

For Machining Titanium Alloys

ASPX

Item
Addition

Vibration Control Provides High Efficiency

Integrated HSK holder type added for higher rigidity and is ideal for larger depths of cut.



YouTube

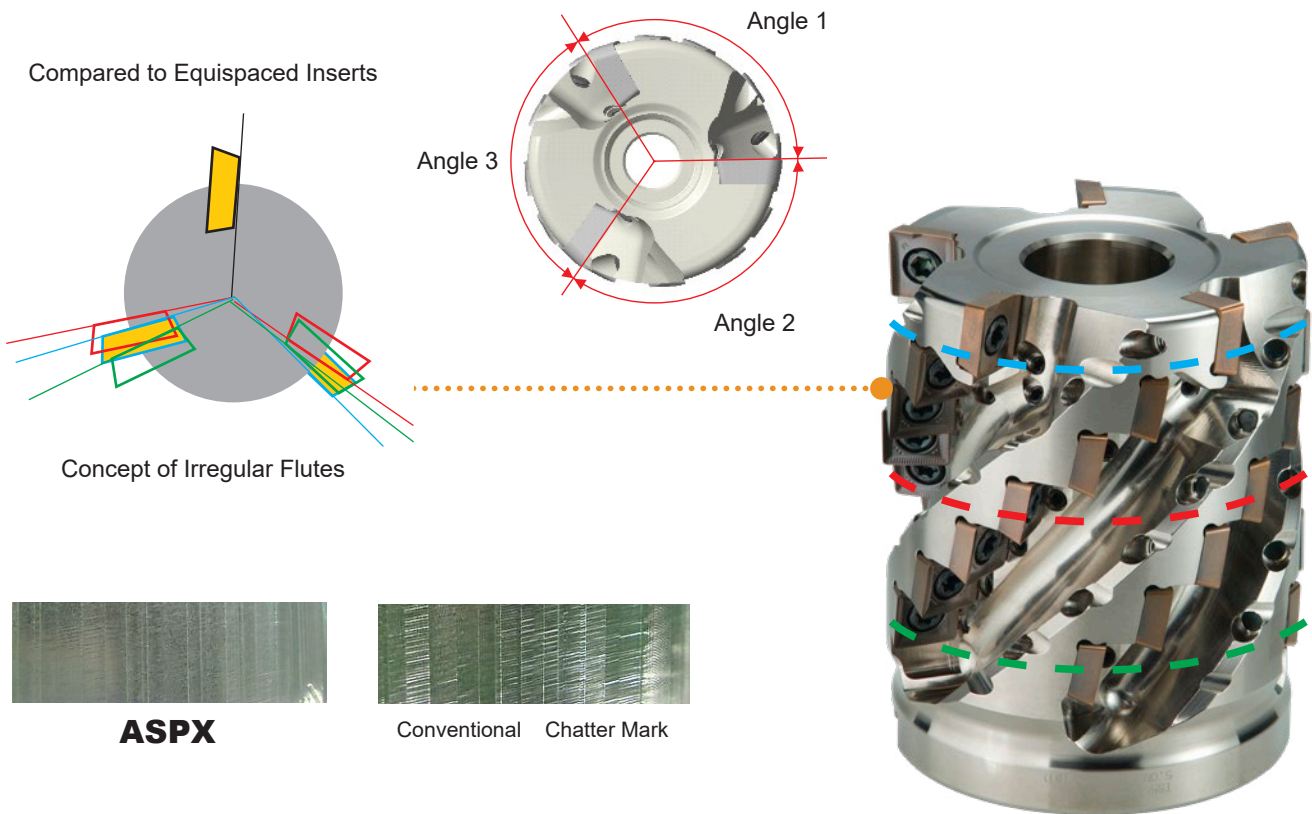
For Machining Titanium Alloys

ASPX

**Vibration Control Features + Low Cutting Resistance
Gives Stable, High-efficiency Cutting**

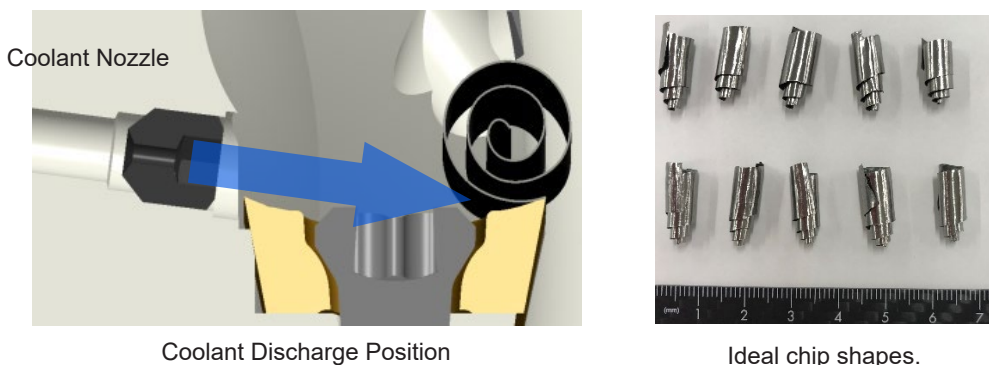
Suppression of Regenerative Chatter

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



Improvement of Chip Discharge

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



Reduced Cutting Resistance

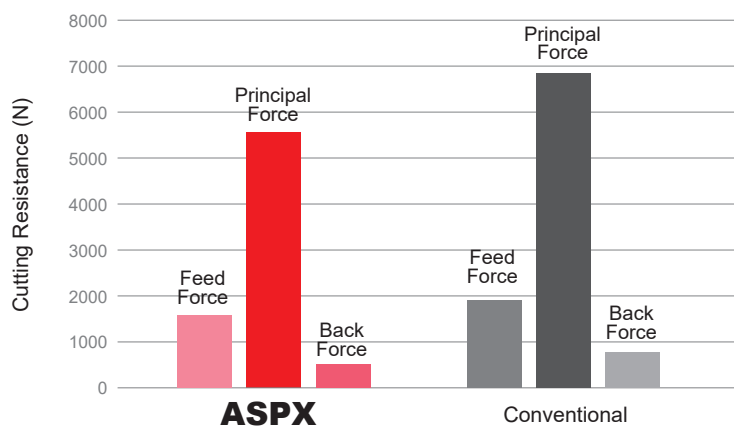
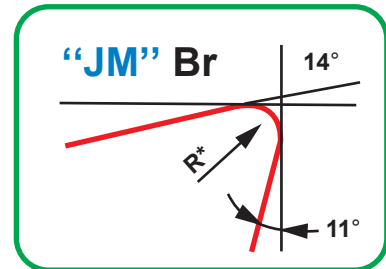
A large rake angle and honing (edge preparation ideal for titanium machining) enhances the low cutting resistance and provides high fracture resistance.



Bottom Edge Insert



Peripheral Edge Insert

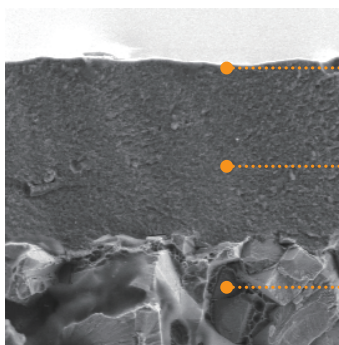


<Cutting Conditions>
 Workpiece Material : Ti-6Al-4V
 Cutter Dia. : DC=80 mm
 Cutting Speed : $v_c=60$ m/min
 Feed per Tooth : $f_z=0.15$ mm/t.
 Depth of Cut : $a_p=30$ mm
 Width of Cut : $a_e=23.3$ mm
 Cutting Mode : Single Flute

PVD Coated Grade for Difficult-to-cut Materials

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.

For Machining Titanium Alloys

DEEP SHOULDER MILLING

<CUTTING FOR TITANIUM ALLOY>



ASPX

P

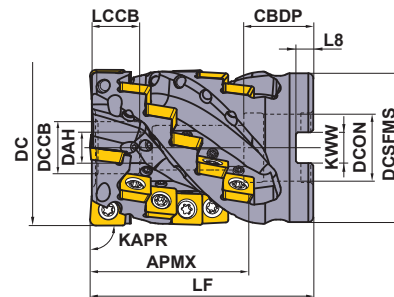
M

K

N

S

H



Right hand tool holder only.

Shell Type

KAPR: 90°

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

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

DC	Order Number	Stock	Number of Flutes	Total	LF	DCON	WT (kg)	APMX
		R						
50	ASPX4-050A03A054RA15	●	3	15	85	22	0.6	54
63	ASPX4-063A04A064RA24	●	4	24	90	27	1.0	64
80	ASPX4-080A05A075RA35	●	5	35	100	32	2.0	75

Mounting Dimensions

DC	Order Number	DCON	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8
50	ASPX4-050A03A054RA15	22	21	10.5	17	14	47	10.4	6.3
63	ASPX4-063A04A064RA24	27	28	12.5	21	19	60	12.4	7
80	ASPX4-080A05A075RA35	32	28	16.5	27	20	76	14.4	8

Spare Parts

Tool Holder Type	*				Number		Number of Insert	
	Clamp Screw	Seal Washer	Wrench	Coolant Nozzle		Anti-seize Lubricant	JPGX	SPGX
ASPX4-050A	TS55	W10-S1	TKY25D	HSD04004H08	18	MK1KS	3	12
ASPX4-063A	TS55	W12-S1	TKY25D	HSD04004H08	28	MK1KS	4	20
ASPX4-080A	TS55	W16-S1	TKY25D	HSD04004H08	40	MK1KS	5	30

* Clamp Torque (N · m) : TS55 = 5.0

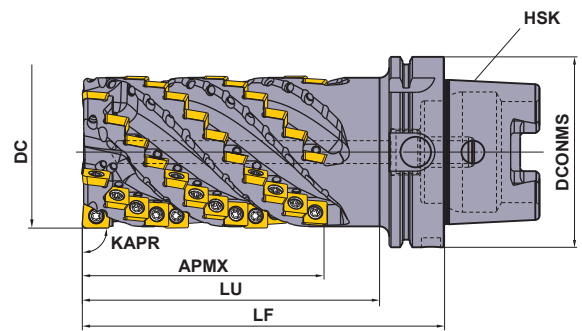
	≤1Mpa (≤20 l/min.)	←Standard→	≥5Mpa (≥30 l/min.)	≥7Mpa (≥50 l/min.)	To Plug a Coolant Hole
Nozzle Dia.	φ0.6mm	φ0.8mm	φ1.2mm	φ1.6mm	—
Order Number	HSD04004H06	HSD04004H08	HSD04004H12	HSD04004H16	HSS04004

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.

● : Inventory maintained in Japan. (10 inserts in one case)



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

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

* Clamp Torque (N · m) : TS55 = 5.0

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. 264cm³/min

Cutting time 50 min / workpiece

Cutting Speed : vc=55m/min
Feed per Tooth : fz=0.12mm/t.
Depth of Cut : ap=80mm
Width of Cut : ae=25mm

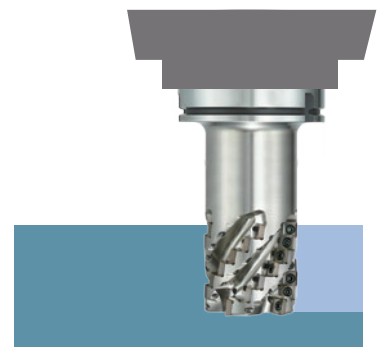


Tool : Integrated Type HSK-A100

M.R.R. 360cm³/min

Cutting time 35 min / workpiece


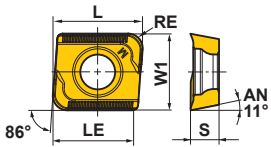

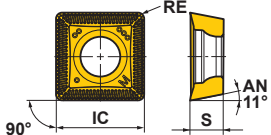
Cutting Speed : vc=75m/min
Feed per Tooth : fz=0.12mm/t.
Depth of Cut : ap=80mm
Width of Cut : ae=25mm



For Machining Titanium Alloys

Inserts

(mm)

Workpiece Material		S	Heat-resistant Alloy, Titanium Alloy		C	Cutting Conditions (Guide) :										
															● : Stable Cutting ● : General Cutting ✕ : Unstable Cutting	
						Edge Preparation :										
						E : Round										
Shape		Order Number		Class	Edge Preparation	Coated				L	LE	W1	IC	S	RE	Geometry
						MP9140										
Bottom		JPGX1404080PPER-JM	G	E	●					15.12	13.4	12.7	—	4.8	0.8	
		JPGX1404120PPER-JM	G	E	●					15.06	13.3	12.7	—	4.8	1.2	
		JPGX1404160PPER-JM	G	E	●					15.00	13.3	12.7	—	4.8	1.6	
		JPGX1404240PPER-JM	G	E	●					14.88	13.2	12.7	—	4.8	2.4	
		JPGX1404320PPER-JM	G	E	●					14.72	13.1	12.7	—	4.8	3.2	
		JPGX1404400PPER-JM	G	E	●					14.64	13.0	12.7	—	4.8	4.0	
		JPGX1404500PPER-JM	G	E	●					14.49	13.0	12.7	—	4.8	5.0	
		JPGX1404635PPER-JM	G	E	●					14.29	12.9	12.7	—	4.8	6.35	
Peripheral		SPGX1204100PPER-JM	G	E	●					—	—	—	12.7	4.8	1.0	

Recommended Cutting Conditions

(mm)

Workpiece Material		Cutting Width ae	Cutting Speed vc (m/min)	Feed per Tooth fz (mm/t.)
S	Ti Alloys Ti-6Al-4V, Ti-6Al-4V-ELI Ti-10V-2Fe-3Al Ti-5Al-5V-5Mo-3Cr etc.	ae ≤ 0.5DC	60(50—80)	0.12(0.10—0.14)
		0.5DC < ae < 0.8DC	50(40—60)	0.10(0.08—0.12)
		ae ≥ 0.8DC	40(50—60)	0.08(0.06—0.10)

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 15kW or higher and torque of 500 Nm or higher for a rotation speed of 500min-1 or less).

Caution, at high load cutting conditions the output power of the machine spindle may be exceeded.

Note 3) If chatter and vibration or machine overloading occur, it is recommended to reduce the depth of cut ap.

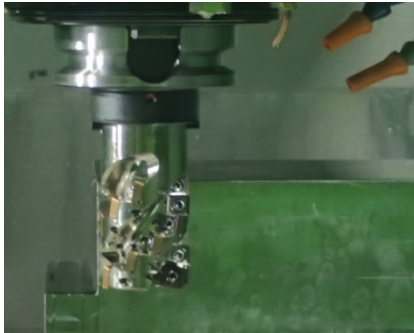
Note 4) The coolant system combines internal and external lubrication, it is recommended to supply coolant in ample quantities.

Note 5) A gradual roll feed into the workpiece and use of down cutting (climb milling) is recommended. (refer to page 5)

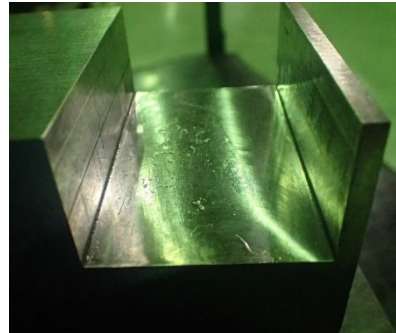
Cutting Performance

High-efficiency Machining of Ti-6Al-4V

Machined surfaces free of chatter marks can be realised to ensure no effects on the finish machining process.



<Cutting Conditions for Shoulder Milling>
 Workpiece Material : Ti-6Al-4V
 Cutter Dia. : $\phi C=50$ mm
 Cutting Speed : $vc=40$ m/min
 Feed per Tooth : $fz=0.13$ mm/t.
 Depth of Cut : $ap=60$ mm
 Width of Cut : $ae=15$ mm
 Cutting Mode : Wet Cutting M.R.R. $90\text{cm}^3/\text{min}$



<Cutting Conditions for Grooving>
 Workpiece Material : Ti-6Al-4V
 Cutter Dia. : $\phi C=50$ mm
 Cutting Speed : $vc=40$ m/min
 Feed per Tooth : $fz=0.08$ mm/t.
 Depth of Cut : $ap=30$ mm
 Width of Cut : $ae=50$ mm
 Cutting Mode : Wet Cutting M.R.R. $92\text{cm}^3/\text{min}$

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
<p>Direct Approach</p> <p>Exit chips are thick.</p>	<p>Cutting load increases suddenly. High risk of chipping.</p>	<p>Primary mode Acceleration Frequency (Hz) Time (sec)</p> <p>High vibration</p>
<p>Roll Into Cutting Approach</p> <p>Exit chips have zero thickness.</p>	<p>Cutting load increases smoothly.</p>	<p>Almost no vibration</p> <p>Primary mode</p>

Down cutting (climb milling) is recommended.

Use of Inserts with Large Corner Radii

When using inserts with corner radius $RE \geq R3.2\text{mm}$, please machine the cutter body with a radius form as shown in the table below.



Insert Corner R RE	Cutter Body Radius R
3.2	3.0
4.0	4.0
5.0	5.0
6.35	6.2

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 CORPORATION

MITSUBISHI MATERIALS CORPORATION

Overseas Sales Dept, Asian Region

KFC bldg., 8F, 1-6-1 Yokoami, Sumida-ku, Tokyo 130-0015, Japan
TEL +81-3-5819-8771 FAX +81-3-5819-8774

Overseas Sales Dept, European & American Region

KFC bldg., 8F, 1-6-1 Yokoami, Sumida-ku, Tokyo 130-0015, Japan
TEL +81-3-5819-8772 FAX +81-3-5819-8774

<http://www.mitsubishicarbide.com/en/>
(Tools specifications subject to change without notice.)