MITSUBISHI MATERIALS

ASPX

VIBRATION CONTROL END MILL PROVIDES HIGH EFFICIENCY FOR MACHINING TITANIUM ALLOYS





TOOL NEWS **B238A**

For Machining Titanium Alloys

ASPX

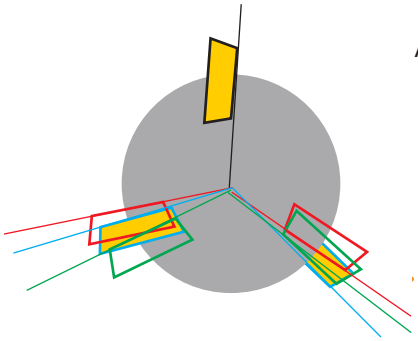
YouTube

Vibration Control Features + Low Cutting Resistance Equals Extremely Stable, High-Efficiency Cutting

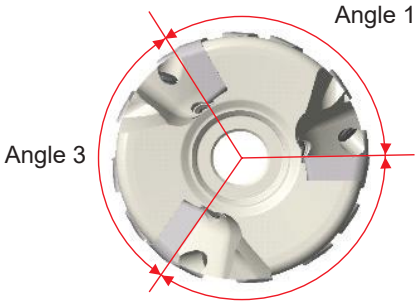
Suppression of Regenerative Chatter

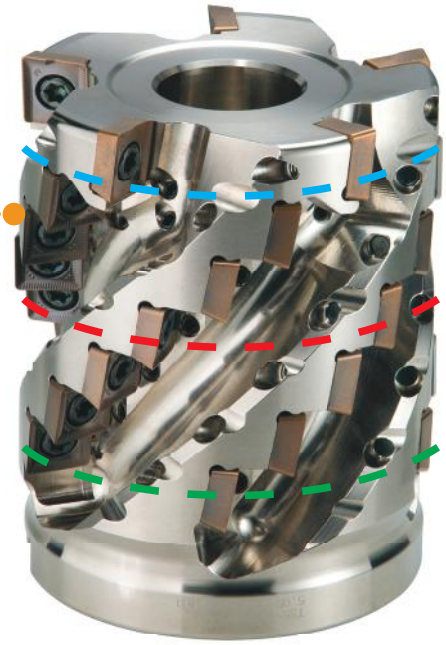
ASPX leads the latest machining theory by adopting irregular flutes and optimally placed inserts to drastically reduce vibration.

Compared to Equispaced Inserts



Concept of Irregular Flutes







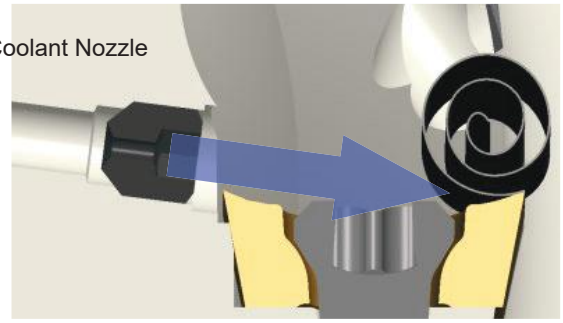
ASPX



Conventional Chatter Mark

Improved Chip Discharge

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



Coolant Discharge Position



Ideal chip shapes.

Reduced Cutting Resistance

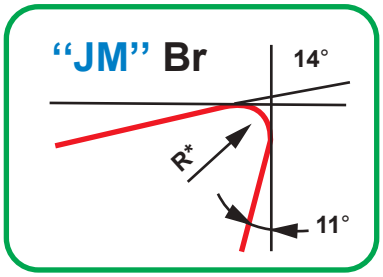
A large rake angle and honing (edge preparation ideal for titanium machining) enhance the low cutting resistance and high fracture resistance.

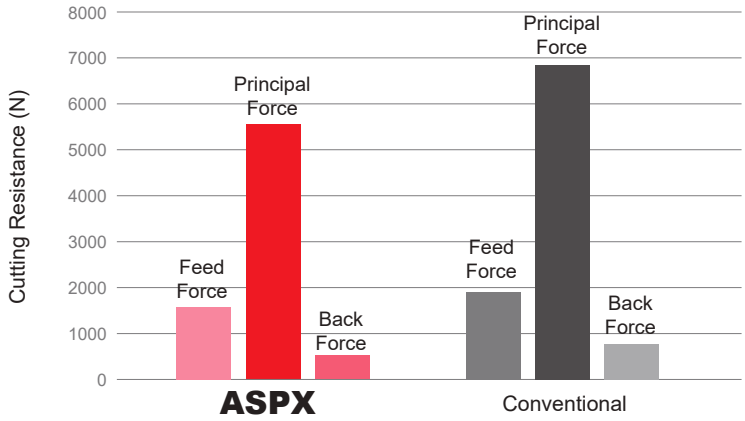


Bottom Edge Insert



Peripheral Edge Insert





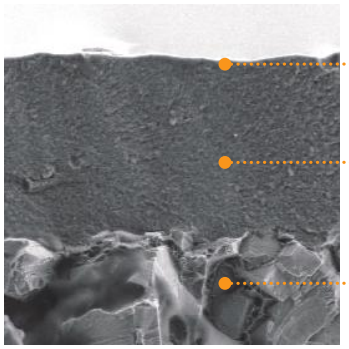
<Cutting Conditions>

Workpiece Material	: Ti-6Al-4V
Cutter Dia.	: DC=3.000"
Cutting Speed	: vc=195 SFM
Feed per Tooth	: fz=.006 IPT
Depth of Cut	: ap=1.181"
Width of Cut	: ae=.917"
Cutting Mode	: Single Flute

PVD Coated Grade for Difficult-to-Cut Materials

MP9140

Combination of a cemented carbide material with outstanding fracture resistance plus a smooth coating for excellent welding resistance yields stable processing and long tool life.



Smooth surface provides excellent welding resistance.

The high Al-rich AlTiN coating succeeds in dramatically improving wear and heat resistance.

Special cemented carbide substrate with improved fracture resistance.

For Machining Titanium Alloys

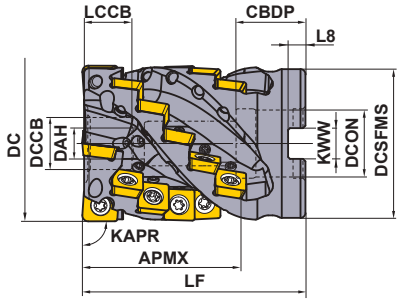
DEEP SHOULDER MILLING

<CUTTING FOR TITANIUM ALLOY>

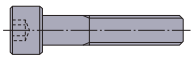
ASPX

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	 *						Number of Insert	
	Clamp Screw	Seal Washer	Wrench	Coolant Nozzle	Number	Anti-seize Lubricant	JPGX	SPGX
ASPX4UR2.000	TS55	WU375-S1	TKY25D	HSD04004H08	18	MK1KS	3	12
ASPX4UR2.500	TS55	WU500-S1	TKY25D	HSD04004H08	28	MK1KS	4	20
ASPX4UR3.000	TS55	WU625-S1	TKY25D	HSD04004H08	40	MK1KS	5	30

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

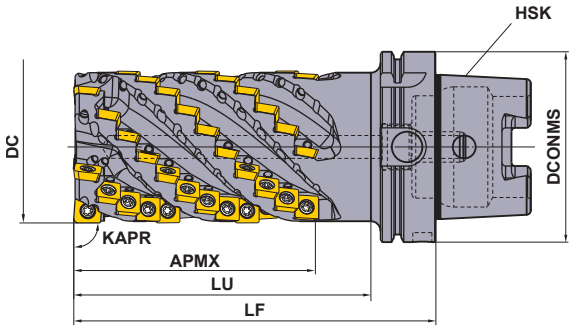
	≤140 PSI (≤5.3 gal/min.)	←Standard→	≥720 PSI (≥7.9 gal/min.)	≥1000 PSI (≥13.2 gal/min.)	To Plug a Coolant Hole
Nozzle Dia.	ø.024"	ø.031"	ø.047"	ø.063"	—
Order Number	**HSD04004H06**	**HSD04004H08**	**HSD04004H12**	**HSD04004H16**	**HSS04004**

Note 1) Coolant nozzles are available with varying diameters for adjusting coolant pressure.
Select the correct nozzle according to the specification.

Note 2) Use HSS04004 (JIS B 1177 flat point M4x4, clamp torque 13.28 lbf-in) to plug the coolant hole.

● : **USA Stock**





The standard type is right-handed (R) only.
The HSK shank type has a built-in movable coolant pipe for installation.

NEW

■ HSK Shank Type

KAPR: 90°
With Coolant Hole

(inch)

DC	Order Number	Stock R	Number of Flutes	Total	LF	LU	DCONMS	HSK	APMX
3.000	**ASPX4UR485H100A050SA**	●	5	60	7.480	6.142	3.937	HSK-A100	5.000
3.000	**ASPX4UR485H125A050SA**	●	5	60	7.480	6.142	4.921	HSK-A125	5.000

● = NEW

Spare Parts

Tool Holder Type	Clamp Screw *	Wrench	Coolant Nozzle	Number	Anti-seize Lubricant	Number of Insert JPGX	Number of Insert SPGX
ASPX4UR485H100A	TS55	TKY25D	HSD04004H08	65	MK1KS	5	55
ASPX4UR485H125A	TS55	TKY25D	HSD04004H08	65	MK1KS	5	55

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

Cutting Example

Titanium Alloy Ti-6Al-4V : Ultra High-Efficiency Machining Example

Compared to a conventional tool productivity has been improved by 130% and the tool life has been doubled.

Conventional

M.R.R. 13.31 in^3/min
Cutting time 50 min / workpiece

Cutting Speed : vc=180 SFM
Feed per Tooth : fz=.005 IPT
Depth of Cut : ap=2.362 inch
Width of Cut : ae=.984 inch

Tool : Integrated Type HSK-A100

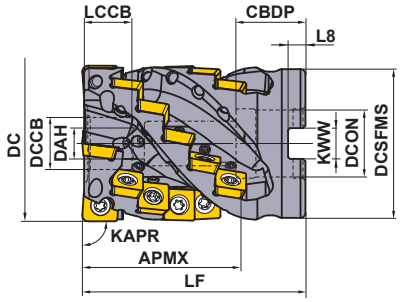
M.R.R. 18.13 in^3/min
Cutting time 35 min / workpiece

Cutting Speed : vc=245 SFM
Feed per Tooth : fz=.005 IPT
Depth of Cut : ap=2.362 inch
Width of Cut : ae=.984 inch

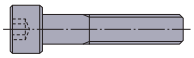


For Machining Titanium Alloys





Right hand tool holder only.

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

Metric Standard

■ Shell Type

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

(mm)

DC	Order Number	Stock 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

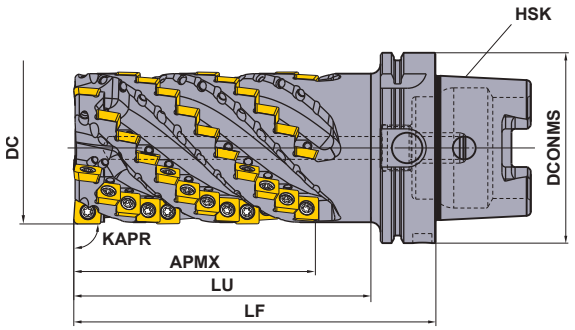
* Clamp Torque (N • m) : TS55 = 5.0

	≤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.

★ : Stocked in Japan





The standard type is right-handed (R) only.
The HSK shank type has a built-in movable coolant pipe for installation.

Metric Standard

NEW

■ HSK Shank Type

KAPR: 90°
With Coolant Hole

(mm)

DC	Order Number	Stock R	Number of Flutes	Total	LF	LU	DCONMS	HSK	APMX
80	**ASPX4R0805H100A127SA**	★	5	60	190	156	100	HSK-A100	127
80	**ASPX4R0805H125A127SA**	★	5	60	190	156	125	HSK-A125	127

● = NEW

Spare Parts

Tool Holder Type	Clamp Screw *	Wrench	Coolant Nozzle	Number	Anti-seize Lubricant	Number of Insert JPGX	Number of Insert SPGX
ASPX4R0805H100A	TS55	TKY25D	HSD04004H08	65	MK1KS	5	55
ASPX4R0805H125A	TS55	TKY25D	HSD04004H08	65	MK1KS	5	55

* Clamp Torque (N • m) : TS55 = 5.0

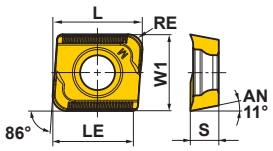
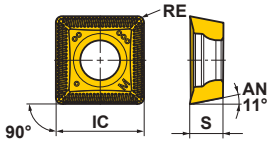
For Machining Titanium Alloys

Inserts

(inch)

Workpiece Material	S	Heat-resistant Alloy, Titanium Alloy

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✠ : Unstable Cutting
Edge Preparation :
E : Round

Shape		Order Number	Class	Edge Preparation	Coated MP9140	L	LE	W1	IC	S	RE	Geometry
Bottom	 2 Corner	**JPGX1404080PPER-JM**	G	E	●	.595	.528	.500	—	.189	.031	
		JPGX1404120PPER-JM	G	E	●	.593	.524	.500	—	.189	.047	
		JPGX1404160PPER-JM	G	E	●	.591	.524	.500	—	.189	.063	
		JPGX1404240PPER-JM	G	E	●	.586	.520	.500	—	.189	.094	
		JPGX1404320PPER-JM	G	E	●	.580	.516	.500	—	.189	.126	
		JPGX1404400PPER-JM	G	E	●	.576	.512	.500	—	.189	.157	
		JPGX1404500PPER-JM	G	E	●	.570	.512	.500	—	.189	.197	
		JPGX1404635PPER-JM	G	E	●	.563	.508	.500	—	.189	.250	
Peripheral	 4 Corner	**SPGX1204100PPER-JM**	G	E	●	—	—	—	.500	.189	.039	

Recommended Cutting Conditions

(inch)

Workpiece Material		Cutting Width **ae**	Cutting Speed **vc** (SFM)	Feed per Tooth **fz** (IPT)
S	Ti Alloys Ti-6Al-4V,Ti-6Al-4V-ELI Ti-10V-2Fe-3Al Ti-5Al-5V-5Mo-3Cr etc.	ae≤0.5DC	195(165—260)	.005(.004—.006)
		0.5DC< ae< 0.8DC	165(130—195)	.004(.003—.005)
		ae≥0.8DC	130(165—195)	.003(.002—.004)

Note 1) The cutting performance depends on machine and clamping rigidity, as well as the supply and pressure of the coolant. Adjust as necessary.
Note 2) Use a machine and spindle size suitable for heavy machining of titanium alloys. (7/24 taper #50 or #60, or high-rigidity HSK-A100 or A125, with an output of 20.1 HP/bhp or higher and torque of 4425 lbf-in or higher for a rotation speed of 500min-1 or less).
Note 3) If chatter and vibration or machine overloading occur, it is recommended to reduce the depth of cut ap.
Note 4) The coolant system combines internal and external lubrication, it is recommended to supply coolant in ample quantities.
Note 5) A gradual roll feed into the workpiece and use of down cutting (climb milling) is recommended. (refer to page 9)

● : USA Stock
(10 inserts in one case)

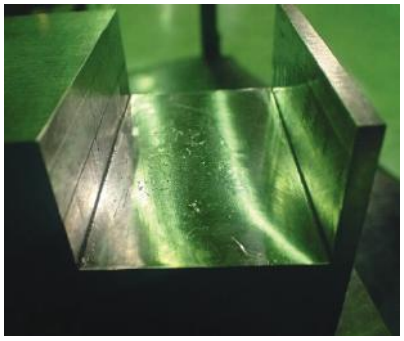
Cutting Performance

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

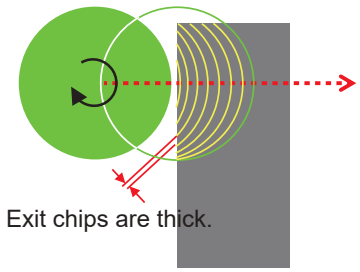
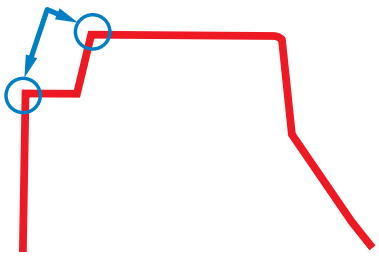
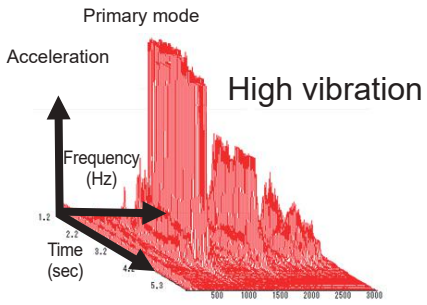
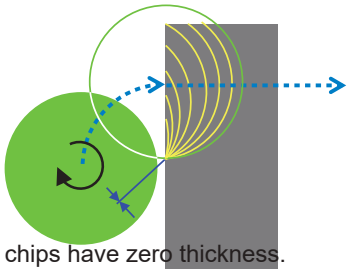
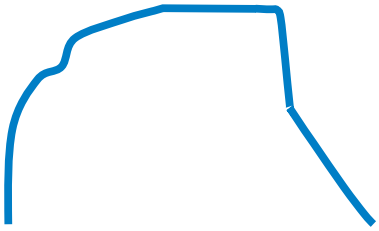
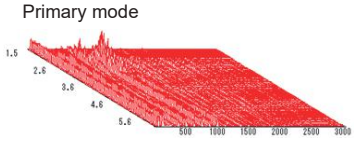


<Cutting Conditions for Grooving>
Workpiece Material : Ti-6Al-4V
Cutter Dia. : DC=2.000"
Cutting Speed : vc=131 SFM
Feed per Tooth : 003 IPT
Depth of Cut : ap=1.181"
Width of Cut : ae=2.000"
M.R.R. : **5.503 in³/min**
Cutting Mode : Wet Cutting

How to Use

Positive Effects of a Roll Into Cutting Approach

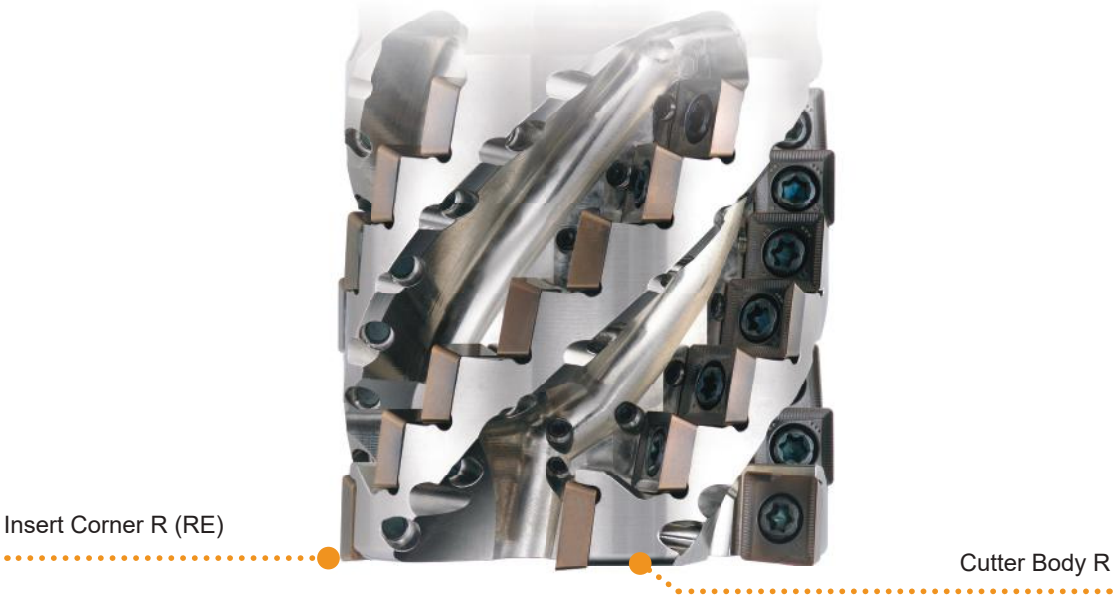
The roll into cutting approach can control sharp increases in cutting loads and prevent sudden chipping of inserts which is likely to occur at the start of machining.

Approach Method	Cutting Load Simulation	Image of Cutting Vibration Frequency
Direct Approach 	Cutting load increases suddenly. High risk of chipping. 	
Roll Into Cutting Approach 	Cutting load increases smoothly. 	Almost no vibration 

Down cutting (climb milling) is recommended.

Note regarding Use of Inserts with Large Corner Radii

When using inserts with corner radius RE≥R.126, please machine the cutter body with a radius form as shown on the table below.



Insert Corner R **RE**	Cutter Body Radius **R**
.126	.118
.157	.157
.197	.197
.250	.244

Memo

MITSUBISHI MATERIALS U.S.A.

MITSUBISHI MATERIALS U.S.A. CORPORATION

California Office
(Headquarters)

3535 Hyland Avenue, Suite 200
Costa Mesa, CA 92626
Customer Service: 800.523.0800
Technical Service: 800.486.2341

Chicago Office
(Engineering)

300 N. Martingale Road, Suite 500
Schaumburg, IL 60173
Main: 847.252.6300
Fax: 847.519.1732

MMC Metal de Mexico, S.A. DE C.V.

Av. La Cañada No.16,
Parque Industrial Bernardo
Quintana, El Marques,
Queretaro C.P. 76246 MEXICO
Main: +52.442.221.61.36
Fax: +52.442.221.61.34

North Carolina-MTEC
(Marketing & Technical Center)

105 Corporate Center Drive, Suite A
Mooresville, NC 28117
Main: 980.312.3100
Fax: 704.746.9292

Toronto Office
(Canada Branch)

600 Matheson Blvd. Unit 5 (Office)
Mississauga, ON L5R 4C1
Main: 905.814.0240
Fax: 905.814.0245

Detroit Office
(Moldino CS)

41700 Gardenbrook Road, Suite 120
Novi, MI 48375
Main: 248.308.2620
Fax: 248.308.2627

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.

www.mmc-carbide.com/us

Tools specifications subject to change without notice.

B238A-US-2021.10