

WSF406W

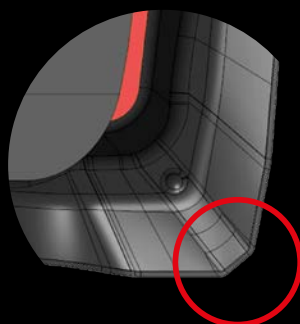
A NEW GENERATION OF HIGH EFFICIENCY CAST IRON
MACHINING IS ACHIEVED WITH LOW CUTTING RESISTANCE
AND AN ADJUSTABLE RUN-OUT SYSTEM



FACE MILLING CUTTER FOR CAST IRON MACHINING WITH AN ADJUSTABLE RUN-OUT SYSTEM



Double sided,
Z Geometry



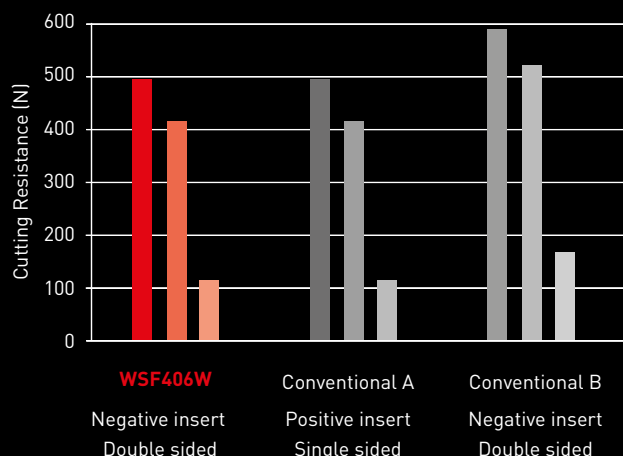
Chamfer geometry



WSF406W

DOUBLE SIDED INSERT WITH POSITIVE GEOMETRY FOR LOW CUTTING RESISTANCE

Material	GG30
Tool	WSF406WR12516EN
Insert	SNMU1206C05ZNER-M (MC520)
Vc (m/min)	160
fz (mm)	0.1
ap (mm)	3.0
ae (mm)	100
Cutting mode	Dry cutting



LOW CUTTING RESISTANCE AND ADJUSTABLE CUTTING EDGE RUN-OUT PRODUCE EXCELLENT SURFACE FINISHES AND INCREASE PRODUCTIVITY

TOUGH AND SHARP INSERTS FOR LOW CUTTING RESISTANCE

MITSUBISHI MATERIALS uniquely developed proprietary “Double Sided, Z Geometry” insert combines the best features of both positive and negative rake inserts to provide multiple cutting edges and achieve low resistance and sharpness. In addition, the chamfer geometry suppresses edge chipping that tends to occur during cast iron machining.

EASY-TO-USE ADJUSTABLE RUN-OUT SYSTEM

The M-Class insert provides a great cost performance ratio and allows for axial cutting edge adjustments of 0.01 mm or less. This helps to achieve surface finishes of Ra 1.6 μ m or less over a wide range of feeds and speeds.



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HIGH PRECISION MACHINING IS POSSIBLE OVER A WIDE RANGE OF CUTTING CONDITIONS

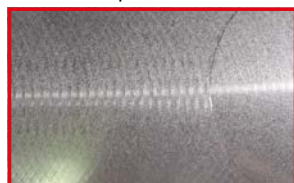
FINISH CUTTING CONDITIONS

Ra: 1.351 μm



fz = 0.3 mm / ap = 1.5 mm

Ra: 0.612 μm



fz = 0.1 mm / ap = 0.3 mm

Material	GG30
Tool	WSF406WR12516EN (Minor cutting edge run-out accuracy: 3 μm)
Insert	SNMU1206C05ZNER-M (MC520)
Vc (m/min)	250
Cutting mode	Dry cutting



ACHIEVES HIGH ACCURACY WITH A SIMPLE OPERATION

Cutting edge run-out is easily altered by turning the adjustment screw.

- 1** Loosen the adjustment screw.
- 2** Locate the insert, half tighten it so accurate adjustment can be made.
- 3** Turn the adjustment screw until the insert is in the required position.
- 4** Fully tighten the insert clamp.

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MATERIAL

Chamfer geometry prevents chipping of the workpiece

The insert corner is chamfered to allow extra workpiece material thickness to help prevent cracking.



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Conventional

Material	GG30
Tool	WSF406WR12516EN
Insert	SNMU1206C05ZNER-M (MC520)
Vc (m/min)	160
fz (mm)	0.1
ap (mm)	3.0
ae (mm)	100
Cutting mode	Dry cutting

WSF406W

RECOMMENDED CUTTING CONDITIONS

COMPARISON OF SURFACE FINISHES FOR EACH DEPTH OF CUT AND FEED: GG30

Achieves an Ra of 1.6 μm or less over a wide range of feeds and depths of cut.

fz = 0.1 mm		fz = 0.2 mm	fz = 0.3 mm
ap = 3.0 mm			
 Ra: 0.819 μm			
ap = 1.5 mm			
 Ra: 0.841 μm		 Ra: 1.039 μm	 Ra: 1.351 μm
ap = 0.3 mm			
 Ra: 0.612 μm		 Ra: 0.897 μm	 Ra: 1.249 μm

CUTTING CONDITIONS

Material	GG30
Tool	WSF406WR12516EN
Insert	SNMU1206C05ZNER-M (MC520)
Vc (m/min)	250
ae (mm)	100
Cutting mode	Dry cutting Minor cutting edge Run-out accuracy = 3 μm

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

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
K Cast iron	K10	
	K20	MC520 MV1020
	K30	
	K40	MV1030

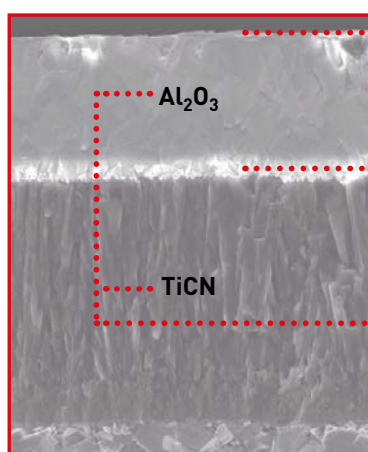


MC520

CVD COATED CARBIDE GRADE FOR CAST IRON MILLING

Improved peeling resistance of the coating layer for gray cast iron milling

By optimising the coating layer and improving the adhesion with the cemented carbide base material, plastic deformation of the cutting edge is suppressed. The coating layer has an excellent resistance to peeling, thereby providing longer tool life.



All Black Super-Even Coating

The new, smoother than standard surface coating prevents welding and edge chipping to allow stable and reliable cutting.

Tough-Grip Coating Technology

Adhesion between the coating layers has been improved exponentially, allowing for greater strength and toughness.

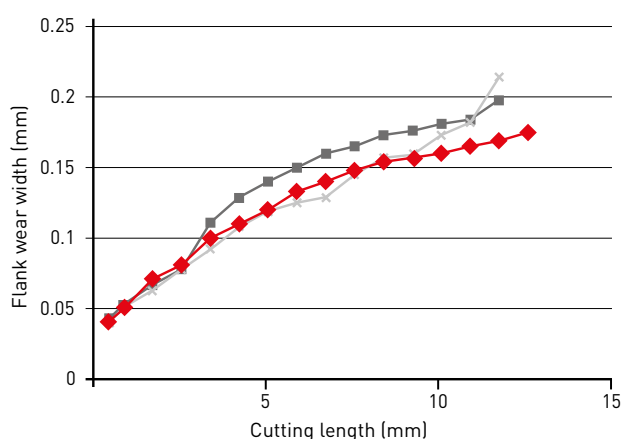
Nano-texture Coating Technology

The optimised crystal growth and the Nano-texture coating technology provide outstanding wear and chipping resistance.

MACHINING PERFORMANCE

COMPARISON OF WEAR RESISTANCE; JIS GG30

The MC520 grade provides excellent wear resistance when machining gray cast iron.



Material	GG30
Tool	WSF406WR12516EN
Insert	SNMU1206C05ZNER-M
Vc (m/min)	300
fz (mm)	0.2
ap (mm)	2.0
Cutting mode	Dry cutting, Single insert

After machining a cutting length of 8.0 m



MC520



Conventional A



Conventional B

◆ MC520 ✕ : Conventional

WSF406W



HIGH EFFICIENCY CUTTING OF CAST IRON

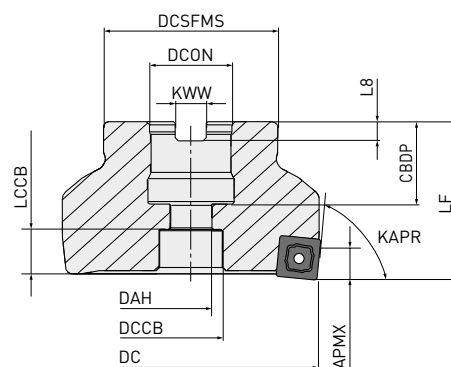
ARBOR TYPE

K



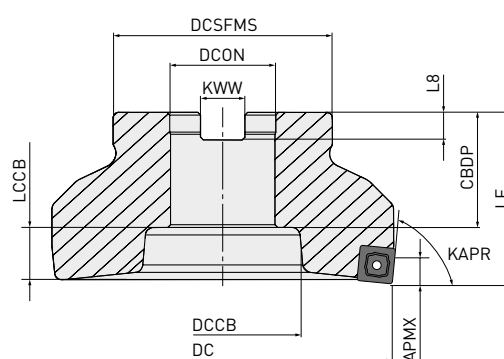
1

Ø80



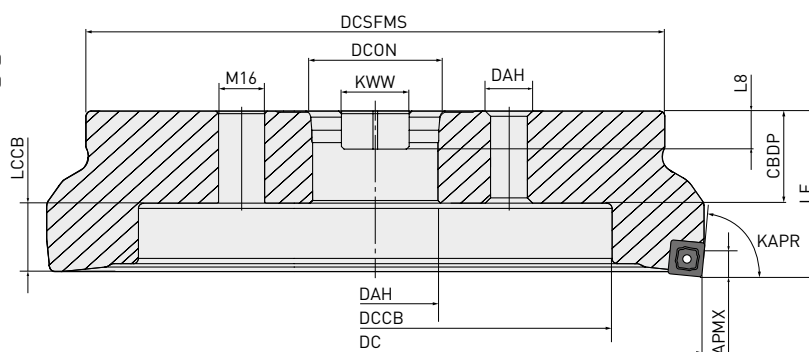
2

Ø100
Ø125
Ø160



3

Ø200
Ø250



Right hand tool holder only.

WSF406W

HIGH EFFICIENCY CUTTING OF CAST IRON

ARBOR TYPE

Order number	Stock	DC	CICT	LF	DCON	WT	APMX	RPMX	Type
WSF406WR08006CN	★	80	6	50	25.4	1.2	7.0	7.800	1
WSF406WR08009CN	★	80	9	50	25.4	1.2	7.0	7.800	1
WSF406WR10008DN	★	100	8	50	31.75	1.7	7.0	7.000	2
WSF406WR10012DN	★	100	12	50	31.75	1.7	7.0	7.000	2
WSF406WR12510EN	★	125	10	63	38.1	3.3	7.0	6.250	2
WSF406WR12516EN	★	125	16	63	38.1	3.2	7.0	6.250	2
WSF406WR16014FN	★	160	14	63	50.8	5	7.0	5.500	2
WSF406WR16020FN	★	160	20	63	50.8	4.9	7.0	5.500	2
WSF406WR20016KN	★	200	16	63	47.625	8.6	7.0	4.900	3
WSF406WR20024KN	★	200	24	63	47.625	8.5	7.0	4.900	3
WSF406WR25022KN	★	250	22	63	47.625	14	7.0	4.400	3
WSF406WR25032KN	★	250	32	63	47.625	13.9	7.0	4.400	3

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1. A set bolt for the arbor is not supplied with the body. Please refer to page 12 to find the correct type of set bolt to order.



MOUNTING DIMENSIONS

Order number	DC	DCON	CBDP	DAH	DCCB	CRKS	LCCB	DCSFMS	KWW	L8	Type
WSF406WR080	80	25.4	34	13	20	—	14	55	9.5	6	1
WSF406WR100	100	31.75	32	—	46	—	16	70	12.7	8	2
WSF406WR125	125	38.1	42	—	56	—	19	80	15.9	10	2
WSF406WR160	160	50.8	45	—	80	—	16	100	19.1	11	2
WSF406WR200	200	47.625	35	18	140	M16	26	175	25.4	14.22	3
WSF406WR250	250	47.625	35	18	180	M16	26	220	25.4	14.22	3

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WSF406W

INSERTS

K	Cast iron		●	●	●												
										Cutting conditions :							
										●: Stable cutting ●: General cutting							
										✱: Unstable cutting							
										Honing: E: Round							
Order number						Class	Honing	MC520	MV1020	MV1030	IC	S	BS	BCH	Geometry		
															Right hand insert only.		
SNMU1206C05ZNER-M						M	E	★	●	●	12.7	6.2	1.6	0.5			
WNGU1206ZNER5C-M						G	E	★			12.7	6.2	5.2				

13

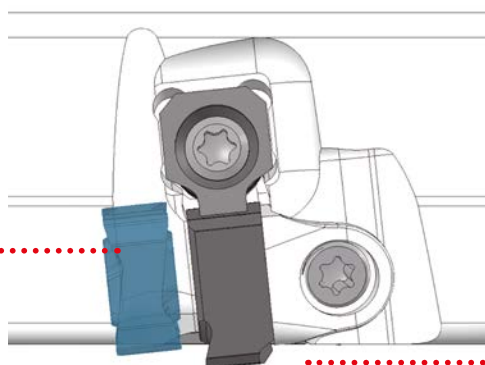
HOW TO USE WIPER INSERT FOR BEST RESULTS

The WSF406W can obtain a good surface finish when using a standard insert due to the adjustable run-out system, but by using a wiper insert, an excellent surface finish can be achieved without having to set a high accuracy face run out. When a wiper insert is mounted, aim to set the standard insert run out accuracy to within 0.04 mm.

Just one wiper insert is enough to achieve excellent finished surfaces.

However, if the feed per revolution is greater than 5.0 mm/rev, attach two or more wiper inserts so that they are evenly spaced in the cutter body and set the run out accuracy between multiple wiper inserts to within 0.003 mm before use.

Standard insert



Set the wiper to protrude from the standard insert by up to 0.07 mm.

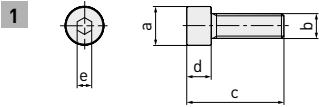
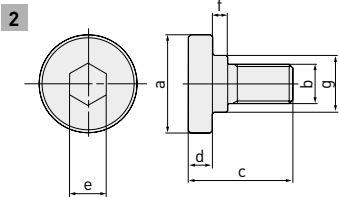
WSF406W

SPARE PARTS

Tool holder type				
	Wedge	Clamp screw	Wrench	Adjustable run-out screw
WSF406W	CWSF406N	LS0622T	TKY15T	ADW04

* Clamp Torque (N • m): LS0622T = 6.0

SET BOLT (SOLD SEPARATELY)

Tool holder type	Set bolt	Reference dimensions							Type	Geometry
		a	b	c	d	e	f	g		
WSF406WR080	HSC12035	18	M12x1.75	47	12	10	—	—	1	
	HSC12045			57						
WSF406WR100	—	40	M16x2	43	10	14	6	23	2	
WSF406WR125	—	50	M20x2.5	54	14	17	6	27	2	
WSF406WR160	—	65	M24x3	59	14	17	10	37	2	
WSF406WR200	—	24	M16x2	43	43	16	14	—	1	
WSF406WR250	—	24	M16x2	43	43	16	14	—	1	

WSF406W

RECOMMENDED CUTTING CONDITIONS

DRY CUTTING

Cutting conditions: ●: Stable cutting ●: General cutting ✖: Unstable cutting

Material	Properties	Conditions	ap	Grade	Vc	fz	ae
K Cast irons	≤350MPa	●	≤ 0.5 mm	MV1020	300 (250 – 300)	0.13 (0.08 – 0.20)	≤0.8
			≤ 2.0 mm	MV1020	250 (210 – 300)	0.15 (0.10 – 0.25)	≤0.8
			2.0 mm – 4.0 mm	MV1020	220 (190 – 260)	0.13 (0.10 – 0.20)	≤0.8
			4.0 mm – 7.5 mm	MV1020	200 (180 – 230)	0.10 (0.08 – 0.15)	≤0.8
			≤ 0.5 mm	MV1030	300 (250 – 300)	0.13 (0.08 – 0.20)	≤0.8
			≤ 2.0 mm	MV1030	250 (210 – 300)	0.15 (0.10 – 0.25)	≤0.8
			2.0 mm – 4.0 mm	MV1030	220 (190 – 260)	0.13 (0.10 – 0.20)	≤0.8
			4.0 mm – 7.5 mm	MV1030	200 (180 – 230)	0.10 (0.08 – 0.15)	≤0.8
			<2.0 mm	MC520	250 (210 – 300)	0.15 (0.10 – 0.25)	<0.8
			2.0 mm – 4.0 mm	MC520	220 (190 – 260)	0.13 (0.10 – 0.20)	<0.8
			4.0 mm – 7.5 mm	MC520	200 (180 – 230)	0.10 (0.08 – 0.15)	<0.8
		●	≤ 0.5 mm	MV1020	250 (210 – 300)	0.13 (0.08 – 0.20)	≤0.8
			≤ 2.0 mm	MV1020	220 (190 – 260)	0.15 (0.10 – 0.25)	≤0.8
			2.0 mm – 4.0 mm	MV1020	200 (180 – 230)	0.13 (0.10 – 0.20)	≤0.8
			4.0 mm – 7.5 mm	MV1020	180 (160 – 210)	0.10 (0.08 – 0.15)	≤0.8
			≤ 0.5 mm	MV1030	150 (100 – 200)	0.13 (0.08 – 0.20)	≤0.8
			≤ 2.0 mm	MV1030	150 (100 – 200)	0.15 (0.10 – 0.25)	≤0.8
			2.0 mm – 4.0 mm	MV1030	140 (80 – 200)	0.13 (0.10 – 0.20)	≤0.8
			4.0 mm – 7.5 mm	MV1030	110 (60 – 160)	0.10 (0.08 – 0.15)	≤0.8
			<2.0 mm	MC520	220 (190 – 260)	0.15 (0.10 – 0.25)	<0.8
			2.0 mm – 4.0 mm	MC520	200 (180 – 230)	0.13 (0.10 – 0.20)	<0.8
			4.0 mm – 7.5 mm	MC520	180 (160 – 210)	0.10 (0.08 – 0.15)	<0.8
		✖	≤ 0.5 mm	MV1020	220 (190 – 260)	0.13 (0.08 – 0.20)	≤0.8
			≤ 2.0 mm	MV1020	200 (180 – 230)	0.15 (0.10 – 0.25)	≤0.8
			2.0 mm – 4.0 mm	MV1020	180 (160 – 210)	0.13 (0.10 – 0.20)	≤0.8
			4.0 mm – 7.5 mm	MV1020	150 (100 – 180)	0.10 (0.08 – 0.15)	≤0.8
			≤ 0.5 mm	MV1030	140 (80 – 200)	0.13 (0.08 – 0.20)	≤0.8
			≤ 2.0 mm	MV1030	140 (80 – 200)	0.15 (0.10 – 0.25)	≤0.8
			2.0 mm – 4.0 mm	MV1030	110 (60 – 160)	0.13 (0.10 – 0.20)	≤0.8
			4.0 mm – 7.5 mm	MV1030	80 (40 – 120)	0.10 (0.08 – 0.15)	≤0.8
			<2.0 mm	MC520	200 (180 – 230)	0.15 (0.10 – 0.25)	<0.8
			2.0 mm – 4.0 mm	MC520	180 (160 – 210)	0.13 (0.10 – 0.20)	<0.8
			4.0 mm – 7.5 mm	MC520	150 (100 – 180)	0.10 (0.08 – 0.15)	<0.8

WSF406W – DRY CUTTING

Cutting conditions: ●: Stable cutting ●: General cutting ✖: Unstable cutting

Material	Properties	Conditions	ap	Grade	Vc	fz	ae
K	Ductile cast irons	≤450MPa	≤ 0.5 mm	MV1020	230 (200 – 250)	0.13 (0.08 – 0.20)	≤0.8
			≤ 2.0 mm	MV1020	200 (170 – 230)	0.15 (0.10 – 0.25)	≤0.8
			2.0 mm – 4.0 mm	MV1020	180 (150 – 210)	0.13 (0.10 – 0.20)	≤0.8
			4.0 mm – 7.5 mm	MV1020	160 (130 – 190)	0.10 (0.08 – 0.15)	≤0.8
			≤ 0.5 mm	MV1030	110 (60 – 160)	0.13 (0.08 – 0.20)	≤0.8
			≤ 2.0 mm	MV1030	110 (60 – 160)	0.15 (0.10 – 0.25)	≤0.8
			2.0 mm – 4.0 mm	MV1030	90 (50 – 130)	0.13 (0.10 – 0.20)	≤0.8
			4.0 mm – 7.5 mm	MV1030	70 (40 – 100)	0.10 (0.08 – 0.15)	≤0.8
			<2.0 mm	MC520	200 (170 – 230)	0.15 (0.10 – 0.25)	<0.8
			2.0 mm – 4.0 mm	MC520	180 (150 – 210)	0.13 (0.10 – 0.20)	<0.8
			4.0 mm – 7.5 mm	MC520	160 (130 – 190)	0.10 (0.08 – 0.15)	<0.8
			≤ 0.5 mm	MV1020	200 (170 – 230)	0.13 (0.08 – 0.20)	≤0.8
			≤ 2.0 mm	MV1020	180 (150 – 210)	0.15 (0.10 – 0.25)	≤0.8
			2.0 mm – 4.0 mm	MV1020	160 (130 – 190)	0.13 (0.10 – 0.20)	≤0.8
			4.0 mm – 7.5 mm	MV1020	140 (110 – 170)	0.10 (0.08 – 0.15)	≤0.8
			≤ 0.5 mm	MV1030	110 (60 – 160)	0.13 (0.08 – 0.20)	≤0.8
			≤ 2.0 mm	MV1030	110 (60 – 160)	0.15 (0.10 – 0.25)	≤0.8
			2.0 mm – 4.0 mm	MV1030	90 (50 – 130)	0.13 (0.10 – 0.20)	≤0.8
			4.0 mm – 7.5 mm	MV1030	70 (40 – 100)	0.10 (0.08 – 0.15)	≤0.8
			<2.0 mm	MC520	180 (150 – 210)	0.15 (0.10 – 0.25)	<0.8
			2.0 mm – 4.0 mm	MC520	160 (130 – 190)	0.13 (0.10 – 0.20)	<0.8
			4.0 mm – 7.5 mm	MC520	140 (110 – 170)	0.10 (0.08 – 0.15)	<0.8
			≤ 0.5 mm	MV1020	180 (150 – 200)	0.13 (0.08 – 0.20)	≤0.8
			≤ 2.0 mm	MV1020	160 (130 – 190)	0.15 (0.10 – 0.25)	≤0.8
			2.0 mm – 4.0 mm	MV1020	140 (110 – 170)	0.13 (0.10 – 0.20)	≤0.8
			4.0 mm – 7.5 mm	MV1020	120 (90 – 150)	0.10 (0.08 – 0.15)	≤0.8
			≤ 0.5 mm	MV1030	90 (50 – 130)	0.13 (0.08 – 0.20)	≤0.8
			≤ 2.0 mm	MV1030	90 (50 – 130)	0.15 (0.10 – 0.25)	≤0.8
			2.0 mm – 4.0 mm	MV1030	70 (40 – 100)	0.13 (0.10 – 0.20)	≤0.8
			4.0 mm – 7.5 mm	MV1030	60 (30 – 90)	0.10 (0.08 – 0.15)	≤0.8
			<2.0 mm	MC520	160 (130 – 190)	0.15 (0.10 – 0.25)	<0.8
			2.0 mm – 4.0 mm	MC520	140 (110 – 170)	0.13 (0.10 – 0.20)	<0.8
			4.0 mm – 7.5 mm	MC520	120 (90 – 150)	0.10 (0.08 – 0.15)	<0.8

WSF406W – DRY CUTTING

Cutting conditions: ●: Stable cutting ●: General cutting ✖: Unstable cutting

Material	Properties	Conditions	ap	Grade	Vc	fz	ae
K	Ductile cast irons	≤800MPa	≤ 0.5 mm	MV1020	230 (200 – 250)	0.13 (0.08 – 0.20)	≤0.8
			≤ 2.0 mm	MV1020	200 (170 – 230)	0.15 (0.10 – 0.25)	≤0.8
			2.0 mm – 4.0 mm	MV1020	180 (150 – 210)	0.13 (0.10 – 0.20)	≤0.8
			4.0 mm – 7.5 mm	MV1020	160 (130 – 190)	0.10 (0.08 – 0.15)	≤0.8
			≤ 0.5 mm	MV1030	110 (60 – 160)	0.13 (0.08 – 0.20)	≤0.8
			≤ 2.0 mm	MV1030	110 (60 – 160)	0.15 (0.10 – 0.25)	≤0.8
			2.0 mm – 4.0 mm	MV1030	90 (50 – 130)	0.13 (0.10 – 0.20)	≤0.8
			4.0 mm – 7.5 mm	MV1030	70 (40 – 100)	0.10 (0.08 – 0.15)	≤0.8
			<2.0 mm	MC520	200 (170 – 230)	0.15 (0.10 – 0.25)	<0.8
			2.0 mm – 4.0 mm	MC520	180 (150 – 210)	0.13 (0.10 – 0.20)	<0.8
			4.0 mm – 7.5 mm	MC520	160 (130 – 190)	0.10 (0.08 – 0.15)	<0.8
			≤ 0.5 mm	MV1020	200 (170 – 230)	0.13 (0.08 – 0.20)	≤0.8
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			2.0 mm – 4.0 mm	MV1020	160 (130 – 190)	0.13 (0.10 – 0.20)	≤0.8
			4.0 mm – 7.5 mm	MV1020	140 (110 – 170)	0.10 (0.08 – 0.15)	≤0.8
			≤ 0.5 mm	MV1030	110 (60 – 160)	0.13 (0.08 – 0.20)	≤0.8
			≤ 2.0 mm	MV1030	110 (60 – 160)	0.15 (0.10 – 0.25)	≤0.8
			2.0 mm – 4.0 mm	MV1030	90 (50 – 130)	0.13 (0.10 – 0.20)	≤0.8
			4.0 mm – 7.5 mm	MV1030	70 (40 – 100)	0.10 (0.08 – 0.15)	≤0.8
			<2.0 mm	MC520	180 (150 – 210)	0.15 (0.10 – 0.25)	<0.8
			2.0 mm – 4.0 mm	MC520	160 (130 – 190)	0.13 (0.10 – 0.20)	<0.8
			4.0 mm – 7.5 mm	MC520	140 (110 – 170)	0.10 (0.08 – 0.15)	<0.8
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			≤ 2.0 mm	MV1020	160 (130 – 190)	0.15 (0.10 – 0.25)	≤0.8
			2.0 mm – 4.0 mm	MV1020	140 (110 – 170)	0.13 (0.10 – 0.20)	≤0.8
			4.0 mm – 7.5 mm	MV1020	120 (90 – 150)	0.10 (0.08 – 0.15)	≤0.8
			≤ 0.5 mm	MV1030	90 (50 – 130)	0.13 (0.08 – 0.20)	≤0.8
			≤ 2.0 mm	MV1030	90 (50 – 130)	0.15 (0.10 – 0.25)	≤0.8
			2.0 mm – 4.0 mm	MV1030	70 (40 – 100)	0.13 (0.10 – 0.20)	≤0.8
			4.0 mm – 7.5 mm	MV1030	60 (30 – 90)	0.10 (0.08 – 0.15)	≤0.8
			<2.0 mm	MC520	160 (130 – 190)	0.15 (0.10 – 0.25)	<0.8
			2.0 mm – 4.0 mm	MC520	140 (110 – 170)	0.13 (0.10 – 0.20)	<0.8
			4.0 mm – 7.5 mm	MC520	120 (90 – 150)	0.10 (0.08 – 0.15)	<0.8

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