

New PVD Coated Grades

MP6100/MP7100/MP9100

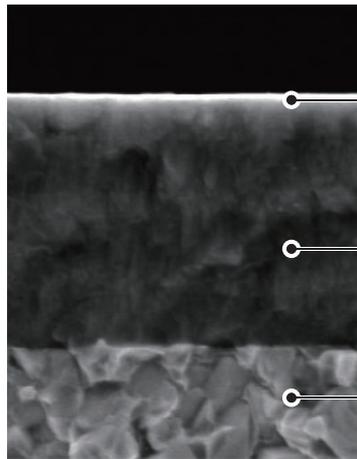
Specialised grades for specific materials.



New PVD Coated Grades

MP6100/MP7100/MP9100

Wide range of grades for specific materials
 MIRACLE SIGMA accumulated Al-Ti-Cr-N based PVD coating



Excellent welding resistance due to low coefficient of friction

PVD accumulated coating (Each damage measures)

Special cemented carbide substrate

	P Steel	M Stainless Steel	S Heat Resistant Alloy • Ti Alloy
Tool wear and Damage	 Thermal Cracks	 Notching	 Welding by Chipping

	MP6120/MP6130	MP7130/MP7140	MP9120/MP9130
Features	Improved thermal conductivity	Improved layer toughness	Low affinity at high temperature
Shape			

	ISO	Coated Carbide
		PVD
P Steel	P10	
	P20	
	P30	
	P40	

	ISO	Coated Carbide
		PVD
M Stainless Steel	M10	
	M20	
	M30	
	M40	

	ISO	Coated Carbide
		PVD
S Heat Resistant Alloy • Ti Alloy	S10	
	S20	
	S30	
	S40	

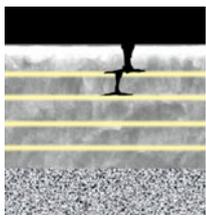
TOUGH-Σ Technology

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

PVD accumulated coating

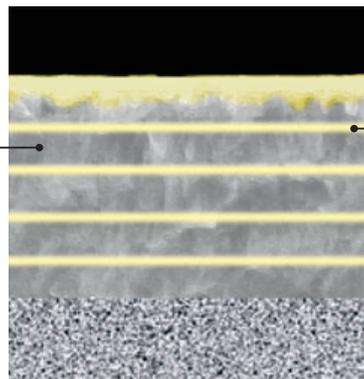
Base layer High Al-(Al, Ti)N

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.

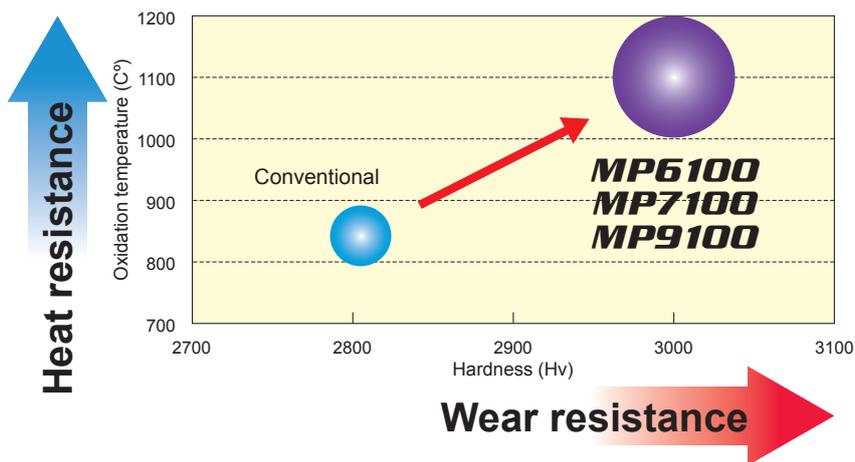


*Graphical representation.

Best layer of each workpiece

P		(Al,Cr)N
		Tough! Thermal Cracks
M		TiN
		Tough! Notching
S		CrN
		Tough! Resistant Chipping

Dramatically improving the heat and wear resistance!



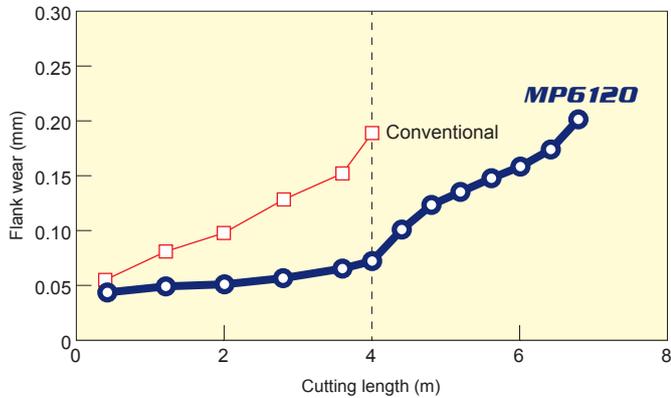
Excellent welding resistance due to low coefficient friction!

	Work Material	Grade	Coefficient of friction		
			Measured at 600 degrees		
			S55C	SUS304	Ti-6Al-4V
P	Carbon Steel, Alloy Steel	MP6100	0.4		
M	Stainless Steel	MP7100		0.5	
S	Titanium Alloy, Heat Resistant Alloy	MP9100			0.3
	Conventional		0.7	0.7	0.7

Cutting Performance

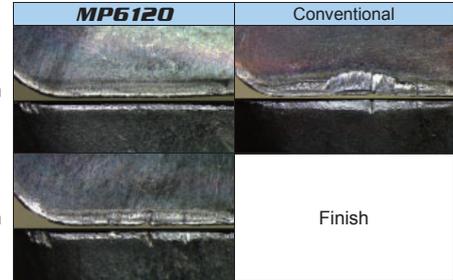
General Steel and Alloy Steel machining

Wear Resistance



Cutting length 4 m

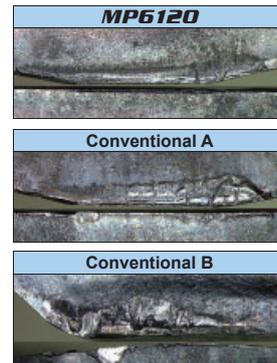
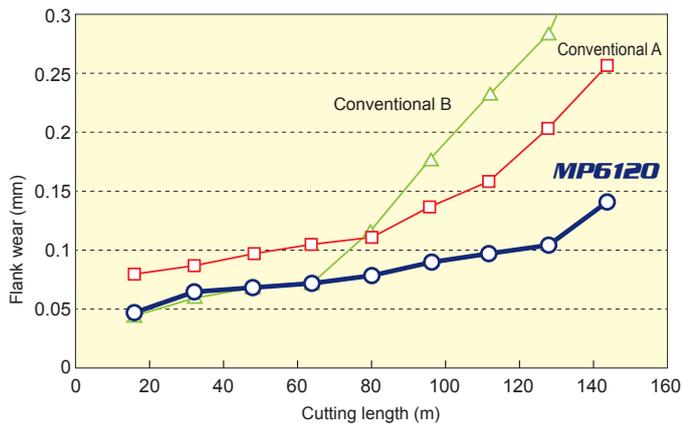
Cutting length 7 m



<Cutting conditions>

Workpiece : JIS SCM440
 Tool : ASX445R12508E
 Insert : SEMT13T3AGSN-JM
 Cutting speed : 270 m/min
 Feed : 0.2 mm/tooth
 Depth of cut : 2.0 mm
 Coolant : Dry cutting

Crater Wear Resistance

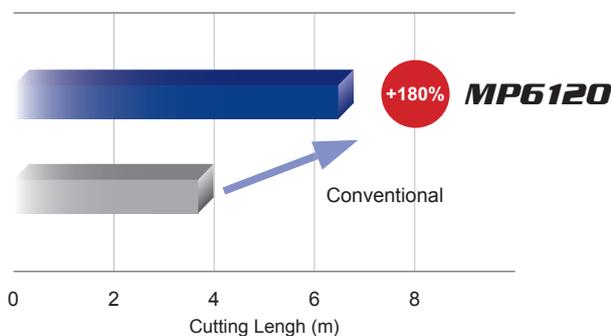


Cutting length : 1.4 m

<Cutting conditions>

Workpiece : JIS SCM440
 Tool : AJX14-063A04R
 Insert : JDMT140520ZDSR-JM
 Cutting speed : 200 m/min
 Feed : 1.5 mm/tooth
 Depth of cut : ap=1.0 mm ae=50 mm
 Coolant : Dry cutting

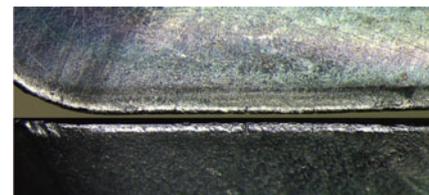
Helps to prevent occurrence and progression of thermal cracking



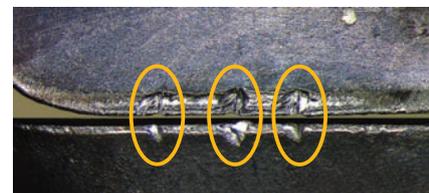
<Cutting Conditions>

Workpiece : JIS SCM440
 Cutter : ASX445R12508E
 Insert : SEMT13TAGSN-JM
 Cutting Speed : 300 m/min
 Feed per Tooth : 0.2 mm/tooth
 Depth of Cut : ae 100 mm, ap 2.0 mm
 Coolant : Dry cutting

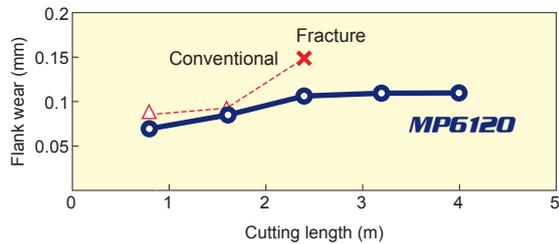
MP6120



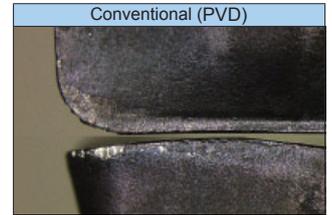
Conventional



Wear Resistance



Cutting length 4.0 m



Cutting length 2.4 m

<Cutting conditions>

Workpiece : SCM440	Feed per tooth : 0.15 mm/tooth
Tool : ASX400-063A05R	Axial depth of cut : 3 mm
Insert : SOET12T308PEER-JM	Radial depth of cut : 50 mm
Cutting speed : 200 m/min	Coolant : Dry cutting

Wear Resistance

MP6120



Cutting length 28 m

Can continue machining up to 46 m

Conventional A



Cutting length 28 m

Conventional B



Cutting length 15 m

<Cutting conditions>

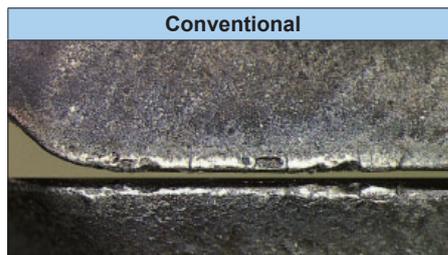
Workpiece : S55C
Tool : APX3000R324SA32SA
Insert : AOMT123608PEER-M
Grade : MP6120
Cutting speed : 200 m/min
Feed per tooth : 0.1 mm/tooth
Width of cut : 2 mm
Depth of cut : 2 mm
Coolant : Dry cutting

Stainless steel machining

Chipping Resistance



Cutting length :1.4 m



Cutting length :0.8 m

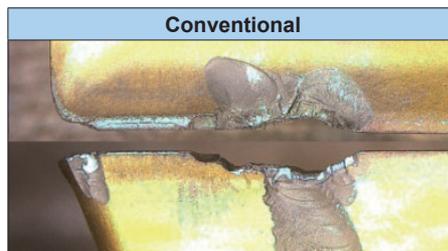
<Cutting conditions>

Workpiece : SUS304
Tool : ASX445R12508E
Insert : SEMT13T3AGSN-JM
Cutting speed : 200 m/min
Feed : 0.2 mm/tooth
Depth of cut : ap=2.0 mm ae=100 mm
Coolant : Dry cutting

Fracture Resistance



Cutting length :1.0 m



Cutting length :0.5 m

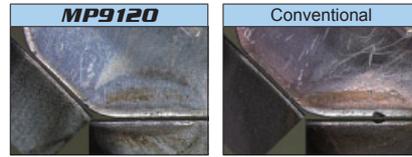
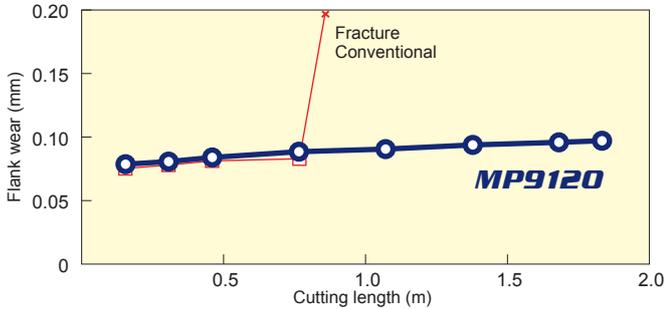
<Cutting conditions>

Workpiece : SUS304
Tool : ASX400R12508E
Insert : SOMET12T308PEER-JM
Cutting speed : 120 m/min
Feed : 0.15 mm/tooth
Depth of cut : ap=6 mm ae=16 mm
Coolant : Wet cutting

Cutting Performance

Titanium alloy and Heat treated steel machining

Wear Resistance



<Cutting conditions>

Workpiece : Ti-6Al-4V
 Tool : ASX445R804S32
 Insert : SEMT13T3AGSN-JM
 Grade : MP9120

Cutting speed : 50 m/min
 Feed : 0.15 mm/tooth
 Depth of cut : 1.5 mm
 Coolant : Wet cutting

Wear and Chipping Resistance

MP9130



Cutting length 1.2 m

Conventional

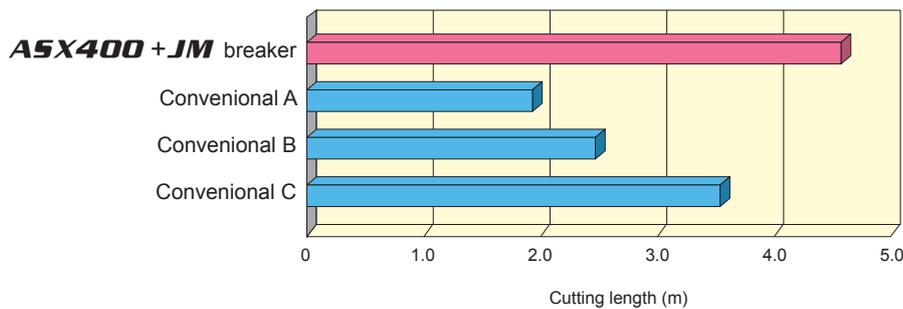


Cutting length 0.75 m

<Cutting conditions>

Workpiece : Ti-6Al-4V
 Tool : APX3000R323SA32SA
 Insert : AOMT123608PEER-M
 Grade : MP9120

Cutting speed : 30 m/min
 Feed per tooth : 0.15 mm/tooth
 Width of cut : 8 mm
 Depth of cut : 8 mm
 Coolant : Wet cutting



<Cutting conditions>

Workpiece : Ti-6Al-4V
 Tool : ASX400-063A04R
 Insert : SOMT12T308PEER-JM
 Grade : MP9120

Cutting speed : 60 m/min
 Feed per tooth : 0.1 mm/tooth
 Axial depth of cut : 8 mm
 Radial depth of cut : 6 mm
 Coolant : Wet cutting

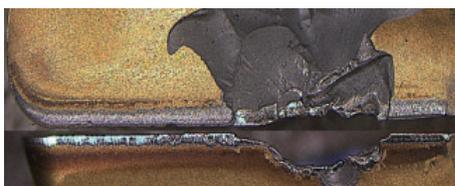
Wear and Chipping Resistance

MP9130



Cutting length 1.5 m

Conventional



Cutting length 1.2 m

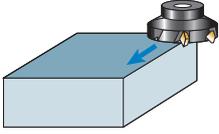
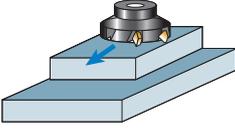
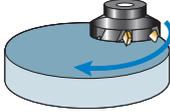
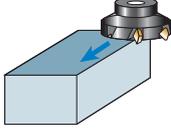
<Cutting conditions>

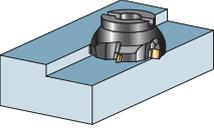
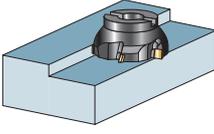
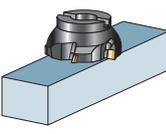
Workpiece : Inconel®718
 Tool : APX3000R324SA32SA
 Insert : AOMT123608PEER-M
 Grade : MP9130

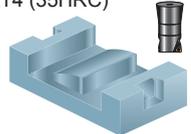
Cutting speed : 30 m/min
 Feed per tooth : 0.15 mm/tooth
 Width of cut : 8 mm
 Depth of cut : 8 mm
 Coolant : Wet cutting

APPLICATION EXAMPLES

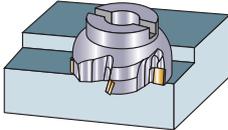
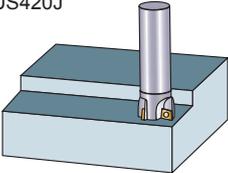
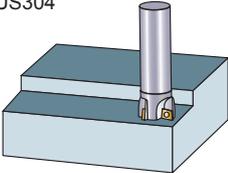
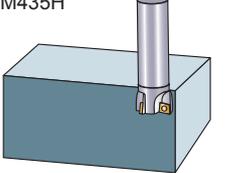
The following application examples are customer's application examples, so it can be different from a maker's recommended conditions.

Tool		ASX445R08004C	ASX445R12508E	ASX445R12508E	ASX445-063A04R
Insert (Grade)		SEMT13T3AGSN-JM (MP9130)	SEMT13T3AGSN-JM (MP6120)	SEET13T3AGEN-JL (MP9120)	SEMT13T3AGSN-JM (MP9130)
Workpiece		15-5PH(Stainless steel) 	SCM440H 	Ti-6Al-4V 	ASTM304 
Component		Aerospace parts	Machine parts	Aerospace parts	Machine parts
Cutting Conditions	Cutting Speed (m/min)	150	250	76	60
	Feed (mm/tooth)	0.12	0.1-0.2	0.1	0.1
	Depth of Cut (mm)	ap:2, ae:76	2.0-5.0	0.25	ap:2, ae:63
Coolant		Dry cutting	Dry cutting	Wet cutting	Dry cutting
Results		MP9130 provides double tool life compared to conventional cutters and achieves high efficiency cutting by shortening the time required to replace a tool.	MP6120 shows only a small amount of wear thereby achieving 1.5 times longer tool life compared to conventional cutters.	Machining time can be extended 3 times longer without chipping.	MP9130 achieves double tool life without burr formation compared to conventional cutters.

Tool		ASX400-050A04R	ASX400-050A05R	ASX400-050A04R
Insert (Grade)		SOMT12T308PEER-JM (MP6120)	SOMT12T308PEER-JM (MP6130)	SOMT12T308PEER-JM (MP7130)
Workpiece		S45C 	SCM440 	SUS316 
Component		Machine parts	Machine parts	Structural component
Cutting Conditions	Cutting Speed (m/min)	152	180	88
	Feed (mm/tooth)	0.15	0.2	0.1
	Axial depth of cut (mm)	3.8	1.8	≤2
	Radial depth of cut (mm)	6.2	31.75	≤2
Coolant		Dry cutting	Wet cutting	Wet cutting
Results		MP6120 achieves 3 times longer tool life compared to conventional cutters.	MP6130 achieves 1.3 times longer tool life with suppressed chipping compared to conventional cutters.	MP7130 can continue machining without fracture.

Tool		AJX12R08006D	AJX12-080A06R	AJX12-080A06R	AJX14R10006D	
Insert (Grade)		JL breaker (MP9130)	JL breaker (MP9120)	JL breaker (MP9130)	JM breaker (MP6120)	
Workpiece		Co-Cr Alloy 	INCONEL 625 	Ti-6Al-4V 	SKT4 (35HRC) 	
Component		Medical component	Aerospace component	Aerospace component	Press mold	
Cutting Conditions	Cutting Speed (mm ⁻¹)	50m/min(240min ⁻¹)	35m/min(140min ⁻¹)	50m/min(240min ⁻¹)	100m/min(318min ⁻¹)	
	Feed (mm/tooth)	864mm/min(0.6mm/tooth)	501mm/min(0.6mm/tooth)	454mm/min(0.38mm/tooth)	760mm/min(0.4mm/tooth)	
	Depth of Cut (mm)	ap (Axial)	0.5	0.8	1	1.5
		ae (Radial)	60	65	50	70
	Overhang length (mm)	-	-	-	80	
Coolant		Wet cutting	Wet cutting	Wet cutting	Air blow	
Results		The reduced wear displayed by MP9130 grade with JL breaker gave an increase in efficiency of 40%.	JL breaker + MP9120 achieves 1.5 times longer tool life compared to conventional products.	The increased tool life and reduced wear displayed by MP9130 grade with JL breaker gave an increase in efficiency of 40%.	Achieved twice the tool life compared to a conventional product.	

APPLICATION EXAMPLES

Tool	APX3000-040A06RA	APX3000R203SA20SA	APX3000R254SA25SA	APX3000R254SA25SA	
Insert (Grade)	AOMT123608PEER-M(MP9130)	AOMT123608PEER-M(MP7130)	AOMT123608PEER-M(MP7130)	AOMT123616PEER-M(MP6130)	
Workpiece	WASPALOY® 	SUS420J 	SUS304 	SCM435H 	
Cutting Conditions	Cutting Speed (m/min)	30	122	140	200
	Feed per Tooth (mm/tooth)	0.033	0.1	0.1	0.12
	Depth of Cut (mm)	1.4	2.54	2	2.5
	Width of Cut (mm)	16	5.08	25	—
Coolant	Wet	Dry	Dry	Dry	Dry
Result	Double tool life compared to conventional products which enabled to cut continuously without interruption.	Actual cutting time has been nearly doubled compared to conventional products.	Tool life has been improved by 25% compared to conventional products because of the superior fracture resistance.	1.5 times longer tool life provided 140% processing efficiency.	

Please note that the machining performed in the application examples is dependent on the rigidity of the machine used and the rigidity of the workpiece and clamping.

Products equipped with **MP6100/MP7100/MP9100**



ASX445



AJX



ASX400



APX3000/4000



VFX



AXD

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

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(Tools specifications subject to change without notice.)