DIA EDGE

ASPX

HIGH-EFFICIENCY SHOULDER MILLING CUTTER FOR TITANIUM ALLOYS

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

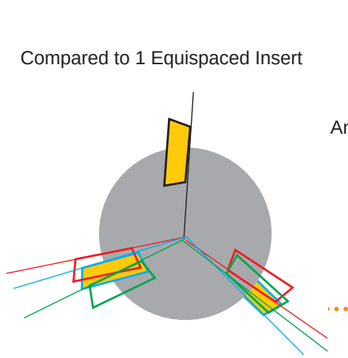
High-Efficiency Shoulder Milling Cutter for Titanium Alloys

DIAEDGE ASPX

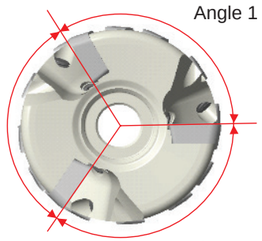
Vibration Control Features + Low Cutting Resistance
--> Provides Stable, High-Efficiency Cutting of Titanium Alloys

Suppression of Regenerative Chatter

ASPX leads the latest machining theory by adopting irregular flutes and optimally placed inserts to drastically reduce vibration.



Concept of Irregular Flutes

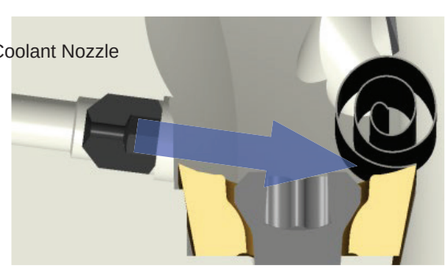


ASPX

Conventional Chatter Mark

Improvement of Chip Discharge

Coolant applied at the rake angle of the cutting edge enables highly efficient chip discharge.



Coolant Discharge Position

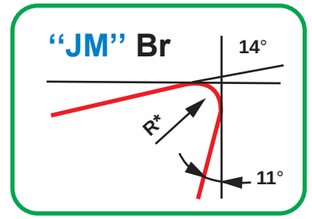
Ideal chip shapes.

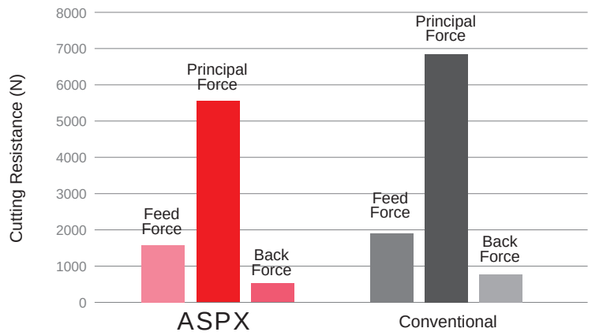
Reduced Cutting Resistance

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





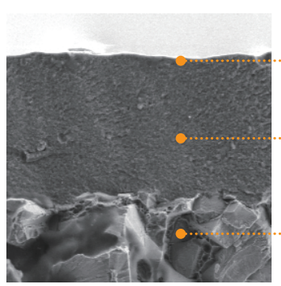
<Cutting Conditions>

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

NEW MP9140

Combination of a cemented carbide material with outstanding fracture resistance, and a smooth coating with excellent welding resistance, provides stable processing with 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.

High-Efficiency Shoulder Milling Cutter for Titanium Alloys

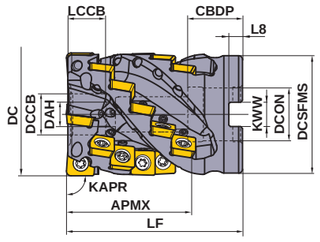
DEEP SHOULDER MILLING

<CUTTING FOR TITANIUM ALLOY>

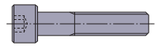
90° KAPR R

ASPX

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 R	Number of Flutes	Total	LF	DCON	WT (lbs)	APMX
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	Clamp Screw *	Seal Washer	Wrench	Coolant Nozzle	Number	Anti-seize Lubricant	Number of Insert 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

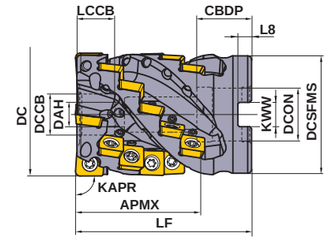
* Clamp Torque (lbf-in) : TS55 = 44.25

	≤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**

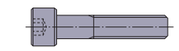
Note 1) Coolant nozzles are available with varying diameters for adjusting coolant pressure.
Select the correct nozzle according to the specification.
Note 2) Use HSS04004 (JIS B 1177 flat point M4x4, clamp torque 13.28 lbf-in) to plug the coolant hole.

● : USA Stock ★ : Stocked in Japan

Metric Standard



Right hand tool holder only.

Cutter Diameter DC	Set Bolt	Geometry
ϕ50	HSC10070	
ϕ63	HSC12070	
ϕ80	HSC16080	

■Shell Type

KAPR: 90°
With Coolant Hole : Shell type should be combined with a through coolant arbor.

(mm)

DC	Order Number	Stock R	Number of Flutes	Total	LF	DCON	WT (kg)	APMX
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	Clamp Screw *	Seal Washer	Wrench	Coolant Nozzle	Number	Anti-seize Lubricant	Number of Insert 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.

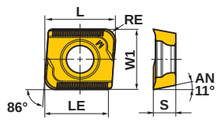
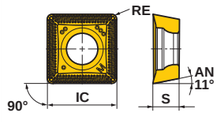
High-Efficiency Shoulder Milling Cutter for Titanium Alloys

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)

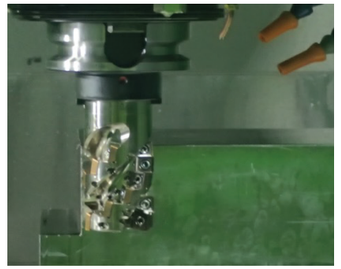
Note 1) The cutting performance depends on machine and clamping rigidity, as well as the supply and pressure of the coolant. Adjust as necessary.
Note 2) Use a machine and spindle size suitable for heavy machining of titanium alloys. (7/24 taper #50 or #60, or high-rigidity HSK-A100 or A125, with an 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 9)
Note 6) For RE>.126, machining of cutter body radius is recommended. (refer to page 10)

● : USA Stock
(10 inserts in one case)

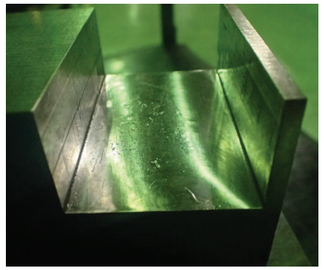
Cutting Performance

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

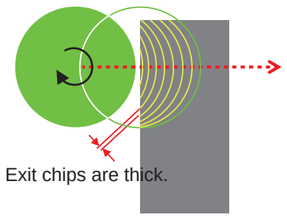
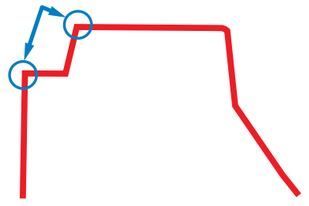
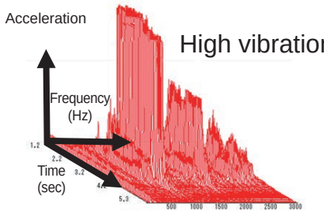
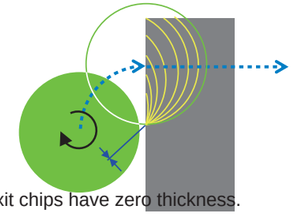
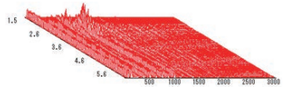


<Cutting Conditions for Grooving>
Workpiece Material : Ti-6Al-4V
Cutter Dia. : DC=2.000"
Cutting Speed : vc=131 SFM
Feed per Tooth : 003 IPT
Depth of Cut : ap=1.181"
Width of Cut : ae=2.000"
M.R.R. : **5.503 in³/min**
Cutting Mode : Wet Cutting

How to Use

Positive Effects of a Roll Into Cutting Approach

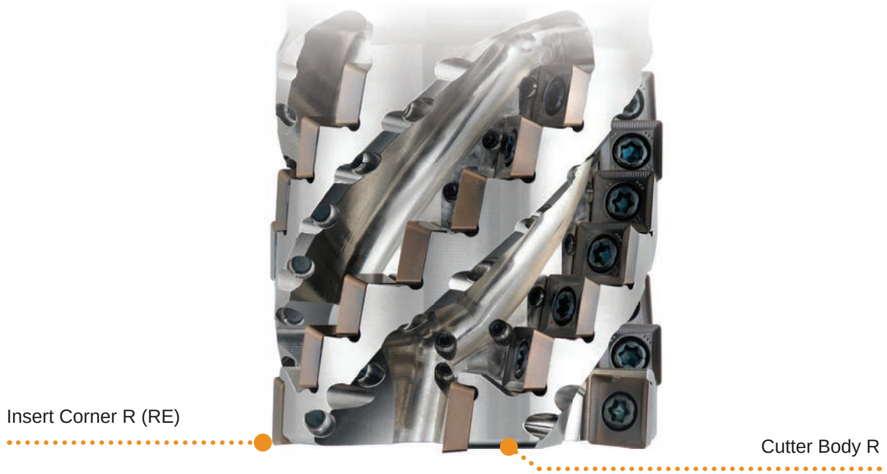
The roll into cutting approach can control sharp increases in cutting loads and prevent sudden chipping of inserts which is likely to occur at the start of machining.

Approach Method	Cutting Load Simulation	Image of Cutting Vibration Frequency
Direct Approach  Exit chips are thick.	Cutting load increases suddenly. High risk of chipping. 	Primary mode Acceleration High vibration Frequency (Hz) Time (sec) 
Roll Into Cutting Approach  Exit chips have zero thickness.	Cutting load increases smoothly. 	Almost no vibration Primary mode 

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

Memo

DIA EDGE

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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.

MITSUBISHI MATERIALS U.S.A.

Product Brands Crafted by Mitsubishi Materials U.S.A.

DIA EDGE MOLDINO

www.DIAEDGE.MMUS.com
www.mmus-carbide.com

Tools specifications subject to change without notice.

B238A-US-2021.01