DIA EDGE TOOL NEWS 2020.7 Update B222G

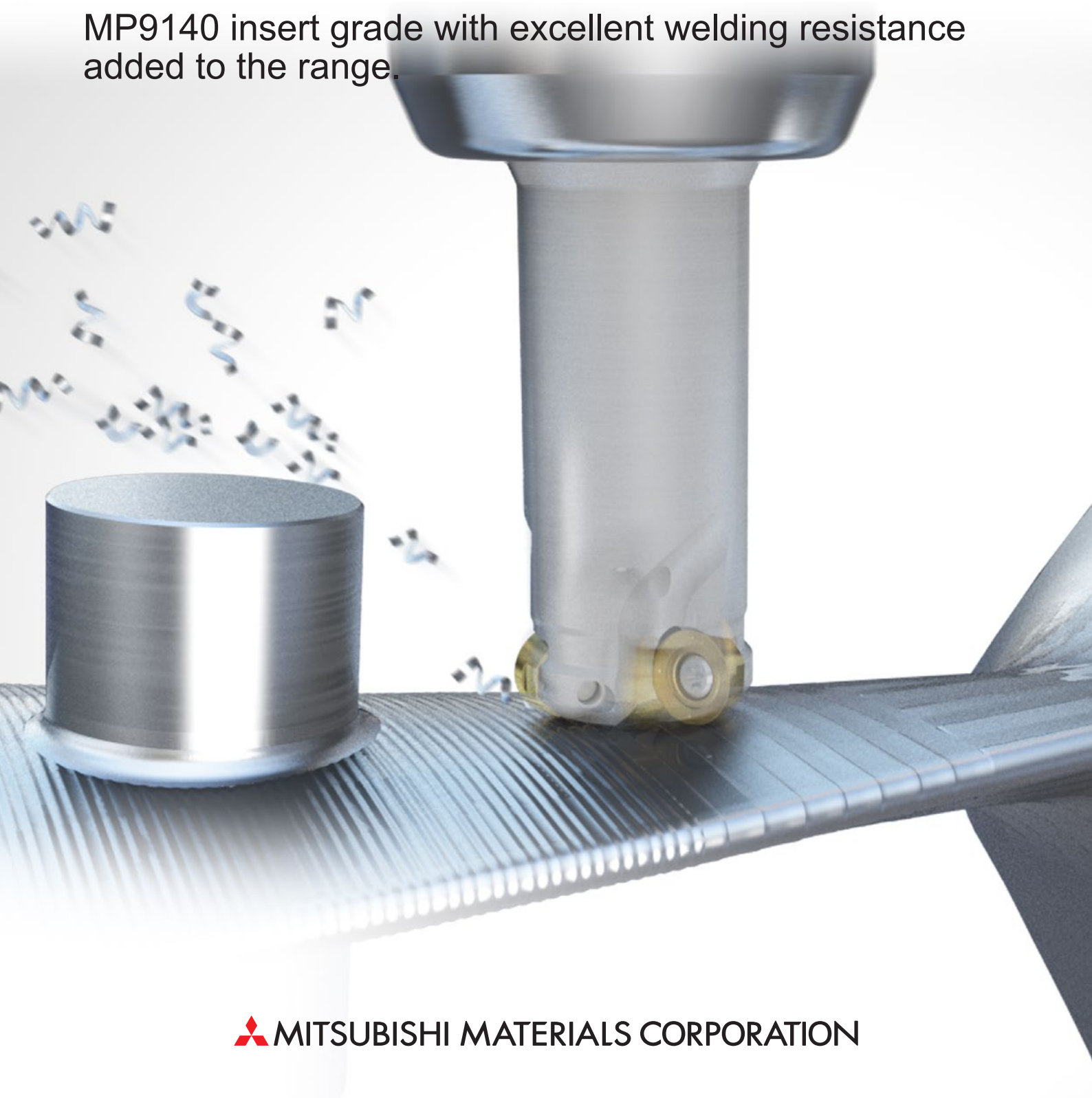
Round Insert Cutter for Difficult-to-cut Materials

ARP Series

Grade Expansion

High Accuracy Run-out Provides Efficient Machining

MP9140 insert grade with excellent welding resistance added to the range.

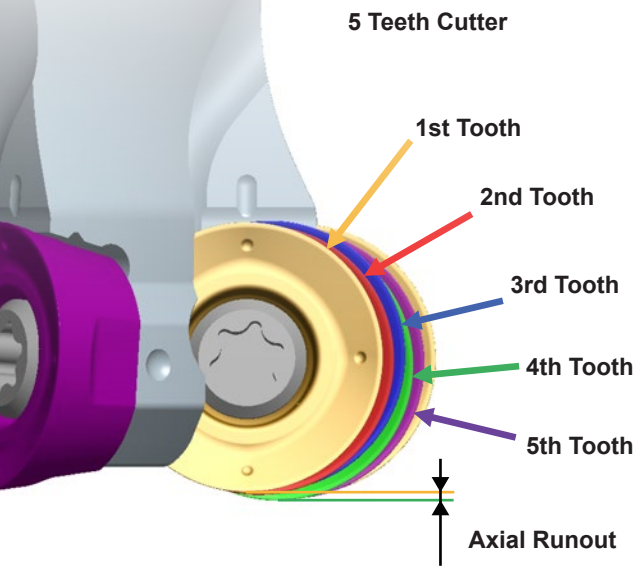


MITSUBISHI MATERIALS CORPORATION

Round Insert Cutter for Difficult-to-cut Materials

ARP Series

Highest Level of Run-out Accuracy Increases Tool Life



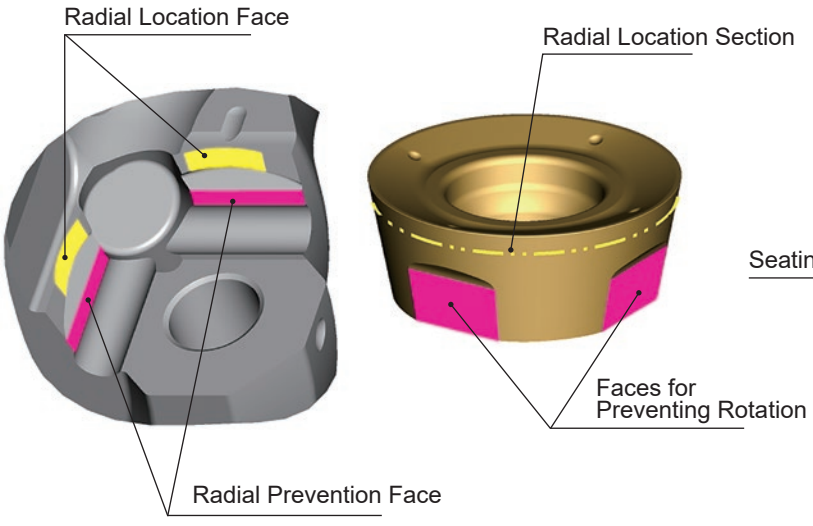
Highly accurate seating realises minimal change of run-out accuracy when indexing the inserts.

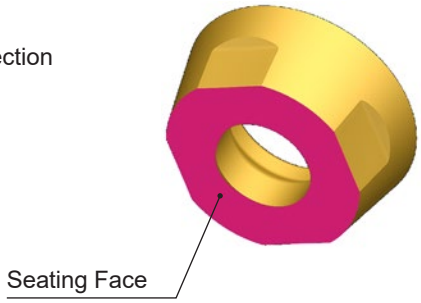
Compared to conventional tools

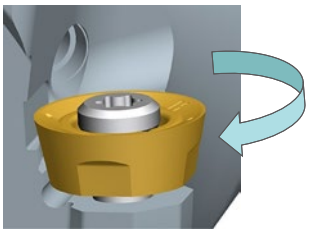
Axial runout 25% improvement

Strong Clamping System

A wide seating face and 2 side location faces prevent inserts from moving during cutting.



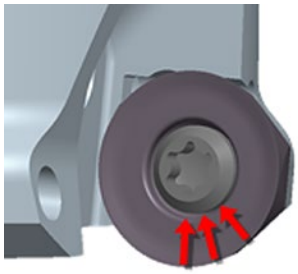




Easy indexing - No need to completely remove the clamping screw.

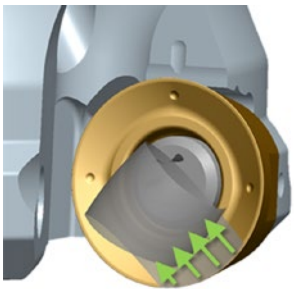
Choose 4 or 8 Indexing Faces According to the Depth of Cut

8 seating face inserts are economical for small depth of cut machining.

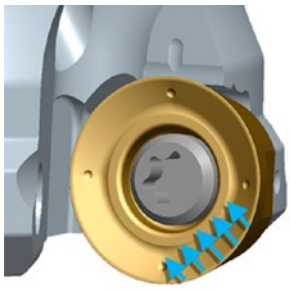


Rake design of
8 indexing face insert

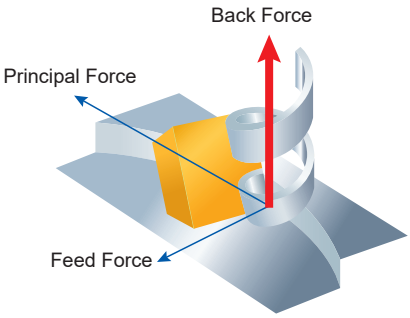
When the cutting depth is medium or higher, the rake face is in the same direction as the chip flow, achieving low cutting resistance. (4 indexing face insert)

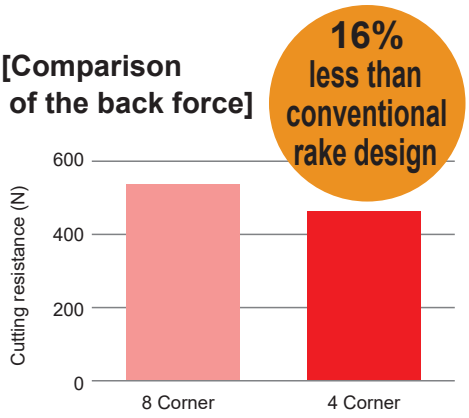


Even chip flow



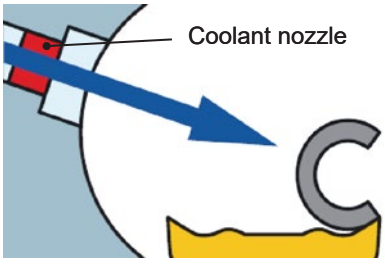
Rake design of 4 indexing face insert

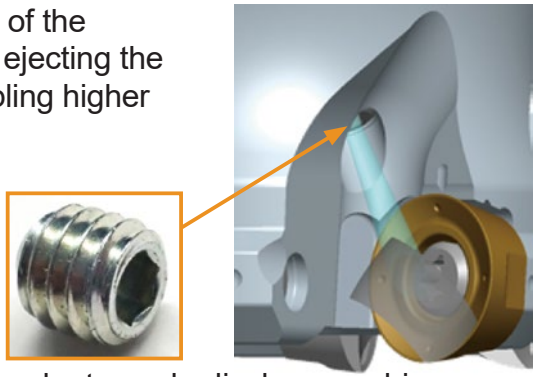




Improved Chip Removal with Coolant

The internal coolant is directed slightly above the rake face of the cutting edge so that it is aimed directly at the chip. Forcibly ejecting the chips prevents them from welding to the cutting edge, enabling higher efficiency machining.



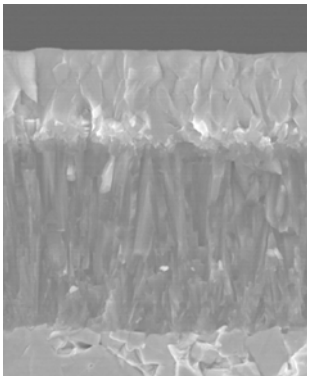


Use of the coolant nozzle discharges chips under high pressure and prevents welding of chips to the cutting edge.

CVD Coated Grade for Machining of Stainless Steels

MC7020

MC7020 has excellent wear, chipping and thermal crack resistance.
These features prevent the problems usually associated with machining stainless steel over prolonged periods.



Improved Wear Resistance

The micro-grain wear resistant Al_2O_3 and fibrous TiCN layers deliver excellent wear resistance when milling a wide range of cast irons.

Improved Fracture Resistance

Use of a specially developed cemented carbide that provides superior resistance to fracture and thermal cracking prevents the cutting edge from sudden fracturing.

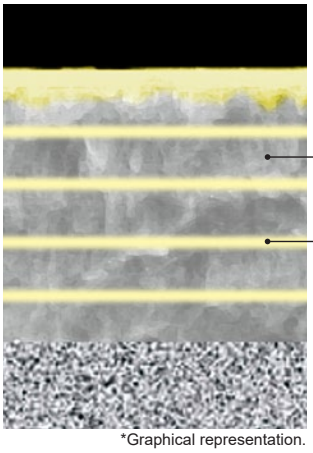
Reduced Abnormal Damage

An extremely smooth black super-smooth coating prevents abnormal damage such as weld chipping.

With Accumulated Al-Ti-Cr-N Based PVD Coating

MP7100, MP9100

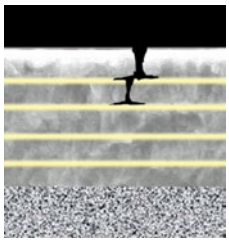
A fusion of the separate coating technologies; PVD and multi-layering realises extra toughness.



*Graphical representation.

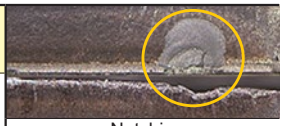
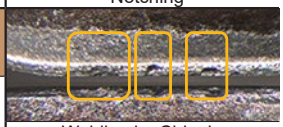
Base Layer
High Al-(Al, Ti)N
The new technology Al-(Al, Ti)N coating provides stabilisation of the high hardness phase and succeeds in dramatically improving wear, crater and welding resistance.

Each Grade Has a Layer Suitable for Each Application Area



*Graphical representation.

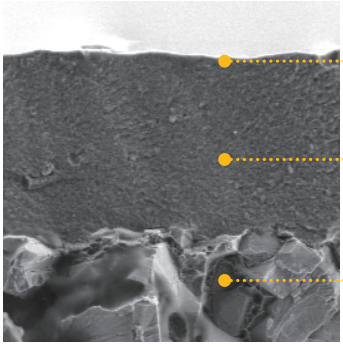
Multi-layering of the coating prevents any cracks penetrating through to the substrate.

M 	TiN Tough Against Notching	 Notching
S 	CrN Tough Against Chipping	 Welding by Chipping

PVD Coated Grade for Difficult-to-cut Materials

NEW MP9140

MP9140 Has Excellent Welding Resistance Due to the Smoothened Surface



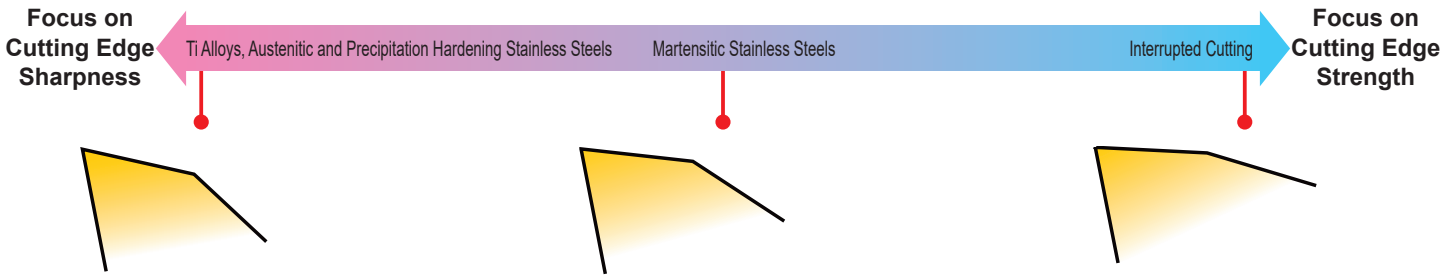
Smooth surfaces provide excellent welding resistance.

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

Special cemented carbide substrate with improved fracture resistance.

Breaker System

Breaker series for various applications



L Breaker

Focus on Cutting Edge Sharpness
Low Resistance Type
- Accurate Moulded Type
- Precision Ground Type

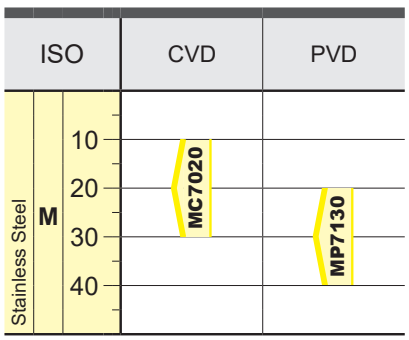
M Breaker

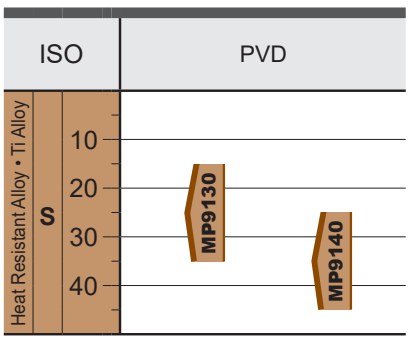
- Accurate Moulded Type
- Precision Ground Type

R Breaker

Reinforced Edge Type
- Accurate Moulded Type
- Precision Ground Type

Workpiece Material	Cutting Condition		
	Light	General	Interrupted
M	L	M	R
S	L	M	R





MULTI FUNCTIONAL MILLING

ARP

P | M | K | N | S | H

Fig.1

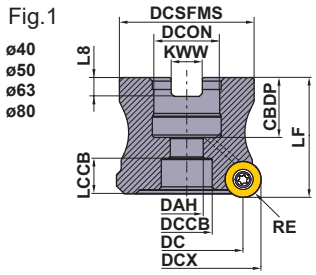
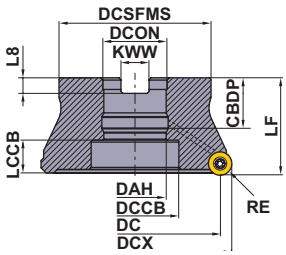


Fig.2



Right hand tool holder only.

DCX		Set Bolt	Geometry	
DCON inch size	DCON mm size			
–	ϕ40	HSC08025H	①	① ②
–	ϕ50, ϕ63	HSC10030H		
ϕ80	ϕ80	HSC12035H		
ϕ100	ϕ100	MBA16033H	②	

■Arbor Type

KAPR: R
GAMP : +4° GAMF : -6°
DCON = inch size, With Coolant Hole

(mm)

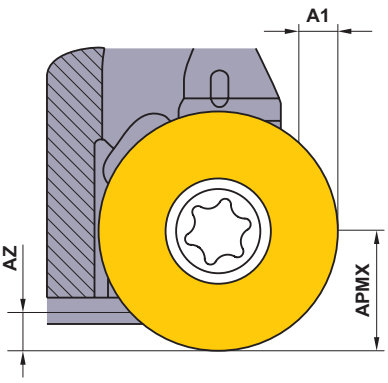
DCX	Order Number	Stock R	RE	*1 No.T	DC	LF	DCON	WT (kg)	Max. Depth of Cut A1	Max. Depth of Cut AZ	RMPX	Fig.	Insert Type
80	**ARP6PR08008CA**	●	6	8	68	50	25.4	0.9	2.5	2.5	2.3°	1	RP○T1248
80	**ARP6PR08009CA**	●	6	9	68	50	25.4	0.9	2.5	2.5	2.3°	1	RP○T1248
100	**ARP6PR10009DA**	●	6	9	88	50	31.75	1.4	2.5	2.5	1.7°	2	RP○T1248
100	**ARP6PR10011DA**	●	6	11	88	50	31.75	1.4	2.5	2.5	1.7°	2	RP○T1248

DCON = mm size, With Coolant Hole

(mm)

DCX	Order Number	Stock R	RE	*1 No.T	DC	LF	DCON	WT (kg)	Max. Depth of Cut A1	Max. Depth of Cut AZ	RMPX	Fig.	Insert Type
40	**ARP5P-040A05AR**	●	5	5	29.9	40	16	0.2	2.0	1.3	2.8°	1	RP○T1040
40	**ARP6P-040A04AR**	●	6	4	28	40	16	0.2	2.0	1.1	2.7°	1	RP○T1248
50	**ARP5P-050A06AR**	●	5	6	39.9	40	22	0.3	2.0	1.8	2.9°	1	RP○T1040
50	**ARP5P-050A07AR**	●	5	7	39.9	40	22	0.3	2.0	1.8	2.9°	1	RP○T1040
50	**ARP6P-050A05AR**	●	6	5	38	40	22	0.3	2.0	1.7	2.9°	1	RP○T1248
50	**ARP6P-050A06AR**	●	6	6	38	40	22	0.3	2.0	1.7	2.9°	1	RP○T1248
63	**ARP5P-063A07AR**	●	5	7	52.9	40	22	0.5	2.5	2.5	3.0°	1	RP○T1040
63	**ARP5P-063A08AR**	●	5	8	52.9	40	22	0.5	2.5	2.5	3.0°	1	RP○T1040
63	**ARP6P-063A06AR**	●	6	6	51	40	22	0.4	2.5	2.5	3.1°	1	RP○T1248
63	**ARR6P-063A07AR**	●	6	7	51	40	22	0.4	2.5	2.5	3.1°	1	RP○T1248
80	**ARP6P-080A08AR**	●	6	8	68	50	27	0.9	2.5	2.5	2.3°	1	RP○T1248
80	**ARP6P-080A09AR**	●	6	9	68	50	27	0.9	2.5	2.5	2.3°	1	RP○T1248
100	**ARP6P-100B09AR**	●	6	9	88	50	32	1.5	2.5	2.5	1.7°	2	RP○T1248
100	**ARP6P-100B11AR**	●	6	11	88	50	32	1.5	2.5	2.5	1.7°	2	RP○T1248

*1 Number of Teeth
Note 1) For the maximum width of cut (APMX), Please refer to page 9.



Dimensions and Symbols (ISO 13399 Compliance)

DCX = Cutting Diameter Maximum
RE = Corner Radius
DC = Cutting Diameter
LF = Functional Length
DCON = Connection Diameter
WT = Weight of Item
A1 = Max. Width of Cut in the Radius Direction
AZ = Plunge Depth Maximum
RMPX = Max.Ramping Angle

● : **Inventory maintained in Japan.**

Mounting Dimensions

(mm)

DCX	Order Number	DCON	CBDP	DAH	DCCB	LCCB	DCSFMS	KWW	L8	Fig.
40	**ARP5P-040A05AR**	16	18	9	14	14.0	34	8.4	5.6	1
40	**ARP6P-040A04AR**	16	18	9	13.4	13.9	34	8.4	5.6	1
50	**ARP5P-050A06AR**	22	20	11	17	12.0	45	10.4	6.3	1
50	**ARP5P-050A07AR**	22	20	11	17	12.0	45	10.4	6.3	1
50	**ARP6P-050A05AR**	22	20	11	17	11.9	45	10.4	6.3	1
50	**ARP6P-050A06AR**	22	20	11	17	11.9	45	10.4	6.3	1
63	**ARP5P-063A07AR**	22	20	11	17	12.0	50	10.4	6.3	1
63	**ARP5P-063A08AR**	22	20	11	17	12.0	50	10.4	6.3	1
63	**ARP6P-063A06AR**	22	20	11	17	11.9	50	10.4	6.3	1
63	**ARR6P-063A07AR**	22	20	11	17	11.9	50	10.4	6.3	1
80	**ARP6PR08008CA**	25.4	26	20	13	14.9	56	9.5	6.0	1
80	**ARP6PR08009CA**	25.4	26	20	13	14.9	56	9.5	6.0	1
80	**ARP6P-080A08AR**	27	23	13	20	14.9	56	12.4	7.0	1
80	**ARP6P-080A09AR**	27	23	13	20	14.9	56	12.4	7.0	1
100	**ARP6PR10009DA**	31.75	32	31.75	45	11.9	70	12.7	8.0	2
100	**ARP6PR10011DA**	31.75	32	31.75	45	11.9	70	12.7	8.0	2
100	**ARP6P-100B09AR**	32	26	45	32	16.9	78	14.4	8.0	2
100	**ARP6P-100B11AR**	32	26	45	32	16.9	78	14.4	8.0	2

Spare Parts

(mm)

Tool Holder Type	 * Clamp Screw	 Wrench (Insert)	 Anti-seize Lubricant
ARP5	TPS351B	TIP10D	MK1KS
ARP6	TPS4	TIP15D	MK1KS

* Clamp Torque (N • m) : TPS351B=2.5,TPS4=3.5

	≤1Mpa (≤20 l/min.)	←Standard→	≥5Mpa (≥30 l/min.)	≥7Mpa (≥50 l/min.)	To Plug a Coolant Hole
Nozzle Dia.	ø0.6mm	ø0.8mm	ø1.2mm	ø1.6mm	–
Order Number	**HSD04004H06**	**HSD04004H08**	**HSD04004H12**	**HSD04004H16**	**HSS04004**

Note 1) Coolant nozzles are available with varying diameters for adjusting coolant pressure. Select nozzles as required by the specification.
Note 2) Use HSS04004 (JIS B 1177 flat point M4x4, clamp torque 1.5 Nm) to plug the coolant hole.

Dimensions and Symbols (ISO 13399 Compliance)

DCX = Cutting Diameter Maximum
DCON = Connection Diameter
CBDP = Connection Bore Depth
DAH = Diameter Access Hole
DCCB = Fixing Bolt Seat Diameter
LCCB = Counterbore Depth Connection Bore
DCSFMS = Contact Surface Diameter Machine Side
KWW = Keyway Width
L8 = Depth of Keyway

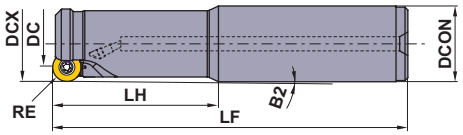


Fig.1

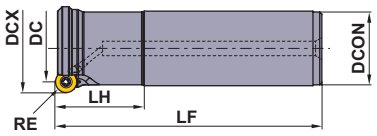


Fig.2

■Arbor Type

KAPR: R
GAMP : +4° GAMF : -6°ー-7°
With Coolant Hole

(mm)

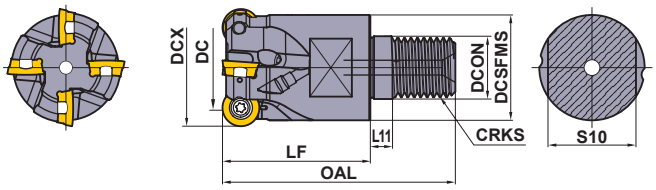
DCX	Order Number	Stock R	RE	*1 No.T	DC	LF	LH	DCON	B2	WT (kg)	Max. Depth of Cut A1	Max. Depth of Cut AZ	RMPX	Fig.	Insert Type
25	**ARP5PR2503SA25M**	●	5	3	15	140	60	25	1.10°	0.4	1.0	0.40	1.8°	1	RP○T1040
25	**ARP5PR2502SA25L**	●	5	2	15	180	80	25	0.80°	0.6	1.0	0.40	1.8°	1	RP○T1040
32	**ARP5PR3204SA32M**	●	5	4	22	150	70	32	0.92°	0.8	1.0	0.65	1.9°	1	RP○T1040
32	**ARP6PR3203SA32M**	●	6	3	20	150	70	32	0.51°	0.8	1.0	0.60	2.0°	1	RP○T1248
32	**ARP5PR3203SA32L**	●	5	3	22	200	120	32	0.94°	1.0	1.0	0.65	1.9°	1	RP○T1040
32	**ARP6PR3202SA32L**	●	6	2	20	200	120	32	0.52°	1.0	1.0	0.60	2.0°	1	RP○T1248
40	**ARP6PR4004SA32M**	●	6	4	28	150	50	32	−	0.9	2.5	1.15	2.7°	2	RP○T1248
40	**ARP6PR4003SA32L**	●	6	3	28	250	50	32	−	1.5	2.5	1.15	2.7°	2	RP○T1248
50	**ARP6PR5005SA42M**	●	6	5	38	150	50	42	−	1.5	2.5	1.70	2.9°	2	RP○T1248
50	**ARP6PR5004SA42L**	●	6	4	38	250	50	42	−	2.5	2.5	1.70	2.9°	2	RP○T1248

*1 Number of Teeth
Note 1) For the maximum width of cut (APMX), Please refer to page 9.

Dimensions and Symbols (ISO 13399 Compliance)

DCX = Cutting Diameter Maximum
RE = Corner Radius
DC = Cutting Diameter
LF = Functional Length
LH = Neck Length
DCON = Connection Diameter
WT = Weight of Item
A1 = Max. Width of Cut in the Radius Direction
AZ = Plunge Depth Maximum
RMPX = Max.Ramping Angle

● : **Inventory maintained in Japan.**



■Screw-in Type

KAPR: R
GAMP : +4° GAMF : -6°—-7°
With Coolant Hole

(mm)

DCX	Order Number	Stock R	RE	*1 No.T	DC	DCON	DCSFMS	OAL	LF	S10	CRKS	WT (kg)	Max. Depth of Cut A1	Max. Depth of Cut AZ	RMPX	Insert Type
25	**ARP5PR2502AM1235**	●	5	2	15	12.5	23.5	57	35	19	M12	0.1	–	0.40	1.8°	RP○T1040
25	**ARP5PR2503AM1235**	●	5	3	15	12.5	23.5	57	35	19	M12	0.1	–	0.40	1.8°	RP○T1040
32	**ARP5PR3203AM1640**	●	5	3	22	17.0	28.5	63	40	24	M16	0.2	1.0	0.65	1.9°	RP○T1040
32	**ARP5PR3204AM1640**	●	5	4	22	17.0	28.5	63	40	24	M16	0.2	1.0	0.65	1.9°	RP○T1040
32	**ARP6PR3202AM1640**	●	6	2	20	17.0	28.5	63	40	24	M16	0.2	1.0	0.60	2.0°	RP○T1248
32	**ARP6PR3203AM1640**	●	6	3	20	17.0	28.5	63	40	24	M16	0.2	1.0	0.60	2.0°	RP○T1248
40	**ARP6PR4003AM1640**	●	6	3	28	17.0	28.5	63	40	24	M16	0.2	2.5	1.15	2.7°	RP○T1248
40	**ARP6PR4004AM1640**	●	6	4	28	17.0	28.5	63	40	24	M16	0.2	2.5	1.15	2.7°	RP○T1248

*1 Number of Teeth
Note 1) For the maximum width of cut (APMX), Please refer to page 9.

Spare Parts

(mm)

Tool Holder Type	*  Clamp Screw	 Wrench (Insert)	 Anti-seize Lubricant
ARP5	TPS351B	TIP10D	MK1KS
ARP6	TPS4	TIP15D	MK1KS

* Clamp Torque (N • m) : TPS351B=2.5,TPS4=3.5

	≤1Mpa (≤20 l/min.)	←Standard→	≥5Mpa (≥30 l/min.)	≥7Mpa (≥50 l/min.)	To Plug a Coolant Hole
Nozzle Dia.	ø0.6mm	ø0.8mm	ø1.2mm	ø1.6mm	–
Order Number	**HSD04004H06**	**HSD04004H08**	**HSD04004H12**	**HSD04004H16**	**HSS04004**

Note 1) Coolant nozzles are available with varying diameters for adjusting coolant pressure. Select nozzles as required by the specification.
Note 2) Use HSS04004 (JIS B 1177 flat point M4x4, clamp torque 1.5 Nm) to plug the coolant hole.

Dimensions and Symbols (ISO 13399 Compliance)

DCX = Cutting Diameter Maximum
RE = Corner Radius
DC = Cutting Diameter
DCON = Functional Length
DCSFMS = Contact Surface Diameter Machine Side
OAL = Overall Length
LF = Functional Length
CRKS = Connection Retention Knob Thread Size
WT = Weight of Item
A1 = Max. Width of Cut in the Radius Direction
AZ = Plunge Depth Maximum
RMPX = Max.Ramping Angle

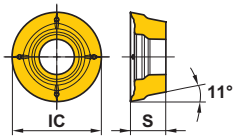
Inserts

(mm)

Workpiece Material		
M	Stainless Steels	
S	Heat-resistant Alloys, Titanium Alloys	

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

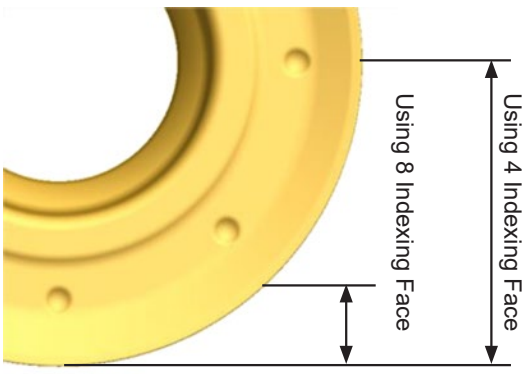
Edge Preparation (Honing) :
E : Round

Shape	Holder	Order Number	Type	Class	Edge Preparation	Coated MC7020	Coated MP7130	Coated MP9130	Coated MP9140	IC	S	APMX 4 Seats	APMX 8 Seats	Geometry
	ARP5	**RPHT1040M0E4-L**	Low Resistance, High Precision	H	E	●	●	●		10	3.97	5.0	–	
		RPMT1040M0E4-L	Low Resistance	M	E	●	●	●		10	3.97	5.0	–	
		NEW **RPMT1040M0E8-L1**	Low Resistance, 8 Seats	M	E	●	●	●	●	10	3.97	5.0	1.4	
		NEW **RPMT1040M0E4-L2**	Low Resistance, High Rigidity	M	E				●	10	3.97	5.0	–	
		RPHT1040M0E4-M	General, High Precision	H	E	●	●	●		10	3.97	5.0	–	
		RPMT1040M0E4-M	General Purpose	M	E	●	●	●		10	3.97	5.0	–	
		NEW **RPMT1040M0E8-M1**	General, 8 Seats	M	E	●	●	●	●	10	3.97	5.0	1.4	
		NEW **RPMT1040M0E4-M2**	General, High Rigidity	M	E				●	10	3.97	5.0	–	
		RPHT1040M0E4-R	Reinforced Edge, High Precision	H	E	●	●	●		10	3.97	5.0	–	
		RPMT1040M0E4-R	Reinforced Edge	M	E	●	●	●		10	3.97	5.0	–	
		NEW **RPMT1040M0E8-R1**	Reinforced Edge, 8 Seats	M	E	●	●	●		10	3.97	5.0	1.4	
	ARP6	**RPHT1248M0E4-L**	Low Resistance, High Precision	H	E	●	●	●		12	4.76	6.0	–	
		RPMT1248M0E4-L	Low Resistance	M	E	●	●	●		12	4.76	6.0	–	
		NEW **RPMT1248M0E8-L1**	Low Resistance, 8 Seats	M	E	●	●	●	●	12	4.76	6.0	1.7	
		NEW **RPMT1248M0E4-L2**	Low Resistance, High Rigidity	M	E				●	12	4.76	6.0	–	
		RPHT1248M0E4-M	General, High Precision	H	E	●	●	●		12	4.76	6.0	–	
		RPMT1248M0E4-M	General Purpose	M	E	●	●	●		12	4.76	6.0	–	
		NEW **RPMT1248M0E8-M1**	General, 8 Seats	M	E	●	●	●	●	12	4.76	6.0	1.7	
		NEW **RPMT1248M0E4-M2**	General, High Rigidity	M	E				●	12	4.76	6.0	–	
		RPHT1248M0E4-R	Reinforced Edge, High Precision	H	E	●	●	●		12	4.76	6.0	–	
		RPMT1248M0E4-R	Reinforced Edge	M	E	●	●	●		12	4.76	6.0	–	
		NEW **RPMT1248M0E8-R1**	Reinforced Edge, 8 Seats	M	E	●	●	●		12	4.76	6.0	1.7	

● = NEW

Depth of cut (ap) for 8 indexing face insert

8 indexing face type inserts can also be used at the same depth of cut as the 4 face type insert.



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

Recommended Cutting Conditions

■ Dry Cutting

	Workpiece Material	Preperties	Grade	**vc** (m/min)	**fz** (mm/t.)
M	Austenitic Stainless Steels	≤200HB	**MC7020**	220 (170—270)	0.2 (0.1—0.35)
			MP7130	200 (150—250)	0.2 (0.1—0.35)
	Austenitic Stainless Steels	>200HB	**MC7020**	190 (140—240)	0.2 (0.1—0.35)
			MP7130	170 (120—220)	0.2 (0.1—0.35)
	Two-phase Stainless Steels	≤280HB	**MC7020**	180 (130—230)	0.2 (0.1—0.35)
			MP7130	160 (110—210)	0.2 (0.1—0.35)
	Ferritic and Martensitic Stainless Steels	≤200MPa	**MC7020**	240 (190—290)	0.2 (0.1—0.35)
			MP7130	200 (150—250)	0.2 (0.1—0.35)
	Ferritic and Martensitic Stainless Steels	>200HB	**MC7020**	240 (190—290)	0.2 (0.1—0.35)
			MP7130	200 (150—250)	0.2 (0.1—0.35)
	Precipitation Hardening Stainless Steels	<450HB	**MC7020**	170 (120—220)	0.2 (0.1—0.35)
			MP7130	150 (100—200)	0.2 (0.1—0.35)

■ Wet Cutting

	Workpiece Material	Preperties	Grade	**vc** (m/min)	**fz** (mm/t.)
M	Austenitic Stainless Steels	≤200HB	**MC7020**	150 (100—200)	0.2 (0.1—0.35)
			MP7130	130 (80—180)	0.2 (0.1—0.35)
	Austenitic Stainless Steels	>200HB	**MC7020**	120 (70—170)	0.2 (0.1—0.35)
			MP7130	100 (80—150)	0.2 (0.1—0.35)
	Two-phase Stainless Steels	≤280HB	**MC7020**	120 (70—170)	0.2 (0.1—0.35)
			MP7130	100 (80—150)	0.2 (0.1—0.35)
	Ferritic and Martensitic Stainless Steels	≤200MPa	**MC7020**	170 (120—220)	0.2 (0.1—0.35)
			MP7130	130 (80—180)	0.2 (0.1—0.35)
	Ferritic and Martensitic Stainless Steels	>200HB	**MC7020**	170 (120—220)	0.2 (0.1—0.35)
			MP7130	130 (80—180)	0.2 (0.1—0.35)
	Precipitation Hardening Stainless Steels	<450HB	**MC7020**	110 (60—160)	0.2 (0.1—0.35)
			MP7130	90 (50—140)	0.2 (0.1—0.35)
S	Titanium Alloys	—	**MP9130**	45(30—55)	0.1(0.05—0.15)
			MP9140	40(30—50)	0.1(0.05—0.15)
	Heat Resistant Alloys	—	**MP9130**	35(15—45)	0.1(0.05—0.15)
			MP9140	30(15—40)	0.1(0.05—0.15)

* Actual cutting conditions are estimated to avoid chatter and vibration when used on stable applications.Make appropriate adjustments when chatter or insert chipping occurs during machining.Use with lower conditions for long overhang applications or when pocket machinig.
* The standard feed per tooth setting for the ARP5 is set at ap = 2.5 mm. For the ARP6, it is set at ap = 3 mm. The feed (fz) can be adjusted by multiplying by the correction ratio value shown in the table below. E.g. Feed recommended when using ARP5, SUS304, MP7130, ap = 1 is 0.2 mm (fz) multiplied by 1.5 (correction ratio F) = 0.3 mm (fz).
* On workpiece entry, reduce the feed by 70%. For ramping, drilling and plunging, reduce by 50%.
* Using the Internal coolant nozzle is recommended for titanium alloy and heat resistant alloy machining.

■ CORRECTION RATIO (F) BASED ON THE (AP) AXIAL CUTTING DEPTH
Correction Ratio (F) based on the (ap) axial cutting depth

Holder	ap=0.5mm	ap=1mm	ap=1.5mm	ap=2mm	ap=2.5mm	ap=3mm	ap=3.5mm	ap=4mm	ap=5mm	ap=6mm
ARP5	2.3	1.5	1.2	1.1	1.0	0.9	0.8	0.8	0.8	—
ARP6	2.5	1.7	1.3	1.1	1.0	1.0	0.9	0.9	0.8	0.8

* Tool body durability may weaken, when the amount of axial cutting exceeds ARP5=5mm and ARP6=6mm.

Depth of Cut and Width of Cut

(mm)

Install Type	DCX	RE	Order Number	No.of Teeth	When using 4 indexing face insert	
					Depth of Cut **ap**	Width of Cut **ae**
Arbor	40	5	**ARP5P-040A05AR**	5	≤2.5	≤1.0DCX
		6	**ARP6P-040A04AR**	4	≤3.5	≤1.0DCX
	50	5	**ARP5P-050A06AR**	6	≤2.5	≤1.0DCX
			ARP5P-050A07AR	7	≤1.5	≤1.0DCX
		6	**ARP6P-050A05AR**	5	≤3.5	≤1.0DCX
			ARP6P-050A06AR	6	≤2.5	≤1.0DCX
	63	5	**ARP5P-063A07AR**	7	≤2.5	≤0.75DCX
			ARP5P-063A08AR	8	≤1.5	≤0.75DCX
		6	**ARP6P-063A06AR**	6	≤3.5	≤0.75DCX
			ARP6P-063A07AR	7	≤2.5	≤0.75DCX
	80	6	**ARP6PR08008CA**	8	≤3.5	≤0.6DCX
			ARP6PR08009CA	9	≤2.5	≤0.6DCX
	100	6	**ARP6PR10009DA**	9	≤3.5	≤0.5DCX
			ARP6PR10011DA	11	≤2.5	≤0.5DCX
Screw-in	25	5	**ARP5PR2502AM1235**	2	≤2.5	≤1.0DCX
			ARP5PR2503AM1235	3	≤1.5	≤1.0DCX
	32	5	**ARP5PR3203AM1640**	3	≤2.5	≤1.0DCX
			ARP5PR3204AM1640	4	≤2.5	≤1.0DCX
		6	**ARP6PR3202AM1640**	2	≤3.5	≤1.0DCX
			ARP6PR3203AM1640	3	≤3.5	≤1.0DCX
	40	6	**ARP6PR4003AM1640**	3	≤3.5	≤1.0DCX
			ARP6PR4004AM1640	4	≤3.5	≤1.0DCX

(mm)

Install Type	DCX	RE	Tool Holder Type	When using 4 indexing face insert	
				Depth of Cut **ap**	Width of Cut **ae**
Shank	25	5	**ARP5PR25**	≤1.5	≤1.0DCX
	32	5	**ARP5PR32**	≤2.5	≤1.0DCX
		6	**ARP6PR32**	≤3.5	≤1.0DCX
	40	6	**ARP6PR40**	≤3.5	≤1.0DCX
	50	6	**ARP6PR50**	≤3.5	≤1.0DCX

Maximum Capacities for Each Type

(mm)

Install Type	DCX	RE	Tool Holder Type	Ramping	Helical Drilling		Drilling Depth	Plunging
				RMPX	**DH max.**	**DH min.**	Maximum **AZ**	**AE1**
Arbor	40	5	**ARP5P-040A**	2.8°	70	78	1.30	2.0
		6	**ARP6P-040A**	2.7°	68	78	1.15	2.0
	50	5	**ARP5P-050A**	2.9°	90	98	1.85	2.0
		6	**ARP6P-050A**	2.9°	88	98	1.70	2.0
	63	5	**ARP5P-063A**	3.0°	116	124	2.50	2.5
		6	**ARP6P-063A**	3.1°	114	124	2.50	2.5
	80	6	**ARP6PR080**	2.3°	148	158	2.50	2.5
	100	6	**ARP6PR100**	1.7°	188	198	2.50	2.5
Shank	25	5	**ARP5PR25**	1.8°	40	48	0.40	1.0
	32	5	**ARP5PR32**	1.9°	54	62	0.65	1.0
		6	**ARP6PR32**	2.0°	52	62	0.60	1.0
	40	6	**ARP6PR40**	2.7°	68	78	1.15	2.5
	50	6	**ARP6PR50**	2.9°	88	98	1.70	2.5
Screw-in	25	5	**ARP5PR25**	1.8°	40	48	0.40	-
	32	5	**ARP5PR32**	1.9°	54	62	0.65	1.0
		6	**ARP6PR32**	2.0°	52	62	0.60	1.0
	40	6	**ARP6PR40**	2.7°	68	78	1.15	2.5

Note 1) When drilling long chips may be generated.

Note 2) When cutting helical holes, do not exceed the largest APMX cutting depth per rotation.

Note 3) Calculate using the following formula for center tool tracks and ϕdc when cutting helical holes: Center tool tracks ϕdc=desired hole diameter ϕDH tool diameter ϕDCX

Note 4) Use of air blow to disperse chips effectively is strongly recommended.

Note 5) Insert pockets are small in fine pitch and small diameter cutters therefore care should be taken to avoid chip jamming. Regulate the feed and speed accordingly.

Note 6) When machining with a large diameter cutter at high feed rates, chip jamming may occur. Regulate the feed and speed accordingly.

Advice for High Efficiency Machining

Fine and super fine pitch cutters improve efficiency by 10-20% when compared to a regular pitch type.

■ **Comparison of Number of Teeth in the Arbor Type**

(mm)

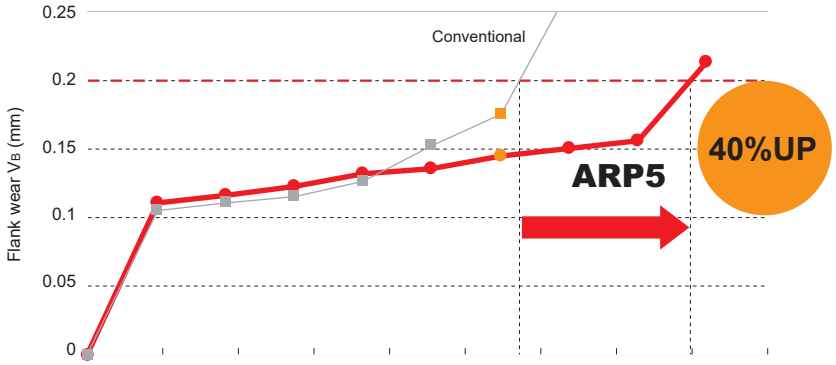
DCX	ARP5		ARP6	
	Fine Pitch	Extra Fine Pitch	Fine Pitch	Extra Fine Pitch
40	5		4	
42	5	6		
50	6	7	5	6
63	7	8	6	7
80			8	9
100			9	11

Efficiency 10-20% UP

Cutting Performance

JIS SUS420J1 Wear Resistance Comparison

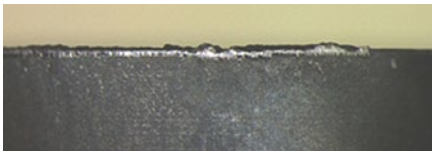
Tool life increased by at least 40% compared to conventional cutters.



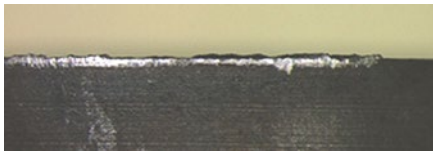
0	2	4	6	8	10	12	14	16	18	Cutting time (min)
0	1.6	3.1	4.7	6.2	7.8	9.4	10.9	12.5	14.0	Cutting length (m)

<Cutting Conditions>
Workpiece Material : JIS SUS420J1
Cutter Dia. : DCX=ø50
Insert : RPHT1040M0E4-R
Grade : MC7020
Cutting Speed : vc = 350m/min
Feed per Tooth : fz = 0.35 mm/t.
Depth of Cut : ap = 2.5 mm
Width of Cut : ae = 25 mm
Cutting Mode : Dry Cutting
Single insert

Cutting Length 8.4m



ARP5 (VB=0.141)



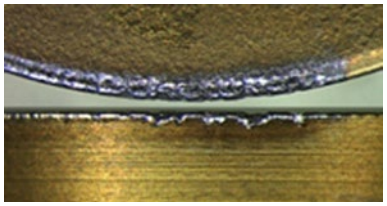
Conventional **(VB=0.172)**

JIS SUS630 Chipping Resistance Comparison

Stable tool life achieved when machining precipitation hardening stainless steel.

Cutting Length 0.4m

ARP5



VB=0.140 Minute chipping

Conventional A

VB=0.358 Large chipping

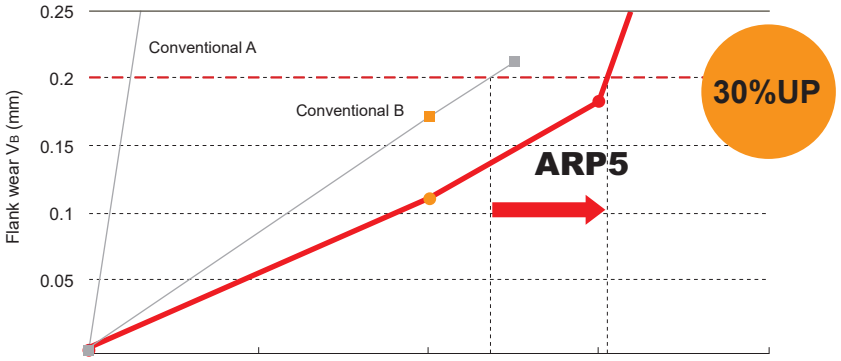
Conventional B

VB=0.172 Chipping

<Cutting Conditions>
Workpiece Material : JIS SUS630
Cutter Dia. : DCX=ø50
Insert : RPHT1040M0E4-L
Grade : MP7130
Cutting Speed : vc = 350m/min
Feed per Tooth : fz = 0.25 mm/t.
Depth of Cut : ap = 2.5 mm
Width of Cut : ae = 14 mm
Cutting Mode : Dry Cutting
Single insert

JIS SUS304 Wear Resistance Comparison

Tool life increased by 30%.



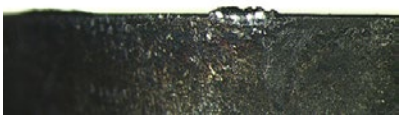
<Cutting Conditions>
Workpiece Material : JIS SUS304
Cutter Dia. : DCX=ø50
Insert : RPHT1040M0E4-L
Grade : MP7130
Cutting Speed : vc = 220m/min
Feed per Tooth : fz = 0.35 mm/t.
Depth of Cut : ap = 2.5 mm
Width of Cut : ae = 25 mm
Cutting Mode : Dry Cutting
Single insert

0	0.82	1.63	2.45	3.27	Cutting time (min)
0	0.4	0.8	1.2	1.6	Cutting length (m)

Cutting Length 0.8m

ARP5 **(VB=0.112)**

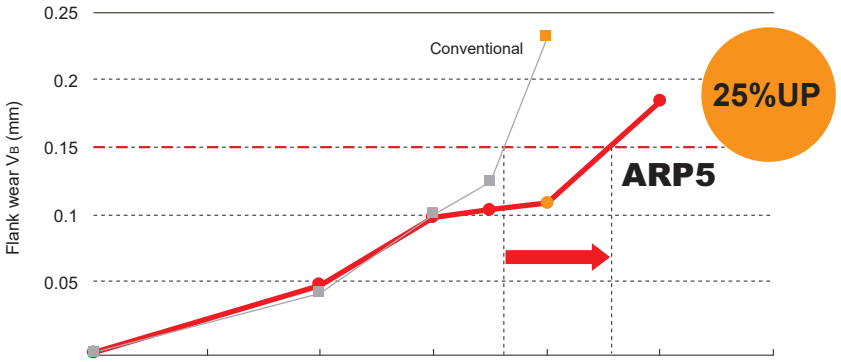
Conventional A **(VB=1.608)**



Conventional B **(VB=0.171)**

Ti-6Al-4V Wear Resistance Comparison

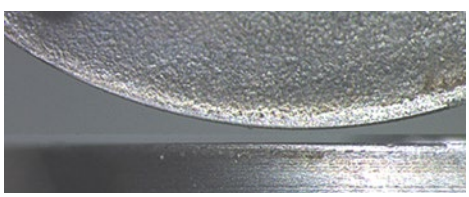
25% increase in tool life.



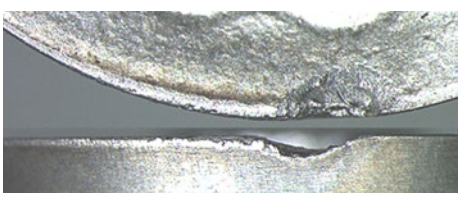
<Cutting Conditions>
Workpiece Material : Ti-6Al-4V
Cutter Dia. : DCX=ø50
Insert : RPHT1040M0E4-L
Grade : MP9130
Cutting Speed : vc = 60m/min
Feed per Tooth : fz = 0.1 mm/t.
Depth of Cut : ap = 2.5 mm
Width of Cut : ae = 20 mm
Cutting Mode : Wet Cutting
(Low pressure)
Single insert

0	13.1	26.2	39.3	52.4	65.4	78.5	Cutting time (min)
0	0.5	1.0	1.5	2.0	2.5	3.0	Cutting length (m)

Cutting Length 2.0m



ARP5 **(VB=0.110)**



Conventional **(VB=0.231)**

Application Examples

Cutter Body		**ARP6P-050A05AR**	**ARP6P-050A06AR**	**ARP6P-050A06AR**
Insert (Grade)		**RPHT1248M0E4-M (MC7020)**	**RPMT1248M0E4-R (MP7130)**	**RPMT1248M0E4-L (MP7130)**
Workpiece		SUS403 	Martensitic Stainless Steel 	Martensitic Stainless Steel 
Component		Power Generator Parts	Power Generator Parts	Aerospace Parts
Cutting Conditions	Cutting Speed **vc** (m/min)	283	250	200
	Feed per Tooth **fz** (mm/t.)	0.25	0.45	0.25
	Depth of Cut **ap** (mm)	3	2.5	1
	With of Cut **ae** (mm)	30	40	20
Cutting Mode		Air blow	M. Q. L.	Wet
Results		Further machining still possible after completing double the normal cutting length.	Machining efficiency increased by 20% and insert life by 30%.	Successfully completed component with improved cutting conditions and some tool life remaining. Cycle time reduced by 47%.

The applications examples above may differ from the recommended cutting conditions.

For Your Safety
●Don't handle inserts and chips without gloves. ●Please machine within the recommended application range and exchange expired tools with new ones in advance of breakage. ●Please use safety covers and wear safety glasses. ●When using compounded cutting oils, please take fire precautions. ●When 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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