P max.**	Minimum Hole Diameter **DH min.**	Maximum Pitch **P max.**	Minimum Hole Diameter **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.
Note 3) WWX200 cannot be used for ramping or helical machining.

<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**).

WWX200/400

● **Plunging**



Depth of Cut in the Radius Direction : **ae** = WWX200 .197 inch
WWX400 .315 inch

Memo

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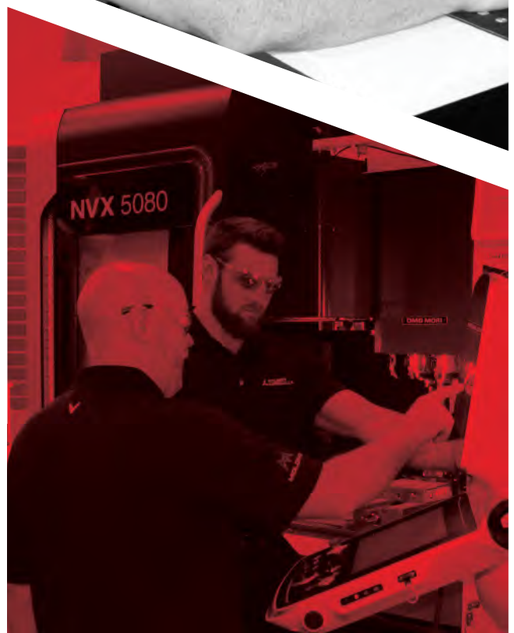

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For Your Safety

- 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 attaching inserts or spare parts, please use only the correct wrench or driver.
- When using rotating tools, please make a trial run to check run-out, vibration and abnormal sounds etc.

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