

RECOMMENDED CUTTING CONDITIONS

■ Dry cutting

Workpiece Material	Hardness	1st Recommendation	2nd Recommendation	vc (m/min)			
					Finish Cutting		
					fz (mm/t)	ap	
P					L Breaker		
Mild Steel	≤ 180HB	MP6120	VP15TF	250 (200—300)	0.15 (0.1—0.2)	≤ 1.0	
		MP6130	VP20RT	240 (190—290)	0.15 (0.1—0.2)	≤ 1.0	
		MX3030	—	180 (130—230)	0.15 (0.1—0.2)	≤ 1.0	
Carbon Steel Alloy Steel	180—350HB	MP6120	VP15TF	220 (170—270)	0.15 (0.1—0.2)	≤ 1.0	
		MP6130	VP20RT	200 (150—250)	0.15 (0.1—0.2)	≤ 1.0	
		MX3030	—	150 (120—180)	0.15 (0.1—0.2)	≤ 1.0	
Alloy Tool Steel	≤ 350HB (Annealing)	MP6120	VP15TF	220 (170—270)	0.15 (0.1—0.2)	≤ 1.0	
		MP6130	VP20RT	200 (150—250)	0.15 (0.1—0.2)	≤ 1.0	
		MX3030	—	150 (120—180)	0.15 (0.1—0.2)	≤ 1.0	
Pre-Hardened Steel	35—45HRC	MP6120	VP15TF	140 (100—180)	0.15 (0.1—0.2)	≤ 1.0	
		MP6130	VP20RT	120 (90—150)	0.15 (0.1—0.2)	≤ 1.0	
M					L Breaker		
Austenitic Stainless Steel	≤ 200HB	MP7130	VP15TF	200 (150—250)	0.15 (0.1—0.2)	≤ 1.0	
		MP7140	VP20RT	200 (150—250)	0.15 (0.1—0.2)	≤ 1.0	
		MX3030	—	130 (100—180)	0.15 (0.1—0.2)	≤ 1.0	
Austenitic Stainless Steel	>200HB	MP7130	VP15TF	170 (120—220)	0.15 (0.1—0.2)	≤ 1.0	
		MP7140	VP20RT	170 (120—220)	0.15 (0.1—0.2)	≤ 1.0	
Two-phase Stainless Steel	≤ 280HB	MP7130	VP15TF	160 (110—210)	0.15 (0.1—0.2)	≤ 1.0	
		MP7140	VP20RT	160 (110—210)	0.15 (0.1—0.2)	≤ 1.0	
Precipitation-Hardening Stainless Steel	≤ 450HB	MP7130	VP15TF	150 (100—200)	0.15 (0.1—0.2)	≤ 1.0	
		MP7140	VP20RT	150 (100—200)	0.15 (0.1—0.2)	≤ 1.0	
K					L Breaker		
Gray Cast Iron	Tensile Strength ≤ 350MPa	MC5020	—	220 (200—270)	0.15 (0.1—0.2)	≤ 1.0	
		VP15TF	—	180 (130—250)	0.15 (0.1—0.2)	≤ 1.0	
		VP20RT	—	170 (120—240)	0.15 (0.1—0.2)	≤ 1.0	
		MX3030	—	150 (120—180)	0.15 (0.1—0.2)	≤ 1.0	
Ductile Cast Iron	Tensile Strength ≤ 450MPa	MC5020	—	200 (180—250)	0.15 (0.1—0.2)	≤ 1.0	
		VP15TF	VP20RT	160 (110—240)	0.15 (0.1—0.2)	≤ 1.0	
Ductile Cast Iron	Tensile Strength ≤ 800MPa	MC5020	—	200 (180—250)	0.15 (0.1—0.2)	≤ 1.0	
		VP15TF	—	160 (110—240)	0.15 (0.1—0.2)	≤ 1.0	
		VP20RT	—	150 (100—200)	0.15 (0.1—0.2)	≤ 1.0	
H					M Breaker		
Hardened Steel	40—55HRC	VP15TF	—	50 (30—70)	0.05 (0.05—0.1)	≤ 1.0	
Hardened Steel	55—62HRC	VP15TF	—	40 (20—50)	0.05 (0.05—0.1)	≤ 1.0	

Note 1) Refer to the table above and set the cutting conditions to match the application.

Note 2) Wet cutting is recommended, when focusing on the surface finish. (Tool life is lower than when dry cutting.)

(mm)

Feed per revolution by machining area fz (mm/t) and the depth of cut ap								
	Light Cutting		Medium Cutting		Rough Cutting		Heavy Cutting	
	fz (mm/t)	ap	fz (mm/t)	ap	fz (mm/t)	ap	fz (mm/t)	ap
	L,M Breaker		M Breaker		M,R Breaker		R,H Breaker	
	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
	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
	0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
	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
	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
	0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
	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
	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
	0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
	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
	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
	L,M Breaker		M Breaker					
	0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
	0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
	0.15 (0.1—0.2)	≤ 2.0	—	—	—	—	—	—
	0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
	0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
	0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
	0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
	0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
	0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
	L,M Breaker		M Breaker		M,R Breaker		R,H Breaker	
	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
	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
	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
	0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
	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
	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
	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
	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
	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,R Breaker		R,H Breaker					
	0.05 (0.05—0.1)	≤ 1.5	0.1 (0.05—0.15)	≤ 2.0	—	—	—	—
	0.05 (0.05—0.1)	≤ 1.5	0.1 (0.05—0.15)	≤ 2.0	—	—	—	—

RECOMMENDED CUTTING CONDITIONS

Wet Cutting

Workpiece Material	Hardness	1st Recommendation	2nd Recommendation	vc (m/min)			
					Finish Cutting		
					fz (mm/t)	ap	
P					L Breaker		
Mild Steel	≤ 180HB	MP6120	VP15TF	150 (100—200)	0.15 (0.1—0.2)	≤ 1.0	
		MP6130	VP20RT	150 (100—200)	0.15 (0.1—0.2)	≤ 1.0	
Carbon Steel Alloy Steel	180—350HB	MP6120	VP15TF	120 (80—160)	0.15 (0.1—0.2)	≤ 1.0	
		MP6130	VP20RT	120 (80—160)	0.15 (0.1—0.2)	≤ 1.0	
Alloy Tool Steel	≤ 350HB (Annealing)	MP6120	VP15TF	120 (80—160)	0.15 (0.1—0.2)	≤ 1.0	
		MP6130	VP20RT	120 (80—160)	0.15 (0.1—0.2)	≤ 1.0	
Pre-Hardened Steel	35—45HRC	MP6120	VP15TF	100 (80—120)	0.15 (0.1—0.2)	≤ 1.0	
		MP6130	VP20RT	100 (80—120)	0.15 (0.1—0.2)	≤ 1.0	
M					L Breaker		
Austenitic Stainless Steel	≤ 200HB	MP7130	VP15TF	130 (80—180)	0.15 (0.1—0.2)	≤ 1.0	
		MP7140	VP20RT	130 (80—180)	0.15 (0.1—0.2)	≤ 1.0	
Austenitic Stainless Steel	> 200HB	MP7130	VP15TF	100 (80—150)	0.15 (0.1—0.2)	≤ 1.0	
		MP7140	VP20RT	100 (80—150)	0.15 (0.1—0.2)	≤ 1.0	
Two-phase Stainless Steel	≤ 280HB	MP7130	VP15TF	100 (80—150)	0.15 (0.1—0.2)	≤ 1.0	
		MP7140	VP20RT	100 (80—150)	0.15 (0.1—0.2)	≤ 1.0	
Precipitation-Hardening Stainless Steel	< 450HB	MP7130	VP15TF	90 (50—140)	0.15 (0.1—0.2)	≤ 1.0	
		MP7140	VP20RT	90 (50—140)	0.15 (0.1—0.2)	≤ 1.0	
K					L Breaker		
Gray Cast Iron	Tensile Strength ≤ 350MPa	MC5020	—	180 (160—200)	0.15 (0.1—0.2)	≤ 1.0	
		VP15TF	VP20RT	130 (100—160)	0.15 (0.1—0.2)	≤ 1.0	
Ductile Cast Iron	Tensile Strength ≤ 450MPa	MC5020	—	180 (160—200)	0.15 (0.1—0.2)	≤ 1.0	
		VP15TF	VP20RT	130 (100—160)	0.15 (0.1—0.2)	≤ 1.0	
Ductile Cast Iron	Tensile Strength ≤ 800MPa	MC5020	—	180 (160—200)	0.15 (0.1—0.2)	≤ 1.0	
		VP15TF	VP20RT	110 (80—140)	0.15 (0.1—0.2)	≤ 1.0	
N					L Breaker		
Aluminium Alloy	—	TF15	—	≥ 300	0.15 (0.1—0.2)	≤ 1.0	
S					L Breaker		
Titanium Alloy	—	MP9120	VP15TF	50 (40—60)	0.05 (0.05—0.1)	≤ 1.0	
		MP9130	VP20RT	50 (40—60)	0.05 (0.05—0.1)	≤ 1.0	
Heat Resistant Alloy	—	MP9120	VP15TF	40 (20—50)	0.05 (0.05—0.1)	≤ 1.0	
		MP9130	VP20RT	40 (20—50)	0.05 (0.05—0.1)	≤ 1.0	

Note 1) Refer to the table above and set the cutting conditions to match the application.

Note 2) Wet cutting is recommended, when focusing on the surface finish. (Tool life is lower than when dry cutting.)

(mm)

Feed per revolution by machining area fz (mm/t) and the depth of cut ap								
	Light Cutting		Medium Cutting		Rough Cutting		Heavy Cutting	
	fz (mm/t)	ap	fz (mm/t)	ap	fz (mm/t)	ap	fz (mm/t)	ap
	L,M Breaker		M Breaker		M,R Breaker		R,H Breaker	
	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
	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
	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
	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
	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
	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
	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
	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
	L,M Breaker		M Breaker					
	0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
	0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
	0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
	0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
	0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
	0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
	0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
	0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 3.0	—	—	—	—
	L,M Breaker		M Breaker		M,R Breaker		R,H Breaker	
	0.15 (0.1—0.2)	≤ 2.0	0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
	0.15 (0.1—0.2)	≤ 2.0	0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
	0.15 (0.1—0.2)	≤ 2.0	0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
	0.15 (0.1—0.2)	≤ 2.0	0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
	0.15 (0.1—0.2)	≤ 2.0	0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
	0.15 (0.1—0.2)	≤ 2.0	0.15 (0.1—0.2)	≤ 2.0	0.2 (0.15—0.25)	≤ 4.0	0.25 (0.2—0.3)	≤ 5.0
	L Breaker		L Breaker		L Breaker		L Breaker	
	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
	L,M Breaker		M Breaker					
	0.05 (0.05—0.1)	≤ 1.5	0.1 (0.05—0.15)	≤ 2.0	—	—	—	—
	0.05 (0.05—0.1)	≤ 1.5	0.1 (0.05—0.15)	≤ 2.0	—	—	—	—
	0.05 (0.05—0.1)	≤ 1.5	0.1 (0.05—0.15)	≤ 2.0	—	—	—	—
	0.05 (0.05—0.1)	≤ 1.5	0.1 (0.05—0.15)	≤ 2.0	—	—	—	—