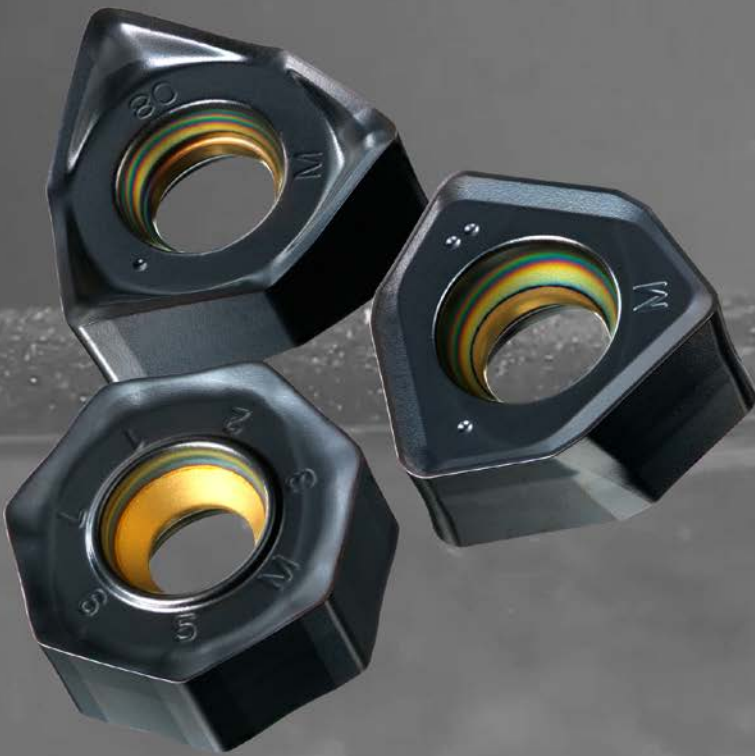


NEW

MV1000 SERIES

SETTING A NEW STANDARD FOR TOOL LIFE

B270E



DIA  **EDGE**

 **MITSUBISHI MATERIALS**

MV1000 SERIES

COATED CARBIDE GRADE FOR MILLING

ADVANCED WEAR RESISTANCE

By adopting the newly developed Al-Rich coating technology, the (Al,Ti)N with a high Al content ratio displays 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.



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.

Graphical representation

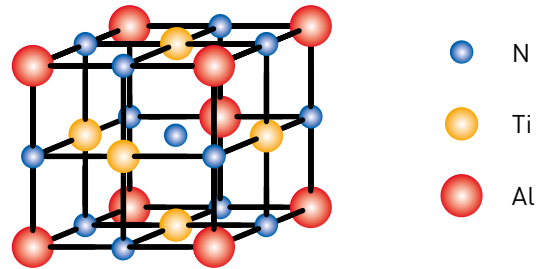


MV1000 SERIES

COMPLETE COATING TECHNOLOGY THAT REWRITES CURRENT TOOL LIFE STANDARDS

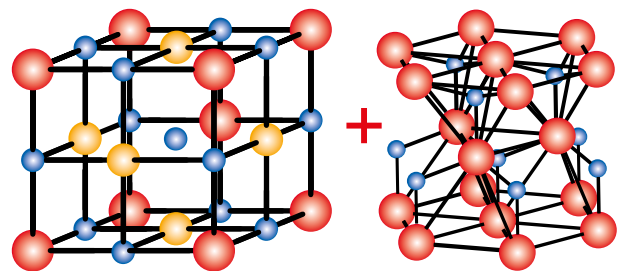
DUE TO THE NEWLY DEVELOPED AL-RICH COATING

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.



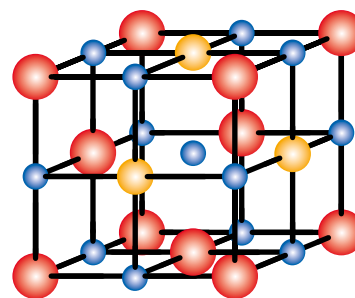
The combination of atoms with different sizes creates an exceptionally hard crystal structure.

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.

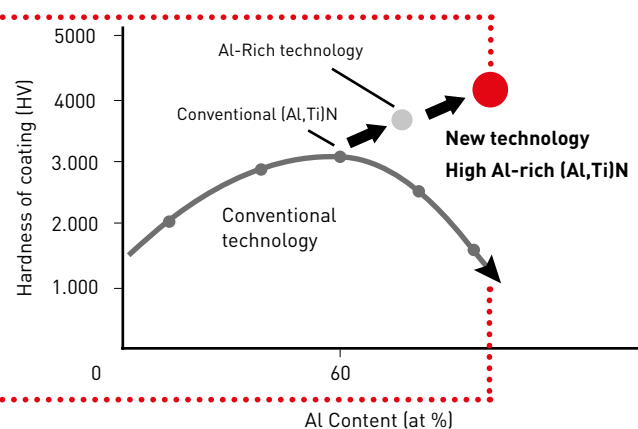
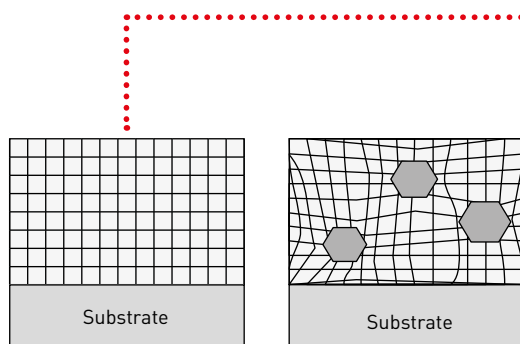
Using a new coating process based on Mitsubishi Materials' own original technology. This way in which the Al-Rich coating does not change its crystal structure even when the Al content is increased. This enables a higher Al content and a provides a higher hardness (Al,Ti)N.



Crystal image of **MV1000** series

□ High hardness phase

⬡ Soft phase



MV1020 / MV1030

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.

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.

Material	ISO	CVD	Material	ISO	CVD	Material	ISO	CVD
P Steel	P10	MV1020	M Stainless steel	M10	MV1030	K Cast iron	K10	MV1020
	P20	MV1030		M20	MV1030		K20	MV1030
	P30			M30			K30	
	P40			M40			K40	

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

MV1000 SERIES

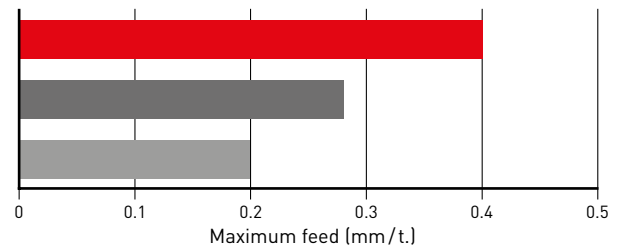
CUTTING PERFORMANCE

MV1030

COMPARISON OF FRACTURE RESISTANCE FOR INTERMITTENT CUTTING OF ALLOY STEEL

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

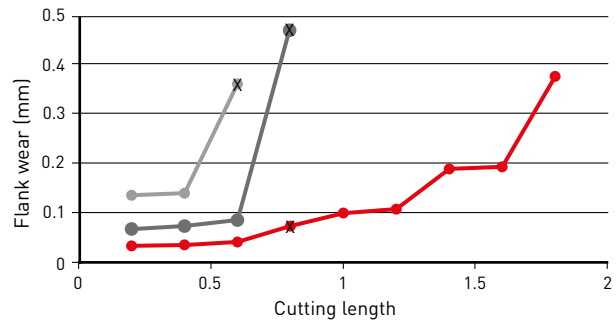
Material	DIN 41CrMo4
Tool	ASX445
Insert	SEMT13T3AGSN-JM
Vc (m/min)	200
ap (mm)	3.0
ae (mm)	100
Cutting mode	Dry cutting



COMPARISON OF WEAR RESISTANCE WHEN MACHINING STAINLESS STEEL

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

Material	DIN X5CrNi189
Tool	ASX445
Insert	SEMT13T3AGSN-JM
Vc (m/min)	180
fz (mm/t)	0.2
ap (mm)	2.0
ae (mm)	100
Cutting mode	Dry cutting Single insert



AFTER MACHINING 0.8 M



MV1030



Conventional A

AFTER MACHINING 0.6 M



Conventional B

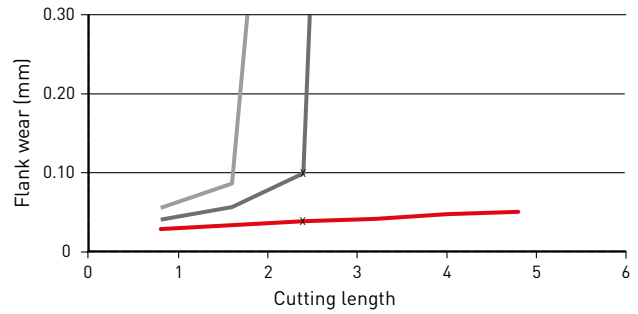
MV1000 SERIES

CUTTING PERFORMANCE

MV1020

COMPARISON OF WEAR RESISTANCE WHEN MACHINING ALLOY STEEL

Material	DIN 41CrMo4
Tool	WWX400
Insert	6NMU1409080PNER-M
Vc (m/min)	300
fz (mm/t)	0.15
ap (mm)	3.0
ae (mm)	52
Cutting mode	Dry cutting Single insert



TAKEN AFTER CUTTING LENGTH OF 2.4 M



MV1020



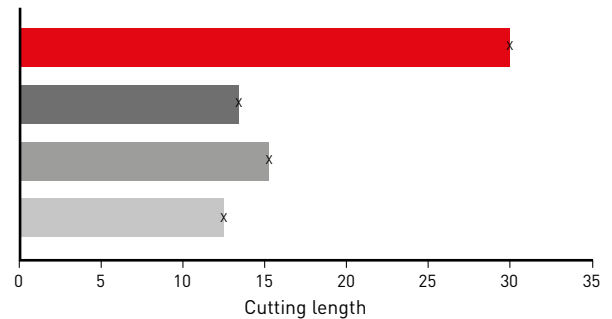
Conventional A



Conventional B

COMPARISON OF WEAR RESISTANCE WHEN MACHINING DUCTILE CAST IRON

Material	DIN GGG70
Tool	WJX14
Insert	JOMU140715ZZER-M
Vc (m/min)	220
fz (mm/t)	1.0
ap (mm)	1.0
ae (mm)	45
Cutting mode	Dry cutting Single insert



30.4 M



MV1020

13.6 M



Conventional A

15.2 M



Conventional B

12.8 M



Conventional C

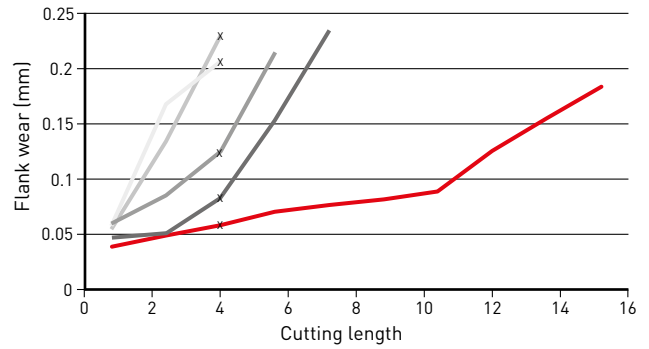
MV1000 SERIES

CUTTING PERFORMANCE

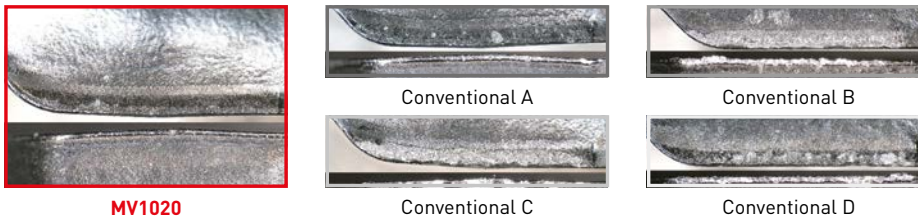
MV1020

COMPARISON OF WEAR RESISTANCE WHEN MACHINING DUCTILE CAST IRON

Material	DIN GGG70
Tool	AHX440
Insert	NNMU130508ZEN-M
Vc (m/min)	300
fz (mm/t)	0.1
ap (mm)	2.0
ae (mm)	52
Cutting mode	Dry cutting Single insert

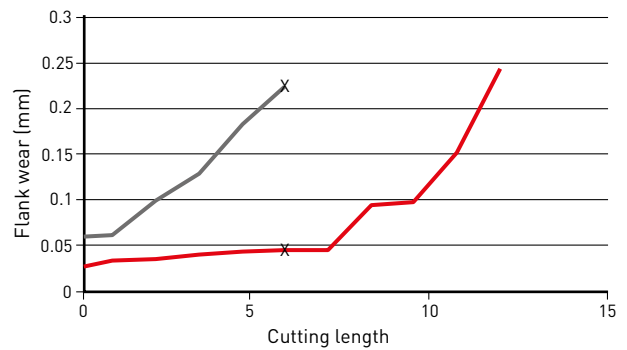


TAKEN AFTER CUTTING LENGTH OF 4.0 M

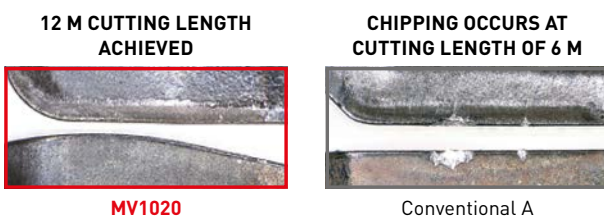


COMPARISON OF WEAR RESISTANCE WHEN MACHINING ALLOY STEEL

Material	DIN 41CrMo4
Tool	WSX445
Insert	SNMU140812ANER-M
Vc (m/min)	300
fz (mm/t)	0.2
ap (mm)	2.0
ae (mm)	100
Cutting mode	Dry cutting



TAKEN AFTER CUTTING LENGTH OF 6.0 M



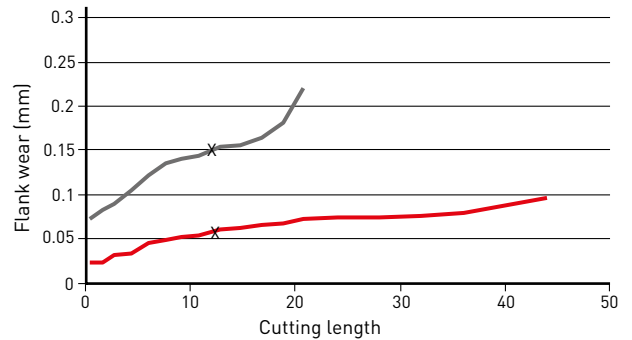
MV1000 SERIES

CUTTING PERFORMANCE

MV1020

COMPARISON OF WEAR RESISTANCE FOR ROLLED STEEL

Material	DIN St 44-2
Tool	ASX445
Insert	SEMT13T3AGSN-JM
Vc (m/min)	300
fz (mm/t)	0.2
ap (mm)	2.0
ae (mm)	100
Cutting mode	Dry cutting



TAKEN AFTER CUTTING LENGTH OF 12.8 M

40 M CUTTING LENGTH ACHIEVED



MV1020

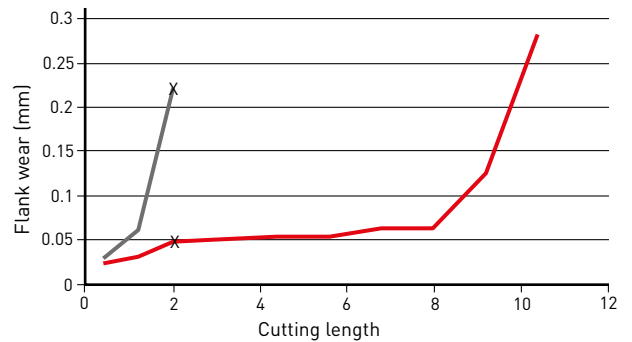
WEAR PROGRESSED AND THE SUBSTRATE WAS EXPOSED



Conventional

COMPARISON OF WEAR RESISTANCE WHEN MACHINING CARBON STEEL

Material	DIN Ck55
Tool	ASX445
Insert	SEMT13T3AGSN-JM
Vc (m/min)	200
fz (mm/t)	0.2
ap (mm)	2.0
ae (mm)	100
Cutting mode	Wet cutting



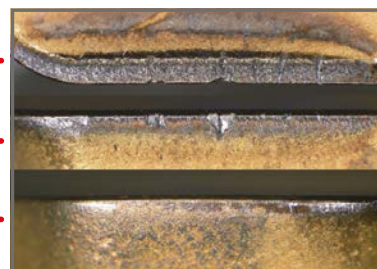
TAKEN AFTER CUTTING LENGTH OF 2.0 M

10 M CUTTING LENGTH ACHIEVED

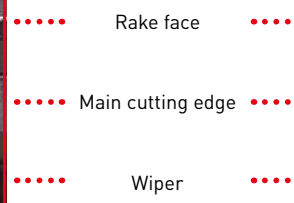


MV1020

CHIPPING OCCURRED DUE TO THERMAL CRACKS AT A CUTTING LENGTH OF 2 M



Conventional



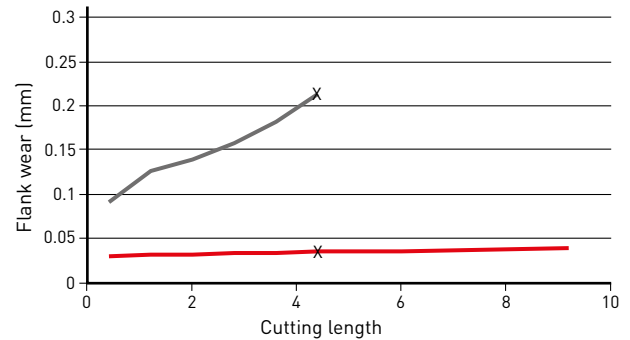
MV1000 SERIES

CUTTING PERFORMANCE

MV1020

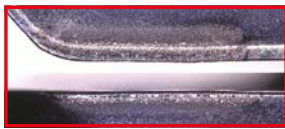
COMPARISON OF WEAR RESISTANCE WHEN MACHINING DUCTILE CAST IRON

Material	DIN GGG40.5
Tool	ASX445
Insert	SEMT13T3AGSN-JM
Vc (m/min)	250
fz (mm/t)	0.2
ap (mm)	2.0
ae (mm)	100
Cutting mode	Dry cutting



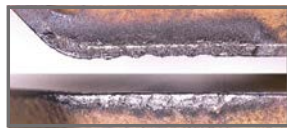
TAKEN AFTER CUTTING LENGTH OF 4.4 M

ACHIEVES A CUTTING LENGTH OF 9 M OR MORE



MV1020

UNABLE TO CONTINUE MACHINING AFTER A CUT LENGTH OF 4.4 M

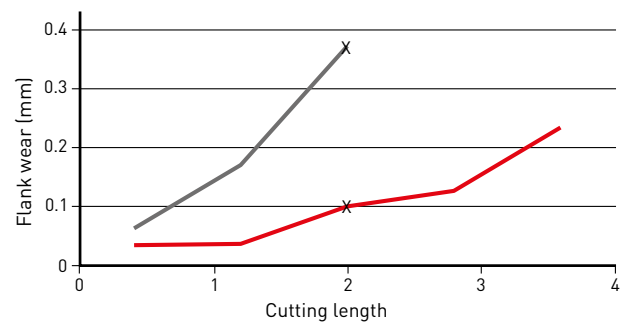


Conventional

COMPARISON OF WEAR RESISTANCE WHEN MACHINING DUCTILE CAST IRON

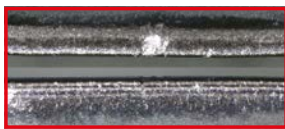
WET CUTTING

Material	DIN GGG70
Tool	ASX445
Insert	SEMT13T3AGSN-JM
Vc (m/min)	200
fz (mm/t)	0.2
ap (mm)	2.0
ae (mm)	100
Cutting mode	Wet cutting



TAKEN AFTER CUTTING LENGTH OF 2.0 M

3.5 M CUTTING LENGTH ACHIEVED



MV1020

UNABLE TO CONTINUE PROCESSING WITH A CUT LENGTH OF 2.0 M



Conventional

MV1000 SERIES

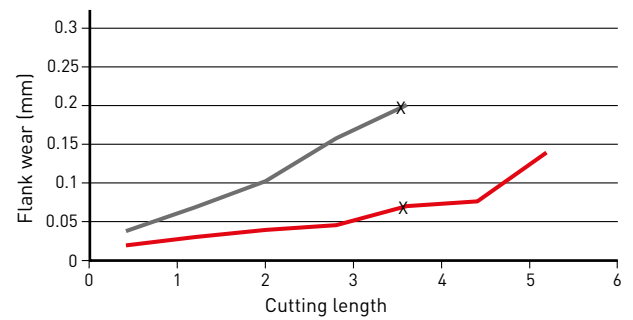
CUTTING PERFORMANCE

MV1020

COMPARISON OF WEAR RESISTANCE WHEN MACHINING DUCTILE CAST IRON

DRY CUTTING

Material	DIN GGG70
Tool	ASX445
Insert	SEMT13T3AGSN-JM
Vc (m/min)	200
fz (mm/t)	0.2
ap (mm)	2.0
ae (mm)	100
Cutting mode	Dry cutting



TAKEN AFTER CUTTING LENGTH OF 3.6 M

5.0 M CUTTING LENGTH ACHIEVED



MV1020

CHIPPING OCCURRED DUE TO PEELING OF THE COATING



Conventional

MV1000 SERIES

INSERTS

P	Steel	◆	◆	Please note that the cutting conditions differ depending on multiple factors, for more details refer to the recommended cutting conditions.
M	Stainless steel	◆	◆	
K	Cast iron	◆	◆	

Honing:
E: Round

Order number	Application	Class	Honing	MV1020	MV1030	IC	S	S1	BS	RE/BCH	Geometry
6NMU0906040PNER-M	General purpose cutting	M	E	●	●	9.0	5.3	6.1	1.6	0.4	WWX200
6NMU0906080PNER-M	General purpose cutting	M	E	●	●	9.0	5.3	6.1	1.2	0.8	
6NMU0906080PNER-R	Cutting edge strength	M	E	●	●	9.0	5.3	6.1	1.2	0.8	
6NGU1409040PNER-L	Low cutting resistance	G	E	●	●	14.0	7.0	9.0	1.7	0.4	WWX400
6NGU1409080PNER-L	Low cutting resistance	G	E	●	●	14.0	7.0	9.0	1.3	0.8	
6NGU1409040PNER-M	General purpose cutting	G	E	●	●	14.0	7.0	9.0	1.7	0.4	
6NGU1409080PNER-M	General purpose cutting	G	E	●	●	14.0	7.0	9.0	1.3	0.8	
6NMU1409040PNER-M	General purpose cutting	M	E	●	●	14.0	7.0	9.0	1.7	0.4	
6NMU1409080PNER-M	General purpose cutting	M	E	●	●	14.0	7.0	9.0	1.3	0.8	
6NMU1409160PNER-M	General purpose cutting	M	E	●	●	14.0	7.0	9.0	0.5	1.6	
6NMU1409200PNER-M	General purpose cutting	M	E	●	●	14.0	7.0	9.0	0.5	2.0	
6NMU1409080PNER-R	Cutting edge strength	M	E	●	●	14.0	7.0	9.0	1.3	0.8	
6NMU1409160PNER-R	Cutting edge strength	M	E	●	●	14.0	7.0	9.0	0.5	1.6	
6NMU1409200PNER-R	Cutting edge strength	M	E	●	●	14.0	7.0	9.0	0.5	2.0	
SNGU140812ANER-L	Low cutting resistance	G	E	●	●	14.0	8.4	—	1.5	1.2	WSX445
SNGU140812ANER-M	General purpose cutting	G	E	●	●	14.0	8.4	—	1.5	1.2	
SNMU140812ANER-M	General purpose cutting	M	E	●	●	14.0	8.4	—	1.5	1.2	
SNMU140812ANER-R	Cutting edge strength	M	E	●	●	14.0	8.4	—	1.5	1.2	
SNMU140812ANER-H	Cutting edge strength	M	E	●	●	14.0	8.4	—	1.5	1.2	
JOMU090512ZZER-L	Low cutting resistance	M	E	●	●	9.525	4.73	—	0.88	1.2	WJX
JOMU140715ZZER-L	Low cutting resistance	M	E	●	●	14.0	6.58	—	1.3	1.5	
JOMU090512ZZER-M	General purpose cutting	M	E	●	●	9.525	4.75	—	0.88	1.2	
JOMU140715ZZER-M	General purpose cutting	M	E	●	●	14.0	6.63	—	1.3	1.5	
JOMU090512ZZER-R	Cutting edge strength	M	E	●	●	9.525	4.83	—	0.88	1.2	
JOMU140715ZZER-R	Cutting edge strength	M	E	●	●	14.0	6.75	—	1.3	1.5	
SNMU1206C05ZNER-M	Cast iron milling	M	E	●	●	12.7	6.2	—	1.6	0.5	WSF406W






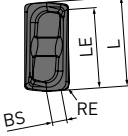



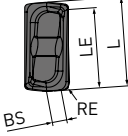



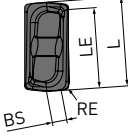


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(10 inserts in one case)



MV1000 SERIES – INSERTS

P	Steel	◆ ◆	Please note that the cutting conditions differ depending on multiple factors, for more details refer to the recommended cutting conditions. Honing: E: Round
M	Stainless steel	◆ ◆	
K	Cast iron	◆ ◆	

Order number	Application	Class	Honing	MV1020	MV1030	L	S	LE	BS	RE	Geometry
LOGU0904020PNER-L	Low cutting resistance	G	E	●	●	8.7	4.3	7.6	1.7	0.2	VPX200    
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	
LOGU0904020PNER-M	General purpose cutting	G	E	●	●	8.7	4.3	7.6	1.7	0.2	VPX300    
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	
LOGU1207020PNER-L	Low cutting resistance	G	E	●	●	12.4	7.0	11.3	3.0	0.2	VPX300    
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	
LOGU1207020PNER-M	General purpose cutting	G	E	●	●	12.4	7.0	11.3	3.0	0.2	VPX300    
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	

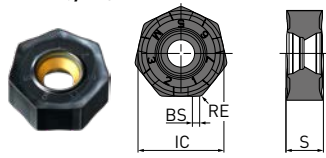
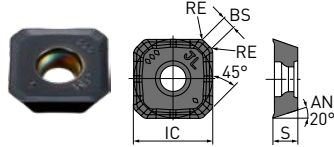
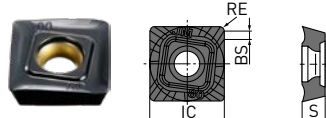
(10 inserts in one case)

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MV1000 SERIES – INSERTS

P	Steel	◆ ◆	Please note that the cutting conditions differ depending on multiple factors, for more details refer to the recommended cutting conditions. Honing: E: Round S: Chamfer + round
M	Stainless steel	◆ ◆	
K	Cast iron	◆ ◆	

Order number	Application	Class	Honing	MV1000		IC	S	S1	BS	RE	Geometry
				MV1020	MV1030						
NNMU130508ZER-L	Low cutting resistance	M	E	●	●	13.4	5.77	—	1.0	0.8	AHX440/475 
NNMU130508ZEN-M	General purpose cutting	M	E	●	●	13.4	5.57	—	1.0	0.8	
NNMU130532ZEN-M	General purpose cutting	M	E	●	●	13.4	5.57	—	—	3.2	
NNMU130532ZEN-R	Cutting edge strength	M	E	●	●	13.4	5.47	—	—	3.2	
SEET13T3AGEN-JL	Finish-light cutting	E	E	●	●	13.4	3.97	—	1.9	1.5	ASX445 
SEMT13T3AGSN-JM	Light-rough cutting	M	S	●	●	13.4	3.97	—	1.9	1.5	
SEMT13T3AGSN-JH	Medium-heavy cutting	M	S	●	●	13.4	3.97	—	1.9	1.5	
SEMT13T3AGSN-FT	Cast iron milling	M	S	●	●	13.4	3.97	—	1.9	1.5	
SOET12T308PEER-JL	Finish-light cutting	E	E	●	●	12.7	3.97	—	1.4	0.8	ASX400 
SOMT12T308PEER-JM	Light-rough cutting	M	E	●	●	12.7	3.97	—	1.4	0.8	
SOMT12T308PEER-JH	Medium-heavy cutting	M	E	●	●	12.7	3.97	—	1.4	0.8	
SOMT12T320PEER-FT	Heavy interrupted cutting	M	E	●	●	12.7	3.97	—	0.5	2.0	

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(10 inserts in one case)



MV1000 SERIES

COATED CARBIDE GRADE FOR MILLING

COVERS A WIDE RANGE OF CUTTING SPEEDS (DRY CUTTING WITH WWX400)

Material	Properties	Grade	Vc
P Mild steel Carbon steel Alloy steel	≤180HB	MV1020	305 (250 – 360)
		MV1030	235 (190 – 280)
		MP6120	245 (200 – 290)
		MP6130	235 (190 – 280)
	180–280HB 280–350HB	MV1020	260 (210 – 310)
		MV1030	200 (155 – 245)
		MP6120	205 (160 – 250)
		MP6130	200 (155 – 245)
		MV1020	260 (210 – 310)
		MV1030	200 (155 – 245)
		MP6120	200 (155 – 245)
		MP6130	195 (150 – 240)
M Stainless steel	>200HB	MV1030	180 (155 – 200)
		MP7130	175 (150 – 200)
		VP15TF	175 (150 – 200)
K Ductile cast iron	Tensile strength ≤450MPa	MV1020	255 (200 – 310)
		MV1030	205 (160 – 250)
		MP6120	205 (160 – 250)
		MP6130	205 (160 – 250)
	Tensile strength >450MPa	MV1020	225 (160 – 290)
		MV1030	170 (130 – 210)
		MP6120	170 (130 – 210)
		MP6130	170 (130 – 210)

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MV1000 SERIES

RECOMMENDED CUTTING CONDITIONS

WWX200/400

CUTTING SPEED (DRY CUTTING)

Material	Properties	Conditions	MV1020			MV1030			
			ae			ae			
			≥0.5 DC	≥0.8 DC	DC (Slot)	≥0.5 DC	≥0.8 DC	DC (Slot)	
			Vc			Vc			
P	Mild steel ≤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]	
P	Carbon steel Alloy steel 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]

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WWX200/400

CUTTING SPEED (WET CUTTING)

Material	Properties	Conditions	MV1020			MV1030			
			ae			ae			
			≥0.5 DC	≥0.8 DC	DC (Slot)	≥0.5 DC	≥0.8 DC	DC (Slot)	
			Vc			Vc			
P	Mild steel ≤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]	
P	Carbon steel Alloy steel 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]

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












MV1000 SERIES

RECOMMENDED CUTTING CONDITIONS

WWX200

DEPTH OF CUT / FEED PER TOOTH

DRY AND WET CUTTING

Material	Properties	Conditions	ae						
			≥0.5 DC		≥0.8 DC		DC (Slot)		
				ap fz		ap fz		ap fz	
P	Mild steel	≤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	≤3.0 0.16 [0.10-0.20]	M,R	≤3.0 0.16 [0.10-0.20]	—	—
	Carbon steel Alloy steel	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]	—	—
	Ductile cast iron	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]	—	—













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1. Refer to the above table and set up cutting conditions according to the application.

WWX400

DEPTH OF CUT / FEED PER TOOTH

DRY AND WET CUTTING

Material	Properties	Conditions	ae						
			≥0.5 DC		≥0.8 DC		DC (Slot)		
				ap fz		ap fz		ap fz	
P	Mild steel	≤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	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 [0.10-0.15]	L, M	≤2.0 0.13 [0.10-0.15]	—	—
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]	—	—
	Ductile cast iron	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]	—	—

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1. Refer to the above table and set up cutting conditions according to the application.

MV1000 SERIES

RECOMMENDED CUTTING CONDITIONS

WSX445

CUTTING SPEED

DRY AND WET CUTTING











Material	Properties	MV1020		MV1030		
		Vc		Vc		
		Dry cutting	Wet cutting	Dry cutting	Wet cutting	
P	Mild steel	≤180HB	300 (200 – 400)	220 (120 – 320)	250 (200 – 300)	150 (100 – 200)
	Carbon steel	180–350HB	260 (170 – 350)	200 (100 – 300)	220 (170 – 270)	120 (80 – 160)
	Alloy steel	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)
		Tensile strength ≤800MPa	220 (80 – 350)	180 (80 – 230)	180 (110 – 250)	140 (80 – 200)

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WSX445

DEPTH OF CUT / FEED PER TOOTH

DRY AND WET CUTTING

Material	Properties											
												
		fz	ap	fz	ap	fz	ap	fz	ap	fz	ap	
P	Mild steel	≤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
	Carbon steel	180–350HB	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
	Alloy steel	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	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	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
		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

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MV1000 SERIES

RECOMMENDED CUTTING CONDITIONS

CHIPBREAKER SELECTION TABLE

WJX09

Material	Properties	L		M		R		
		Conditions	ap	Conditions	ap	Conditions	ap	
P	Mild steel	≤180HB	● ●	≤1.0	● ●	≤1.5	● ✖	≤1.5
	Carbon steel, Alloy steel	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

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WJX14

Material	Properties	L		M		R		
		Conditions	ap	Conditions	ap	Conditions	ap	
P	Mild steel	≤180HB	● ●	≤2.0	● ●	≤3.0	● ✖	≤3.0
	Carbon steel, Alloy steel	180–350HB	● ●	≤2.0	● ●	≤3.0	● ✖	≤3.0
M	Stainless steel	—	● ●	≤2.0	● ●	≤1.5	—	—
K	Ductile cast iron	Tensile strength ≤450MPa	● ●	≤2.0	● ●	≤3.0	—	—
		Tensile strength ≤800MPa	● ●	≤2.0	● ●	≤2.0	—	—

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MV1000 SERIES

RECOMMENDED CUTTING CONDITIONS

WJX09

CUTTING SPEED (DRY CUTTING)


Material	Properties	MV1020	MV1030	
		Vc	Vc	
P	Mild steel	≤180HB	230 (180 – 280)	160 (100 – 220)
	Carbon steel, Alloy steel	180–350HB	220 (170 – 270)	150 (80 – 220)
M	Stainless steel	≤200HB	—	160 (130 – 200)
		>200HB	—	140 (80 – 200)
K	Ductile cast iron	Tensile strength ≤450MPa	210 (160 – 260)	160 (120 – 210)
		Tensile strength ≤800MPa	190 (140 – 240)	130 (90 – 170)

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WJX09

DEPTH OF CUT / FEED PER TOOTH

DRY CUTTING

Material	Properties	 ap	DCX = 25, 28 (Z=2)	DCX = 25, 28 (Z=3)	DCX ≥ 32			
			fz	fz	fz			
P	Mild steel	≤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)	
				≤0.5	1.3 (0.4 – 1.7)	1.3 (0.4 – 1.7)	1.5 (0.4 – 2.0)	
P	Carbon steel Alloy steel	180–350HB	M, R	≤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)	
				≤0.5	1.2 (0.3 – 1.5)	1.2 (0.3 – 1.5)	1.2 (0.3 – 1.5)	
			L	≤1.0	0.7 (0.2 – 1.0)	0.7 (0.2 – 0.9)	0.7 (0.2 – 1.0)	
				≤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	Stainless steel	—	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)	
			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)	
K	Ductile cast iron	Tensile strength ≤450MPa	M, R	≤1.5	0.5 (0.3 – 0.7)	—	0.7 (0.3 – 1.0)	
				≤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)	
			L	≤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)	
				≤0.5	0.8 (0.3 – 1.2)	0.8 (0.3 – 1.2)	0.8 (0.3 – 1.2)	
	K	Ductile cast iron	Tensile strength ≤800MPa	L	≤1.0	0.5 (0.2 – 0.8)	0.5 (0.2 – 0.8)	0.5 (0.2 – 0.8)

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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.
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 %.
3. When large vibration occurs, reduce the cutting conditions.
4. For interrupted cutting, reduce the cutting speed and feed rate by 20 %.

MV1000 SERIES

RECOMMENDED CUTTING CONDITIONS

WJX14

CUTTING SPEED (DRY CUTTING)

Material	Properties	MV1020	MV1030
		Vc	Vc
P	Mild steel	220 (170 – 270)	130 (80 – 180)
	Carbon steel, Alloy steel	200 (150 – 250)	120 (60 – 180)
M	≤200HB	—	160 (130 – 200)
	>200HB	—	140 (100 – 200)
K	Tensile strength ≤450MPa	200 (150 – 250)	150 (100 – 200)
	Tensile strength ≤800MPa	180 (130 – 230)	120 (80 – 160)

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MV1000 SERIES

RECOMMENDED CUTTING CONDITIONS

WJX14

DEPTH OF CUT / FEED PER TOOTH

DRY CUTTING

Material	Properties	 ap	DCX = 50, 52		DCX ≥ 63
			fz		fz
P Mild steel	≤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]
			≤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]
M Carbon steel Alloy steel	180–350HB	M, R	≤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]
			≤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]
		L	≤2.0	0.7 [0.3 – 1.2]	0.7 [0.3 – 1.2]
			≤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]
			≤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]
M Stainless steel	≤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]
	>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]
K Ductile cast iron	Tensile strength ≤450MPa	MR	≤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]
		L	≤3.0	0.3 [0.2 – 0.8]	0.4 [0.2 – 1.0]
			≤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]
	Tensile strength ≤800MPa	M	≤2.0	0.8 [0.3 – 1.5]	0.8 [0.3 – 1.5]
			≤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]
		L	≤2.0	1.0 [0.4 – 1.5]	1.2 [0.4 – 1.8]
			≤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]	

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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.
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 %.
3. When large vibration occurs, reduce the cutting conditions.
4. For interrupted cutting, reduce the cutting speed and feed rate by 20 %.

MV1000 SERIES

RECOMMENDED CUTTING CONDITIONS

VPX200/300

CUTTING SPEED (DRY CUTTING)

Material	Properties	Conditions	Recommendation 1st 2nd	ae									
				≤0.25 DC		0.25 – 0.5 DC		0.5 – 0.75 DC		DC (Slot)			
				MV1020	MV1030	MV1020	MV1030	MV1020	MV1030	MV1020	MV1030		
P	Mild steel	≤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	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)
		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	≤200HB	●●	L	M	—	180 (140–210)	—	170 (130–200)	—	140 (110–160)	—	140 (110–160)
		>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)

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WET CUTTING

Material	Properties	Conditions	Recommendation 1st 2nd	ae									
				≤0.25 DC		0.25 – 0.5 DC		0.5 – 0.75 DC		DC (Slot)			
				MV1020	MV1030	MV1020	MV1030	MV1020	MV1030	MV1020	MV1030		
P	Mild steel	≤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	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)
		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)

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MV1000 SERIES

RECOMMENDED CUTTING CONDITIONS

VPX200

DEPTH OF CUT / FEED PER TOOTH

DRY AND WET CUTTING

Material	Properties	ae	Conditions	DC						
				Ø 16 – Ø 18		Ø 20 – Ø 25		Ø 28 – Ø 63		
				ap	fz	ap	fz	ap	fz	
P	Mild steel	≤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 (Slot)	● ●	≤2	0.06–0.10	≤4	0.06–0.10	≤4	0.08–0.12
	Carbon steel Alloy steel	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 (Slot)	● ●	≤2	0.06–0.10	≤4	0.06–0.10	≤4	0.08–0.12
		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 (Slot)	● ●	≤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 (Slot)	● ●	≤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 (Slot)	● ●	≤2	0.06–0.10	≤4	0.06–0.10	≤4	0.06–0.10

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- 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
- 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
- A type with fewer teeth is recommended when the depth of cut in the radius direction (ae) is 0.5 DC or more.
- Wet cutting is recommended, when focusing on the surface finish. (Service life is shorter than for dry cutting.)
- 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 use a new clamp screw periodically.

MV1000 SERIES

RECOMMENDED CUTTING CONDITIONS

VPX300

DEPTH OF CUT / FEED PER TOOTH

DRY AND WET CUTTING

Material	Properties	ae	Conditions	DC				
				Ø 25		Ø 28 - Ø 80		
				ap	fz	ap	fz	
P	Mild steel	≤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	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
	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

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- 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.
- 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
- A type with fewer teeth is recommended when the depth of cut in the radius direction (ae) is 0.5 DC or more.
- Wet cutting is recommended, when focusing on the surface finish. (Service life is shorter than for dry cutting.)
- 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 renew the clamp screw periodically.

MV1000 SERIES

RECOMMENDED CUTTING CONDITIONS

AHX440S

DRY CUTTING


Material	Properties	Vc		fz	ap	ae	
		MV1020	MV1030				
P	Mild steel	≤180HB	300 (200 – 400)	245 (190 – 300)	0.3 (0.2 – 0.4)	≤3	≤0.8 DC
	Carbon steel	180–280HB	260 (170 – 350)	210 (150 – 270)	0.3 (0.2 – 0.4)	≤3	≤0.8 DC
	Alloy steel	280–350HB	180 (100 – 250)	135 (90 – 180)	0.3 (0.2 – 0.4)	≤3	≤0.8 DC
M	Stainless steel	≤200HB	—	185 (120 – 250)	0.2 (0.1 – 0.3)	≤3	≤0.8 DC
		>200HB	—	140 (80 – 200)	0.2 (0.1 – 0.3)	≤3	≤0.8 DC
K	Ductile cast iron	Tensile strength ≤450MPa	240 (130 – 350)	185 (120 – 250)	0.2 (0.1 – 0.3)	≤3	≤0.8 DC
		Tensile strength ≤800MPa	220 (80 – 350)	150 (100 – 200)	0.2 (0.1 – 0.3)	≤3	≤0.8 DC

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

AHX475S

DRY CUTTING

Material	Properties		Vc		fz	ap	ae	
			MV1020	MV1030				
P	Mild steel	≤180HB	R	220 (170 – 270)	140 (80 – 200)	0.6	≤1.6	≤0.5 DC
			R	220 (170 – 270)	140 (80 – 200)	0.8	≤1.6	0.5 DC < ae ≤ 0.8 DC
			M	220 (170 – 270)	140 (80 – 200)	1.0	≤1.6	0.8 DC < ae ≤ DC
	Carbon steel Alloy steel	180–280HB	R	200 (150 – 250)	120 (60 – 180)	0.6	≤1.6	≤0.5 DC
			R	200 (150 – 250)	120 (60 – 180)	0.8	≤1.6	0.5 DC < ae ≤ 0.8 DC
			M	200 (150 – 250)	120 (60 – 180)	1.0	≤1.6	0.8 DC < ae ≤ DC
	280–350HB	R	150 (100 – 200)	90 (30 – 150)	0.5	≤1.6	≤0.5 DC	
		R	150 (100 – 200)	90 (30 – 150)	0.6	≤1.6	0.5 DC < ae ≤ 0.8 DC	
		R	150 (100 – 200)	90 (30 – 150)	0.7	≤1.6	0.8 DC < ae ≤ DC	
K	Ductile cast iron	Tensile strength ≤450MPa	R	200 (150 – 250)	140 (80 – 200)	0.6	≤1.6	≤0.5 DC
			R	200 (150 – 250)	140 (80 – 200)	0.8	≤1.6	0.5 DC < ae ≤ 0.8 DC
			M	200 (150 – 250)	140 (80 – 200)	1.0	≤1.6	0.8 DC < ae ≤ DC
		Tensile strength ≤800MPa	R	180 (130 – 230)	140 (80 – 200)	0.5	≤1.6	≤0.5 DC
			R	180 (130 – 230)	140 (80 – 200)	0.6	≤1.6	0.5 DC < ae ≤ 0.8 DC
			R	180 (130 – 230)	140 (80 – 200)	0.7	≤1.6	0.8 DC < ae ≤ DC

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

MV1000 SERIES

RECOMMENDED CUTTING CONDITIONS

WSF406W

DRY CUTTING

Material	Properties	Conditions	ap	Vc		fz	ae
				MV1020	MV1030		
Gray cast iron	Tensile strength ≤350MPa	●	ap ≤ 0.5 mm	300 (250 – 300)	150 (100 – 200)	0.13 (0.08 – 0.20)	≤0.8DC
			ap ≤ 2.0 mm	250 (210 – 300)	150 (100 – 200)	0.15 (0.10 – 0.25)	≤0.8DC
			2.0 mm < ap ≤ 4.0 mm	220 (190 – 260)	140 (80 – 200)	0.13 (0.10 – 0.20)	≤0.8DC
			4.0 mm < ap ≤ 7.5 mm	200 (180 – 230)	110 (60 – 160)	0.10 (0.08 – 0.15)	≤0.8DC
		●	ap ≤ 0.5 mm	250 (210 – 300)	150 (100 – 200)	0.13 (0.08 – 0.20)	≤0.8DC
			ap ≤ 2.0 mm	220 (190 – 260)	150 (100 – 200)	0.15 (0.10 – 0.25)	≤0.8DC
			2.0 mm < ap ≤ 4.0 mm	200 (180 – 230)	140 (80 – 200)	0.13 (0.10 – 0.20)	≤0.8DC
			4.0 mm < ap ≤ 7.5 mm	180 (160 – 210)	110 (60 – 160)	0.10 (0.08 – 0.15)	≤0.8DC
		✘	ap ≤ 0.5 mm	220 (190 – 260)	140 (80 – 200)	0.13 (0.08 – 0.20)	≤0.8DC
			ap ≤ 2.0 mm	200 (180 – 230)	140 (80 – 200)	0.15 (0.10 – 0.25)	≤0.8DC
			2.0 mm < ap ≤ 4.0 mm	180 (160 – 210)	110 (60 – 160)	0.13 (0.10 – 0.20)	≤0.8DC
			4.0 mm < ap ≤ 7.5 mm	150 (100 – 180)	80 (40 – 120)	0.10 (0.08 – 0.15)	≤0.8DC
Ductile cast iron	Tensile strength ≤450MPa	●	ap ≤ 0.5 mm	230 (200 – 250)	110 (60 – 160)	0.13 (0.08 – 0.20)	≤0.8DC
			ap ≤ 2.0 mm	200 (170 – 230)	110 (60 – 160)	0.15 (0.10 – 0.25)	≤0.8DC
			2.0 mm < ap ≤ 4.0 mm	180 (150 – 210)	90 (50 – 130)	0.13 (0.10 – 0.20)	≤0.8DC
			4.0 mm < ap ≤ 7.5 mm	160 (130 – 190)	70 (40 – 100)	0.10 (0.08 – 0.15)	≤0.8DC
		●	ap ≤ 0.5 mm	200 (170 – 230)	110 (60 – 160)	0.13 (0.08 – 0.20)	≤0.8DC
			ap ≤ 2.0 mm	180 (150 – 210)	110 (60 – 160)	0.15 (0.10 – 0.25)	≤0.8DC
			2.0 mm < ap ≤ 4.0 mm	160 (130 – 190)	90 (50 – 130)	0.13 (0.10 – 0.20)	≤0.8DC
			4.0 mm < ap ≤ 7.5 mm	140 (110 – 170)	70 (40 – 100)	0.10 (0.08 – 0.15)	≤0.8DC
		✘	ap ≤ 0.5 mm	180 (150 – 200)	90 (50 – 130)	0.13 (0.08 – 0.20)	≤0.8DC
			ap ≤ 2.0 mm	160 (130 – 190)	90 (50 – 130)	0.15 (0.10 – 0.25)	≤0.8DC
			2.0 mm < ap ≤ 4.0 mm	140 (110 – 170)	70 (40 – 100)	0.13 (0.10 – 0.20)	≤0.8DC
			4.0 mm < ap ≤ 7.5 mm	120 (90 – 150)	60 (30 – 90)	0.10 (0.08 – 0.15)	≤0.8DC
Ductile cast iron	Tensile strength ≤800MPa	●	ap ≤ 0.5 mm	230 (200 – 250)	110 (60 – 160)	0.13 (0.08 – 0.20)	≤0.8DC
			ap ≤ 2.0 mm	200 (170 – 230)	110 (60 – 160)	0.15 (0.10 – 0.25)	≤0.8DC
			2.0 mm < ap ≤ 4.0 mm	180 (150 – 210)	90 (50 – 130)	0.13 (0.10 – 0.20)	≤0.8DC
			4.0 mm < ap ≤ 7.5 mm	160 (130 – 190)	70 (40 – 100)	0.10 (0.08 – 0.15)	≤0.8DC
		●	ap ≤ 0.5 mm	200 (170 – 230)	110 (60 – 160)	0.13 (0.08 – 0.20)	≤0.8DC
			ap ≤ 2.0 mm	180 (150 – 210)	110 (60 – 160)	0.15 (0.10 – 0.25)	≤0.8DC
			2.0 mm < ap ≤ 4.0 mm	160 (130 – 190)	90 (50 – 130)	0.13 (0.10 – 0.20)	≤0.8DC
			4.0 mm < ap ≤ 7.5 mm	140 (110 – 170)	70 (40 – 100)	0.10 (0.08 – 0.15)	≤0.8DC
		✘	ap ≤ 0.5 mm	180 (150 – 210)	90 (50 – 130)	0.13 (0.08 – 0.20)	≤0.8DC
			ap ≤ 2.0 mm	160 (130 – 190)	90 (50 – 130)	0.15 (0.10 – 0.25)	≤0.8DC
			2.0 mm < ap ≤ 4.0 mm	140 (110 – 170)	70 (40 – 100)	0.13 (0.10 – 0.20)	≤0.8DC
			4.0 mm < ap ≤ 7.5 mm	120 (90 – 150)	60 (30 – 90)	0.10 (0.08 – 0.15)	≤0.8DC




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MV1000 SERIES

RECOMMENDED CUTTING CONDITIONS

ASX445




DRY AND WET CUTTING

Material	Properties	Vc		L		M		R		
		MV1020	MV1030	fz		fz		fz		
P	Mild steel	≤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	180–350HB	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
	Alloy steel	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

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ASX400

DRY AND WET CUTTING

Material	Properties	Vc		L		M		R		
		MV1020	MV1030	fz		fz		fz		
P	Mild steel	≤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	180–350HB	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
	Alloy steel	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
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

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