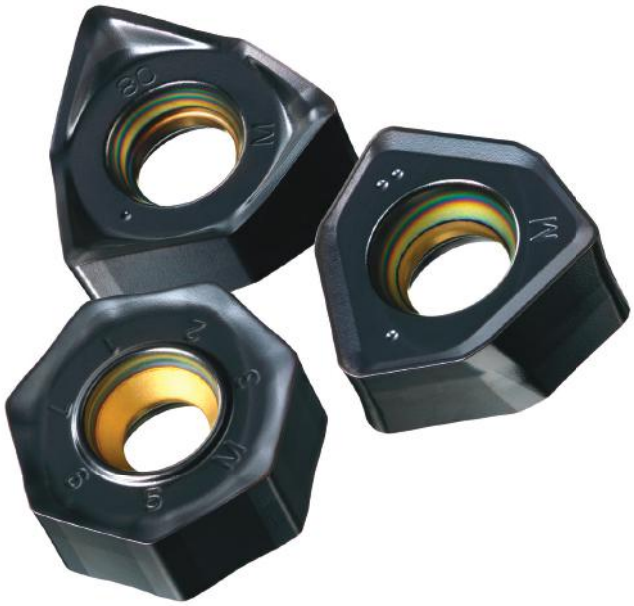
MITSUBISHI MATERIALS

MV1000 Series

COATED CARBIDE GRADE FOR MILLING



MV1020
MV1030 + **WSX, WWX, VPX, WJX etc.**

TOOL NEWS **B270A**

Coated Carbide Grade for Milling

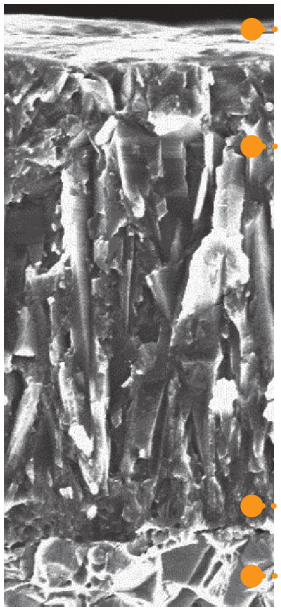
MV1000 Series

Advanced Wear Resistance

By adopting the newly developed Al-Rich coating technology, the (Al,Ti)N with a high Al content ratio displays a very high hardness. This greatly improves oxidation and wear resistance.

Advanced Thermal Shock Resistance

The extreme heat resistance of this new series achieves amazing stability, not only during dry cutting, but also when wet cutting where inserts are usually prone to thermal cracking.



*Graphical Representation.

Excellent welding resistance
Smooth surface

Outstanding wear resistance
Newly developed Al-Rich coating

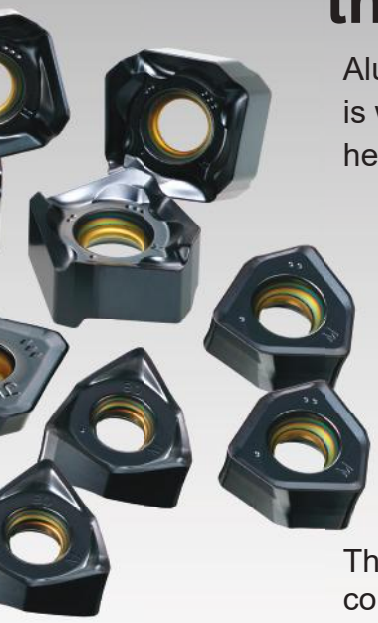
Excellent chipping resistance for stable machining
Newly developed bonding layer

Fracture resistance for the ultimate stability
Exclusive cemented carbide substrate

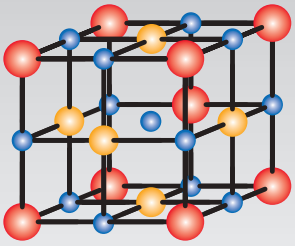
Complete Coating Technology that Topples Current Tool Life Standards

Due to

the Newly Developed Al-Rich Coating

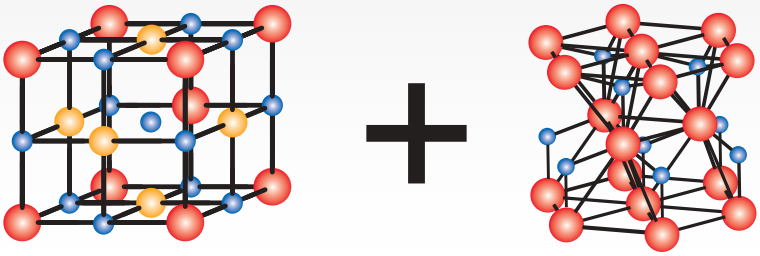


Aluminum titanium nitride (Al,Ti)N is a compound of aluminum and titanium that is widely used as a coating for cutting tools due to its extremely hard and heat-resistant properties.



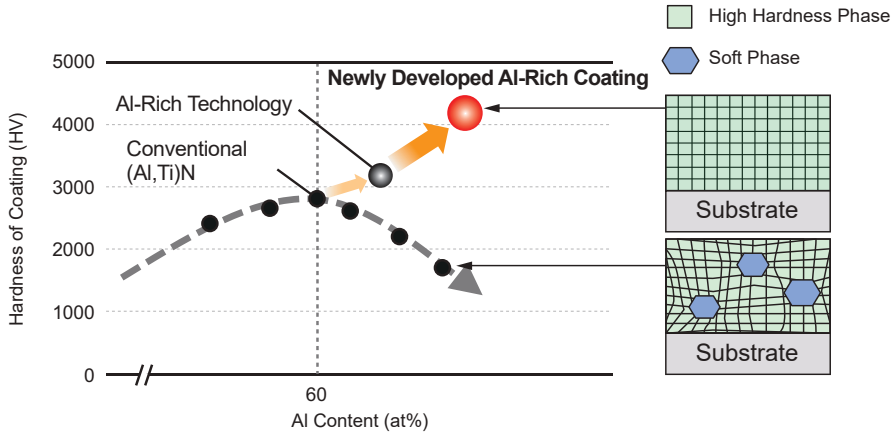
The combination of atoms with different sizes creates an exceptionally hard crystal structure.

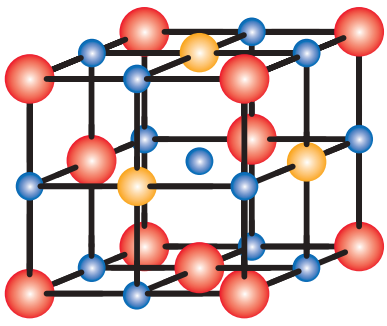
The hardness of (Al,Ti)N increases as the Al content ratio increases, but with conventional technology, when the Al content ratio exceeds 60%, the crystal structure changes and the hardness of (Al,Ti)N decreases.



When the Al ratio is over 60%, a softer crystal phase is formed.

Using a new coating process based on Mitsubishi Materials' own original technology, a way in which an Al-Rich coating does not change its crystal structure even when the Al content is increased was developed. This also achieves a higher Al content and high the hardness of (Al,Ti)N.





Crystal image of **MV1000** series

Coated Carbide Grade for Milling

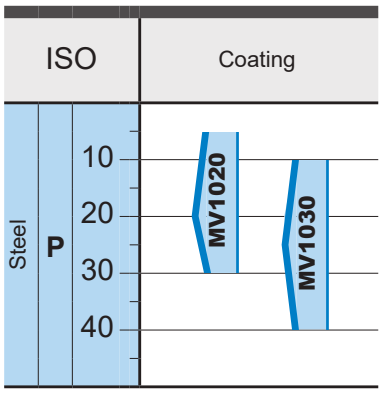
MV1020

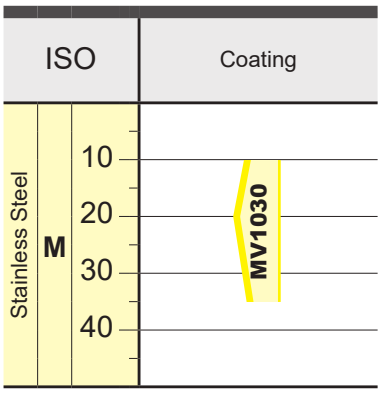
This grade has advanced wear and thermal shock resistance and also achieves stable cutting at unprecedented cutting speeds, especially when machining steel and ductile cast iron, thus greatly reducing work time.

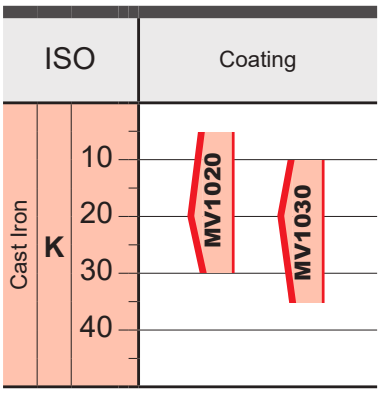
Coated Carbide Grade for Milling

MV1030

The new Al-Rich coating also provides excellent wear resistance. An unprecedented performance against sudden breakage was also realized, especially during problematic wet cutting and when machining stainless steels.



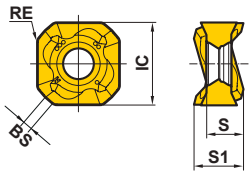
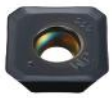
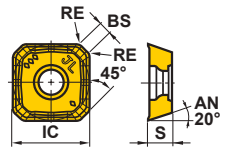
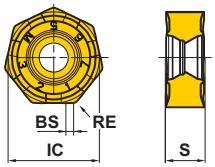
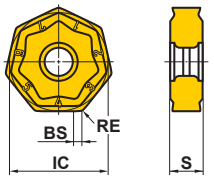
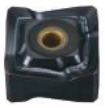
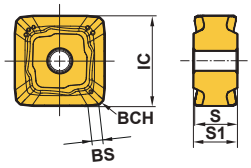




Note 1) Dry cutting is recommended for machining stainless steel with MV1030.

Inserts

(inch)

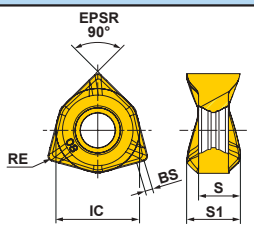
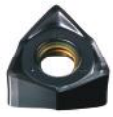
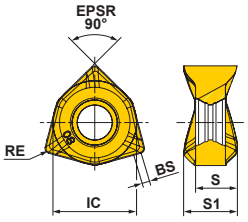
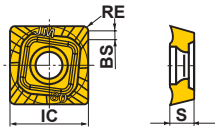
Shape	Application	Order Number	Class	Edge Preparation	Coated NEW MV1020	Coated NEW MV1030		IC	S	S1	BS	RE	Geometry
Face Milling													
WSX445	Low Cutting Resistance	**SNGU140812ANER-L**	G	E	●	●		.551	.248	.331	.059	.047	
	General Purpose Cutting	**SNGU140812ANER-M**	G	E	●	●		.551	.248	.331	.059	.047	
		SNMU140812ANER-M	M	E	●	●		.551	.248	.331	.059	.047	
	General Purpose Cutting (Left Hand)	**SNMU140812ANEL-M**	M	E	●	●		.551	.248	.331	.059	.047	
	Cutting Edge Strength	**SNMU140812ANER-R**	M	E	●	●		.551	.248	.331	.059	.047	
		SNMU140812ANER-H	M	E	●	●		.551	.248	.331	.059	.047	
ASX445 	Finish - Light Cutting	**SEET13T3AGEN-JL**	E	E	●	●		.528	.156	–	.075	.059	
	Light - Rough Cutting	**SEMT13T3AGSN-JM**	M	S	●	●		.528	.156	–	.075	.059	
	Medium - Heavy Cutting	**SEMT13T3AGSN-JH**	M	S	●	●		.528	.156	–	.075	.059	
	Roughing For Cast Iron	**SEMT13T3AGSN-FT**	M	S	●	●		.528	.156	–	.075	.059	
AHX440S AHX475S	Low Cutting Resistance	**NNMU130508ZER-L**	M	E	●	●		.528	.227	–	.039	.031	
	General Purpose Cutting	**NNMU130508ZEN-M**	M	E	●	●		.528	.219	–	.039	.031	
		NNMU130532ZEN-M	M	E	●	●		.528	.219	–	–	.126	
	Cutting Edge Strength	**NNMU130532ZEN-R**	M	E	●	●		.528	.215	–	–	.126	
AHX640S AHX640W	General Cutting For Steel	**NNMU200708ZEN-M**	M	E	●	●		.787	.315	–	.039	.031	
	General Cutting For Cast Iron	**NNMU200608ZEN-MK**	M	E	●	●		.787	.258	–	.039	.031	
	Cutting Edge Strength For Cast Iron	**NNMU200608ZEN-HK**	M	E	●	●		.787	.258	–	.039	.031	
	For Titanium Alloys and Heat Resistant Alloys	**NNMU200712ZER-L**	M	E	●	●		.787	.315	–	.039	.047	
WSF406W 	High Efficiency Cutting For Cast Iron	**SNMU1206C05ZNER-M**	M	E	★	★		.500	.236	.244	.063	.020	

● = NEW

● : USA Stock ★ : Stocked in Japan
(10 inserts in one case)

Inserts

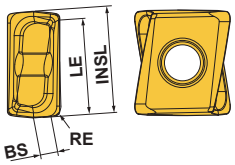
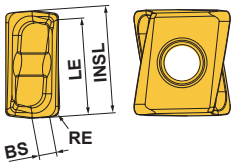
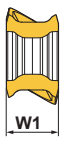
(inch)

Shape	Application	Order Number	Class	Edge Preparation	Coated NEW MV1020	Coated NEW MV1030		IC	S	S1	BS	RE	Geometry
Shoulder Milling													
WWX200	Low Cutting Resistance	**6NGU0906040PNER-L**	G	E	●	●		.354	.209	.240	.063	.016	
		6NGU0906080PNER-L	G	E	●	●		.354	.209	.240	.047	.031	
	General Purpose Cutting	**6NMU0906040PNER-M**	M	E	●	●		.354	.209	.240	.063	.016	
		6NMU0906080PNER-M	M	E	●	●		.354	.209	.240	.047	.031	
	Cutting Edge Strength	**6NMU0906080PNER-R**	M	E	●	●		.354	.209	.240	.047	.031	
WWX400 	Low Cutting Resistance	**6NGU1409040PNER-L**	G	E	●	●		.551	.276	.354	.067	.016	
		6NGU1409080PNER-L	G	E	●	●		.551	.276	.354	.051	.031	
	General Purpose Cutting	**6NGU1409040PNER-M**	G	E	●	●		.551	.276	.354	.067	.016	
		6NGU1409080PNER-M	G	E	●	●		.551	.276	.354	.051	.031	
		6NMU1409040PNER-M	M	E	●	●		.551	.276	.354	.067	.016	
		6NMU1409080PNER-M	M	E	●	●		.551	.276	.354	.051	.031	
		6NMU1409160PNER-M	M	E	●	●		.551	.276	.354	.020	.063	
		6NMU1409200PNER-M	M	E	●	●		.551	.276	.354	.020	.079	
	Cutting Edge Strength	**6NMU1409080PNER-R**	M	E	●	●		.551	.276	.354	.051	.031	
		6NMU1409160PNER-R	M	E	●	●		.551	.276	.354	.020	.063	
		6NMU1409200PNER-R	M	E	●	●		.551	.276	.354	.020	.079	
ASX400	Finish - Light Cutting	**SOET12T308PEER-JL**	E	E	●	●		.500	.156	–	.055	.031	
	Light - Rough Cutting	**SOMT12T308PEER-JM**	M	E	●	●		.500	.156	–	.055	.031	
	Medium - Heavy Cutting	**SOMT12T308PEER-JH**	M	E	●	●		.500	.156	–	.055	.031	
	Roughing For Cast Iron	**SOMT12T320PEER-FT**	M	E	●	●		.500	.156	–	.020	.079	

● = NEW

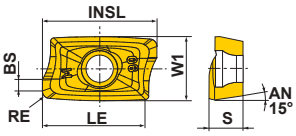
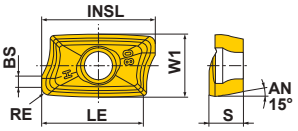
● : USA Stock ★ : Stocked in Japan
(10 inserts in one case)

(inch)

Shape	Application	Order Number	Class	Edge Preparation	Coated NEW MV1020	Coated NEW MV1030		INSL	W1	LE	BS	RE	Geometry
Multi-Functional Milling													
VPX200	Low Cutting Resistance	**LOGU0904020PNER-L**	G	E	●	●		.343	.169	.299	.067	.008	
		LOGU0904040PNER-L	G	E	●	●		.343	.169	.299	.063	.016	
		LOGU0904080PNER-L	G	E	●	●		.343	.169	.299	.047	.031	
		LOGU0904100PNER-L	G	E	●	●		.343	.169	.299	.039	.039	
		LOGU0904120PNER-L	G	E	●	●		.343	.169	.299	.035	.047	
		LOGU0904160PNER-L	G	E	●	●		.343	.169	.299	.020	.063	
	General Purpose Cutting	**LOGU0904020PNER-M**	G	E	●	●		.343	.169	.299	.067	.008	
		LOGU0904040PNER-M	G	E	●	●		.343	.169	.299	.059	.016	
		LOGU0904080PNER-M	G	E	●	●		.343	.169	.299	.047	.031	
		LOGU0904100PNER-M	G	E	●	●		.343	.169	.299	.039	.039	
		LOGU0904120PNER-M	G	E	●	●		.343	.169	.299	.031	.047	
		LOGU0904160PNER-M	G	E	●	●		.343	.169	.299	.020	.063	
VPX300	Low Cutting Resistance	**LOGU1207020PNER-L**	G	E	●	●		.488	.276	.445	.118	.008	
		LOGU1207040PNER-L	G	E	●	●		.488	.276	.445	.110	.016	
		LOGU1207080PNER-L	G	E	●	●		.488	.276	.445	.102	.031	
		LOGU1207100PNER-L	G	E	●	●		.488	.276	.445	.098	.039	
		LOGU1207120PNER-L	G	E	●	●		.488	.276	.445	.094	.047	
		LOGU1207160PNER-L	G	E	●	●		.488	.276	.445	.071	.063	
		LOGU1207200PNER-L	G	E	●	●		.488	.276	.445	.055	.079	
		LOGU1207240PNER-L	G	E	●	●		.488	.276	.445	.047	.094	
		LOGU1207300PNER-L	G	E	●	●		.488	.276	.445	.024	.118	
		LOGU1207320PNER-L	G	E	●	●		.488	.276	.445	.016	.126	
	General Purpose Cutting	**LOGU1207020PNER-M**	G	E	●	●		.488	.276	.445	.118	.008	
		LOGU1207040PNER-M	G	E	●	●		.488	.276	.445	.110	.016	
		LOGU1207080PNER-M	G	E	●	●		.488	.276	.445	.094	.031	
		LOGU1207100PNER-M	G	E	●	●		.488	.276	.445	.091	.039	
		LOGU1207120PNER-M	G	E	●	●		.488	.276	.445	.083	.047	
		LOGU1207160PNER-M	G	E	●	●		.488	.276	.445	.067	.063	
		LOGU1207200PNER-M	G	E	●	●		.488	.276	.445	.055	.079	
		LOGU1207240PNER-M	G	E	●	●		.488	.276	.445	.039	.094	
		LOGU1207300PNER-M	G	E	●	●		.488	.276	.445	.020	.118	
		LOGU1207320PNER-M	G	E	●	●		.488	.276	.445	.012	.126	

Inserts

(inch)

Shape	Application	Order Number	Class	Edge Preparation	Coated NEW MV1020	Coated NEW MV1030	INSL	LE	W1	S	BS	RE	Geometry
APX3000	General Purpose Cutting	AOMT123602PEER-M	M	E	●	●	.472	.394	.260	.142	.071	.008	
		AOMT123604PEER-M	M	E	●	●	.472	.394	.260	.142	.063	.016	
		AOMT123608PEER-M	M	E	●	●	.472	.394	.260	.142	.047	.031	
		AOMT123610PEER-M	M	E	●	●	.472	.394	.260	.142	.039	.039	
		AOMT123612PEER-M	M	E	●	●	.472	.394	.260	.142	.031	.047	
		AOMT123616PEER-M	M	E	●	●	.472	.394	.260	.142	.016	.063	
		AOMT123620PEER-M	M	E	●	●	.472	.394	.260	.142	.016	.079	
		AOMT123624PEER-M	M	E	●	●	.472	.394	.260	.142	.016	.094	
		AOMT123630PEER-M	M	E	●	●	.472	.394	.260	.142	.016	.118	
		AOMT123632PEER-M	M	E	●	●	.472	.394	.260	.142	.016	.126	
	Cutting Edge Strength	AOMT123604PEER-H	M	E	●	●	.472	.394	.260	.142	.063	.016	
		AOMT123608PEER-H	M	E	●	●	.472	.394	.260	.142	.047	.031	
		AOMT123616PEER-H	M	E	●	●	.472	.394	.260	.142	.016	.063	
APX4000	General Purpose Cutting	AOMT184804PEER-M	M	E	●	●	.709	.591	.354	.189	.071	.016	
		AOMT184808PEER-M	M	E	●	●	.709	.591	.354	.189	.055	.031	
		AOMT184810PEER-M	M	E	●	●	.709	.591	.354	.189	.039	.039	
		AOMT184812PEER-M	M	E	●	●	.709	.591	.354	.189	.031	.047	
		AOMT184816PEER-M	M	E	●	●	.709	.591	.354	.189	.016	.063	
		AOMT184820PEER-M	M	E	●	●	.709	.591	.354	.189	.016	.079	
	Cutting Edge Strength	AOMT184804PEER-H	M	E	●	●	.709	.591	.354	.189	.071	.016	
		AOMT184808PEER-H	M	E	●	●	.709	.591	.354	.189	.055	.031	
		AOMT184816PEER-H	M	E	●	●	.709	.591	.354	.189	.016	.063	

● = NEW

● : USA Stock ★ : Stocked in Japan
(10 inserts in one case)

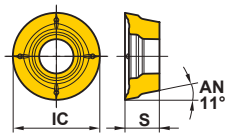
(inch)

Shape	Application	Order Number	Class	Edge Preparation	Coated NEW MV1020	Coated NEW MV1030		AN	IC	S	BS	RE	Geometry
AJX	General Purpose Cutting	**JOMW06T215ZZSR-FT**	M	S	●	●		13°	.250	.109	.047	.059	
		JOMW080320ZZSR-FT	M	S	●	●		13°	.315	.125	.055	.079	
		JDMW09T320ZDSR-FT	M	S	●	●		15°	.375	.156	.071	.079	
		JDMW120420ZDSR-FT	M	S	●	●		15°	.472	.187	.098	.079	
		JDMW140520ZDSR-FT	M	S	●	●		15°	.551	.219	.110	.079	
	Cutting Edge Strength	**JDMT120420ZDSR-ST**	M	S	●	●		15°	.472	.187	.098	.079	
		JDMT140520ZDSR-ST	M	S	●	●		15°	.551	.219	.110	.079	
	Low Cutting Resistance For Difficult-to-cut Materials	**JOMT06T216ZZER-JL**	M	E	●	●		13°	.250	.109	.047	.063	
		JOMT080322ZZER-JL	M	E	●	●		13°	.315	.125	.055	.087	
		JDMT09T323ZDER-JL	M	E	●	●		15°	.375	.156	.071	.091	
		JDMT120423ZDER-JL	M	E	●	●		15°	.472	.187	.098	.091	
		JDMT140523ZDER-JL	M	E	●	●		15°	.551	.219	.110	.091	
	Low Cutting Resistance	**JOMT06T215ZZSR-JM**	M	S	●	●		13°	.250	.109	.047	.059	
		JOMT080320ZZSR-JM	M	S	●	●		13°	.315	.125	.055	.079	
		JDMT09T320ZDSR-JM	M	S	●	●		15°	.375	.156	.071	.079	
		JDMT120420ZDSR-JM	M	S	●	●		15°	.472	.187	.098	.079	
		JDMT140520ZDSR-JM	M	S	●	●		15°	.551	.219	.110	.079	
WJX09 WJX14	Low Cutting Resistance	**JOMU090512ZZER-L**	M	E	●	●		-	.375	.186	.035	.047	
		JOMU140715ZZER-L	M	E	●	●		-	.551	.259	.051	.059	
	General Purpose Cutting	**JOMU090512ZZER-M**	M	E	●	●		-	.375	.187	.035	.047	
		JOMU140715ZZER-M	M	E	●	●		-	.551	.261	.051	.059	
	Cutting Edge Strength	**JOMU090512ZZER-R**	M	E	●	●		-	.375	.190	.035	.047	
		JOMU140715ZZER-R	M	E	●	●		-	.551	.266	.051	.059	

● = NEW

Inserts

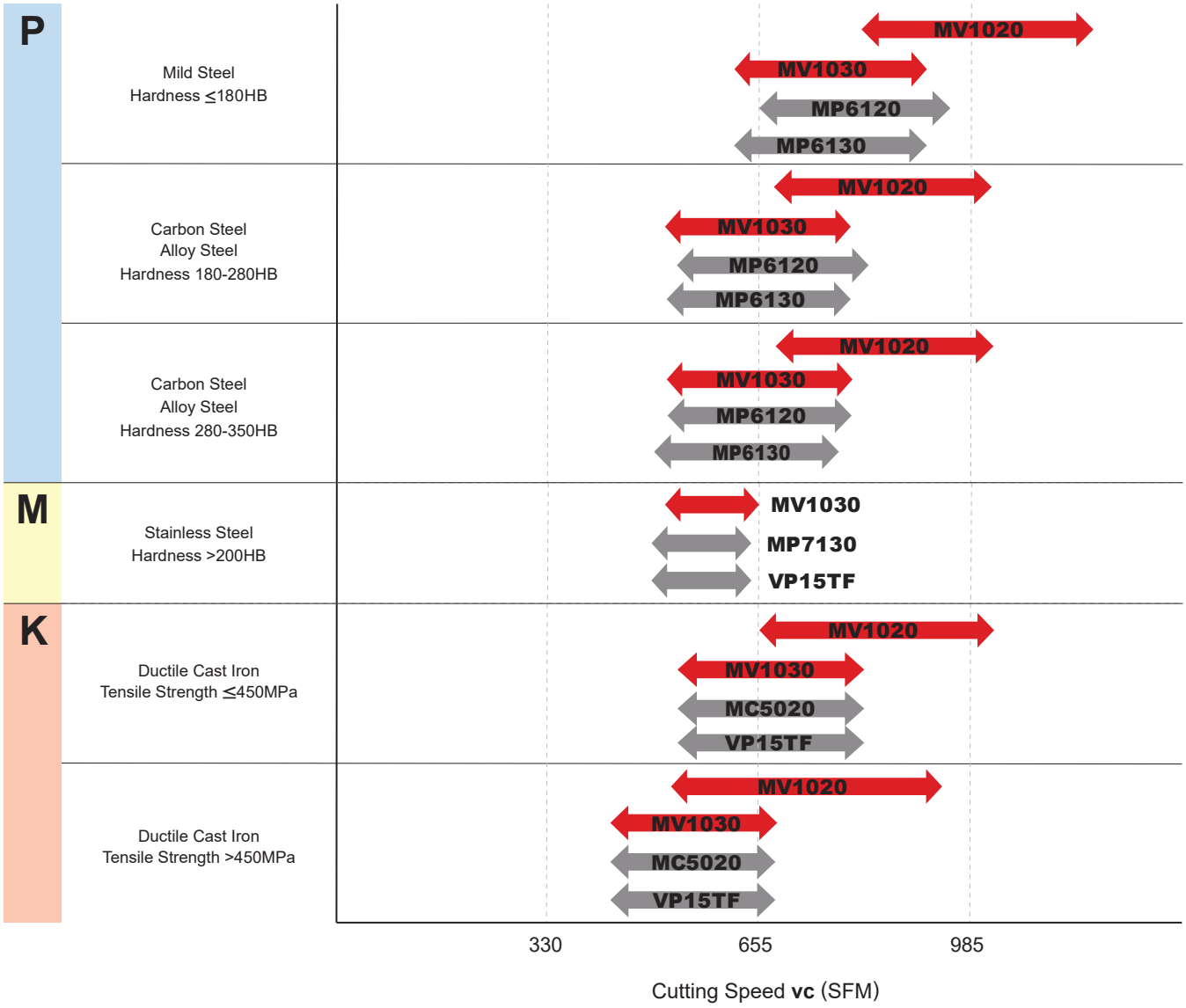
(inch)

Shape	Application	Order Number	Class	Edge Preparation	Coated NEW MV1020	Coated NEW MV1030		IC	S	APMX 4 Seats	APMX 8 Seats	Geometry
ARP5	Low Cutting Resistance 8 Seats	**RPMT1040M0E8-L1**	M	E	●	●		.394	.156	.197	.055	
	Low Cutting Resistance High Rigidity	**RPMT1040M0E4-L2**	M	E	●	●		.394	.156	.197	-	
	General Purpose Cutting 8 Seats	**RPMT1040M0E8-M1**	M	E	●	●		.394	.156	.197	.055	
	General Purpose Cutting High Rigidity	**RPMT1040M0E4-M2**	M	E	●	●		.394	.156	.197	-	
	Cutting Edge Strength 8 Seats	**RPMT1040M0E8-R1**	M	E	●	●		.394	.156	.197	.055	
	Cutting Edge Strength High Rigidity	**RPMT1040M0E4-R2**	M	E	●	●		.394	.156	.197	-	
ARP6	Low Cutting Resistance 8 Seats	**RPMT1248M0E8-L1**	M	E	●	●		.472	.187	.236	.067	
	Low Cutting Resistance High Rigidity	**RPMT1248M0E4-L2**	M	E	●	●		.472	.187	.236	-	
	General Purpose Cutting 8 Seats	**RPMT1248M0E8-M1**	M	E	●	●		.472	.187	.236	.067	
	General Purpose Cutting High Rigidity	**RPMT1248M0E4-M2**	M	E	●	●		.472	.187	.236	-	
	Cutting Edge Strength 8 Seats	**RPMT1248M0E8-R1**	M	E	●	●		.472	.187	.236	.067	
	Cutting Edge Strength High Rigidity	**RPMT1248M0E4-R2**	M	E	●	●		.472	.187	.236	-	

● = NEW

● : USA Stock ★ : Stocked in Japan
(10 inserts in one case)

Covers a wide range of cutting speeds (Dry cutting with WWX400)



Recommended Cutting Conditions

WWX200/400 Cutting Speed
Dry Cutting

(inch)

	Material	Properties	Cutting Conditions	MV1020 Width of Cut **ae** 0.5DC≥ Cutting Speed **vc** (SFM)	MV1020 Width of Cut **ae** 0.8DC≥ Cutting Speed **vc** (SFM)	MV1020 Width of Cut **ae** DC(Slot) Cutting Speed **vc** (SFM)	MV1030 Width of Cut **ae** 0.5DC≥ Cutting Speed **vc** (SFM)	MV1030 Width of Cut **ae** 0.8DC≥ Cutting Speed **vc** (SFM)	MV1030 Width of Cut **ae** DC(Slot) Cutting Speed **vc** (SFM)
P	Mild Steel	Hardness ≤180HB	●	985(820–1150)	920(755–1080)	820(655–985)	755(620–885)	690(560–820)	620(490–755)
			●	950(785–1115)	850(690–1050)	785(620–950)	755(620–885)	690(560–820)	620(490–755)
	Carbon Steel Alloy Steel	Hardness 180–350HB	●	850(690–1015)	785(620–920)	690(525–850)	655(525–785)	590(460–720)	525(395–655)
			●	820(655–985)	755(590–885)	655(490–820)	655(525–785)	590(460–720)	525(395–655)
M	Stainless Steel	–	●	–	–	–	590(525–655)	525(460–590)	–
			●	–	–	–	560(490–620)	490(425–560)	–
K	Ductile Cast Iron	Tensile Strength ≤450MPa	●	785(655–1015)	720(560–920)	655(490–850)	690(560–820)	620(490–755)	560(425–690)
			●	755(620–985)	690(525–885)	620(460–820)	690(560–820)	620(490–755)	560(425–690)
		Tensile Strength ≤800MPa	●	690(525–920)	620(460–820)	525(395–690)	560(425–690)	490(360–620)	425(295–560)
			●	655(490–885)	590(425–785)	490(360–655)	560(425–690)	490(360–620)	425(295–560)

WWX200/400 Cutting Speed
Wet Cutting

(inch)

	Material	Properties	Cutting Conditions	MV1020 Width of Cut **ae** 0.5DC≥ Cutting Speed **vc** (SFM)	MV1020 Width of Cut **ae** 0.8DC≥ Cutting Speed **vc** (SFM)	MV1020 Width of Cut **ae** DC(Slot) Cutting Speed **vc** (SFM)	MV1030 Width of Cut **ae** 0.5DC≥ Cutting Speed **vc** (SFM)	MV1030 Width of Cut **ae** 0.8DC≥ Cutting Speed **vc** (SFM)	MV1030 Width of Cut **ae** DC(Slot) Cutting Speed **vc** (SFM)
P	Mild Steel	Hardness ≤180HB	●	720(690–755)	620(590–690)	590(525–620)	460(425–490)	395(360–425)	360(330–395)
			●	690(655–720)	590(560–655)	560(490–590)	460(425–490)	395(360–425)	360(330–395)
	Carbon Steel Alloy Steel	Hardness 180–350HB	●	655(620–690)	560(525–620)	525(490–560)	460(425–490)	395(360–425)	360(330–395)
			●	620(590–655)	525(490–590)	490(460–525)	460(425–490)	395(360–425)	360(330–395)
K	Ductile Cast Iron	Tensile Strength ≤450MPa	●	655(590–785)	590(490–720)	490(425–655)	525(460–590)	460(395–525)	395(330–460)
			●	620(560–755)	560(460–690)	460(395–620)	525(460–590)	460(395–525)	395(330–460)
		Tensile Strength ≤800MPa	●	590(560–690)	525(490–620)	460(395–525)	490(460–525)	425(395–460)	360(330–395)
			●	560(525–655)	490(460–590)	395(360–490)	490(460–525)	425(395–460)	360(330–395)

Note 1) The recommended cutting speed has been calculated for a depth of cut 2mm. Please reduce the cutting speed by an appropriate amount corresponding to the increase in cutting depth.

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✤ : Unstable Cutting

WWX200 Depth of Cut / Feed per Tooth
Dry and Wet Cutting

(inch)

	Material	Properties	Cutting Conditions	Width of Cut **ae**								
				0.5DC≥			0.8DC≥			DC(Slot)		
				Chipbreaker	Depth of Cut **ap**	Feed **fz** (IPT)	Chipbreaker	Depth of Cut **ap**	Feed **fz** (IPT)	Chipbreaker	Depth of Cut **ap**	Feed **fz** (IPT)
P	Mild Steel	Hardness ≤180HB	● ◐	L–M	≤.118	.005(.004–.006)	L–M	≤.118	.005(.004–.006)	L–M	≤.079	.005(.004–.006)
			◐	M–R	≤.118	.006(.004–.008)	M–R	≤.118	.006(.004–.008)	–	–	–
	Carbon Steel Alloy Steel	Hardness 180–350HB	● ◐	L–M	≤.118	.005(.004–.006)	L–M	≤.118	.005(.004–.006)	L–M	≤.079	.005(.004–.006)
			◐	M–R	≤.118	.006(.004–.008)	M–R	≤.118	.006(.004–.008)	–	–	–
K	Ductile Cast Iron	Tensile Strength ≤450MPa	● ◐	L–M	≤.118	.005(.004–.006)	L–M	≤.118	.005(.004–.006)	L–M	≤.079	.005(.004–.006)
			◐	M–R	≤.118	.006(.004–.008)	M–R	≤.118	.006(.004–.008)	–	–	–
		Tensile Strength ≤800MPa	● ◐	L–M	≤.118	.005(.004–.006)	L–M	≤.118	.005(.004–.006)	L–M	≤.079	.005(.004–.006)
			◐	M–R	≤.118	.006(.004–.008)	M–R	≤.118	.006(.004–.008)	–	–	–

Note 1) Refer to the above table and set up cutting conditions according to cutting applications.

WWX400 Depth of Cut / Feed per Tooth
Dry and Wet Cutting

(inch)

	Material	Properties	Cutting Conditions	Width of Cut **ae**								
				0.5DC≥			0.8DC≥			DC(Slot)		
				Chipbreaker	Depth of Cut **ap**	Feed **fz** (IPT)	Chipbreaker	Depth of Cut **ap**	Feed **fz** (IPT)	Chipbreaker	Depth of Cut **ap**	Feed **fz** (IPT)
P	Mild Steel	Hardness ≤180HB	● ◐	L–M	≤.157	.005(.004–.006)	L–M	≤.118	.005(.004–.006)	L–M	≤.079	.005(.004–.006)
			◐	M–R	≤.157	.006(.004–.008)	M–R	≤.118	.006(.004–.008)	–	–	–
	Carbon Steel Alloy Steel	Hardness 180–350HB	● ◐	L–M	≤.157	.005(.004–.006)	L–M	≤.118	.005(.004–.006)	L–M	≤.079	.005(.004–.006)
			◐	M–R	≤.157	.006(.004–.008)	M–R	≤.118	.006(.004–.008)	–	–	–
M	Stainless Steel	–	● ◐	L–M	≤.079	.005(.004–.006)	L–M	≤.079	.005(.004–.006)	–	–	–
K	Ductile Cast Iron	Tensile Strength ≤450MPa	● ◐	L–M	≤.157	.005(.004–.006)	L–M	≤.118	.005(.004–.006)	L–M	≤.079	.005(.004–.006)
			◐	M–R	≤.157	.006(.004–.008)	M–R	≤.118	.006(.004–.008)	–	–	–
		Tensile Strength ≤800MPa	● ◐	L–M	≤.157	.005(.004–.006)	L–M	≤.118	.005(.004–.006)	L–M	≤.079	.005(.004–.006)
			◐	M–R	≤.157	.006(.004–.008)	M–R	≤.118	.006(.004–.008)	–	–	–

Note 1) Refer to the above table and set up cutting conditions according to cutting applications.

Recommended Cutting Conditions

WSX445 Cutting Speed
Dry and Wet Cutting

(inch)

	Material	Properties	MV1020 Cutting Speed **vc** (SFM) Dry Cutting	MV1020 Cutting Speed **vc** (SFM) Wet Cutting	MV1030 Cutting Speed **vc** (SFM) Dry Cutting	MV1030 Cutting Speed **vc** (SFM) Wet Cutting
P	Mild Steel	Hardness ≤180HB	985(655–1310)	720(395–1050)	820(655–985)	490(330–655)
P	Carbon Steel Alloy Steel	Hardness 180–350HB	850(560–1150)	655(330–985)	720(560–885)	395(260–525)
P	Carbon Steel Alloy Steel	Hardness 280–350HB	590(330–820)	490(330–655)	590(330–820)	395(260–525)
M	Stainless Steel	–	–	–	655(490–820)	–
K	Ductile Cast Iron	Tensile Strength ≤450MPa	785(425–1150)	655(425–820)	525(360–785)	490(330–655)
K	Ductile Cast Iron	Tensile Strength ≤800MPa	720(260–1150)	590(260–755)	590(360–820)	460(260–655)

WSX445 Depth of Cut / Feed per Tooth
Dry and Wet Cutting

(inch)

	Material	Properties	Depth of Cut **ap** / Feed per Tooth **fz**									
			Finish-Light Cutting		Light Cutting		Medium Cutting		Rough Cutting		Heavy Cutting	
			fz (IPT)	**ap**	**fz** (IPT)	**ap**	**fz** (IPT)	**ap**	**fz** (mm/t.)	**ap**	**fz** (IPT)	**ap**
P			L Chipbreaker		L,M Chipbreaker		M Chipbreaker		M,R Chipbreaker		R,H Chipbreaker	
P	Mild Steel	Hardness ≤180HB	.006 (.004–.008)	≤.039	.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	.008 (.006–.010)	≤.157	.010 (.008–.012)	≤.197
P	Carbon Steel Alloy Steel	Hardness 180–280HB	.006 (.004–.008)	≤.039	.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	.008 (.006–.010)	≤.157	.010 (.008–.012)	≤.197
P	Carbon Steel Alloy Steel	Hardness 280–350HB	.006 (.004–.008)	≤.039	.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	.008 (.006–.010)	≤.157	.010 (.008–.012)	≤.197
M			L Chipbreaker		L,M Chipbreaker		M Chipbreaker		M,R Chipbreaker		R,H Chipbreaker	
M	Stainless Steel	–	.006 (.004–.008)	≤.039	.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	–	–	–	–
K			L Chipbreaker		L,M Chipbreaker		M Chipbreaker		M,R Chipbreaker		R,H Chipbreaker	
K	Ductile Cast Iron	Tensile Strength ≤450MPa	.006 (.004–.008)	≤.039	.006 (.004–.008)	<.079	.008 (.006–.010)	≤.118	.008 (.006–.010)	≤.157	.010 (.008–.012)	≤.197
K	Ductile Cast Iron	Tensile Strength ≤800MPa	.006 (.004–.008)	≤.039	.006 (.004–.008)	≤.079	.008 (.006–.010)	<.118	.008 (.006–.010)	≤.157	.010 (.008–.012)	≤.197

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

Chipbreaker Selection Table

WJX09

(inch)

	Material	Properties	L Chipbreaker		M Chipbreaker		R Chipbreaker	
			Cutting Conditions	Depth of Cut **ap**	Cutting Conditions	Depth of Cut **ap**	Cutting Conditions	Depth of Cut **ap**
P	Mild Steel	Hardness ≤180HB	● ◔	≤.039	● ◔	≤.059	◔ ✣	≤.059
	Carbon Steel Alloy Steel	Hardness 180—350HB	● ◔	≤.039	● ◔	≤.059	◔ ✣	≤.059
M	Stainless Steel	—	○ ◔	≤.039	○ ◔	≤.039	—	—
K	Ductile Cast Iron	Tensile Strength ≤450MPa	● ◔	≤.039	● ◔	≤.059	◔ ✣	≤.059
		Tensile Strength ≤800MPa	● ◔	≤.039	● ◔	≤.039	◔ ✣	≤.039

WJX14

(inch)

	Material	Properties	L Chipbreaker		M Chipbreaker		R Chipbreaker	
			Cutting Conditions	Depth of Cut **ap**	Cutting Conditions	Depth of Cut **ap**	Cutting Conditions	Depth of Cut **ap**
P	Mild Steel	Hardness ≤180HB	● ◔	≤.079	● ◔	≤.118	◔ ✣	≤.118
	Carbon Steel Alloy Steel	Hardness 180—350HB	● ◔	≤.079	● ◔	≤.118	◔ ✣	≤.118
M	Stainless Steel	—	○ ◔	≤.059	○ ◔	≤.059	—	—
K	Ductile Cast Iron	Tensile Strength ≤450MPa	● ◔	≤.079	● ◔	≤.118	—	—
		Tensile Strength ≤800MPa	● ◔	≤.079	● ◔	≤.079	—	—

Recommended Cutting Conditions

WJX09 Cutting Speed
Dry Cutting

(inch)

	Material	Properties	MV1020	MV1030
			Cutting Speed **vc** (SFM)	Cutting Speed **vc** (SFM)
P	Mild Steel	Hardness ≤180HB	755(590—920)	525(330—720)
P	Carbon Steel Alloy Steel	Hardness 180—350HB	720(560—885)	490(260—720)
M	Stainless Steel	Hardness ≤200HB	—	525(425—655)
M	Stainless Steel	Hardness >200HB	—	460(260—655)
K	Ductile Cast Iron	Tensile Strength ≤450MPa	690(525—850)	525(395—690)
K	Ductile Cast Iron	Tensile Strength ≤800MPa	620(460—785)	425(295—560)

WJX09 Depth of Cut / Feed per Tooth
Dry Cutting

(inch)

	Material	Properties	Chipbreaker	Depth of Cut **ap**	Cutting Dia. Max. DCX=1.000", 1.125", 25mm, 28mm (Z=2) Feed **fz** (IPT)	Cutting Dia. Max. DCX=1.000", 1.125", 25mm, 28mm (Z=3) Feed **fz** (IPT)	Cutting Dia. Max. DCX≥1.250", 32 mm Feed **fz** (IPT)
P	Mild Steel	Hardness ≤180HB	M, R	≤.020	.051(.016—.079)	.051(.016—.079)	.059(.020—.079)
				≤.039	.039(.012—.051)	.031(.012—.039)	.047(.016—.059)
				≤.059	.024(.012—.039)	—	.031(.016—.047)
			L	≤.020	.047(.016—.063)	.047(.016—.063)	.047(.016—.063)
				≤.039	.031(.012—.047)	.031(.012—.039)	.039(.016—.098)
	Carbon Steel Alloy Steel	Hardness 180—350HB	M, R	≤.020	.051(.016—.067)	.051(.016—.067)	.059(.016—.079)
				≤.039	.031(.012—.039)	.028(.012—.035)	.039(.012—.051)
				≤.059	.020(.012—.028)	—	.028(.012—.039)
			L	≤.020	.047(.012—.059)	.047(.012—.059)	.047(.012—.059)
				≤.039	.028(.008—.039)	.028(.008—.035)	.028(.008—.039)
M	Stainless Steel	—	L	≤.020	.031(.012—.039)	.031(.012—.039)	.031(.012—.039)
				≤.039	.039(.016—.047)	.039(.016—.047)	.039(.016—.047)
			M	≤.020	.024(.008—.031)	.024(.008—.031)	.024(.008—.031)
				≤.039	.031(.012—.039)	.031(.012—.039)	.031(.012—.039)
K	Ductile Cast Iron	Tensile Strength ≤450MPa	M, R	≤.020	.051(.016—.067)	.051(.016—.067)	.059(.016—.079)
				≤.039	.031(.012—.039)	.028(.012—.035)	.039(.012—.051)
				≤.059	.020(.012—.028)	—	.028(.012—.039)
			L	≤.020	.039(.012—.051)	.039(.012—.051)	.039(.012—.051)
				≤.039	.031(.008—.039)	.028(.008—.035)	.031(.008—.047)
		Tensile Strength ≤800MPa	M, R	≤.020	.039(.008—.059)	.039(.008—.059)	.051(.012—.067)
				≤.039	.031(.008—.039)	.024(.008—.031)	.039(.012—.047)
			L	≤.020	.031(.012—.047)	.031(.012—.047)	.031(.012—.047)
				≤.039	.020(.008—.031)	.020(.008—.031)	.020(.008—.031)

Note 1) To discharge chips effectively, use an air blow when machining. When the air blow is less effective at discharging chips, we recommend wet cutting.
Note 2) When wet cutting, tool life may become shorter than dry cutting. When carrying out wet cutting for the applications recommended with dry cutting, reduce the cutting speed by 25%.
Note 3) When large vibration occurs, reduce the cutting conditions.
Note 4) For interrupted cutting, reduce the cutting speed and feed rate by 20%.

WJX14 Cutting Speed
Dry Cutting

(inch)

	Material	Properties	MV1020	MV1030
			Cutting Speed **vc** (SFM)	Cutting Speed **vc** (SFM)
P	Mild Steel	Hardness ≤180HB	720(560–885)	425(260–590)
P	Carbon Steel Alloy Steel	Hardness 180–350HB	655(490–820)	395(195–590)
M	Stainless Steel	Hardness ≤200HB	–	525(425–655)
M	Stainless Steel	Hardness >200HB	–	460(330–655)
K	Ductile Cast Iron	Tensile Strength ≤450MPa	655(490–820)	490(330–655)
K	Ductile Cast Iron	Tensile Strength ≤800MPa	590(425–755)	395(260–525)

Recommended Cutting Conditions

WJX14 Depth of Cut / Feed per Tooth
Dry Cutting

(inch)

	Material	Properties	Chipbreaker	Depth of Cut **ap**	Cutting Dia. Max. DCX=2.000", 50 mm, 52 mm	Cutting Dia. Max. DCX≥2.500", 63 mm
					Feed **fz** (IPT)	Feed **fz** (IPT)
P	Mild Steel	Hardness ≤180HB	M,R	≤.039	.059(.024—.098)	.067(.024—.110)
				≤.059	.051(.024—.079)	.059(.024—.098)
				≤.079	.047(.024—.079)	.051(.024—.098)
				≤.098	.031(.012—.059)	.039(.012—.063)
				≤.118	.016(.008—.039)	.020(.008—.047)
			L	≤.039	.047(.016—.079)	.047(.016—.079)
				≤.059	.039(.016—.071)	.039(.016—.098)
				≤.079	.031(.016—.067)	.031(.016—.067)
	Carbon Steel Alloy Steel	Hardness 180—350HB	M,R	≤.039	.059(.020—.079)	.067(.020—.098)
				≤.059	.047(.020—.067)	.051(.020—.087)
				≤.079	.039(.020—.059)	.047(.020—.079)
				≤.098	.028(.012—.047)	.035(.012—.059)
				≤.118	.012(.008—.031)	.016(.008—.039)
			L	≤.039	.039(.012—.067)	.039(.012—.067)
				≤.059	.031(.012—.059)	.031(.012—.059)
				≤.079	.028(.012—.047)	.028(.012—.047)
M	Stainless Steel	Hardness ≤200HB	M	≤.039	.039(.020—.047)	.039(.020—.047)
				≤.059	.039(.020—.039)	.039(.020—.039)
			L	≤.039	.031(.012—.047)	.031(.012—.047)
				≤.059	.031(.012—.039)	.031(.012—.039)
		Hardness >200HB	M	≤.039	.039(.020—.047)	.039(.020—.047)
				≤.059	.039(.020—.039)	.039(.020—.039)
			L	≤.039	.031(.012—.047)	.031(.012—.047)
				≤.059	.031(.012—.039)	.031(.012—.039)
K	Ductile Cast Iron	Tensile Strength ≤450MPa	M	≤.039	.059(.020—.079)	.067(.020—.098)
				≤.059	.051(.020—.071)	.059(.020—.079)
				≤.079	.047(.020—.071)	.051(.020—.079)
				≤.098	.028(.012—.047)	.035(.012—.059)
				≤.118	.012(.008—.031)	.016(.008—.039)
			L	≤.039	.047(.012—.079)	.047(.012—.079)
				≤.059	.039(.012—.067)	.039(.012—.067)
				≤.079	.031(.012—.059)	.031(.012—.059)
		Tensile Strength ≤800MPa	M	≤.039	.051(.016—.071)	.059(.016—.079)
				≤.059	.047(.016—.059)	.051(.016—.071)
				≤.079	.039(.016—.059)	.047(.016—.071)
			L	≤.039	.039(.012—.067)	.039(.012—.067)
				≤.059	.031(.012—.059)	.031(.012—.059)
				≤.079	.028(.012—.047)	.028(.012—.047)

Note 1) To discharge chips effectively, use an air blow when machining. When the air blow is less effective at discharging chips, we recommend wet cutting.
Note 2) When wet cutting, tool life may become shorter than dry cutting. When carrying out wet cutting for the applications recommended with dry cutting, reduce the cutting speed by 25%.
Note 3) When large vibration occurs, reduce the cutting conditions.
Note 4) For interrupted cutting, reduce the cutting speed and feed rate by 20%.

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

VPX200/300 Cutting Speed
Dry Cutting

(inch)

	Material	Properties	Cutting Conditions	Recommended		Width of Cut **ae**							
						≤0.25DC		0.25-0.5DC		0.5-0.75DC		DC(Slot)	
				1st	2nd	**MV1020**	**MV1030**	**MV1020**	**MV1030**	**MV1020**	**MV1030**	**MV1020**	**MV1030**
P	Mild Steel	Hardness ≤180HB	● ◔	L	M	920 (720–1080)	755 (590–885)	885 (690–1050)	720 (560–850)	720 (560–850)	590 (460–690)	720 (560–850)	590 (460–690)
P	Carbon Steel Alloy Steel	Hardness 180–280HB	● ◔	L	M	720 (560–850)	590 (460–690)	690 (525–785)	560 (425–655)	560 (425–655)	460 (360–525)	560 (425–655)	560 (425–655)
P	Carbon Steel Alloy Steel	Hardness 280–350HB	● ◔	L	M	590 (460–690)	590 (460–690)	560 (425–655)	560 (425–655)	460 (360–525)	460 (360–525)	460 (360–525)	460 (360–525)
M	Stainless Steel	Hardness ≤200HB	○ ◔	L	M	–	590 (460–690)	–	560 (425–655)	–	460 (360–525)	–	460 (360–525)
M	Stainless Steel	Hardness >200HB	○ ◔	L	M	–	490 (360–590)	–	460 (330–525)	–	360 (260–425)	–	360 (260–425)
K	Ductile Cast Iron	Tensile Strength ≤450MPa	● ◔	M	L	655 (490–920)	490 (330–655)	620 (460–885)	460 (295–620)	560 (425–785)	410 (260–560)	560 (425–785)	330 (260–395)
K	Ductile Cast Iron	Tensile Strength ≤800MPa	● ◔	M	L	590 (460–820)	490 (330–655)	560 (425–785)	460 (295–620)	490 (395–690)	410 (260–560)	490 (395–690)	490 (395–690)

Cutting Mode : Wet Cutting

(inch)

	Material	Properties	Cutting Conditions	Recommended		Width of Cut **ae**							
						≤0.25DC		0.25-0.5DC		0.5-0.75DC		DC(Slot)	
				1st	2nd	**MV1020**	**MV1030**	**MV1020**	**MV1030**	**MV1020**	**MV1030**	**MV1020**	**MV1030**
P	Mild Steel	Hardness ≤180HB	● ◔	L	M	690 (490–950)	460 (330–620)	655 (460–885)	425 (295–590)	490 (360–590)	330 (230–395)	490 (360–590)	330 (230–395)
P	Carbon Steel Alloy Steel	Hardness 180–280HB	● ◔	L	M	590 (460–690)	395 (295–460)	560 (395–655)	360 (260–425)	490 (360–590)	330 (230–395)	490 (360–590)	330 (230–395)
P	Carbon Steel Alloy Steel	Hardness 280–350HB	● ◔	L	M	460 (360–525)	395 (295–460)	425 (295–490)	360 (260–425)	395 (260–460)	330 (230–395)	395 (260–460)	395 (260–460)
K	Ductile Cast Iron	Tensile Strength ≤450MPa	● ◔	M	L	590 (490–785)	425 (260–590)	560 (460–755)	395 (230–560)	490 (425–655)	345 (195–490)	490 (425–655)	345 (195–490)
K	Ductile Cast Iron	Tensile Strength ≤800MPa	● ◔	M	L	525 (425–690)	425 (260–590)	490 (395–655)	395 (230–560)	425 (360–560)	345 (195–490)	425 (360–560)	345 (195–490)

Recommended Cutting Conditions

VPX200 Depth of Cut / Feed per Tooth
Dry and Wet Cutting

(inch)

	Material	Properties	Width of Cut **ae**	Cutting Conditions	DC					
					ø.625–ø.750(ø16mm–18mm)		ø.875–ø1.000(ø20mm–25mm)		ø1.125–ø2.500(ø28mm–63mm)	
					Depth of Cut **ap**	Feed **fz** (IPT)	Depth of Cut **ap**	Feed **fz** (IPT)	Depth of Cut **ap**	Feed **fz** (IPT)
P	Mild Steel	Hardness ≤180HB	≤0.25DC	● ●	≤.236	.004–.006	≤.315	.004–.008	≤.315	.004–.010
			0.25–0.5DC	● ●	≤.197	.003–.005	≤.315	.004–.006	≤.315	.004–.008
			0.5–0.75DC	● ●	≤.157	.003–.005	≤.236	.003–.005	≤.236	.004–.006
			DC(Slot)	● ●	≤.079	.002–.004	≤.157	.002–.004	≤.157	.003–.005
	Carbon Steel Alloy Steel	Hardness 180–280HB	≤0.25DC	● ●	≤.236	.004–.006	≤.315	.004–.008	≤.315	.004–.010
			0.25–0.5DC	● ●	≤.197	.003–.005	≤.315	.004–.006	≤.315	.004–.008
			0.5–0.75DC	● ●	≤.157	.003–.005	≤.236	.003–.005	≤.236	.004–.006
			DC(Slot)	● ●	≤.079	.002–.004	≤.157	.002–.004	≤.157	.003–.005
		Hardness 280–350HB	≤0.25DC	● ●	≤.236	.004–.006	≤.315	.004–.006	≤.315	.004–.008
			0.25–0.5DC	● ●	≤.197	.003–.005	≤.315	.003–.005	≤.315	.004–.006
			0.5–0.75DC	● ●	≤.157	.003–.005	≤.236	.002–.004	≤.236	.003–.005
			DC(Slot)	● ●	≤.079	.002–.004	≤.157	.002–.004	≤.157	.002–.004
M	Stainless Steel	–	≤0.25DC	● ●	≤.236	.004–.006	≤.315	.004–.008	≤.315	.004–.008
			0.25–0.5DC	● ●	≤.197	.003–.005	≤.315	.003–.006	≤.315	.003–.006
			0.5–0.75DC	● ●	≤.157	.002–.004	≤.236	.003–.005	≤.236	.003–.005
			DC(Slot)	● ●	≤.079	.002–.004	≤.157	.002–.004	≤.157	.002–.004
K	Ductile Cast Iron	Tensile Strength ≤800MPa	≤0.25DC	● ●	≤.236	.004–.006	≤.315	.004–.008	≤.315	.004–.008
			0.25–0.5DC	● ●	≤.197	.003–.005	≤.315	.004–.006	≤.315	.004–.006
			0.5–0.75DC	● ●	≤.157	.003–.005	≤.236	.003–.005	≤.236	.003–.005
			DC(Slot)	● ●	≤.079	.002–.004	≤.157	.002–.004	≤.157	.002–.004

VPX300 Depth of Cut / Feed per Tooth
Dry and Wet Cutting

(inch)

	Material	Properties	Width of Cut **ae**	Cutting Conditions	DC			
					ø1.000(ø25mm)		ø1.125–ø3.000(ø28mm–80mm)	
					Depth of Cut **ap**	Feed **fz** (IPT)	Depth of Cut **ap**	Feed **fz** (IPT)
P	Mild Steel	Hardness ≤180HB	≤0.25DC	● ●	≤.433	.004–.008	≤.433	.004–.012
			0.25–0.5DC	● ●	≤.433	.004–.006	≤.433	.004–.010
			0.5–0.75DC	● ●	≤.315	.003–.005	≤.315	.004–.008
			DC(Slot)	● ●	≤.197	.002–.004	≤.197	.003–.006
	Carbon Steel Alloy Steel	Hardness 180–280HB	≤0.25DC	● ●	≤.433	.004–.008	≤.433	.004–.012
			0.25–0.5DC	● ●	≤.433	.004–.006	≤.433	.004–.010
			0.5–0.75DC	● ●	≤.315	.003–.005	≤.315	.004–.008
			DC(Slot)	● ●	≤.197	.002–.004	≤.197	.003–.006
		Hardness 280–350HB	≤0.25DC	● ●	≤.433	.004–.006	≤.433	.004–.010
			0.25–0.5DC	● ●	≤.433	.003–.005	≤.433	.004–.008
			0.5–0.75DC	● ●	≤.315	.002–.004	≤.315	.004–.006
			DC(Slot)	● ●	≤.197	.002–.004	≤.197	.003–.005
M	Stainless Steel	–	≤0.25DC	● ●	≤.433	.004–.008	≤.433	.004–.008
			0.25–0.5DC	● ●	≤.433	.003–.006	≤.433	.003–.006
			0.5–0.75DC	● ●	≤.315	.003–.005	≤.315	.003–.005
			DC(Slot)	● ●	≤.197	.002–.004	≤.197	.002–.004
K	Ductile Cast Iron	Tensile Strength ≤800MPa	≤0.25DC	● ●	≤.433	.004–.008	≤.433	.004–.010
			0.25–0.5DC	● ●	≤.433	.004–.006	≤.433	.004–.008
			0.5–0.75DC	● ●	≤.315	.003–.005	≤.315	.004–.006
			DC(Slot)	● ●	≤.197	.002–.004	≤.197	.003–.005

Note 1) These cutting conditions should be referenced for standard shank types (last letter in designation is S) and arbor shank types. If there is chatter, insert chipping, etc. during machining, alter conditions accordingly.
Note 2) Chattering vibration is more likely under the following circumstances. Use a cut and feed per tooth that are at minimum recommended conditions or below.
· When tool overhang is long (using a long shank, screw-in type, etc.).
· Rigidity of machine, workpiece material or attachment of workpiece material is low.
· Corner radius during pocket milling
Note 3) A type with fewer teeth is recommended when the depth of cut in the radius direction (ae) is 0.5 DC or more.
Note 4) Wet cutting is recommended, when focusing on the surface finish. (Service life is shorter than for dry cutting.)
Note 5) When using under higher than recommended cutting conditions, or for long periods of time, the clamp screw may become fatigued and break during machining. Please change out the clamp screw periodically.

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✲ : Unstable Cutting

AHX440S
Dry Cutting

(inch)

	Material	Properties	Cutting Speed **vc** (SFM)		Feed **fz** (IPT)	Depth of Cut **ap**	Width of Cut **ae**
			MV1020	**MV1030**			
P	Mild Steel	Hardness ≤180HB	985(655—1310)	805(620—985)	.012(.008—.016)	≤.118	≤0.8DC
	Carbon Steel Alloy Steel	Hardness 180—280HB	850(560—1150)	690(490—885)	.012(.008—.016)	≤.118	≤0.8DC
	Carbon Steel Alloy Steel	Hardness 280—350HB	590(330—820)	490(295—590)	.012(.008—.016)	≤.118	≤0.8DC
M	Stainless Steel	Hardness ≤200HB	—	605(395—820)	.008(.004—.012)	≤.118	≤0.8DC
		Hardness >200HB	—	460(260—655)	.008(.004—.012)	≤.118	≤0.8DC
K	Ductile Cast Iron	Tensile Strength ≤450MPa	785(425—1150)	605(395—820)	.008(.004—.012)	≤.118	≤0.8DC
		Tensile Strength ≤800MPa	720(260—1150)	490(330—655)	.008(.004—.012)	≤.118	≤0.8DC

(Note 1) Refer to the above table and set up cutting conditions according to cutting applications.
(Note 2) When placing emphasis on surface finish quality, wet cutting is recommended. (Tool life is lowered as compared to dry cutting)
(Note 3) The recommended depth of cut differs according to insert geometry.
(Note 4) When clamp rigidity is low and tool overhang is long, we recommended to reduce the cutting speed and the feed rate by 30%.
(Note 5) Recommended wet cutting for good surface finishing of stainless steel. (Tool life is short compared to wet cutting.)

AHX475S
Dry Cutting

(inch)

	Material	Properties	Chipbreaker	Cutting Speed **vc** (SFM)		Feed **fz** (IPT)	Depth of Cut **ap**	Width of Cut **ae**
				MV1020	**MV1030**			
P	Mild Steel	Hardness ≤180HB	R	720(560—885)	460(260—655)	.024	≤.063	≤0.5DC
			R	720(560—885)	460(260—655)	.031	≤.063	0.5DC<ae≤0.8DC
			M	720(560—885)	460(260—655)	.039	≤.063	0.8DC<ae≤DC
	Carbon Steel Alloy Steel	Hardness 180—280HB	R	655(490—820)	395(195—590)	.024	≤.063	≤0.5DC
			R	655(490—820)	395(195—590)	.031	≤.063	0.5DC<ae≤0.8DC
			M	655(490—820)	395(195—590)	.039	≤.063	0.8DC<ae≤DC
	Carbon Steel Alloy Steel	Hardness 280—350HB	R	490(330—655)	295(100—490)	.020	≤.063	≤0.5DC
			R	490(330—655)	295(100—490)	.024	≤.063	0.5DC<ae≤0.8DC
			R	490(330—655)	295(100—490)	.028	≤.063	0.8DC<ae≤DC
K	Ductile Cast Iron	Tensile Strength ≤450MPa	R	655(490—820)	460(260—655)	.024	≤.063	≤0.5DC
			R	655(490—820)	460(260—655)	.031	≤.063	0.5DC<ae≤0.8DC
			M	655(490—820)	460(260—655)	.039	≤.063	0.8DC<ae≤DC
		Tensile Strength ≤800MPa	R	590(425—755)	460(260—655)	.020	≤.063	≤0.5DC
			R	590(425—755)	460(260—655)	.024	≤.063	0.5DC<ae≤0.8DC
			R	590(425—755)	460(260—655)	.028	≤.063	0.8DC<ae≤DC

(Note 1) When clamp rigidity is low and tool overhang is long, we recommended to reduce the cutting speed and the feed rate by 30%.

Recommended Cutting Conditions

WSF406W
Dry Cutting

(inch)

	Material	Properties	Cutting Conditions	Depth of Cut **ap**	Cutting Speed **vc** (SFM)		Feed **fz** (IPT)	Width of Cut **ae**
					MV1020	**MV1030**		
K	Gray Cast Iron (FC300 etc.)	Tensile Strength ≤350MPa	●	ap ≤.020	985(820—985)	490(330—655)	.005(.003—.008)	≤0.8DC
				ap ≤.079	820(690—985)	490(330—655)	.006(.004—.010)	≤0.8DC
				.079< ap ≤.157	720(620—850)	460(260—655)	.005(.004—.008)	≤0.8DC
				.157< ap ≤.295	655(590—755)	360(195—525)	.004(.003—.006)	≤0.8DC
			◔	ap ≤.020	820(690—985)	490(330—655)	.005(.003—.008)	≤0.8DC
				ap ≤.079	720(620—850)	490(330—655)	.006(.004—.010)	≤0.8DC
				.079< ap ≤.157	655(590—755)	460(260—655)	.005(.004—.008)	≤0.8DC
				.157< ap ≤.295	590(525—690)	360(195—525)	.004(.003—.006)	≤0.8DC
			✚	ap ≤.020	720(620—850)	460(260—655)	.005(.003—.008)	≤0.8DC
				ap ≤.079	655(590—755)	460(260—655)	.006(.004—.010)	≤0.8DC
				.079< ap ≤.157	590(525—690)	360(195—525)	.005(.004—.008)	≤0.8DC
				.157< ap ≤.295	490(330—590)	260(130—395)	.004(.003—.006)	≤0.8DC
	Ductile Cast Iron (FCD450 etc.)	Tensile Strength ≤450MPa	●	ap ≤.020	755(655—820)	360(195—525)	.005(.003—.008)	≤0.8DC
				ap ≤.079	655(560—755)	360(195—525)	.006(.004—.010)	≤0.8DC
				.079< ap ≤.157	590(490—690)	295(165—425)	.005(.004—.008)	≤0.8DC
				.157< ap ≤.295	525(425—620)	230(130—330)	.004(.003—.006)	≤0.8DC
			◔	ap ≤.020	655(560—755)	360(195—525)	.005(.003—.008)	≤0.8DC
				ap ≤.079	590(490—690)	360(195—525)	.006(.004—.010)	≤0.8DC
				.079< ap ≤.157	525(425—620)	295(165—425)	.005(.004—.008)	≤0.8DC
				.157< ap ≤.295	460(360—560)	230(130—330)	.004(.003—.006)	≤0.8DC
			✚	ap ≤.020	590(490—655)	295(165—425)	.005(.003—.008)	≤0.8DC
				ap ≤.079	525(425—620)	295(165—425)	.006(.004—.010)	≤0.8DC
				.079< ap ≤.157	460(360—560)	230(130—330)	.005(.004—.008)	≤0.8DC
				.157< ap ≤.295	395(295—490)	195(100—295)	.004(.003—.006)	≤0.8DC
	Ductile Cast Iron (FCD700 etc.)	Tensile Strength ≤800MPa	●	ap ≤.020	755(655—820)	360(195—525)	.005(.003—.008)	≤0.8DC
				ap ≤.079	655(560—755)	360(195—525)	.006(.004—.010)	≤0.8DC
				.079< ap ≤.157	590(490—690)	295(165—425)	.005(.004—.008)	≤0.8DC
				.157< ap ≤.295	525(425—620)	230(130—330)	.004(.003—.006)	≤0.8DC
			◔	ap ≤.020	655(560—755)	360(195—525)	.005(.003—.008)	≤0.8DC
				ap ≤.079	590(490—690)	360(195—525)	.006(.004—.010)	≤0.8DC
				.079< ap ≤.157	525(425—620)	295(165—425)	.005(.004—.008)	≤0.8DC
				.157< ap ≤.295	460(360—560)	230(130—330)	.004(.003—.006)	≤0.8DC
			✚	ap ≤.020	590(490—690)	295(165—425)	.005(.003—.008)	≤0.8DC
				ap ≤.079	525(425—620)	295(165—425)	.006(.004—.010)	≤0.8DC
				.079< ap ≤.157	460(360—560)	230(130—330)	.005(.004—.008)	≤0.8DC
				.157< ap ≤.295	395(295—490)	195(100—295)	.004(.003—.006)	≤0.8DC

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

ASX445
Dry and Wet Cutting

(inch)

Material		Properties	Cutting Speed **vc** (m/min)		Finish-Light Cutting		Light-Rough Cutting		Medium-Heavy Cutting	
			MV1020	**MV1030**	Feed **fz** (IPT)	Chipbreaker	Feed **fz** (IPT)	Chipbreaker	Feed **fz** (IPT)	Chipbreaker
P	Mild Steel	Hardness ≤180HB	985(655—1310)	900(655—1150)	.006(.004—.008)	JL	.008(.004—.012)	JM	.012(.008—.016)	JH
P	Carbon Steel Alloy Steel	Hardness 180—280HB	850(560—1150)	770(560—985)	.006(.004—.008)	JL	.008(.004—.012)	JM	.012(.008—.016)	JH
P	Carbon Steel Alloy Steel	Hardness 280—350HB	590(330—820)	540(330—755)	.006(.004—.008)	JL	.008(.004—.012)	JM	.012(.008—.016)	JH
M	Stainless Steel	—	—	720(560—885)	.006(.004—.008)	JL	.008(.004—.012)	JM	.012(.008—.016)	JH
K	Ductile Cast Iron	Tensile Strength ≤450MPa	785(425—1150)	620(425—820)	.006(.004—.008)	JL	.008(.004—.012)	JM	.012(.008—.016)	JH FT
K	Ductile Cast Iron	Tensile Strength >450MPa	720(260—1150)	360(260—490)	.006(.004—.008)	JL	.008(.004—.012)	JM	.012(.008—.016)	JH FT

ASX400
Dry and Wet Cutting

(inch)

Material		Properties	Cutting Speed **vc** (m/min)		Finish-Light Cutting		Light-Rough Cutting		Medium-Heavy Cutting	
			MV1020	**MV1030**	Feed **fz** (IPT)	Chipbreaker	Feed **fz** (IPT)	Chipbreaker	Feed **fz** (IPT)	Chipbreaker
P	Mild Steel	Hardness ≤180HB	985(655—1310)	900(655—1150)	.007(.003—.011)	JL	.008(.004—.012)	JM	.010(.004—.014)	JH
P	Carbon Steel Alloy Steel	Hardness 180—280HB	850(560—1150)	770(560—985)	.006(.003—.009)	JL	.007(.004—.011)	JM	.010(.004—.014)	JH
P	Carbon Steel Alloy Steel	Hardness 280—350HB	590(330—820)	540(330—755)	.005(.002—.008)	JL	.006(.004—.010)	JM	.007(.004—.011)	JH
M	Stainless Steel	—	—	720(560—885)	.006(.003—.009)	JL	.007(.004—.011)	JM	.008(.004—.012)	JH FT
K	Ductile Cast Iron	Tensile Strength ≤450MPa	785(425—1150)	620(425—820)	.007(.003—.011)	JL	.008(.004—.012)	JM	.010(.004—.014)	JH FT
K	Ductile Cast Iron	Tensile Strength >450MPa	720(260—1150)	360(260—490)	.007(.003—.011)	JL	.008(.004—.012)	JM	.010(.004—.014)	JH FT

Recommended Cutting Conditions

APX3000/4000 Cutting Speed

(inch)

Material		Properties	Cutting Conditions	Recommended		Width of Cut **ae**							
						≤0.25DC		0.25-0.5DC		0.5-0.75DC		DC(Slot)	
				1st	2nd	**MV1020**	**MV1030**	**MV1020**	**MV1030**	**MV1020**	**MV1030**	**MV1020**	**MV1030**
P	Mild Steel	Hardness ≤180HB	● ●	L	M	920 (720–1080)	755 (590–885)	885 (690–1050)	720 (560–850)	720 (560–850)	590 (460–690)	720 (560–850)	590 (460–690)
	Carbon Steel Alloy Steel	Hardness 180–280HB	● ●	L	M	720 (560–850)	590 (460–690)	690 (525–785)	560 (425–655)	560 (425–655)	460 (360–525)	560 (425–655)	560 (425–655)
		Hardness 280–350HB	● ●	L	M	590 (460–690)	590 (460–690)	560 (425–655)	560 (425–655)	460 (360–525)	460 (360–525)	460 (360–525)	460 (360–525)
M	Stainless Steel	Hardness ≤200HB	● ●	L	M	–	590 (460–690)	–	560 (425–655)	–	460 (360–525)	–	460 (360–525)
		Hardness >200HB	● ●	L	M	–	490 (360–590)	–	460 (330–525)	–	360 (260–425)	–	360 (260–425)
K	Ductile Cast Iron	Tensile Strength ≤450MPa	● ●	M	L	590 (460–690)	590 (460–690)	560 (425–655)	560 (425–655)	460 (360–525)	460 (360–525)	460 (360–525)	460 (360–525)
		Tensile Strength ≤800MPa	● ●	M	L	590 (460–690)	590 (460–690)	560 (425–655)	560 (425–655)	460 (360–525)	460 (360–525)	460 (360–525)	460 (360–525)

APX3000 Depth of Cut / Feed per Tooth

(inch)

Material		Properties	Width of Cut **ae**	DC					
				ø.500–ø.625(ø12mm–16mm)		ø.750–ø1.000(ø20mm–25mm)		ø1.250–ø3.000(ø28mm–100mm)	
				Depth of Cut **ap**	Feed per Tooth **fz** (IPT)	Depth of Cut **ap**	Feed per Tooth **fz** (IPT)	Depth of Cut **ap**	Feed per Tooth **fz** (IPT)
P	Mild Steel	Hardness ≤180HB	≤.25DC	≤.157	.006	≤.197	.010	≤.197	.008
				.157–.276	.004	.197–..276	.008	.197–..276	.006
				–	–	.276–.335	.006	.276–.335	.004
				–	–	.335–.394	.004	.335–.394	.003
			.25–.5DC	≤.079	.006	≤.118	.010	≤.118	.008
				.078–.197	.004	.118–.217	.008	.118–.217	.004
				–	–	.217–.315	.006	.217–.315	.003
				–	–	.315–.394	.004	.315–.394	.003
	Carbon Steel Alloy Steel	Hardness 150–350HB	.5–.75DC	≤.157	.004	≤.157	.006	≤.118	.004
				–	–	.157–.394	.004	.118–.276	.003
			DC(Slot)	≤.118	.004	≤.157	.004	≤.118	.004
				–	–	.157–.276	.003	.118–.197	.003
M	Stainless Steel	Hardness >200HB	≤.25DC	≤.157	.006	≤.197	.008	≤.197	.008
				.157–.276	.004	.197–..276	.006	.197–..276	.006
				–	–	.276–.335	.004	.276–.335	.004
				–	–	.335–.394	.003	.335–.394	.004
			.25–.5DC	≤.079	.006	≤.118	.008	≤.118	.008
				.078–.197	.004	.118–.217	.006	.118–.217	.006
				–	–	.217–.315	.004	.217–.315	.004
				–	–	.315–.394	.003	.315–.394	.003
			.5–.75DC	≤.157	.004	≤.157	.004	≤.118	.004
				–	–	.157–.394	.003	.118–.276	.003
			DC(Slot)	≤.157	.004	≤.157	.004	≤.118	.004
				–	–	.157–.276	.003	.118–.197	.003
K	Ductile Cast Iron	Tensile Strength ≤800MPa	≤.25DC	≤.157	.004	≤.197	.008	≤.197	.008
				.157–.276	.003	.197–..276	.006	.197–..276	.006
				–	–	.276–.335	.004	.276–.335	.004
				–	–	.335–.394	.003	.335–.394	.003
			.25–.5DC	≤.079	.004	≤.118	.008	≤.118	.008
				.079–.197	.003	.118–.217	.006	.118–.217	.006
				–	–	.217–.315	.004	.217–.315	.004
				–	–	.315–.394	.003	.315–.394	.003
			.5–.75DC	≤.157	.003	≤.157	.004	≤.118	.004
				–	–	.315–.394	.003	.118–.276	.003
			DC(Slot)	≤.118	.003	≤.157	.004	≤.118	.004
				–	–	.157–.276	.003	.118–.197	.003

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

APX4000 Depth of Cut / Feed per Tooth

(inch)

	Material	Properties	Width of Cut **ae**	Depth of Cut **ap**	Feed per Tooth **fz** (IPT) DC ø.750–ø1.500 (ø25mm–40mm)	DC ø2.000–ø3.000 (ø50mm–80mm)	DC ø4.000 (ø100mm–160mm)
P	Mild Steel	Hardness ≤180HB	≤.5DC	≤.197	.012	.012	.010
				.197–.295	.010	.010	.008
				.295–.394	.008	.008	.006
				.394–.492	.006	.006	.004
				.492–.591	.004	.004	.003
			.5–.75DC	≤.197	.008	.008	.006
				.295–.394	.006	.006	.004
				.394–.591	.004	.004	.003
	Carbon Steel Alloy Steel	Hardness 150–350HB	DC(Slot)	≤.197	.006	.006	.006
				.197–.295	.004	.004	.004
				.295–.394	.003	.003	.003
M	Stainless Steel	Hardness >200HB	≤.5DC	≤.197	.012	.010	.010
				.197–.295	.010	.008	.008
				.295–.394	.008	.006	.006
				.394–.492	.006	.004	.004
				.492–.591	.004	.003	.003
			.5–.75DC	≤.197	.008	.006	.006
				.295–.394	.006	.004	.004
				.394–.591	.004	.003	.003
			DC(Slot)	≤.197	.006	.006	.006
				.197–.295	.004	.004	.004
				.295–.394	.003	.003	.003
K	Ductile Cast Iron	Tensile Strength ≤800MPa	≤.5DC	≤.197	.010	.010	.010
				.197–.295	.008	.008	.008
				.295–.394	.006	.006	.006
				.394–.492	.004	.004	.004
				.492–.591	.003	.003	.003
			.5–.75DC	≤.197	.008	.008	.006
				.295–.394	.006	.006	.004
				.394–.591	.004	.004	.003
			DC(Slot)	≤.197	.006	.006	.006
				.197–.295	.004	.004	.004
				.295–.394	.003	.003	.003

Recommended Cutting Conditions

ARP5/6
Dry Cutting

(inch)

	Material	Properties	Cutting Mode	MV1030 First recommendation Cutting Speed **vc** (SFM)	MV1020 For high-efficiency machining Cutting Speed **vc** (SFM)	Feed per Tooth **fz** (IPT)
M	Austenitic Stainless Steel	Hardness ≤200HB	Dry	720(560—885)	820(655—985)	.008(.004—.014)
			Wet	490(330—655)	590(425—755)	.008(.004—.014)
	Austenitic Stainless Steel	Hardness >200HB	Dry	620(460—785)	720(560—885)	.008(.004—.014)
			Wet	425(260—590)	490(330—655)	.008(.004—.014)
	Duplex Stainless Steel	Hardness ≤280HB	Dry	720(560—885)	820(655—985)	.008(.004—.014)
			Wet	490(330—655)	590(425—755)	.008(.004—.014)
	Ferritic and Martensitic Stainless Steel	Hardness ≤200HB	Dry	785(620—950)	885(720—1050)	.008(.004—.014)
			Wet	560(395—720)	620(460—785)	.008(.004—.014)
	Ferritic and Martensitic Stainless Steel	Hardness >200HB	Dry	785(620—950)	885(720—1050)	.008(.004—.014)
			Wet	560(395—720)	620(460—785)	.008(.004—.014)
	Precipitation Hardening Stainless Steel	Hardness >450HB	Dry	560(395—720)	620(460—785)	.008(.004—.014)
			Wet	395(230—560)	425(260—590)	.008(.004—.014)

(Note 1) Actual cutting conditions are estimated to avoid chatter vibration with high rigidity of a machine or workpiece material. Make appropriate adjustments when chatter and/or insert chipping occurs during cutting. Use with lowered conditions when there is a big overhang and/or when pocket-cutting.

(Note 2) Feed rate for recommended cutting conditions table above based when axial depth of cut is ap=.098” with ARP5, and when depth of cut is ap=.118” with ARP6. Due to the chip thinning effect when the axial depth of cut fluctuates, feed rate compensation table below shows (correction values “F”) to help calculate correct feed. Example: Feed recommended for ARP5, 304 Stainless steel, MP7130, ap=.039” is .008IPTx1.5(correction values “F”)=.012 IPT.

(Note 3) For slotting, use 70% of the recommended feed rate listed above. For ramping, helical cutting, and plunging, use 50% of the recommended feed rate listed above.

(Note 4) Internal coolant is recommended in titanium alloy and heat resistant alloy machining.

Feed rate compensation table, (correction values "F") based on axial depth of cut "ap" fluctuation.

Holder Type	ap = .020"	ap = .039"	ap = .059"	ap = .079"	ap = .098"	ap = .118"	ap = .138"	ap = .157"	ap = .197"	ap = .236"
ARP5	2.3	1.5	1.2	1.1	1.0	.9	.8	.8	.8	-
ARP6	2.5	1.7	1.3	1.1	1.0	1.0	.9	.9	.8	.8

Tool body durability may weaken, when the amount of axial cutting exceeds ARP5=.197" and ARP6=.236".

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✲ : Unstable Cutting

AJX Cutting Speed

(inch)

	Material	Properties	MV1020 Cutting Speed **vc** (SFM)	MV1030 Cutting Speed **vc** (SFM)
P	Mild Steel	Hardness ≤180HB	755(590–920)	525(330–720)
	Carbon Steel Alloy Steel	Hardness 180–280HB	720(560–885)	490(260–720)
	Carbon Steel Alloy Steel	Hardness 280–350HB	590(330–820)	460(230–690)
	Alloy Tool Steel	Hardness ≤350HB (Annealing)	590(330–820)	460(230–690)
M	Stainless Steel	Hardness ≤200HB	–	525(425–655)
		Hardness >200HB	–	460(260–655)
K	Ductile Cast Iron	Tensile Strength ≤450MPa	690(525–850)	525(395–690)
		Tensile Strength ≤800MPa	620(460–785)	425(295–560)

AJX Depth of Cut / Feed per Tooth

(inch)

	Material	Properties	DCX=.625", .688" (16 mm, 17 mm) Shank Type AJXU06 Type 2 (Number of Teeth)			DCX=.750", .875" (20 mm, 22 mm) Shank Type AJXU08 Type 2 (Number of Teeth)			DCX=.750" (20 mm) Shank Type AJXU06 Type 3 (Number of Teeth)			DCX=1.000", 1.125" (25 mm, 28 mm) Shank Type AJXU09 Type 2 (Number of Teeth)		
			Over-hang	Axial Depth of Cut	Feed per Tooth (IPT)	Over-hang	Axial Depth of Cut	Feed per Tooth (IPT)	Over-hang	Axial Depth of Cut	Feed per Tooth (IPT)	Over-hang	Axial Depth of Cut	Feed per Tooth (IPT)
P	Mild Steel	Hardness ≤180HB	5.5	.031	.031	6.3	.039	.039	6.3	.035	.035	6.7	.039	.047
			7.0	.024	.024	8.3	.031	.031	8.3	.028	.028	9.0	.031	.039
			8.2	.016	.016	9.4	.024	.024	9.4	.020	.020	11.5	.024	.031
	Carbon Steel Alloy Steel	Hardness 180–280HB	5.5	.031	.031	6.3	.039	.039	6.3	.035	.035	6.7	.039	.047
			7.0	.024	.024	8.3	.031	.031	8.3	.028	.028	9.0	.031	.039
			8.2	.016	.016	9.4	.024	.024	9.4	.020	.020	11.5	.024	.031
	Carbon Steel Alloy Steel	Hardness 280–350HB	5.5	.028	.031	6.3	.031	.039	6.3	.028	.035	6.7	.031	.047
			7.0	.020	.024	8.3	.024	.031	8.3	.020	.028	9.0	.024	.039
			8.2	.012	.016	9.4	.016	.024	9.4	.016	.020	11.5	.016	.031
	Alloy Tool Steel	Hardness ≤350HB (Annealing)	5.5	.028	.031	6.3	.031	.039	6.3	.028	.035	6.7	.031	.047
			7.0	.020	.024	8.3	.024	.031	8.3	.020	.028	9.0	.024	.039
			8.2	.012	.016	9.4	.016	.024	9.4	.016	.020	11.5	.016	.031
M	Stainless Steel	Hardness ≤200HB	5.5	.031	.028	6.3	.039	.031	6.3	.035	.028	6.7	.039	.039
			7.0	.024	.020	8.3	.031	.024	8.3	.028	.020	9.0	.031	.031
			8.2	.016	.012	9.4	.024	.016	9.4	.020	.012	11.5	.024	.024
K	Ductile Cast Iron	Tensile Strength ≤800MPa	5.5	.028	.031	6.3	.031	.039	6.3	.028	.035	6.7	.031	.047
			7.0	.020	.024	8.3	.024	.031	8.3	.020	.028	9.0	.024	.039
			8.2	.012	.016	9.4	.016	.024	9.4	.016	.020	11.5	.016	.031

Depth of cut of JL chipbreaker is up to .024 inch. (06 size)
Depth of cut of JL chipbreaker is up to .047 inch. (09, 12 size)
Depth of cut of JL chipbreaker is up to .035 inch. (08 size)

Recommended Cutting Conditions

AJX Depth of Cut / Feed per Tooth

(inch)

	Material	Properties	DCX=1.000" (25 mm) Shank Type			DCX=1.250" (32 mm) Shank Type			DCX=1.250" (32 mm) Shank Type			DCX=1.500" (40 mm) 1.250" Shank		
			AJXU08 Type			AJXU12 Type			AJXU09 Type			AJXU12 Type		
			3 (Number of Teeth)			2 (Number of Teeth)			3 (Number of Teeth)			3 (Number of Teeth)		
			Over-hang	Axial Depth of Cut	Feed per Tooth (IPT)	Over-hang	Axial Depth of Cut	Feed per Tooth (IPT)	Over-hang	Axial Depth of Cut	Feed per Tooth (IPT)	Over-hang	Axial Depth of Cut	Feed per Tooth (IPT)
P	Mild Steel	Hardness ≤180HB	6.7	.035	.039	7.0	.047	.055	7.0	.043	.047	7.0	.040	.055
			9.0	.028	.031	9.0	.039	.047	9.0	.035	.039	9.5	.039	.047
			11.5	.020	.024	11.0	.031	.039	11.5	.028	.031	12.0	.031	.039
	Carbon Steel Alloy Steel	Hardness 180–280HB	6.7	.035	.039	7.0	.047	.055	7.0	.043	.047	7.0	.047	.055
			9.0	.028	.031	9.0	.039	.047	9.0	.035	.039	9.5	.039	.047
			11.5	.020	.024	11.0	.031	.039	11.5	.028	.031	12.0	.031	.039
	Carbon Steel Alloy Steel	Hardness 280–350HB	6.7	.028	.039	7.0	.039	.055	7.0	.035	.047	7.0	.039	.055
			9.0	.020	.031	9.0	.031	.047	9.0	.028	.039	9.5	.031	.047
			11.5	.016	.024	11.0	.024	.039	11.5	.020	.031	12.0	.024	.039
	Alloy Tool Steel	Hardness ≤350HB (Annealing)	6.7	.028	.039	7.0	.039	.055	7.0	.035	.047	7.0	.039	.055
			9.0	.020	.031	9.0	.031	.047	9.0	.028	.039	9.5	.031	.047
			11.5	.016	.024	11.0	.024	.039	11.5	.020	.031	12.0	.024	.039
M	Stainless Steel	Hardness ≤200HB	6.7	.035	.035	7.0	.047	.047	7.0	.043	.039	7.0	.047	.047
			9.0	.028	.028	9.0	.039	.039	9.0	.035	.031	9.5	.039	.039
			11.5	.020	.020	11.0	.031	.031	11.5	.028	.024	12.0	.031	.031
K	Ductile Cast Iron	Tensile Strength ≤800MPa	6.7	.028	.039	7.0	.039	.055	7.0	.035	.047	7.0	.039	.055
			9.0	.020	.031	9.0	.031	.047	9.0	.028	.039	9.5	.031	.047
			11.5	.016	.024	11.0	.024	.039	11.5	.020	.031	12.0	.024	.039

	Material	Properties	DCX=1.500" (40 mm) 1.250" Shank			DCX=1.500" (40 mm) 1.500" Shank			DCX=2.000" (50 mm) Shank Type			DCX=2.000", 2.500" (50 mm, 63 mm) Arbor Type		
			AJXU09 Type			AJXU12 Type			AJXU14 Type			AJXU12 Type(2.000") AJXU14 Type(2.500")		
			4 (Number of Teeth)			3 (Number of Teeth)			3 (Number of Teeth)			3 or 4 (Number of Teeth)		
			Over-hang	Axial Depth of Cut	Feed per Tooth (IPT)	Over-hang	Axial Depth of Cut	Feed per Tooth (IPT)	Over-hang	Axial Depth of Cut	Feed per Tooth (IPT)	Over-hang	Axial Depth of Cut	Feed per Tooth (IPT)
P	Mild Steel	Hardness ≤180HB	7.0	.043	.047	7.0	.047	.059	7.0	.055	.059	6.0	.059	.059
			9.5	.035	.039	9.5	.039	.051	9.5	.047	.051	10.0	.051	.051
			12.0	.028	.031	12.0	.031	.043	—	—	—	14.0	.043	.043
	Carbon Steel Alloy Steel	Hardness 180–280HB	7.0	.043	.047	7.0	.047	.059	7.0	.055	.059	6.0	.059	.059
			9.5	.035	.039	9.5	.039	.051	9.5	.047	.051	10.0	.051	.051
			12.0	.028	.031	12.0	.031	.043	—	—	—	14.0	.043	.043
	Carbon Steel Alloy Steel	Hardness 280–350HB	7.0	.035	.047	7.0	.039	.059	7.0	.047	.059	6.0	.051	.059
			9.5	.028	.039	9.5	.031	.051	9.5	.039	.051	10.0	.043	.051
			12.0	.020	.031	12.0	.024	.043	—	—	—	14.0	.035	.043
	Alloy Tool Steel	Hardness ≤350HB (Annealing)	7.0	.035	.047	7.0	.039	.059	7.0	.047	.059	6.0	.051	.059
			9.5	.028	.039	9.5	.031	.051	9.5	.039	.051	10.0	.043	.051
			12.0	.020	.031	12.0	.024	.043	—	—	—	14.0	.035	.043
M	Stainless Steel	Hardness ≤200HB	7.0	.043	.039	7.0	.047	.051	7.0	.055	.067	6.0	.059	.067
			9.5	.035	.031	9.5	.039	.043	9.5	.047	.059	10.0	.051	.059
			12.0	.028	.024	12.0	.031	.035	—	—	—	14.0	.043	.051
K	Ductile Cast Iron	Tensile Strength ≤800MPa	7.0	.035	.047	7.0	.039	.059	7.0	.047	.059	6.0	.051	.059
			9.5	.028	.039	9.5	.031	.051	9.5	.039	.051	10.0	.043	.051
			12.0	.020	.031	12.0	.024	.043	—	—	—	14.0	.035	.043

Depth of cut of JL chipbreaker is up to .024 inch. (06 size)
Depth of cut of JL chipbreaker is up to .047 inch. (09, 12 size)
Depth of cut of JL chipbreaker is up to .035 inch. (08 size)

(inch)

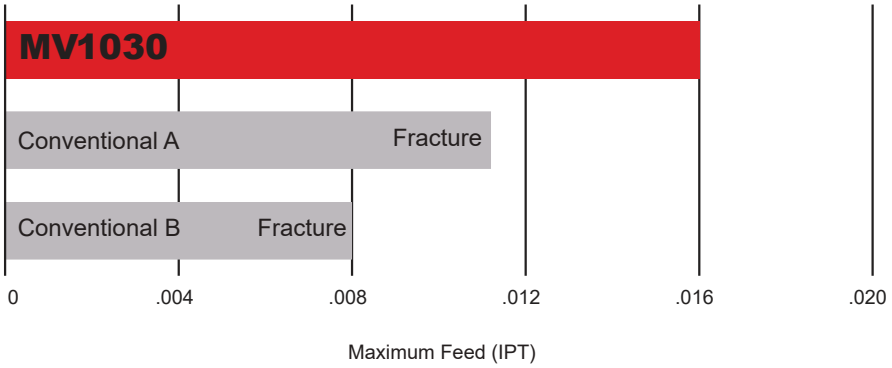
	Material	Properties	DCX=2.000", 2.500" (50mm, 63mm, 66 mm) Arbor Type			DCX=3.000", 4.000", 4.921", 6.299" (80 mm, 100 mm, 125 mm, 160 mm) Arbor Type			DCX=3.000", 4.000" (80 mm, 100 mm) Arbor Type		
			AJXU09 Type(2.000") AJXU12 Type(2.500")			AJXU14 Type AJX14 Type			AJXU12 Type		
			4 (Number of Teeth)			4 - 8 (Number of Teeth)			6 or 7 (Number of Teeth)		
			Over-hang	Axial Depth of Cut	Feed per Tooth (IPT)	Over-hang	Axial Depth of Cut	Feed per Tooth (IPT)	Over-hang	Axial Depth of Cut	Feed per Tooth (IPT)
P	Mild Steel	Hardness ≤180HB	6.0	.053	.051	7.0	.059	.059	7.0	.053	.051
			10.0	.046	.043	12.0	.051	.051	12.0	.046	.043
			14.0	.039	.035	18.0	.039	.039	18.0	.035	.031
	Carbon Steel Alloy Steel	Hardness 180—280HB	6.0	.053	.051	7.0	.059	.059	7.0	.053	.051
			10.0	.046	.043	12.0	.051	.051	12.0	.046	.043
			14.0	.039	.035	18.0	.039	.039	18.0	.035	.031
	Carbon Steel Alloy Steel	Hardness 280—350HB	6.0	.046	.051	7.0	.051	.059	7.0	.046	.051
			10.0	.039	.043	12.0	.043	.051	12.0	.039	.043
			14.0	.032	.035	18.0	.031	.039	18.0	.028	.031
	Alloy Tool Steel	Hardness ≤350HB (Annealing)	6.0	.046	.051	7.0	.051	.059	7.0	.046	.051
			10.0	.039	.043	12.0	.043	.051	12.0	.039	.043
			14.0	.032	.035	18.0	.031	.039	18.0	.028	.031
M	Stainless Steel	Hardness ≤200HB	6.0	.053	.043	7.0	.059	.051	7.0	.053	.043
			10.0	.046	.035	12.0	.051	.043	12.0	.046	.035
			14.0	.039	.028	18.0	.039	.031	18.0	.035	.024
K	Ductile Cast Iron	Tensile Strength ≤800MPa	6.0	.046	.051	7.0	.051	.059	7.0	.046	.051
			10.0	.039	.043	12.0	.043	.051	12.0	.039	.043
			14.0	.032	.035	18.0	.031	.039	18.0	.028	.031

Depth of cut of JL chipbreaker is up to .047 inch. (09, 12 size)

Cutting Performance

Comparison of fracture resistance for intermittent cutting of 4140 alloy steel

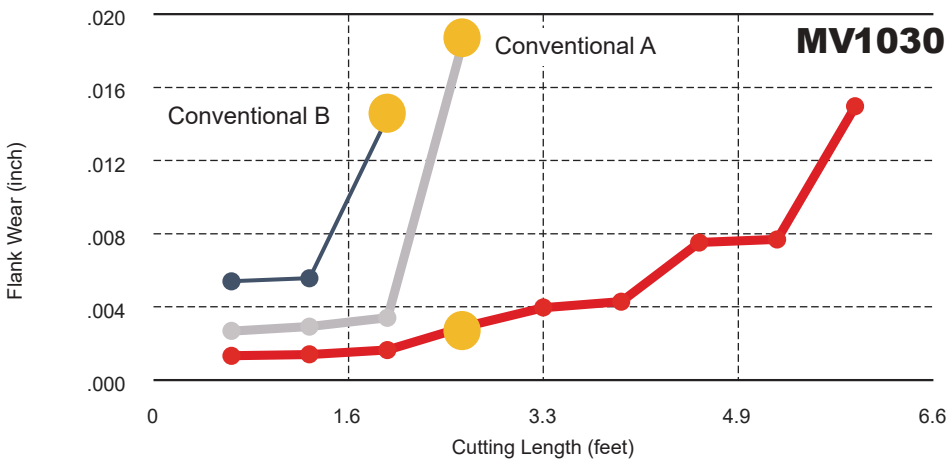
MV1030 is capable of high feed machining due to its excellent fracture resistance even during interrupted cutting.



<Cutting Conditions>
Material : AISI 4140
Tool : ASX445
Inserts : SEMT13T3AGSN-JM
Cutting Speed : vc=655 SFM
Depth of Cut : ap=.118 inch
Width of Cut : ae=3.937 inch
Cutting Mode : Dry Cutting

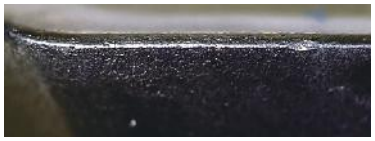
Comparison of wear resistance when machining stainless steel 304

MV1030 suppresses damage at the cut border and can be expected to significantly improve tool life.



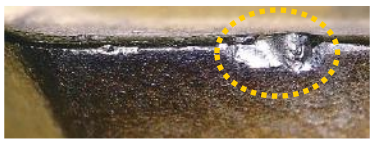
<Cutting Conditions>
Material : AISI 304
Tool : ASX445
Inserts : SEMT13T3AGSN-JM
Cutting Speed : vc=590 SFM
Feed per Tooth : fz=.008 IPT
Depth of Cut : ap=.079 inch
Width of Cut : ae=3.937 inch
Cutting Mode : Dry Cutting
Single Insert

●Photographed after Machining



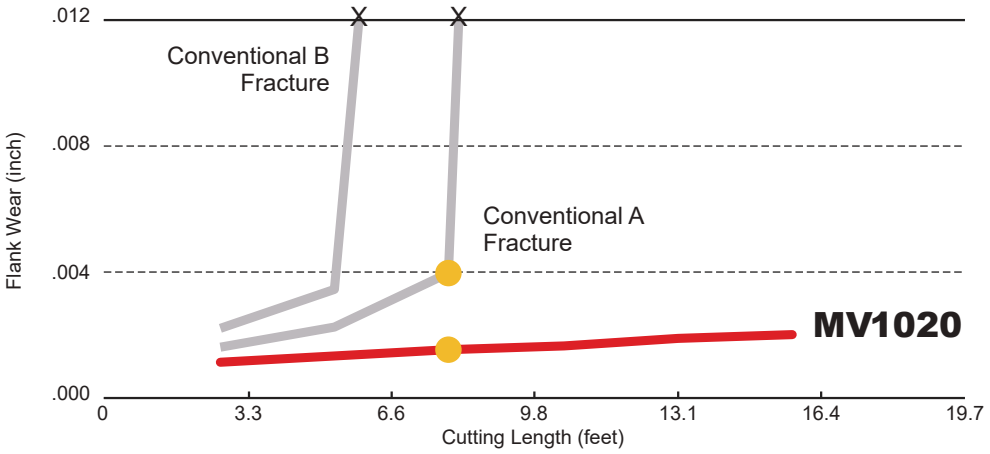
MV1030 After Machining 2.6 feet

Conventional A After Machining 2.6 feet



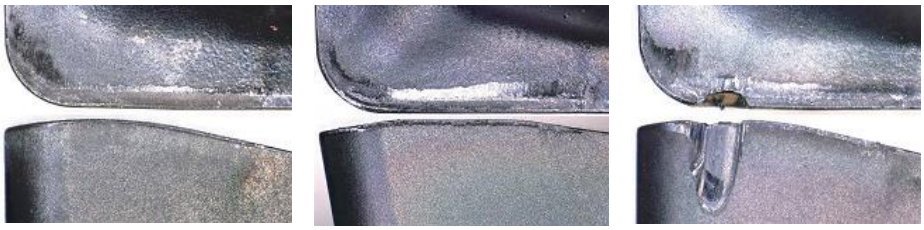
Conventional B After Machining 2.0 feet

Comparison of wear resistance when machining alloy steel 4140



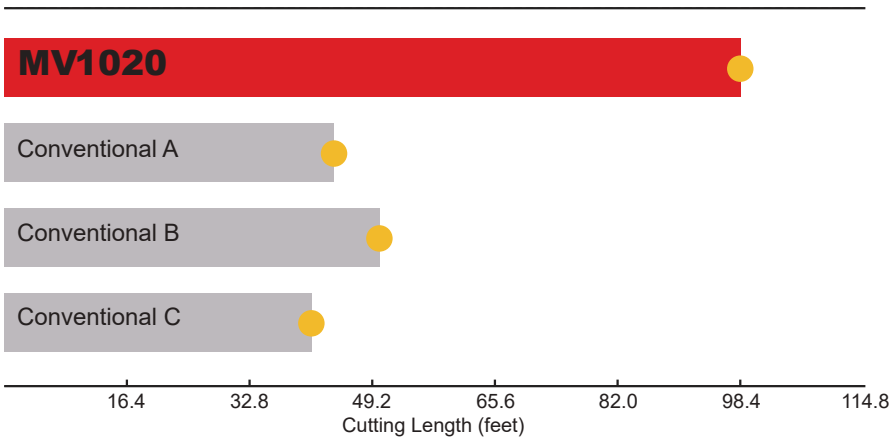
<Cutting Conditions>
Material : AISI 4140
Tool : WWX400
Inserts : 6NMU1409080PNER-M
Cutting Speed : vc=985 SFM
Feed per Tooth : fz=.006 IPT
Depth of Cut : ap=.118 inch
Width of Cut : ae=2.047 inch
Cutting Mode : Dry Cutting
Single Insert

* Taken after cutting length of 7.9 feet

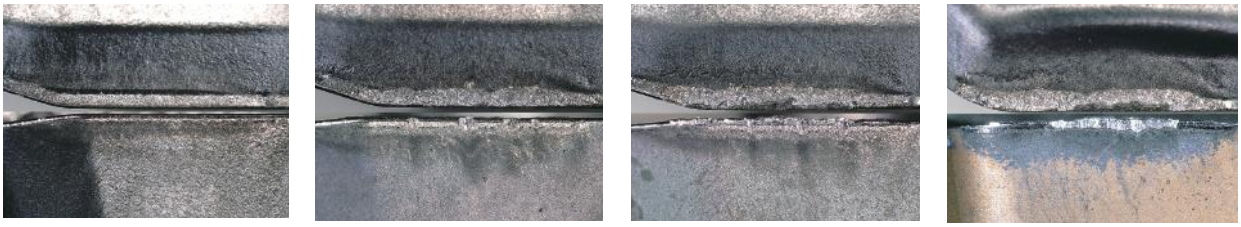


MV1020 | Conventional A | Conventional B

Comparison of wear resistance when machining ductile cast Iron 100-70-03



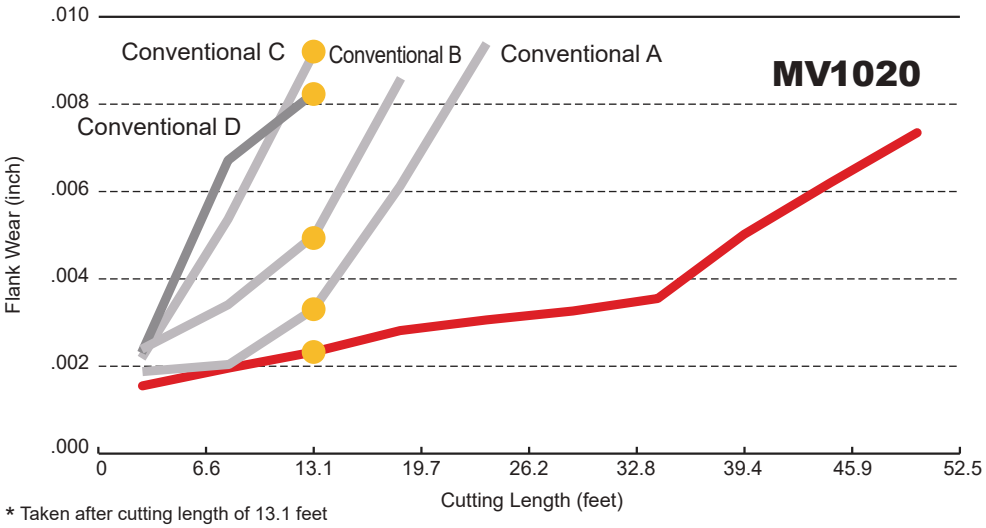
<Cutting Conditions>
Material : ASTM 100-70-03
Tool : WJX14
Inserts : JOMU140715ZZER-M
Cutting Speed : vc=720 SFM
Feed per Tooth : fz=.039 IPT
Depth of Cut : ap=.039 inch
Width of Cut : ae=1.772 inch
Cutting Mode : Dry Cutting
Single Insert



MV1020 (99.7 feet) | Conventional A (44.6 feet) | Conventional B (49.9 feet) | Conventional C (42.0 feet)

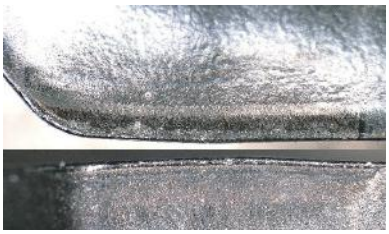
Cutting Performance

Comparison of wear resistance when machining ductile cast Iron 100-70-03



<Cutting Conditions>
Material : ASTM 100-70-03
Tool : AHX440S
Inserts : NNMU130508ZEN-M
Cutting Speed : vc=985 SFM
Feed per Tooth : fz=.004 IPT
Depth of Cut : ap=.079 inch
Width of Cut : ae=2.047 inch
Cutting Mode : Dry Cutting
Single Insert

* Taken after cutting length of 13.1 feet



MV1020

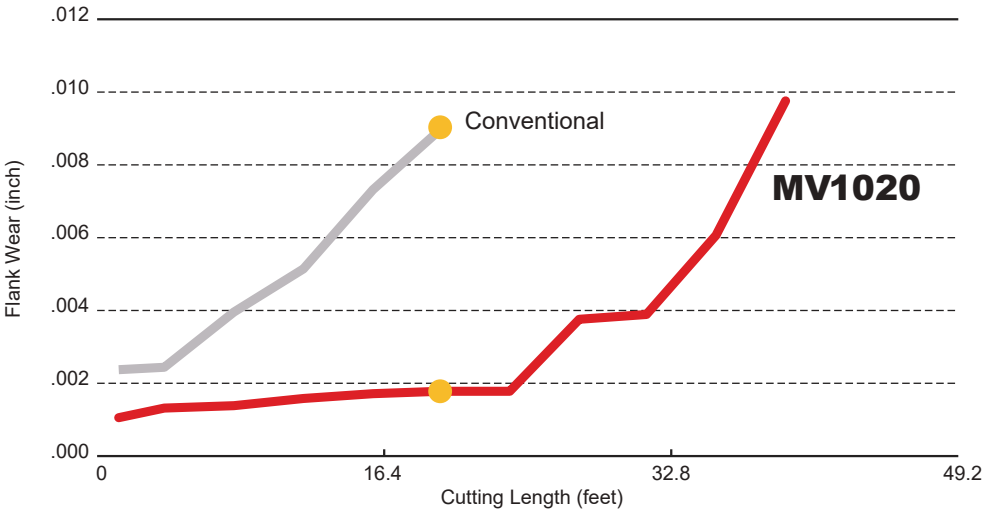
Conventional A

Conventional B

Conventional C

Conventional D

Comparison of wear resistance when machining alloy steel 4140



<Cutting Conditions>
Material : AISI 4140
Tool : WSX445
Inserts : SNMU140812ANER-M
Cutting Speed : vc=985 SFM
Feed per Tooth : fz=.008 IPT
Depth of Cut : ap=.079 inch
Width of Cut : ae=3.937 inch
Cutting Mode : Dry Cutting

39.4 feet cutting length achieved

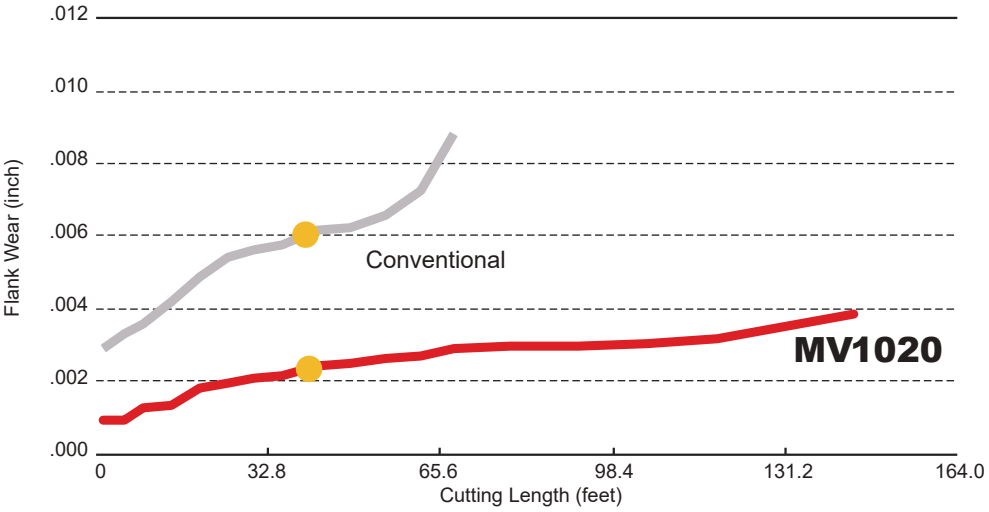
MV1020

Chipping occurs at cutting length of 19.7 feet

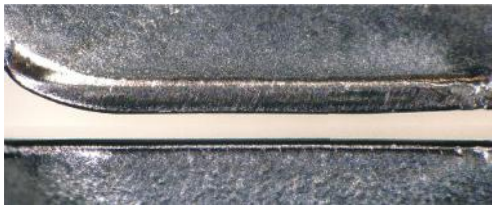
Conventional

* Taken after cutting length of 19.7 feet

Comparison of wear resistance for rolled steel JIS SS400

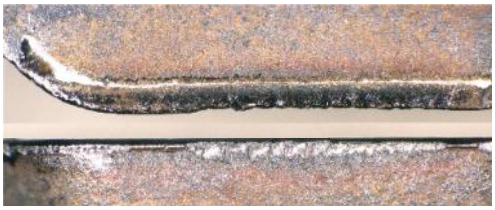


<Cutting Conditions>
Material : JIS SS400
Tool : ASX445
Inserts : SEMT13T3AGSN-JM
Cutting Speed : vc=985 SFM
Feed per Tooth : fz=.008 IPT
Depth of Cut : ap=.079 inch
Width of Cut : ae=3.937 inch
Cutting Mode : Dry Cutting



131.2 feet cutting length achieved

MV1020

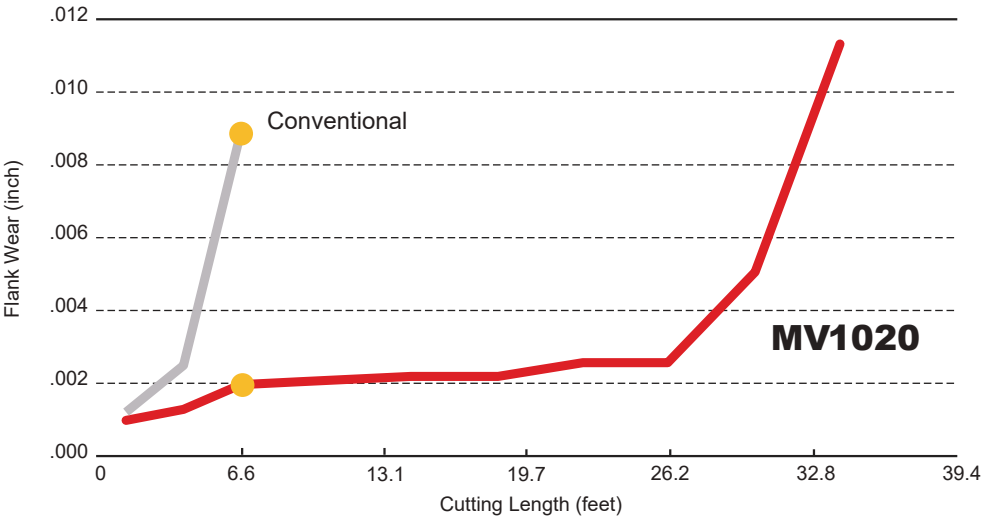


Wear progressed and the substrate was exposed

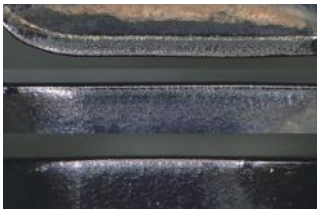
Conventional

* Taken after cutting length of 42.0 feet

Comparison of wear resistance when machining carbon steel 1055



<Cutting Conditions>
Material : AISI 1055
Tool : ASX445
Inserts : SEMT13T3AGSN-JM
Cutting Speed : vc=655 SFM
Feed per Tooth : fz=.008 IPT
Depth of Cut : ap=.079 inch
Width of Cut : ae=3.937 inch
Cutting Mode : Wet Cutting



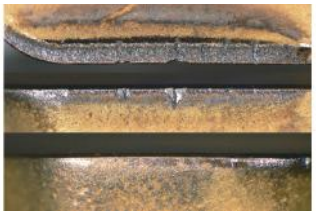
32.8 feet cutting length achieved

MV1020

Rake Face

Main Cutting Edge

Wiper



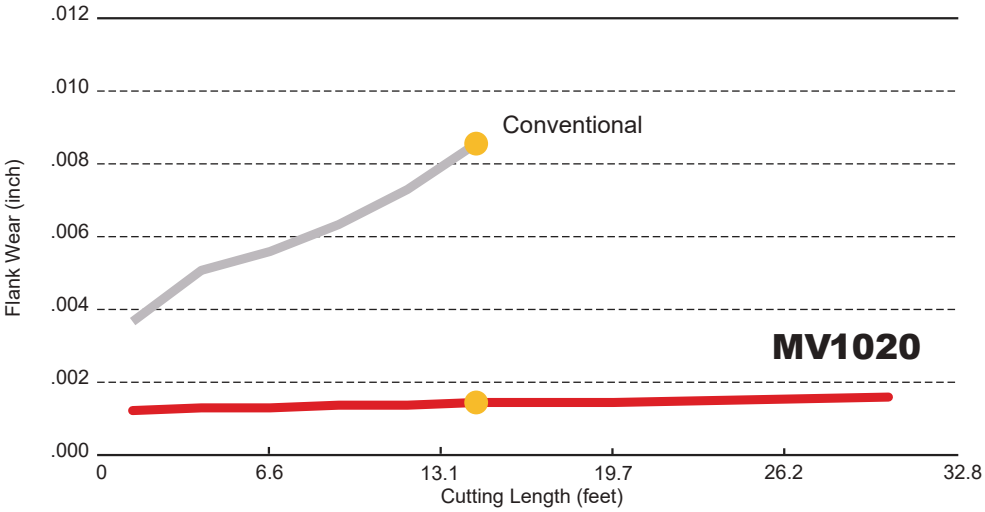
Chipping occurred due to thermal cracks at a cutting length of 6.6 feet

Conventional

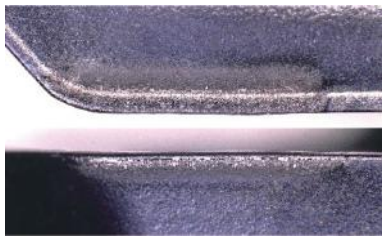
* Taken after cutting length of 6.6 feet

Cutting Performance

Comparison of wear resistance when machining ductile cast Iron 65-45-12



<Cutting Conditions>
Material : ASTM 65-45-12
Tool : ASX445
Inserts : SEMT13T3AGSN-JM
Cutting Speed : vc=820 SFM
Feed per Tooth : fz=.008 IPT
Depth of Cut : ap=.079 inch
Width of Cut : ae=3.937 inch
Cutting Mode : Dry Cutting



Achieves a cutting length of 29.5 feet or more

MV1020

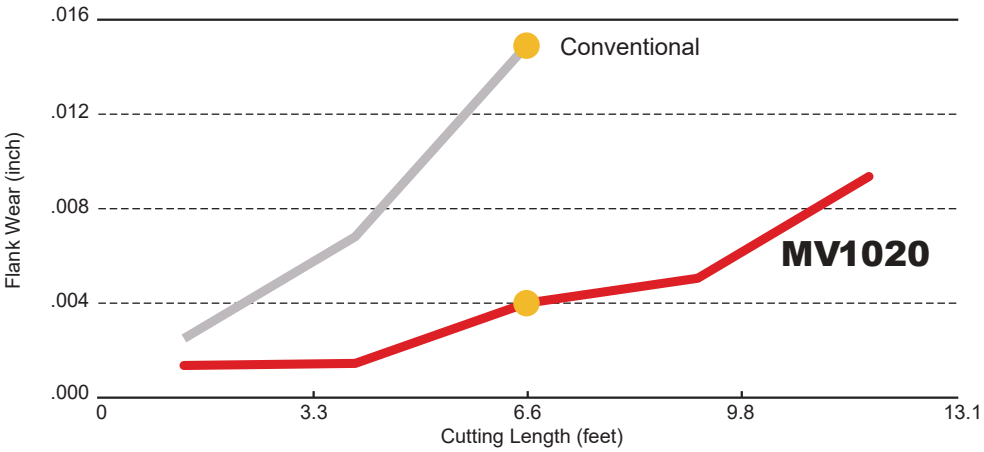
Unable to continue machining after a cut length of 14.4 feet

Conventional

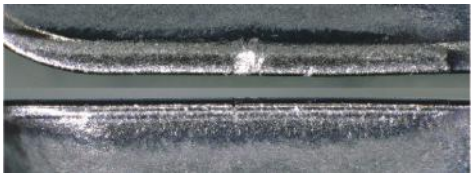
* Taken after cutting length of 14.4 feet

Comparison of wear resistance when machining ductile cast Iron 100-70-03

Wet Cutting

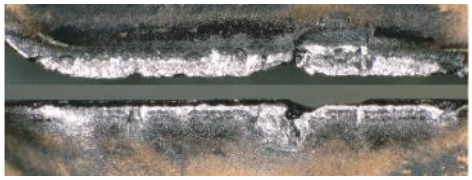


<Cutting Conditions>
Material : ASTM 100-70-03
Tool : ASX445
Inserts : SEMT13T3AGSN-JM
Cutting Speed : vc=655 SFM
Feed per Tooth : fz=.008 IPT
Depth of Cut : ap=.079 inch
Width of Cut : ae=3.937 inch
Cutting Mode : Wet Cutting



11.5 feet cutting length achieved

MV1020



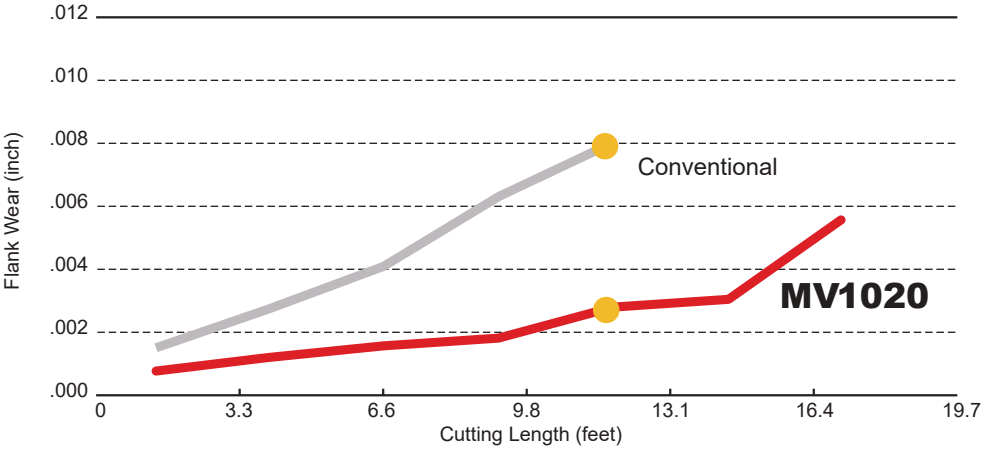
Unable to continue processing with a cut length of 6.6 feet

Conventional

* Taken after cutting length of 6.6 feet

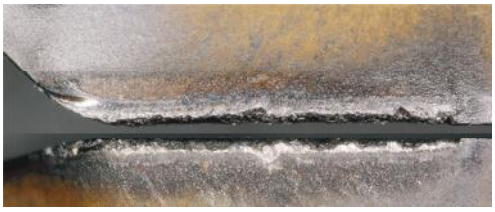
Comparison of wear resistance when machining ductile cast Iron 100-70-03

Dry Cutting



<Cutting Conditions>
Material : ASTM 100-70-03
Tool : ASX445
Inserts : SEMT13T3AGSN-JM
Cutting Speed : vc=655 SFM
Feed per Tooth : fz=.008 IPT
Depth of Cut : ap=.079 inch
Width of Cut : ae=3.937 inch
Cutting Mode : Dry Cutting

16.4 feet cutting length achieved
MV1020



Chipping occurred due to peeling of the coating
Conventional

* Taken after cutting length of 11.8 feet

MITSUBISHI MATERIALS U.S.A.

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(Moldino CS)

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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.

B270A-US-2025.4