DIA EDGE

TOOL NEWS B270B

Coated Carbide Grade for Milling

MV1000 Series

NEW Products

Setting a New Standard for Tool Life

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

MITSUBISHI MATERIALS CORPORATION

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

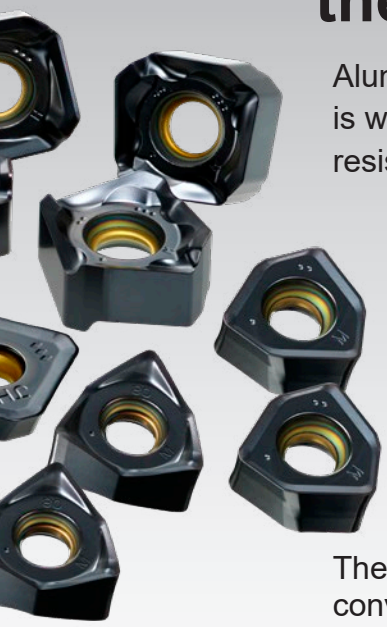
Excellent chipping resistance for stable machining
Newly developed bonding layer

Fracture resistance for the ultimate stability
Exclusive cemented carbide substrate

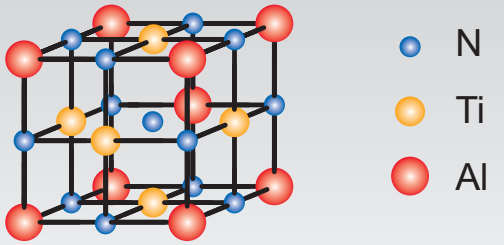
Complete Coating Technology that Topples Current Tool Life Standards

Due to

the Newly Developed Al-Rich Coating

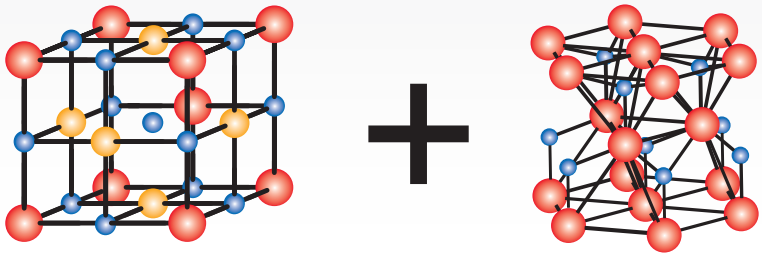


Aluminium titanium nitride (Al,Ti)N is a compound of aluminium and titanium that is widely used as a coating for cutting tools due to its extremely hard and heat-resistant properties.



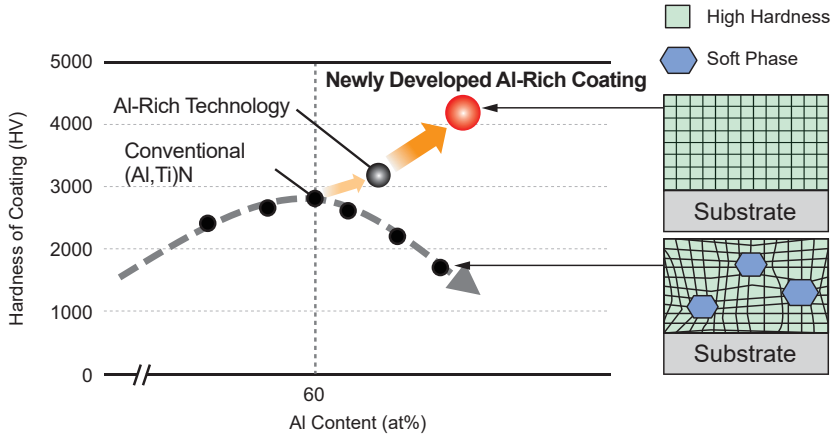
The combination of atoms with different sizes creates an exceptionally hard crystal structure.

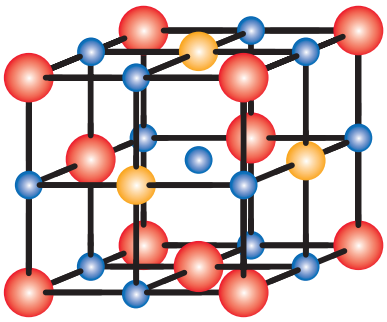
The hardness of (Al,Ti)N increases as the Al content ratio increases, but with conventional technology, when the Al content ratio exceeds 60%, the crystal structure changes and the hardness of (Al,Ti)N decreases.



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

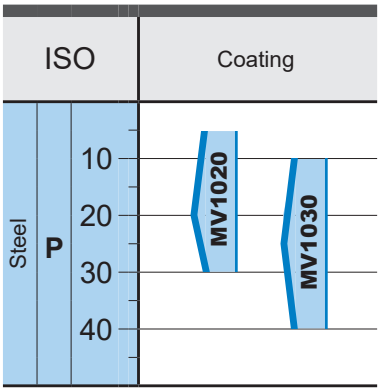
MV1020

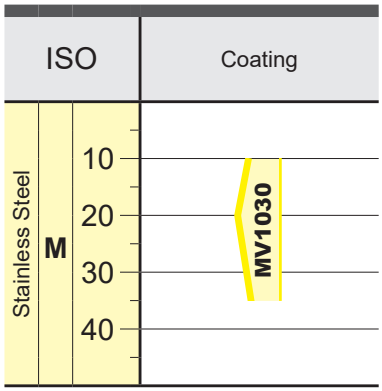
This grade has advanced wear and thermal shock resistance and also achieves stable cutting at unprecedented cutting speeds especially when machining steel and ductile cast iron, thus greatly reducing work time.

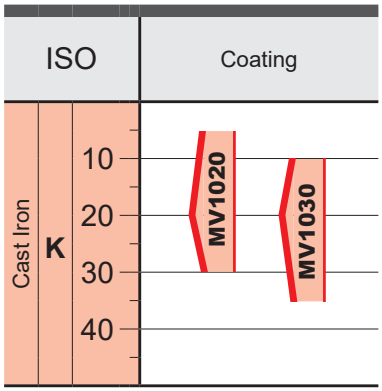
Coated Carbide Grade for Milling

MV1030

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







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

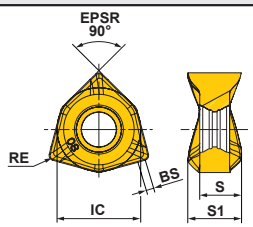
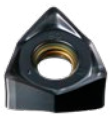
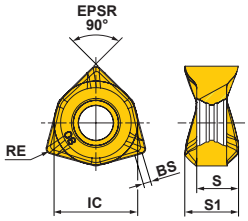
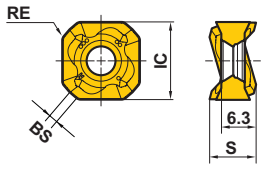
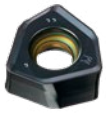
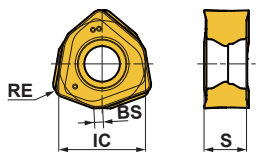
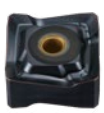
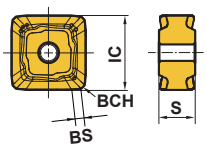
Inserts

(mm)

Workpiece Material		
P	Steel	◆ ◆
M	Stainless Steel	◇
K	Cast Iron	◆ ◆

Please note that the cutting conditions differ depending on multiple factors, for more details refer to the Recommended Cutting Conditions.

Edge Preparation : E : Round

Shape	Application	Order Number	Class	Edge Preparation	Coated MV1020	Coated MV1030	IC	S	S1	BS	RE/ BCH	Geometry
WWX200 	General Purpose Cutting	NEW **6NMU0906040PNER-M**	M	E	●		9.0	5.3	6.1	1.6	0.4	
	General Purpose Cutting	NEW **6NMU0906080PNER-M**	M	E	●		9.0	5.3	6.1	1.2	0.8	
	Cutting Edge Strength	NEW **6NMU0906080PNER-R**	M	E	●		9.0	5.3	6.1	1.2	0.8	
WWX400 	Low Cutting Resistance	**6NGU1409040PNER-L**	G	E	●	●	14.0	7.0	9.0	1.7	0.4	
	Low Cutting Resistance	**6NGU1409080PNER-L**	G	E	●	●	14.0	7.0	9.0	1.3	0.8	
	General Purpose Cutting	NEW **6NGU1409040PNER-M**	G	E	●	●	14.0	7.0	9.0	1.7	0.4	
	General Purpose Cutting	NEW **6NGU1409080PNER-M**	G	E	●	●	14.0	7.0	9.0	1.3	0.8	
	General Purpose Cutting	**6NMU1409040PNER-M**	M	E	●	●	14.0	7.0	9.0	1.7	0.4	
	General Purpose Cutting	**6NMU1409080PNER-M**	M	E	●	●	14.0	7.0	9.0	1.3	0.8	
	General Purpose Cutting	NEW **6NMU1409160PNER-M**	M	E	●	●	14.0	7.0	9.0	0.5	1.6	
	General Purpose Cutting	NEW **6NMU1409200PNER-M**	M	E	●	●	14.0	7.0	9.0	0.5	2.0	
	Cutting Edge Strength	**6NMU1409080PNER-R**	M	E	●	●	14.0	7.0	9.0	1.3	0.8	
	Cutting Edge Strength	NEW **6NMU1409160PNER-R**	M	E	●	●	14.0	7.0	9.0	0.5	1.6	
	Cutting Edge Strength	NEW **6NMU1409200PNER-R**	M	E	●	●	14.0	7.0	9.0	0.5	2.0	
WSX445 	Low Cutting Resistance	**SNGU140812ANER-L**	G	E	●	●	14.0	8.4	–	1.5	1.2	
	General Purpose Cutting	**SNGU140812ANER-M**	G	E	●	●	14.0	8.4	–	1.5	1.2	
	General Purpose Cutting	**SNMU140812ANER-M**	M	E	●	●	14.0	8.4	–	1.5	1.2	
	Cutting Edge Strength	**SNMU140812ANER-R**	M	E	●	●	14.0	8.4	–	1.5	1.2	
	Cutting Edge Strength	**SNMU140812ANER-H**	M	E	●	●	14.0	8.4	–	1.5	1.2	
WJX 	Low Cutting Resistance	**JOMU090512ZZER-L**	M	E	●	●	9.525	4.73	–	0.88	1.2	
	Low Cutting Resistance	**JOMU140715ZZER-L**	M	E	●	●	14.0	6.58	–	1.3	1.5	
	General Purpose Cutting	**JOMU090512ZZER-M**	M	E	●	●	9.525	4.75	–	0.88	1.2	
	General Purpose Cutting	**JOMU140715ZZER-M**	M	E	●	●	14.0	6.63	–	1.3	1.5	
	Cutting Edge Strength	**JOMU090512ZZER-R**	M	E	●	●	9.525	4.83	–	0.88	1.2	
	Cutting Edge Strength	**JOMU140715ZZER-R**	M	E	●	●	14.0	6.75	–	1.3	1.5	
WSF406W 	Cast Iron Milling	NEW **SNMU1206C05ZNER-M**	M	E	●	●	12.7	6.2	–	1.6	0.5	

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

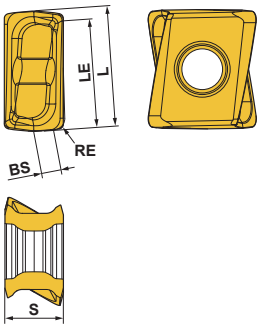
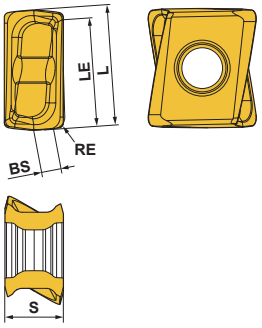
Coated Carbide Grade for Milling

(mm)

Workpiece Material			MV1020	MV1030
	P	Steel	◆	◆
	M	Stainless Steel		◇
	K	Cast Iron	◆	◆

Please note that the cutting conditions differ depending on multiple factors, for more details refer to the Recommended Cutting Conditions.

Edge Preparation : E : Round

Shape	Application	Order Number	Class	Edge Preparation	Coated MV1020	Coated MV1030	L	RE	LE	S	RE	Geometry
VPX200	Low Cutting Resistance	**LOGU0904020PNER-L**	G	E	●	●	8.7	4.3	7.6	1.7	0.2	
		LOGU0904040PNER-L	G	E	●	●	8.7	4.3	7.6	1.5	0.4	
		LOGU0904080PNER-L	G	E	●	●	8.7	4.3	7.6	1.2	0.8	
		LOGU0904100PNER-L	G	E	●	●	8.7	4.3	7.6	1.0	1.0	
		LOGU0904120PNER-L	G	E	●	●	8.7	4.3	7.6	0.8	1.2	
		LOGU0904160PNER-L	G	E	●	●	8.7	4.3	7.6	0.5	1.6	
	General Purpose Cutting	**LOGU0904020PNER-M**	G	E	●	●	8.7	4.3	7.6	1.7	0.2	
		LOGU0904040PNER-M	G	E	●	●	8.7	4.3	7.6	1.6	0.4	
		LOGU0904080PNER-M	G	E	●	●	8.7	4.3	7.6	1.2	0.8	
		LOGU0904100PNER-M	G	E	●	●	8.7	4.3	7.6	1.0	1.0	
		LOGU0904120PNER-M	G	E	●	●	8.7	4.3	7.6	0.9	1.2	
		LOGU0904160PNER-M	G	E	●	●	8.7	4.3	7.6	0.5	1.6	
VPX300	Low Cutting Resistance	**LOGU1207020PNER-L**	G	E	●	●	12.4	7.0	11.3	3.0	0.2	
		LOGU1207040PNER-L	G	E	●	●	12.4	7.0	11.3	2.8	0.4	
		LOGU1207080PNER-L	G	E	●	●	12.4	7.0	11.3	2.6	0.8	
		LOGU1207100PNER-L	G	E	●	●	12.4	7.0	11.3	2.5	1.0	
		LOGU1207120PNER-L	G	E	●	●	12.4	7.0	11.3	2.4	1.2	
		LOGU1207160PNER-L	G	E	●	●	12.4	7.0	11.3	1.8	1.6	
		LOGU1207200PNER-L	G	E	●	●	12.4	7.0	11.3	1.4	2.0	
		LOGU1207240PNER-L	G	E	●	●	12.4	7.0	11.3	1.2	2.4	
		LOGU1207300PNER-L	G	E	●	●	12.4	7.0	11.3	0.6	3.0	
		LOGU1207320PNER-L	G	E	●	●	12.4	7.0	11.3	0.4	3.2	
	General Purpose Cutting	**LOGU1207020PNER-M**	G	E	●	●	12.4	7.0	11.3	3.0	0.2	
		LOGU1207040PNER-M	G	E	●	●	12.4	7.0	11.3	2.8	0.4	
		LOGU1207080PNER-M	G	E	●	●	12.4	7.0	11.3	2.4	0.8	
		LOGU1207100PNER-M	G	E	●	●	12.4	7.0	11.3	2.3	1.0	
		LOGU1207120PNER-M	G	E	●	●	12.4	7.0	11.3	2.1	1.2	
		LOGU1207160PNER-M	G	E	●	●	12.4	7.0	11.3	1.7	1.6	
		LOGU1207200PNER-M	G	E	●	●	12.4	7.0	11.3	1.4	2.0	
		LOGU1207240PNER-M	G	E	●	●	12.4	7.0	11.3	1.0	2.4	
		LOGU1207300PNER-M	G	E	●	●	12.4	7.0	11.3	0.5	3.0	
		LOGU1207320PNER-M	G	E	●	●	12.4	7.0	11.3	0.3	3.2	

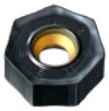
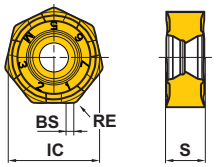
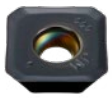
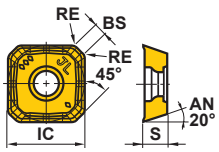
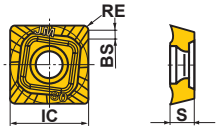
● : Inventory maintained in Japan.
(10 inserts in one case)

(mm)

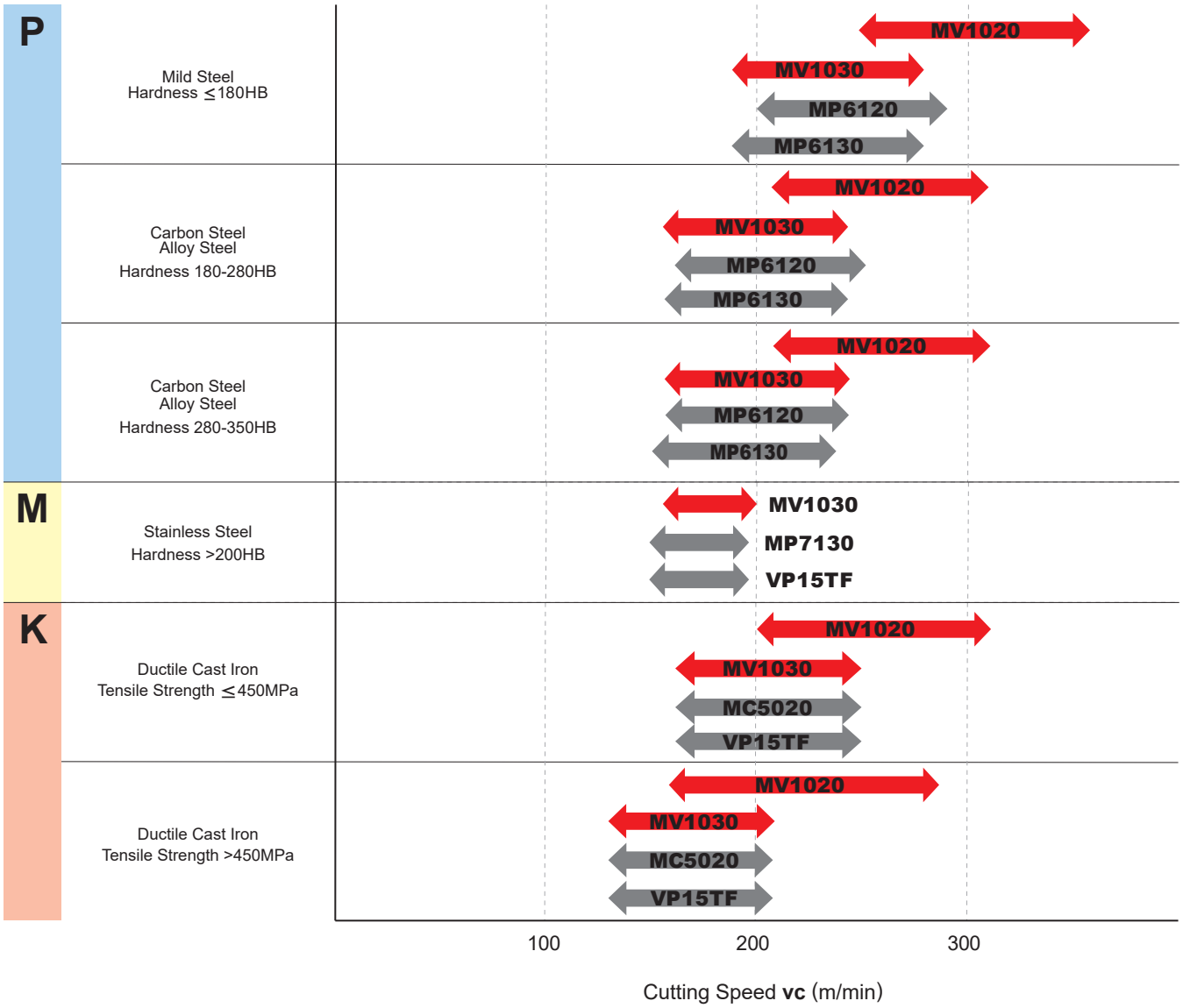
Workpiece Material			
P	Steel	◆	◆
M	Stainless Steel		◇
K	Cast Iron	◆	◆

Please note that the cutting conditions differ depending on multiple factors, for more details refer to the Recommended Cutting Conditions.

Edge Preparation : E : Round **S :** Chamfer + Hone

Shape	Application	Order Number	Class	Edge Preparation	Coated MV1020	Coated MV1030	IC	S	S1	BS	RE	Geometry
AHX440/475 	Low Cutting Resistance	**NNMU130508ZER-L**	M	E	●	●	13.4	5.77	–	1.0	0.8	
	General Purpose Cutting	**NNMU130508ZEN-M**	M	E	●	●	13.4	5.57	–	1.0	0.8	
	General Purpose Cutting	**NNMU130532ZEN-M**	M	E	●	●	13.4	5.57	–	–	3.2	
	Cutting Edge Strength	**NNMU130532ZEN-R**	M	E	●	●	13.4	5.47	–	–	3.2	
ASX445 	Finish-Light Cutting	**SEET13T3AGEN-JL**	E	E	●	●	13.4	3.97	–	1.9	1.5	
	Light-Rough Cutting	**SEMT13T3AGSN-JM**	M	S	●	●	13.4	3.97	–	1.9	1.5	
	Medium-Heavy Cutting	**SEMT13T3AGSN-JH**	M	S	●	●	13.4	3.97	–	1.9	1.5	
	Cast Iron Milling	**SEMT13T3AGSN-FT**	M	S	●	●	13.4	3.97	–	1.9	1.5	
ASX400 	Finish-Light Cutting	**SOET12T308PEER-JL**	E	E	●	●	12.7	3.97	–	1.4	0.8	
	Light-Rough Cutting	**SOMT12T308PEER-JM**	M	E	●	●	12.7	3.97	–	1.4	0.8	
	Medium-Heavy Cutting	**SOMT12T308PEER-JH**	M	E	●	●	12.7	3.97	–	1.4	0.8	
	Heavy Interrupted Cutting	**SOMT12T320PEER-FT**	M	E	●	●	12.7	3.97	–	0.5	2.0	

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



Recommended Cutting Conditions

■ WWX200/400 Cutting Speed
Dry Cutting

(mm)

Workpiece Material		Properties	Cutting Conditions	MV1020 Width of Cut **ae** 0.5DC≥	MV1020 0.8DC≥	MV1020 DC(Slot)	MV1030 Width of Cut **ae** 0.5DC≥	MV1030 0.8DC≥	MV1030 DC(Slot)
				Cutting Speed **vc** (m/min)			Cutting Speed **vc** (m/min)		
P	Mild Steel	Hardness ≤180HB	●	300(250–350)	280(230–330)	250(200–300)	230(190–270)	210(170–250)	190(150–230)
			●	290(240–340)	260(210–320)	240(190–290)	230(190–270)	210(170–250)	190(150–230)
	Carbon Steel Alloy Steel	Hardness 180–350HB	●	260(210–310)	240(190–280)	210(160–260)	200(160–240)	180(140–220)	160(120–200)
			●	250(200–300)	230(180–270)	200(150–250)	200(160–240)	180(140–220)	160(120–200)
M	Stainless Steel	–	●	–	–	–	180(160–200)	160(140–180)	–
			●	–	–	–	170(150–190)	150(130–170)	–
K	Ductile Cast Iron	Tensile Strength ≤450MPa	●	240(200–310)	220(170–280)	200(150–260)	210(170–250)	190(150–230)	170(130–210)
			●	230(190–300)	210(160–270)	190(140–250)	210(170–250)	190(150–230)	170(130–210)
		Tensile Strength ≤800MPa	●	210(160–280)	190(140–250)	160(120–210)	170(130–210)	150(110–190)	130(90–170)
			●	200(150–270)	180(130–240)	150(110–200)	170(130–210)	150(110–190)	130(90–170)

■ WWX200/400 Cutting Speed
Wet Cutting

(mm)

Workpiece Material		Properties	Cutting Conditions	MV1020 Width of Cut **ae** 0.5DC≥	MV1020 0.8DC≥	MV1020 DC(Slot)	MV1030 Width of Cut **ae** 0.5DC≥	MV1030 0.8DC≥	MV1030 DC(Slot)
				Cutting Speed **vc** (m/min)			Cutting Speed **vc** (m/min)		
P	Mild Steel	Hardness ≤180HB	●	220(210–230)	190(180–210)	180(160–190)	140(130–150)	120(110–130)	110(100–120)
			●	210(200–220)	180(170–200)	170(150–180)	140(130–150)	120(110–130)	110(100–120)
	Carbon Steel Alloy Steel	Hardness 180–350HB	●	200(190–210)	170(160–190)	160(150–170)	140(130–150)	120(110–130)	110(100–120)
			●	190(180–200)	160(150–180)	150(140–160)	140(130–150)	120(110–130)	110(100–120)
K	Ductile Cast Iron	Tensile Strength ≤450MPa	●	200(180–240)	180(150–220)	150(130–200)	160(140–180)	140(120–160)	120(100–140)
			●	190(170–230)	170(140–210)	140(120–190)	160(140–180)	140(120–160)	120(100–140)
		Tensile Strength ≤800MPa	●	180(170–210)	160(150–190)	140(120–160)	150(140–160)	130(120–140)	110(100–120)
			●	170(160–200)	150(140–180)	120(110–150)	150(140–160)	130(120–140)	110(100–120)

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.

Recommended Cutting Conditions

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

(mm)

Workpiece Material		Properties	Cutting Conditions	Width of Cut **ae**								
				0.5DC≥			0.8DC≥			DC(Slot)		
				Breaker	Depth of Cut **ap**	Feed **fz** (mm/t.)	Breaker	Depth of Cut **ap**	Feed **fz** (mm/t.)	Breaker	Depth of Cut **ap**	Feed **fz** (mm/t.)
P	Mild Steel	Hardness ≤180HB	● ●	L–M	≤3.0	0.13(0.10–0.15)	L–M	≤3.0	0.13(0.10–0.15)	L–M	≤2.0	0.13(0.10–0.15)
			●	M–R	v3.0	0.16(0.10–0.20)	M–R	≤3.0	0.16(0.10–0.20)	–	–	–
	Carbon Steel Alloy Steel	Hardness 180–350HB	● ●	L–M	≤3.0	0.13(0.10–0.15)	L–M	≤3.0	0.13(0.10–0.15)	L–M	≤2.0	0.13(0.10–0.15)
			●	M–R	≤3.0	0.16(0.10–0.20)	M–R	≤3.0	0.16(0.10–0.20)	–	–	–
K	Ductile Cast Iron	Tensile Strength ≤450MPa	● ●	L–M	≤3.0	0.13(0.10–0.15)	L–M	≤3.0	0.13(0.10–0.15)	L–M	≤2.0	0.13(0.10–0.15)
			●	M–R	≤3.0	0.16(0.10–0.20)	M–R	≤3.0	0.16(0.10–0.20)	–	–	–
		Tensile Strength ≤800MPa	● ●	L–M	≤3.0	0.13(0.10–0.15)	L–M	≤3.0	0.13(0.10–0.15)	L–M	≤2.0	0.13(0.10–0.15)
			●	M–R	≤3.0	0.16(0.10–0.20)	M–R	≤3.0	0.16(0.10–0.20)	–	–	–

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

(mm)

Workpiece Material		Properties	Cutting Conditions	Width of Cut **ae**								
				0.5DC≥			0.8DC≥			DC(Slot)		
				Breaker	Depth of Cut **ap**	Feed **fz** (mm/t.)	Breaker	Depth of Cut **ap**	Feed **fz** (mm/t.)	Breaker	Depth of Cut **ap**	Feed **fz** (mm/t.)
P	Mild Steel	Hardness ≤180HB	● ●	L–M	≤4.0	0.13(0.10–0.15)	L–M	≤3.0	0.13(0.10–0.15)	L–M	≤2.0	0.13(0.10–0.15)
			●	M–R	≤4.0	0.16(0.10–0.20)	M–R	≤3.0	0.16(0.10–0.20)	–	–	–
	Carbon Steel Alloy Steel	Hardness 180–350HB	● ●	L–M	≤4.0	0.13(0.10–0.15)	L–M	≤3.0	0.13(0.10–0.15)	L–M	≤2.0	0.13(0.10–0.15)
			●	M–R	≤4.0	0.16(0.10–0.20)	M–R	≤3.0	0.16(0.10–0.20)	–	–	–
M	Stainless Steel	–	● ●	L–M	≤2.0	0.13(0.1–0.15)	L–M	≤2.0	0.13(0.1–0.15)	–	–	–
K	Ductile Cast Iron	Tensile Strength ≤450MPa	● ●	L–M	≤4.0	0.13(0.10–0.15)	L–M	≤3.0	0.13(0.10–0.15)	L–M	≤2.0	0.13(0.10–0.15)
			●	M–R	≤4.0	0.16(0.10–0.20)	M–R	≤3.0	0.16(0.10–0.20)	–	–	–
		Tensile Strength ≤800MPa	● ●	L–M	≤4.0	0.13(0.10–0.15)	L–M	≤3.0	0.13(0.10–0.15)	L–M	≤2.0	0.13(0.10–0.15)
			●	M–R	≤4.0	0.16(0.10–0.20)	M–R	≤3.0	0.16(0.10–0.20)	–	–	–

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

■ WSX445 Cutting Speed
Dry and Wet Cutting

(mm)

	Workpiece Material	Properties	MV1020 Cutting Speed **vc** (m/min) Dry Cutting	MV1020 Cutting Speed **vc** (m/min) Wet Cutting	MV1030 Cutting Speed **vc** (m/min) Dry Cutting	MV1030 Cutting Speed **vc** (m/min) Wet Cutting
P	Mild Steel	Hardness ≤180HB	300(200–400)	220(120–320)	250(200–300)	150(100–200)
P	Carbon Steel Alloy Steel	Hardness 180–350HB	260(170–350)	200(100–300)	220(170–270)	120(80–160)
P	Carbon Steel Alloy Steel	Hardness 280–350HB	180(100–250)	150(100–200)	180(100–250)	120(80–160)
M	Stainless Steel	–	–	–	200(150–250)	–
K	Ductile Cast Iron	Tensile Strength ≤450MPa	240(130–350)	200(130–250)	160(110–240)	150(100–200)
K	Ductile Cast Iron	Tensile Strength ≤800MPa	220(80–350)	180(80–230)	180(110–250)	140(80–200)

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

(mm)

	Workpiece Material	Properties	Depth of Cut **ap** / Feed per Tooth **fz**									
			Finish-Light Cutting		Light Cutting		Medium Cutting		Rough Cutting		Heavy Cutting	
			fz (mm/t.)	**ap**	**fz** (mm/t.)	**ap**	**fz** (mm/t.)	**ap**	**fz** (mm/t.)	**ap**	**fz** (mm/t.)	**ap**
P			L Breaker		L,M Breaker		M Breaker		M,R Breaker		R,H Breaker	
P	Mild Steel	Hardness ≤180HB	0.15 (0.1–0.2)	≤1.0	0.15 (0.1–0.2)	≤2.0	0.2 (0.15–0.25)	≤3.0	0.2 (0.15–0.25)	≤4.0	0.25 (0.2–0.3)	≤5.0
P	Carbon Steel Alloy Steel	Hardness 180–280HB	0.15 (0.1–0.2)	≤1.0	0.15 (0.1–0.2)	≤2.0	0.2 (0.15–0.25)	≤3.0	0.2 (0.15–0.25)	≤4.0	0.25 (0.2–0.3)	≤5.0
P	Carbon Steel Alloy Steel	Hardness 280–350HB	0.15 (0.1–0.2)	≤1.0	0.15 (0.1–0.2)	≤2.0	0.2 (0.15–0.25)	≤3.0	0.2 (0.15–0.25)	≤4.0	0.25 (0.2–0.3)	≤5.0
M			L Breaker		L,M Breaker		M Breaker		M,R Breaker		R,H Breaker	
M	Stainless Steel	–	0.15 (0.1–0.2)	≤1.0	0.15 (0.1–0.2)	≤2.0	0.2 (0.15–0.25)	≤3.0	–	–	–	–
K			L Breaker		L,M Breaker		M Breaker		M,R Breaker		R,H Breaker	
K	Ductile Cast Iron	Tensile Strength ≤450MPa	0.15 (0.1–0.2)	≤1.0	0.15 (0.1–0.2)	≤2.0	0.2 (0.15–0.25)	≤3.0	0.2 (0.15–0.25)	≤4.0	0.25 (0.2–0.3)	≤5.0
K	Ductile Cast Iron	Tensile Strength ≤800MPa	0.15 (0.1–0.2)	≤1.0	0.15 (0.1–0.2)	≤2.0	0.2 (0.15–0.25)	≤3.0	0.2 (0.15–0.25)	≤4.0	0.25 (0.2–0.3)	≤5.0

Recommended Cutting Conditions

Chip Breaker Selection Table

■ WJX09

(mm)

	Workpiece Material	Properties	L Breaker		M Breaker		R Breaker	
			Cutting Conditions	Depth of Cut **ap**	Cutting Conditions	Depth of Cut **ap**	Cutting Conditions	Depth of Cut **ap**
P	Mild Steel	Hardness ≤180HB	● ◐	≤1.0	● ◐	≤1.5	◐ ❄	≤1.5
	Carbon Steel Alloy Steel	Hardness 180–350HB	● ◐	≤1.0	● ◐	≤1.5	◐ ❄	≤1.5
M	Stainless Steel	–	○ ◔	≤1.0	○ ◔	≤1.0	–	–
K	Ductile Cast Iron	Tensile Strength ≤450MPa	● ◐	≤1.0	● ◐	≤1.5	◐ ❄	≤1.5
		Tensile Strength ≤800MPa	● ◐	≤1.0	● ◐	≤1.0	◐ ❄	≤1.0

■ WJX14

(mm)

	Workpiece Material	Properties	L Breaker		M Breaker		R Breaker	
			Cutting Conditions	Depth of Cut **ap**	Cutting Conditions	Depth of Cut **ap**	Cutting Conditions	Depth of Cut **ap**
P	Mild Steel	Hardness ≤180HB	● ◐	≤2.0	● ◐	≤3.0	◐ ❄	≤3.0
	Carbon Steel Alloy Steel	Hardness 180–350HB	● ◐	≤2.0	● ◐	≤3.0	◐ ❄	≤3.0
M	Stainless Steel	–	○ ◔	≤1.5	○ ◔	≤1.5	–	–
K	Ductile Cast Iron	Tensile Strength ≤450MPa	● ◐	≤2.0	● ◐	≤3.0	–	–
		Tensile Strength ≤800MPa	● ◐	≤2.0	● ◐	≤2.0	–	–

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

■ WJX09 Cutting Speed
Dry Cutting

(mm)

	Workpiece Material	Properties	MV1020	MV1030
			Cutting Speed **vc** (m/min)	Cutting Speed **vc** (m/min)
P	Mild Steel	Hardness ≤180HB	230(180–280)	160(100–220)
P	Carbon Steel Alloy Steel	Hardness 180–350HB	220(170–270)	150(80–220)
M	Stainless Steel	Hardness ≤200HB	–	160(130–200)
M	Stainless Steel	Hardness >200HB	–	140(80–200)
K	Ductile Cast Iron	Tensile Strength ≤450MPa	210(160–260)	160(120–210)
K	Ductile Cast Iron	Tensile Strength ≤800MPa	190(140–240)	130(90–170)

■ WJX09 Depth of Cut / Feed per Tooth
Dry Cutting

(mm)

	Workpiece Material	Properties	Breaker	Depth of Cut **ap**	Cutting Dia. Max. DCX=25, 28 (Z=2) Feed **fz** (mm/t.)	Cutting Dia. Max. DCX=25, 28 (Z=3) Feed **fz** (mm/t.)	Cutting Dia. Max. DCX≥32 Feed **fz** (mm/t.)
P	Mild Steel	Hardness ≤180HB	M, R	≤0.5	1.3(0.4–2.0)	1.3(0.4–2.0)	1.5(0.5–2.0)
				≤1.0	1.0(0.3–1.3)	0.8(0.3–1.0)	1.2(0.4–1.5)
				≤1.5	0.6(0.3–1.0)	–	0.8(0.4–1.2)
			L	≤0.5	1.2(0.4–1.6)	1.2(0.4–1.6)	1.2(0.4–1.6)
				≤1.0	0.8(0.3–1.2)	0.8(0.3–1.0)	1.0(0.4–2.5)
	Carbon Steel Alloy Steel	Hardness 180–350HB	M, R	≤0.5	1.3(0.4–1.7)	1.3(0.4–1.7)	1.5(0.4–2.0)
				≤1.0	0.8(0.3–1.0)	0.7(0.3–0.9)	1.0(0.3–1.3)
				≤1.5	0.5(0.3–0.7)	–	0.7(0.3–1.0)
			L	≤0.5	1.2(0.3–1.5)	1.2(0.3–1.5)	1.2(0.3–1.5)
				≤1.0	0.7(0.2–1.0)	0.7(0.2–0.9)	0.7(0.2–1.0)
M	Stainless Steel	–	L	≤0.5	0.8(0.3–1.0)	0.8(0.3–1.0)	0.8(0.3–1.0)
				≤1.0	1.0(0.4–1.2)	1.0(0.4–1.2)	1.0(0.4–1.2)
			M	≤0.5	0.6(0.2–0.8)	0.6(0.2–0.8)	0.6(0.2–0.8)
				≤1.0	0.8(0.3–1.0)	0.8(0.3–1.0)	0.8(0.3–1.0)
K	Ductile Cast Iron	Tensile Strength ≤450MPa	M, R	≤0.5	1.3(0.4–1.7)	1.3(0.4–1.7)	1.5(0.4–2.0)
				≤1.0	0.8(0.3–1.0)	0.7(0.3–0.9)	1.0(0.3–1.3)
				≤1.5	0.5(0.3–0.7)	–	0.7(0.3–1.0)
			L	≤0.5	1.0(0.3–1.3)	1.0(0.3–1.3)	1.0(0.3–1.3)
				≤1.0	0.8(0.2–1.0)	0.7(0.2–0.9)	0.8(0.2–1.2)
		Tensile Strength ≤800MPa	M, R	≤0.5	1.0(0.2–1.5)	1.0(0.2–1.5)	1.3(0.3–1.7)
				≤1.0	0.8(0.2–1.0)	0.6(0.2–0.8)	1.0(0.3–1.2)
			L	≤0.5	0.8(0.3–1.2)	0.8(0.3–1.2)	0.8(0.3–1.2)
				≤1.0	0.5(0.2–0.8)	0.5(0.2–0.8)	0.5(0.2–0.8)

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%.

Recommended Cutting Conditions

■ WJX14 Cutting Speed

Dry Cutting

(mm)

	Workpiece Material	Properties	MV1020 Cutting Speed **vc** (m/min)	MV1030 Cutting Speed **vc** (m/min)
P	Mild Steel	Hardness ≤180HB	220(170–270)	130(80–180)
	Carbon Steel Alloy Steel	Hardness 180–350HB	200(150–250)	120(60–180)
M	Stainless Steel	Hardness ≤200HB	–	160(130–200)
		Hardness >200HB	–	140(100–200)
K	Ductile Cast Iron	Tensile Strength ≤450MPa	200(150–250)	150(100–200)
		Tensile Strength ≤800MPa	180(130–230)	120(80–160)

■ WJX14 Depth of Cut / Feed per Tooth
Dry Cutting

(mm)

	Workpiece Material	Properties	Breaker	Depth of Cut **ap**	Cutting Dia. Max. DCX=50, 52 Feed **fz** (mm/t.)	Cutting Dia. Max. DCX≥63 Feed **fz** (mm/t.)
P	Mild Steel	Hardness ≤180HB	M,R	≤1.0	1.5(0.6–2.5)	1.7(0.6–2.8)
				≤1.5	1.3(0.6–2.0)	1.5(0.6–2.5)
				≤2.0	1.2(0.6–2.0)	1.3(0.6–2.5)
				≤2.5	0.8(0.3–1.5)	1.0(0.3–1.6)
				≤3.0	0.4(0.2–1.0)	0.5(0.2–1.2)
			L	≤1.0	1.2(0.4–2.0)	1.2(0.4–2.0)
				≤1.5	1.0(0.4–1.8)	1.0(0.4–2.5)
				≤2.0	0.8(0.4–1.7)	0.8(0.4–1.7)
	Carbon Steel Alloy Steel	Hardness 180–350HB	M,R	≤1.0	1.5(0.5–2.0)	1.7(0.5–2.5)
				≤1.5	1.2(0.5–1.7)	1.3(0.5–2.2)
				≤2.0	1.0(0.5–1.5)	1.2(0.5–2.0)
				≤2.5	0.7(0.3–1.2)	0.9(0.3–1.5)
				≤3.0	0.3(0.2–0.8)	0.4(0.2–1.0)
			L	≤1.0	1.0(0.3–1.7)	1.0(0.3–1.7)
				≤1.5	0.8(0.3–1.5)	0.8(0.3–1.5)
				≤2.0	0.7(0.3–1.2)	0.7(0.3–1.2)
M	Stainless Steel	Hardness ≤200HB	M	≤1.0	1.0(0.5–1.2)	1.0(0.5–1.2)
				≤1.5	1.0(0.5–1.0)	1.0(0.5–1.0)
			L	≤1.0	0.8(0.3–1.2)	0.8(0.3–1.2)
				≤1.5	0.8(0.3–1.0)	0.8(0.3–1.0)
		Hardness >200HB	M	≤1.0	1.0(0.5–1.2)	1.0(0.5–1.2)
				≤1.5	1.0(0.5–1.0)	1.0(0.5–1.0)
			L	≤1.0	0.8(0.3–1.2)	0.8(0.3–1.2)
				≤1.5	0.8(0.3–1.0)	0.8(0.3–1.0)
K	Ductile Cast Iron	Tensile Strength ≤450MPa	M	≤1.0	1.5(0.5–2.0)	1.7(0.5–2.5)
				≤1.5	1.3(0.5–1.8)	1.5(0.5–2.0)
				≤2.0	1.2(0.5–1.8)	1.3(0.5–2.0)
				≤2.5	0.7(0.3–1.2)	0.9(0.3–1.5)
				≤3.0	0.3(0.2–0.8)	0.4(0.2–1.0)
			L	≤1.0	1.2(0.3–2.0)	1.2(0.3–2.0)
				≤1.5	1.0(0.3–1.7)	1.0(0.3–1.7)
				≤2.0	0.8(0.3–1.5)	0.8(0.3–1.5)
		Tensile Strength ≤800MPa	M	≤1.0	1.3(0.4–1.8)	1.5(0.4–2.0)
				≤1.5	1.2(0.4–1.5)	1.3(0.4–1.8)
				≤2.0	1.0(0.4–1.5)	1.2(0.4–1.8)
			L	≤1.0	1.0(0.3–1.7)	1.0(0.3–1.7)
				≤1.5	0.8(0.3–1.5)	0.8(0.3–1.5)
				≤2.0	0.7(0.3–1.2)	0.7(0.3–1.2)

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%.

Recommended Cutting Conditions

■ VPX200/300 Cutting Speed

Dry Cutting

Workpiece 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	280 (220–330)	230 (180–270)	270 (210–320)	220 (170–260)	220 (170–260)	180 (140–210)	220 (170–260)	180 (140–210)
	Carbon Steel Alloy Steel	Hardness 180–280HB	● ●	L	M	220 (170–260)	180 (140–210)	210 (160–240)	170 (130–200)	170 (130–200)	140 (110–160)	170 (130–200)	170 (130–200)
		Hardness 280–350HB	● ●	L	M	180 (140–210)	180 (140–210)	170 (130–200)	170 (130–200)	140 (110–160)	140 (110–160)	140 (110–160)	140 (110–160)
M	Stainless Steel	Hardness ≤200HB	● ●	L	M	–	180 (140–210)	–	170 (130–200)	–	140 (110–160)	–	140 (110–160)
		Hardness >200HB	● ●	L	M	–	150 (110–180)	–	140 (100–160)	–	110 (80–130)	–	110 (80–130)
K	Ductile Cast Iron	Tensile Strength ≤450MPa	● ●	M	L	200 (150–280)	150 (100–200)	190 (140–270)	140 (90–190)	170 (130–240)	125 (80–170)	170 (130–240)	100 (80–120)
		Tensile Strength ≤800MPa	● ●	M	L	180 (140–250)	150 (100–200)	170 (130–240)	140 (90–190)	150 (120–210)	125 (80–170)	150 (120–210)	150 (120–210)

Cutting Mode : Wet Cutting

Workpiece 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	210 (150–290)	140 (100–190)	200 (140–270)	130 (90–180)	150 (110–180)	100 (70–120)	150 (110–180)	100 (70–120)
	Carbon Steel Alloy Steel	Hardness 180–280HB	● ●	L	M	180 (140–210)	120 (90–140)	170 (120–200)	110 (80–130)	150 (110–180)	100 (70–120)	150 (110–180)	100 (70–120)
		Hardness 280–350HB	● ●	L	M	140 (110–160)	120 (90–140)	130 (90–150)	110 80–130)	120 (80–140)	100 (70–120)	120 (80–140)	120 (80–140)
K	Ductile Cast Iron	Tensile Strength ≤450MPa	● ●	M	L	180 (150–240)	130 (80–180)	170 (140–230)	120 (70–170)	150 (130–200)	105 (60–150)	150 (130–200)	105 (60–150)
		Tensile Strength ≤800MPa	● ●	M	L	160 (130–210)	130 (80–180)	150 (120–200)	120 (70–170)	130 (110–170)	105 (60–150)	130 (110–170)	105 (60–150)

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

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

(mm)

Workpiece Material		Properties	Width of Cut **ae**	Cutting Conditions	DC					
					ø16—ø18		ø20—ø25		ø28—ø63	
					Depth of Cut **ap**	Feed **fz** (mm/t.)	Depth of Cut **ap**	Feed **fz** (mm/t.)	Depth of Cut **ap**	Feed **fz** (mm/t.)
P	Mild Steel	Hardness ≤180HB	≤0.25DC	● ◔	≤6	0.10—0.15	≤8	0.10—0.20	≤8	0.10—0.25
			0.25—0.5DC	● ◔	≤5	0.08—0.12	≤8	0.10—0.15	≤8	0.10—0.20
			0.5—0.75DC	● ◔	≤4	0.08—0.12	≤6	0.08—0.12	≤6	0.10—0.15
			DC(溝)	● ◔	≤2	0.06—0.10	≤4	0.06—0.10	≤4	0.08—0.12
	Carbon Steel Alloy Steel	Hardness 180—280HB	≤0.25DC	● ◔	≤6	0.10—0.15	≤8	0.10—0.20	≤8	0.10—0.25
			0.25—0.5DC	● ◔	≤5	0.08—0.12	≤8	0.10—0.15	≤8	0.10—0.20
			0.5—0.75DC	● ◔	≤4	0.08—0.12	≤6	0.08—0.12	≤6	0.10—0.15
			DC(溝)	● ◔	≤2	0.06—0.10	≤4	0.06—0.10	≤4	0.08—0.12
		Hardness 280—350HB	≤0.25DC	● ◔	≤6	0.10—0.15	≤8	0.10—0.15	≤8	0.10—0.20
			0.25—0.5DC	● ◔	≤5	0.08—0.12	≤8	0.08—0.12	≤8	0.10—0.15
			0.5—0.75DC	● ◔	≤4	0.08—0.12	≤6	0.06—0.10	≤6	0.08—0.12
			DC(溝)	● ◔	≤2	0.06—0.10	≤4	0.06—0.10	≤4	0.06—0.10
M	Stainless Steel	—	≤0.25DC	◔ ◔	≤6	0.10—0.15	≤8	0.10—0.20	≤8	0.10—0.20
			0.25—0.5DC	◔ ◔	≤5	0.08—0.12	≤8	0.08—0.15	≤8	0.08—0.15
			0.5—0.75DC	◔ ◔	≤4	0.06—0.10	≤6	0.08—0.12	≤6	0.08—0.12
			DC(溝)	◔ ◔	≤2	0.06—0.10	≤4	0.06—0.10	≤4	0.06—0.10
K	Ductile Cast Iron	Tensile Strength ≤800MPa	≤0.25DC	● ◔	≤6	0.10—0.15	≤8	0.10—0.20	≤8	0.10—0.20
			0.25—0.5DC	● ◔	≤5	0.08—0.12	≤8	0.10—0.15	≤8	0.10—0.15
			0.5—0.75DC	● ◔	≤4	0.08—0.12	≤6	0.08—0.12	≤6	0.08—0.12
			DC(溝)	● ◔	≤2	0.06—0.10	≤4	0.06—0.10	≤4	0.06—0.10

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

Workpiece Material		Properties	Width of Cut **ae**	Cutting Conditions	DC			
					ø25		ø28—ø80	
					Depth of Cut **ap**	Feed **fz** (mm/t.)	Depth of Cut **ap**	Feed **fz** (mm/t.)
P	Mild Steel	Hardness ≤180HB	≤0.25DC	● ◔	≤11	0.10—0.20	≤11	0.10—0.30
			0.25—0.5DC	● ◔	≤11	0.10—0.15	≤11	0.10—0.25
			0.5—0.75DC	● ◔	≤8	0.08—0.12	≤8	0.10—0.20
			DC(Slot)	● ◔	≤5	0.06—0.10	≤5	0.08—0.15
	Carbon Steel Alloy Steel	Hardness 180—280HB	≤0.25DC	● ◔	≤11	0.10—0.20	≤11	0.10—0.30
			0.25—0.5DC	● ◔	≤11	0.10—0.15	≤11	0.10—0.25
			0.5—0.75DC	● ◔	≤8	0.08—0.12	≤8	0.10—0.20
			DC(Slot)	● ◔	≤5	0.06—0.10	≤5	0.08—0.15
		Hardness 280—350HB	≤0.25DC	● ◔	≤11	0.10—0.15	≤11	0.10—0.25
			0.25—0.5DC	● ◔	≤11	0.08—0.12	≤11	0.10—0.20
			0.5—0.75DC	● ◔	≤8	0.06—0.10	≤8	0.10—0.15
			DC(Slot)	● ◔	≤5	0.06—0.10	≤5	0.08—0.12
M	Stainless Steel	—	≤0.25DC	◔ ◔	≤11	0.10—0.20	≤11	0.10—0.20
			0.25—0.5DC	◔ ◔	≤11	0.08—0.15	≤11	0.08—0.15
			0.5—0.75DC	◔ ◔	≤8	0.08—0.12	≤8	0.08—0.12
			DC(Slot)	◔ ◔	≤5	0.06—0.10	≤5	0.06—0.10
K	Ductile Cast Iron	Tensile Strength ≤800MPa	≤0.25DC	● ◔	≤11	0.10—0.20	≤11	0.10—0.25
			0.25—0.5DC	● ◔	≤11	0.10—0.15	≤11	0.10—0.20
			0.5—0.75DC	● ◔	≤8	0.08—0.12	≤8	0.10—0.15
			DC(Slot)	● ◔	≤5	0.06—0.10	≤5	0.08—0.12

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.

Recommended Cutting Conditions

■ AHX440S
Dry Cutting

(mm)

	Workpiece Material	Properties	Cutting Speed **vc** (m/min)		Feed **fz** (mm/t.)	Depth of Cut **ap**	Width of Cut **ae**
			MV1020	**MV1030**			
P	Mild Steel	Hardness ≤180HB	300(200–400)	245(190–300)	0.3(0.2–0.4)	≤3	≤0.8DC
	Carbon Steel Alloy Steel	Hardness 180–280HB	260(170–350)	210(150–270)	0.3(0.2–0.4)	≤3	≤0.8DC
	Carbon Steel Alloy Steel	Hardness 280–350HB	180(100–250)	135(90–180)	0.3(0.2–0.4)	≤3	≤0.8DC
M	Stainless Steel	Hardness ≦200HB	–	185(120–250)	0.2(0.1-0.3)	≤3	≤0.8DC
		Hardness >200HB	–	140(80–200)	0.2(0.1-0.3)	≤3	≤0.8DC
K	Ductile Cast Iron	Tensile Strength ≤450MPa	240(130–350)	185(120–250)	0.2(0.1–0.3)	≤3	≤0.8DC
		Tensile Strength ≤800MPa	220(80–350)	150(100–200)	0.2(0.1–0.3)	≤3	≤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

(mm)

	Workpiece Material	Properties	Breaker	Cutting Speed **vc** (m/min)		Feed **fz** (mm/t.)	Depth of Cut **ap**	Width of Cut **ae**
				MV1020	**MV1030**			
P	Mild Steel	Hardness ≤180HB	R	220(170–270)	140(80–200)	0.6	≤1.6	≤0.5DC
			R	220(170–270)	140(80–200)	0.8	≤1.6	0.5DC<ae≤0.8DC
			M	220(170–270)	140(80–200)	1.0	≤1.6	0.8DC<ae≤DC
	Carbon Steel Alloy Steel	Hardness 180–280HB	R	200(150–250)	120(60–180)	0.6	≤1.6	≤0.5DC
			R	200(150–250)	120(60–180)	0.8	≤1.6	0.5DC<ae≤0.8DC
			M	200(150–250)	120(60–180)	1.0	≤1.6	0.8DC<ae≤DC
	Carbon Steel Alloy Steel	Hardness 280–350HB	R	150(100–200)	90(30–150)	0.5	≤1.6	<0.5DC
			R	150(100–200)	90(30–150)	0.6	≤1.6	0.5DC<ae≤0.8DC
			R	150(100–200)	90(30–150)	0.7	≤1.6	0.8DC<ae≤DC
K	Ductile Cast Iron	Tensile Strength ≤450MPa	R	200(150–250)	140(80–200)	0.6	≤1.6	≤0.5DC
			R	200(150–250)	140(80–200)	0.8	≤1.6	0.5DC<ae≤0.8DC
			M	200(150–250)	140(80–200)	1.0	≤1.6	0.8DC<ae≤DC
		Tensile Strength ≤800MPa	R	180(130–230)	140(80–200)	0.5	≤1.6	≤0.5DC
			R	180(130–230)	140(80–200)	0.6	≤1.6	0.5DC<ae≦0.8DC
			R	180(130–230)	140(80–200)	0.7	≤1.6	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%.

Cutting Conditions (Guide) :
● : Stable Cutting ◕ : General Cutting ✠ : Unstable Cutting

■ WSF406W
Dry Cutting

(mm)

	Workpiece Material	Properties	Cutting Conditions	Depth of Cut **ap**	Cutting Speed **vc** (m/min)		Feed **fz** (mm/t.)	Width of Cut **ae**
					MV1020	**MV1030**		
K	Gray Cast Iron (FC300 etc.)	Tensile Strength ≤350MPa	●	ap≤0.5mm	300(250—300)	150(100—200)	0.13(0.08—0.20)	≤0.8DC
				ap≤2.0mm	250(210—300)	150(100—200)	0.15(0.10—0.25)	≤0.8DC
				2.0mm<ap≤4.0mm	220(190—260)	140(80—200)	0.13(0.10—0.20)	≤0.8DC
				4.0mm< ap≤7.5mm	200(180—230)	110(60—160)	0.10(0.08—0.15)	≤0.8DC
			◕	ap≤0.5mm	250(210—300)	150(100—200)	0.13(0.08—0.20)	≤0.8DC
				ap≤2.0mm	220(190—260)	150(100—200)	0.15(0.10—0.25)	≤0.8DC
				2.0mm<ap≤4.0mm	200(180—230)	140(80—200)	0.13(0.10—0.20)	≤0.8DC
				4.0mm< ap≤7.5mm	180(160—210)	110(60—160)	0.10(0.08—0.15)	≤0.8DC
			✠	ap≤0.5mm	220(190—260)	140(80—200)	0.13(0.08—0.20)	≤0.8DC
				ap≤2.0mm	200(180—230)	140(80—200)	0.15(0.10—0.25)	≤0.8DC
				2.0mm<ap≤4.0mm	180(160—210)	110(60—160)	0.13(0.10—0.20)	≤0.8DC
				4.0mm< ap≤7.5mm	150(100—180)	80(40—120)	0.10(0.08—0.15)	≤0.8DC
	Ductile Cast Iron (FCD450 etc.)	Tensile Strength ≤450MPa	●	ap≤0.5mm	230(200—250)	110(60—160)	0.13(0.08—0.20)	≤0.8DC
				ap≤2.0mm	200(170—230)	110(60—160)	0.15(0.10—0.25)	≤0.8DC
				2.0mm<ap≤4.0mm	180(150—210)	90(50—130)	0.13(0.10—0.20)	≤0.8DC
				4.0mm< ap≤7.5mm	160(130—190)	70(40—100)	0.10(0.08—0.15)	≤0.8DC
			◕	ap≤0.5mm	200(170—230)	110(60—160)	0.13(0.08—0.20)	≤0.8DC
				ap≤2.0mm	180(150—210)	110(60—160)	0.15(0.10—0.25)	≤0.8DC
				2.0mm<ap≤4.0mm	160(130—190)	90(50—130)	0.13(0.10—0.20)	≤0.8DC
				4.0mm< ap≤7.5mm	140(110—170)	70(40—100)	0.10(0.08—0.15)	≤0.8DC
			✠	ap≤0.5mm	180(150—200)	90(50—130)	0.13(0.08—0.20)	≤0.8DC
				ap≤2.0mm	160(130—190)	90(50—130)	0.15(0.10—0.25)	≤0.8DC
				2.0mm<ap≤4.0mm	140(110—170)	70(40—100)	0.13(0.10—0.20)	≤0.8DC
				4.0mm< ap≤7.5mm	120(90—150)	60(30—90)	0.10(0.08—0.15)	≤0.8DC
	Ductile Cast Iron (FCD700 etc.)	Tensile Strength ≤800MPa	●	ap≤0.5mm	230(200—250)	110(60—160)	0.13(0.08—0.20)	≤0.8DC
				ap≤2.0mm	200(170—230)	110(60—160)	0.15(0.10—0.25)	≤0.8DC
				2.0mm<ap≤4.0mm	180(150—210)	90(50—130)	0.13(0.10—0.20)	≤0.8DC
				4.0mm< ap≤7.5mm	160(130—190)	70(40—100)	0.10(0.08—0.15)	≤0.8DC
			◕	ap≤0.5mm	200(170—230)	110(60—160)	0.13(0.08—0.20)	≤0.8DC
				ap≤2.0mm	180(150—210)	110(60—160)	0.15(0.10—0.25)	≤0.8DC
				2.0mm<ap≤4.0mm	160(130—190)	90(50—130)	0.13(0.10—0.20)	≤0.8DC
				4.0mm< ap≤7.5mm	140(110—170)	70(40—100)	0.10(0.08—0.15)	≤0.8DC
			✠	ap≤0.5mm	180(150—210)	90(50—130)	0.13(0.08—0.20)	≤0.8DC
				ap≤2.0mm	160(130—190)	90(50—130)	0.15(0.10—0.25)	≤0.8DC
				2.0mm<ap≤4.0mm	140(110—170)	70(40—100)	0.13(0.10—0.20)	≤0.8DC
				4.0mm< ap≤7.5mm	120(90—150)	60(30—90)	0.10(0.08—0.15)	≤0.8DC

Recommended Cutting Conditions

■ ASX445

Dry and Wet Cutting

(mm)

Workpiece Material		Properties	Cutting Speed **vc** (m/min)		Finish-Light Cutting		Light-Rough Cutting		Medium-Heavy Cutting	
			MV1020	**MV1030**	Feed **fz** (mm/t.)	Breaker	Feed **fz** (mm/t.)	Breaker	Feed **fz** (mm/t.)	Breaker
P	Mild Steel	Hardness ≤180HB	300(200—400)	275(200—350)	0.15(0.1—0.2)	JL	0.2(0.1—0.3)	JM	0.3(0.2—0.4)	JH
	Carbon Steel Alloy Steel	Hardness 180—280HB	260(170—350)	235(170—300)	0.15(0.1—0.2)	JL	0.2(0.1—0.3)	JM	0.3(0.2—0.4)	JH
		Hardness 280—350HB	180(100—250)	165(100—230)	0.15(0.1—0.2)	JL	0.2(0.1—0.3)	JM	0.3(0.2—0.4)	JH
M	Stainless Steel	—	—	220(170—270)	0.15(0.1—0.2)	JL	0.2(0.1—0.3)	JM	0.3(0.2—0.4)	JH
K	Ductile Cast Iron	Tensile Strength ≤450MPa	240(130—350)	190(130—250)	0.15(0.1—0.2)	JL	0.2(0.1—0.3)	JM	0.3(0.2—0.4)	JH FT
		Tensile Strength >450MPa	220(80—350)	110(80—150)	0.15(0.1—0.2)	JL	0.2(0.1—0.3)	JM	0.3(0.2—0.4)	JH FT

■ ASX400

Dry and Wet Cutting

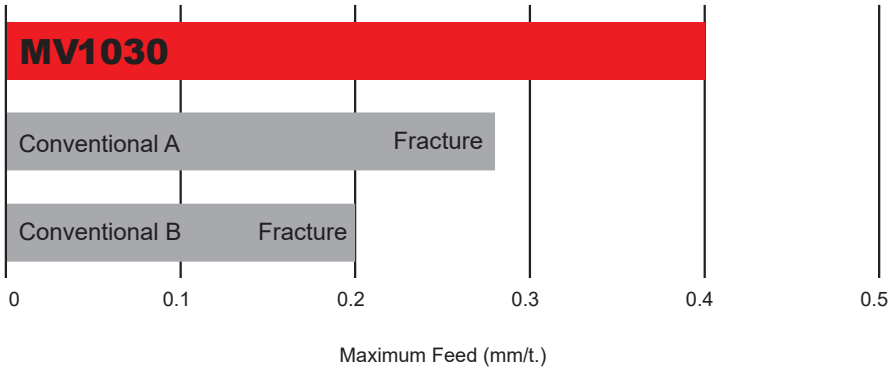
(mm)

Workpiece Material		Properties	Cutting Speed **vc** (m/min)		Finish-Light Cutting		Light-Rough Cutting		Medium-Heavy Cutting	
			MV1020	**MV1030**	Feed **fz** (mm/t.)	Breaker	Feed **fz** (mm/t.)	Breaker	Feed **fz** (mm/t.)	Breaker
P	Mild Steel	Hardness ≤180HB	300(200—400)	275(200—350)	0.18(0.08—0.28)	JL	0.20(0.10—0.30)	JM	0.25(0.10—0.35)	JH
	Carbon Steel Alloy Steel	Hardness 180—280HB	260(170—350)	235(170—300)	0.15(0.07—0.23)	JL	0.18(0.10—0.28)	JM	0.20(0.10—0.30)	JH
		Hardness 280—350HB	180(100—250)	165(100—230)	0.13(0.06—0.20)	JL	0.15(0.10—0.25)	JM	0.18(0.10—0.28)	JH
M	Stainless Steel	—	—	220(170—270)	0.15(0.07—0.23)	JL	0.18(0.10—0.28)	JM	0.20(0.10—0.30)	JH FT
K	Ductile Cast Iron	Tensile Strength ≤450MPa	240(130—350)	190(130—250)	0.18(0.10—0.28)	JL	0.20(0.10—0.30)	JM	0.25(0.10—0.35)	JH FT
		Tensile Strength >450MPa	220(80—350)	110(80—150)	0.18(0.10—0.28)	JL	0.20(0.10—0.30)	JM	0.25(0.10—0.35)	JH FT

Cutting Performance

Comparison of fracture resistance for intermittent cutting of SCM440 alloy steel

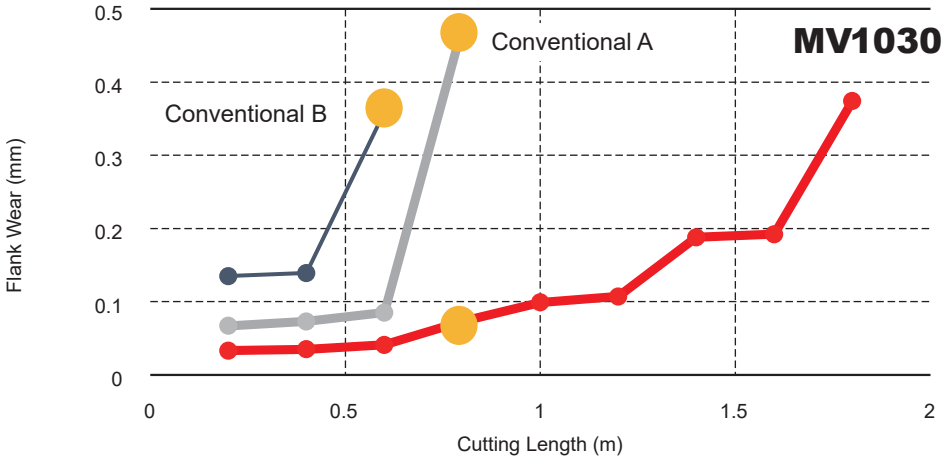
MV1030 is capable of high feed machining due to its excellent fracture resistance even during interrupted cutting.



<Cutting Conditions>
Workpiece
Material : JIS SCM440
Tool : ASX445
Inserts : SEMT13T3AGSN-JM
Cutting Speed : vc=200 m/min
Depth of Cut : ap=3.0 mm
Width of Cut : ae=100 mm
Cutting Mode : Dry Cutting

Comparison of wear resistance when machining stainless steel SUS304

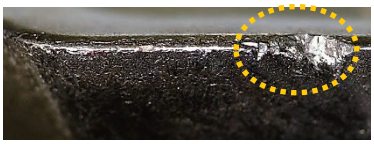
MV1030 suppresses damage at the cut border and can be expected to significantly improve tool life.



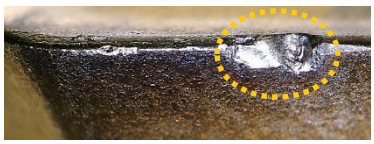
<Cutting Conditions>
Workpiece
Material : JIS SUS304
Tool : ASX445
Inserts : SEMT13T3AGSN-JM
Cutting Speed : vc=180 m/min
Feed per Tooth : fz=0.2 mm/t.
Depth of Cut : ap=2.0 mm
Width of Cut : ae=100 mm
Cutting Mode : Dry Cutting
Single Insert

●Photographed after Machining

MV1030 After Machining 0.8 m



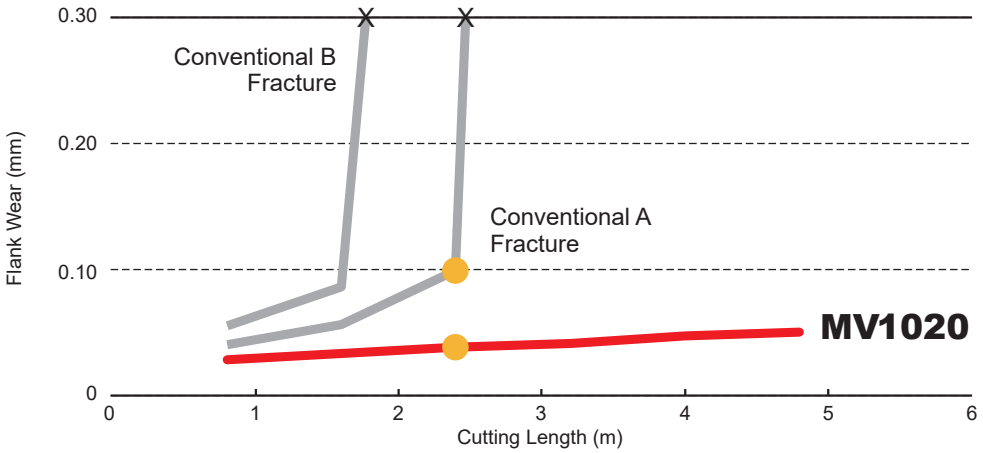
Conventional A After Machining 0.8 m



Conventional B After Machining 0.6 m

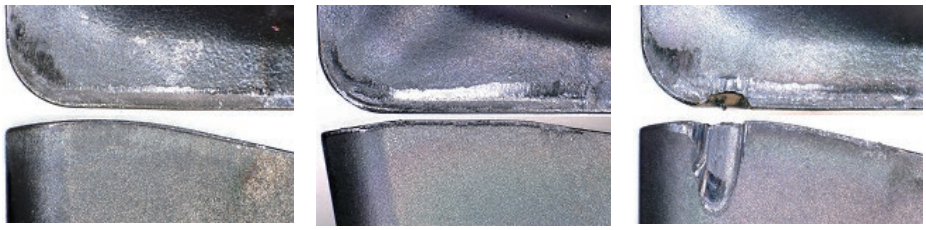
Cutting Performance

Comparison of wear resistance when machining alloy steel SCM440



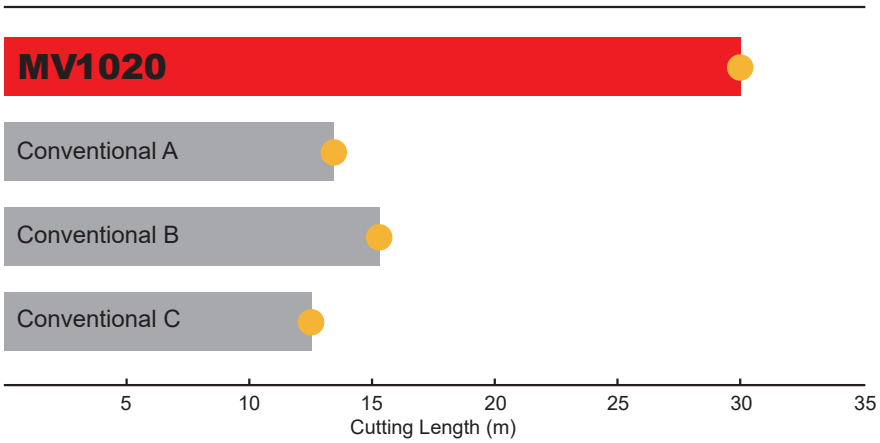
<Cutting Conditions>
Workpiece
Material : JIS SCM440
Tool : WWX400
Inserts : 6NMU1409080PNER-M
Cutting Speed : vc=300 m/min
Feed per Tooth : fz=0.15 mm/t.
Depth of Cut : ap=3.0 mm
Width of Cut : ae=52 mm
Cutting Mode : Dry Cutting
Single Insert

* Taken after cutting length of 2.4 m

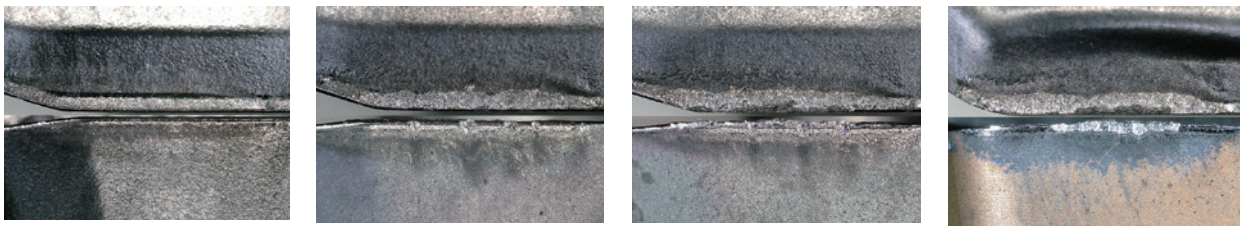


MV1020 | Conventional A | Conventional B

Comparison of wear resistance when machining ductile cast Iron FCD700

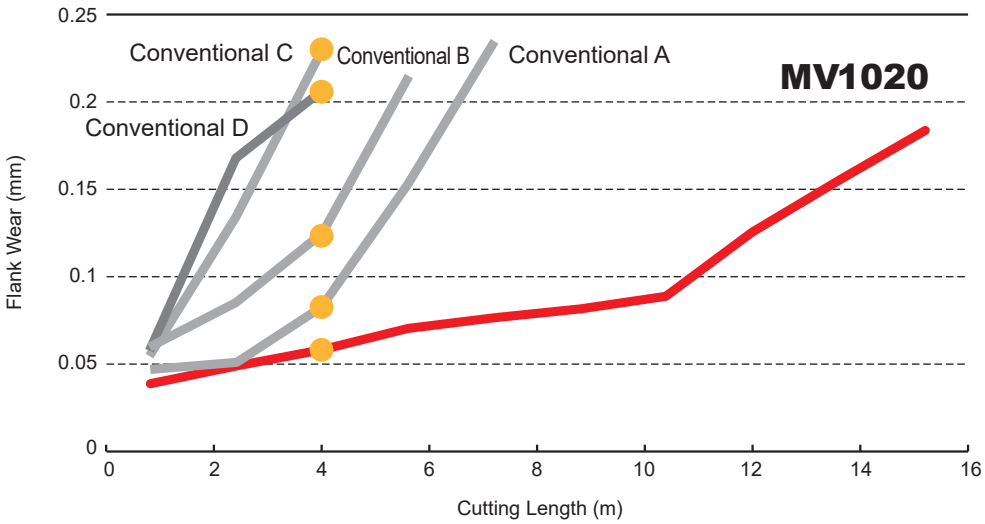


<Cutting Conditions>
Workpiece
Material : JIS FCD700
Tool : WJX14
Inserts : JOMU140715ZZER-M
Cutting Speed : vc=220 m/min
Feed per Tooth : fz=1.0 mm/t.
Depth of Cut : ap=1.0 mm
Width of Cut : ae=45 mm
Cutting Mode : Dry Cutting
Single Insert



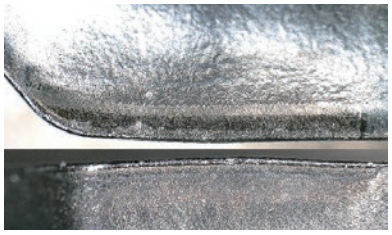
MV1020 (30.4 m) | Conventional A (13.6 m) | Conventional B (15.2 m) | Conventional C (12.8 m)

Comparison of wear resistance when machining ductile cast Iron FCD700

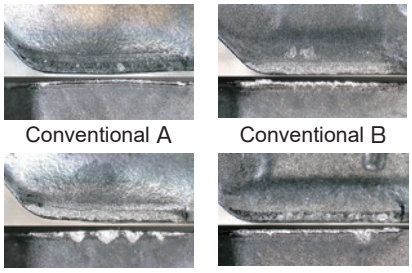


<Cutting Conditions>
Workpiece
Material : JIS FCD700
Tool : AHX440
Inserts : NNMU130508ZEN-M
Cutting Speed : vc=300 m/min
Feed per Tooth : fz=0.1 mm/t.
Depth of Cut : ap=2.0 mm
Width of Cut : ae=52 mm
Cutting Mode : Dry Cutting
Single Insert

* Taken after cutting length of 4.0 m



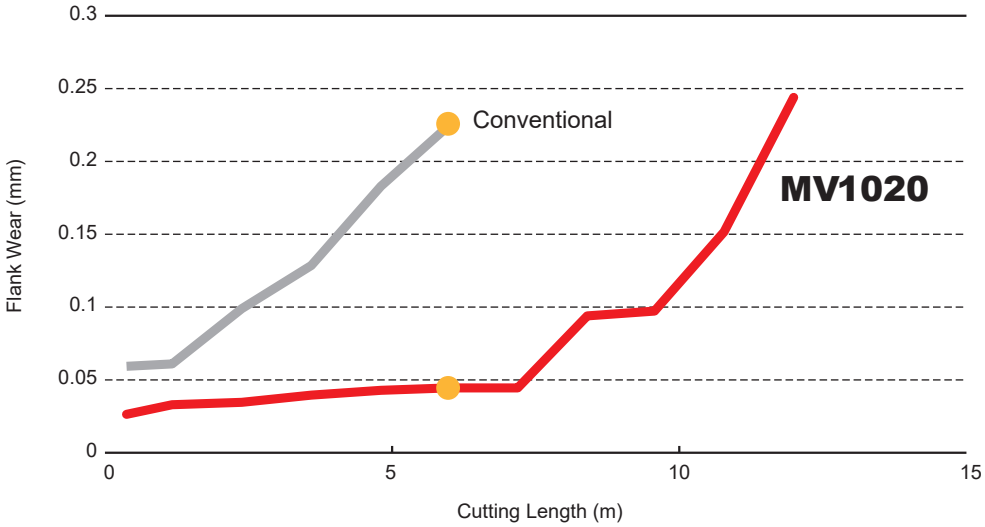
MV1020



Conventional A | Conventional B

Conventional C | Conventional D

Comparison of wear resistance when machining alloy steel SCM440



<Cutting Conditions>
Workpiece
Material : JIS SCM440
Tool : WSX445
Inserts : SNMU140812ANER-M
Cutting Speed : vc=300 m/min
Feed per Tooth : fz=0.2 mm/t.
Depth of Cut : ap=2.0 mm
Width of Cut : ae=100 mm
Cutting Mode : Dry Cutting

12m cutting length achieved

MV1020

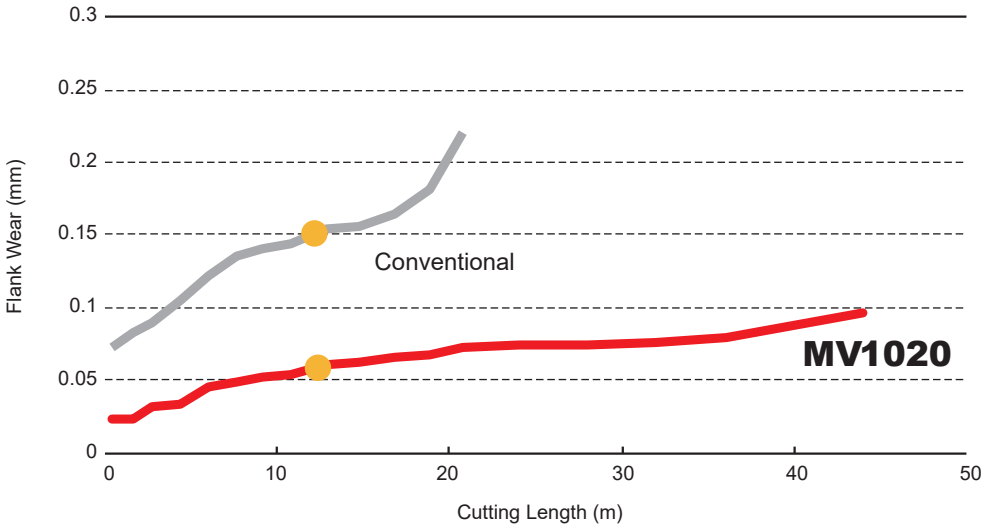
Chipping occurs at cutting length of 6m

Conventional

* Taken after cutting length of 6.0 m

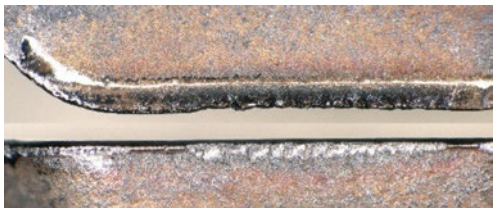
Cutting Performance

Comparison of wear resistance for rolled steel SS400



<Cutting Conditions>
Workpiece
Material : JIS SS400
Tool : ASX445
Inserts : SEMT13T3AGSN-JM
Cutting Speed : vc=300 m/min
Feed per Tooth : fz=0.2 mm/t.
Depth of Cut : ap=2.0 mm
Width of Cut : ae=100 mm
Cutting Mode : Dry Cutting

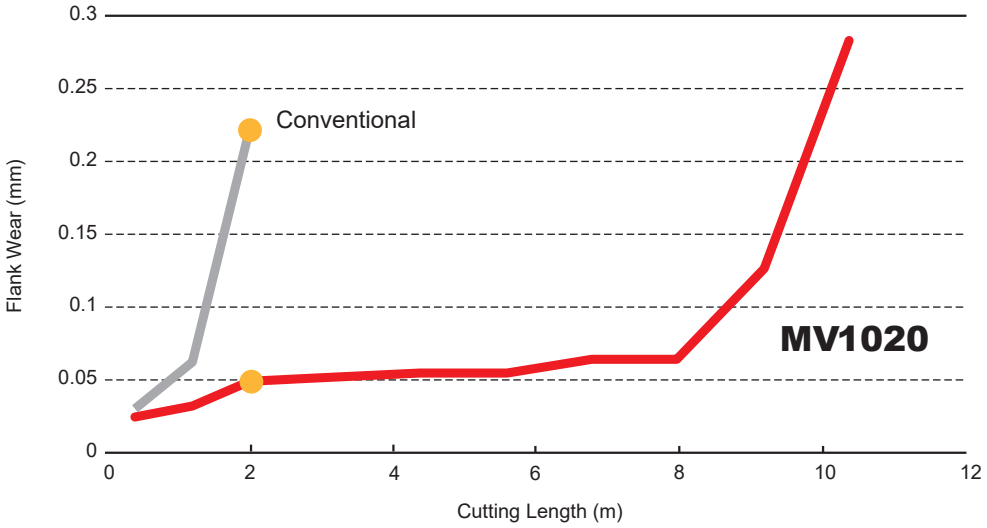
40m cutting length achieved
MV1020



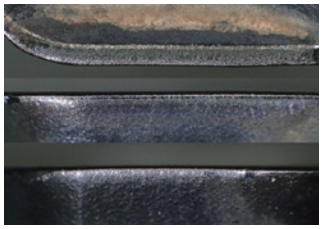
Wear progressed and the substrate was exposed
Conventional

* Taken after cutting length of 12.8 m

Comparison of wear resistance when machining carbon steel S55C

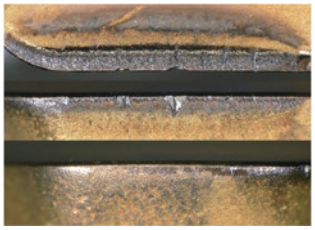


<Cutting Conditions>
Workpiece
Material : JIS S55C
Tool : ASX445
Inserts : SEMT13T3AGSN-JM
Cutting Speed : vc=200 m/min
Feed per Tooth : fz=0.2 mm/t.
Depth of Cut : ap=2.0 mm
Width of Cut : ae=100 mm
Cutting Mode : Wet Cutting



10m cutting length achieved
MV1020

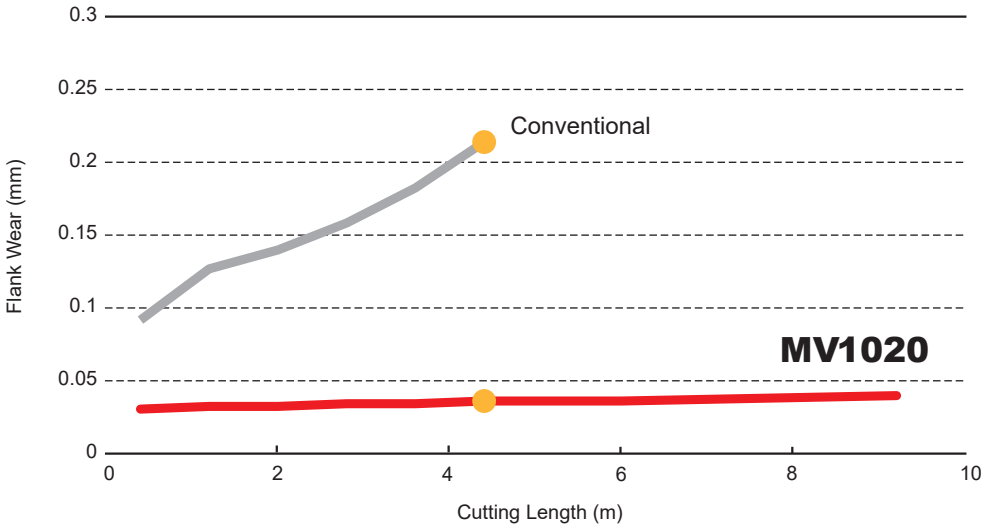
Rake Face
Main Cutting Edge
Wiper



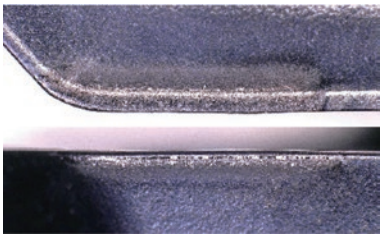
Chipping occurred due to thermal cracks at a cutting length of 2m
Conventional

* Taken after cutting length of 2.0 m

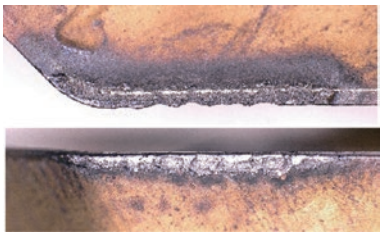
Comparison of wear resistance when machining ductile cast Iron FCD450



<Cutting Conditions>
Workpiece
Material : JIS FCD450
Tool : ASX445
Inserts : SEMT13T3AGSN-JM
Cutting Speed : vc=250 m/min
Feed per Tooth : fz=0.2 mm/t.
Depth of Cut : ap=2.0 mm
Width of Cut : ae=100 mm
Cutting Mode : Dry Cutting



Achieves a cutting length of 9 m or more
MV1020

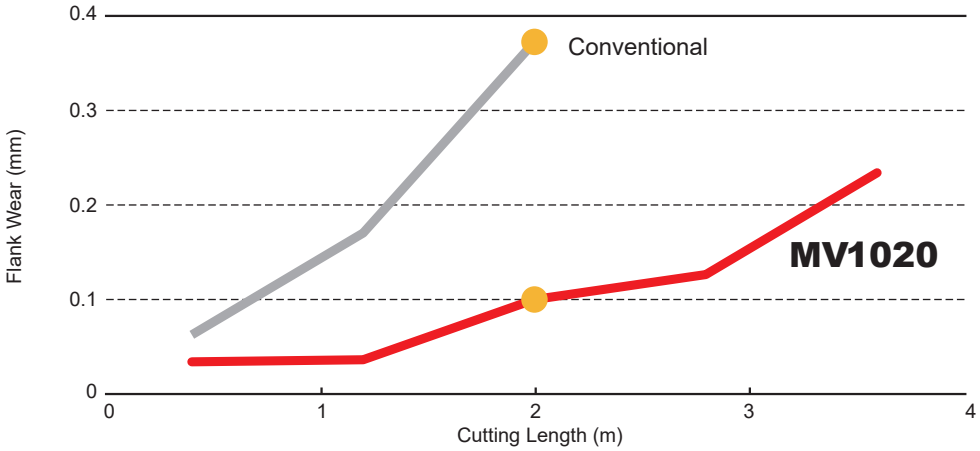


Unable to continue machining after a cut length of 4.4m
Conventional

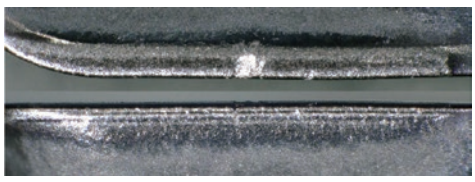
* Taken after cutting length of 4.4 m

Comparison of wear resistance when machining ductile cast Iron FCD700

Wet Cutting



<Cutting Conditions>
Workpiece
Material : JIS FCD700
Tool : ASX445
Inserts : SEMT13T3AGSN-JM
Cutting Speed : vc=200 m/min
Feed per Tooth : fz=0.2 mm/t.
Depth of Cut : ap=2.0 mm
Width of Cut : ae=100 mm
Cutting Mode : Wet Cutting



3.5m cutting length achieved
MV1020

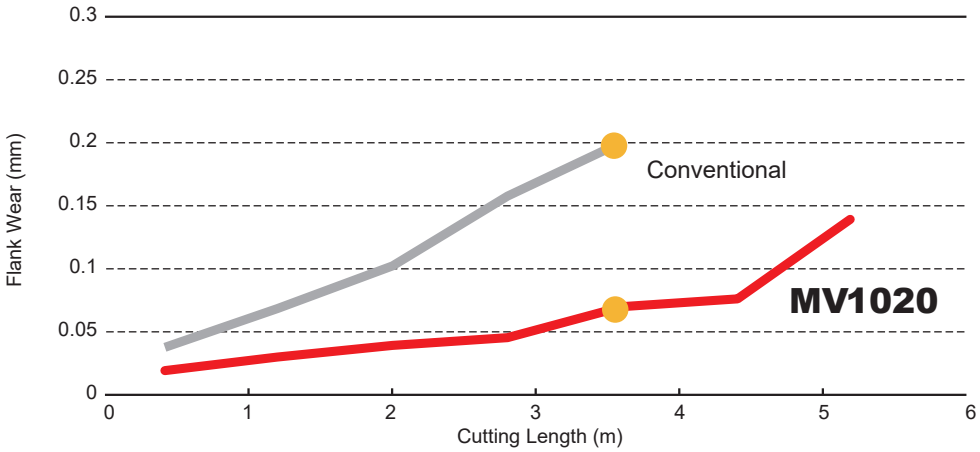
Unable to continue processing with a cut length of 2.0m
Conventional

* Taken after cutting length of 2.0 m

Cutting Performance

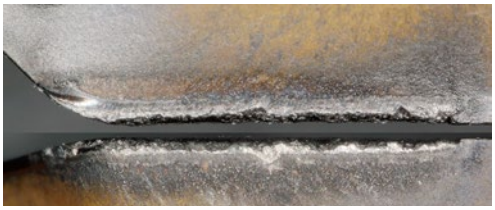
Comparison of wear resistance when machining ductile cast Iron FCD700

Dry Cutting



<Cutting Conditions>
Workpiece
Material : JIS FCD700
Tool : ASX445
Inserts : SEMT13T3AGSN-JM
Cutting Speed : vc=200 m/min
Feed per Tooth : fz=0.2 mm/t.
Depth of Cut : ap=2.0 mm
Width of Cut : ae=100 mm
Cutting Mode : Dry Cutting

5.0m cutting length achieved
MV1020



Chipping occurred due to peeling of the coating
Conventional

* Taken after cutting length of 3.6 m

Memo

Coated Carbide Grade for Milling

MV1000 Series

For Your Safety
●Don't handle inserts and chips without gloves. ●Please machine within the recommended application range and exchange expired tools with new ones in advance of breakage. ●Please use safety covers and wear safety glasses. ●When using compounded cutting oils, please take fire precautions. ●When attaching inserts or spare parts, please use only the correct wrench or driver. ●When using rotating tools, please make a trial run to check run-out, vibration and abnormal sounds etc.

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http://www.mmc-carbide.com/
(Tools specifications subject to change without notice.)

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