Dry Cutting

Work Material	Properties	Grade		vc (SFM)	Finish Cutting		
					fz (IPT)	ap	
P					L Breaker		
Mild Steels	≤180HB	MP6120	VP15TF	820 (655—985)	.006 (.004—.008)	≤.039	
		MP6130	VP20RT	785 (620—950)	.006 (.004—.008)	≤.039	
		MX3030	—	590 (425—755)	.006 (.004—.008)	≤.039	
Carbon Steels Alloy Steels	180—350HB	MP6120	VP15TF	720 (560—885)	.006 (.004—.008)	≤.039	
		MP6130	VP20RT	655 (490—820)	.006 (.004—.008)	≤.039	
		MX3030	—	490 (395—590)	.006 (.004—.008)	≤.039	
Alloy Tool Steels	≤ 350HB (Annealing)	MP6120	VP15TF	720 (560—885)	.006 (.004—.008)	≤.039	
		MP6130	VP20RT	655 (490—820)	.006 (.004—.008)	≤.039	
		MX3030	—	490 (395—590)	.006 (.004—.008)	≤.039	
Pre-hardened Steels	35—45HRC	MP6120	VP15TF	460 (330—590)	.006 (.004—.008)	≤.039	
		MP6130	VP20RT	395 (295—490)	.006 (.004—.008)	≤.039	
M					L Breaker		
Austenitic Stainless Steels	≤200HB	MP7130	VP15TF	655 (490—820)	.006 (.004—.008)	≤.039	
		MP7140	VP20RT	655 (490—820)	.006 (.004—.008)	≤.039	
		MX3030	—	425 (330—590)	.006 (.004—.008)	≤.039	
Austenitic Stainless Steels	>200HB	MP7130	VP15TF	560 (395—720)	.006 (.004—.008)	≤.039	
		MP7140	VP20RT	560 (395—720)	.006 (.004—.008)	≤.039	
Duplex Stainless Steels	≤ 280HB	MP7130	VP15TF	525 (360—690)	.006 (.004—.008)	≤.039	
		MP7140	VP20RT	525 (360—690)	.006 (.004—.008)	≤.039	
Precipitation Hardening Stainless Steels	< 450HB	MP7130	VP15TF	490 (330—655)	.006 (.004—.008)	≤.039	
		MP7140	VP20RT	490 (330—655)	.006 (.004—.008)	≤.039	
K					L Breaker		
Gray Cast Irons	Tensile Strength ≤350MPa	MC5020	—	220 (200—270)	.006 (.004—.008)	≤.039	
		VP15TF	—	180 (130—250)	.006 (.004—.008)	≤.039	
		VP20RT	—	170 (120—240)	.006 (.004—.008)	≤.039	
		MX3030	—	150 (120—180)	.006 (.004—.008)	≤.039	
Ductile Cast Irons	Tensile Strength ≤450MPa	MC5020	—	200 (180—250)	.006 (.004—.008)	≤.039	
		VP15TF	VP20RT	160 (110—240)	.006 (.004—.008)	≤.039	
Ductile Cast Irons	Tensile Strength ≤800MPa	MC5020	—	200 (180—250)	.006 (.004—.008)	≤.039	
		VP15TF	—	160 (110—240)	.006 (.004—.008)	≤.039	
		VP20RT	—	150 (100—200)	.006 (.004—.008)	≤.039	
H					M Breaker		
Hardened Steels	40—55HRC	VP15TF	—	50 (30—70)	.002 (.002—.004)	≤.039	
Hardened Steels	55—62HRC	VP15TF	—	40 (20—50)	.002 (.002—.004)	≤.039	

(inch)

Light Cutting		Medium Cutting		Rough Cutting		Heavy Cutting	
fz (IPT)	**ap**	**fz** (IPT)	**ap**	**fz** (IPT)	**ap**	**fz** (IPT)	**ap**
L,M Breaker		M Breaker		M,R Breaker		R,H Breaker	
.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	.008 (.006–.010)	≤.157	.010 (.008–.012)	≤.197
.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	.008 (.006–.010)	≤.157	.010 (.008–.012)	≤.197
.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	–	–	–	–
.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	.008 (.006–.010)	≤.157	.010 (.008–.012)	≤.197
.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	.008 (.006–.010)	≤.157	.010 (.008–.012)	≤.197
.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	–	–	–	–
.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	.008 (.006–.010)	≤.157	.010 (.008–.012)	≤.197
.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	.008 (.006–.010)	≤.157	.010 (.008–.012)	≤.197
.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	–	–	–	–
.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	.008 (.006–.010)	≤.157	.010 (.008–.012)	≤.197
.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	.008 (.006–.010)	≤.157	.010 (.008–.012)	≤.197
L,M Breaker		M Breaker					
.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	–	–	–	–
.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	–	–	–	–
.006 (.004–.008)	≤.079	–	–	–	–	–	–
.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	–	–	–	–
.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	–	–	–	–
.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	–	–	–	–
.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	–	–	–	–
.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	–	–	–	–
.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	–	–	–	–
L,M Breaker		M Breaker		M,R Breaker		R,H Breaker	
.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	.008 (.006–.010)	≤.157	.010 (.008–.012)	≤.197
.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	.008 (.006–.010)	≤.157	.010 (.008–.012)	≤.197
.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	.008 (.006–.010)	≤.157	.010 (.008–.012)	≤.197
.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	–	–	–	–
.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	.008 (.006–.010)	≤.157	.010 (.008–.012)	≤.197
.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	.008 (.006–.010)	≤.157	.010 (.008–.012)	≤.197
.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	.008 (.006–.010)	≤.157	.010 (.008–.012)	≤.197
.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	.008 (.006–.010)	≤.157	.010 (.008–.012)	≤.197
.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	.008 (.006–.010)	≤.157	.010 (.008–.012)	≤.197
M,R Breaker		R,H Breaker					
.002 (.002–.004)	≤.059	.004 (.002–.006)	≤.079	–	–	–	–
.002 (.002–.004)	≤.059	.004 (.002–.006)	≤.079	–	–	–	–

Wet Cutting

Work Material	Properties	Grade		vc (SFM)	Finish Cutting		
					fz (IPT)	ap	
P					L Breaker		
Mild Steels	≤ 180HB	MP6120	VP15TF	490 (330—655)	.006 (.004—.008)	≤.039	
		MP6130	VP20RT	490 (330—655)	.006 (.004—.008)	≤.039	
Carbon Steels Alloy Steels	180—350HB	MP6120	VP15TF	395 (260—525)	.006 (.004—.008)	≤.039	
		MP6130	VP20RT	395 (260—525)	.006 (.004—.008)	≤.039	
Alloy Tool Steels	≤ 350HB (Annealing)	MP6120	VP15TF	395 (260—525)	.006 (.004—.008)	≤.039	
		MP6130	VP20RT	395 (260—525)	.006 (.004—.008)	≤.039	
Pre-hardened Steels	35—45HRC	MP6120	VP15TF	330 (260—395)	.006 (.004—.008)	≤.039	
		MP6130	VP20RT	330 (260—395)	.006 (.004—.008)	≤.039	
M					L Breaker		
Austenitic Stainless Steels	≤ 200HB	MP7130	VP15TF	425 (260—590)	.006 (.004—.008)	≤.039	
		MP7140	VP20RT	425 (260—590)	.006 (.004—.008)	≤.039	
Austenitic Stainless Steels	> 200HB	MP7130	VP15TF	330 (260—490)	.006 (.004—.008)	≤.039	
		MP7140	VP20RT	330 (260—490)	.006 (.004—.008)	≤.039	
Duplex Stainless Steels	≤ 280HB	MP7130	VP15TF	330 (260—490)	.006 (.004—.008)	≤.039	
		MP7140	VP20RT	330 (260—490)	.006 (.004—.008)	≤.039	
Precipitation Hardening Stainless Steels	< 450HB	MP7130	VP15TF	295 (165—460)	.006 (.004—.008)	≤.039	
		MP7140	VP20RT	295 (165—460)	.006 (.004—.008)	≤.039	
K					L Breaker		
Gray Cast Irons	Tensile Strength ≤350MPa	MC5020	—	590 (525—655)	.006 (.004—.008)	≤.039	
		VP15TF	VP20RT	425 (330—525)	.006 (.004—.008)	≤.039	
Ductile Cast Irons	Tensile Strength ≤450MPa	MC5020	—	590 (525—655)	.006 (.004—.008)	≤.039	
		VP15TF	VP20RT	425 (330—525)	.006 (.004—.008)	≤.039	
Ductile Cast Irons	Tensile Strength ≤ 800MPa	MC5020	—	590 (525—655)	.006 (.004—.008)	≤.039	
		VP15TF	VP20RT	360 (260—460)	.006 (.004—.008)	≤.039	
N					L Breaker		
Aluminum Alloys	—	TF15	—	1640 (655—3280)	.006 (.004—.008)	≤.039	
S					L Breaker		
Titanium Alloys	—	MP9120	VP15TF	165 (130—195)	.002 (.002—.004)	≤.039	
		MP9130	VP20RT	165 (130—195)	.002 (.002—.004)	≤.039	
Heat Resistant Alloys	—	MP9120	VP15TF	130 (65—165)	.002 (.002—.004)	≤.039	
		MP9130	VP20RT	130 (65—165)	.002 (.002—.004)	≤.039	

(inch)

	Light Cutting		Medium Cutting		Rough Cutting		Heavy Cutting	
	fz (IPT)	**ap**	**fz** (IPT)	**ap**	**fz** (IPT)	**ap**	**fz** (IPT)	**ap**
	L,M Breaker		M Breaker		M,R Breaker		R,H Breaker	
	.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	.008 (.006–.010)	≤.157	.010 (.008–.012)	≤.197
	.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	.008 (.006–.010)	≤.157	.010 (.008–.012)	≤.197
	.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	.008 (.006–.010)	≤.157	.010 (.008–.012)	≤.197
	.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	.008 (.006–.010)	≤.157	.010 (.008–.012)	≤.197
	.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	.008 (.006–.010)	≤.157	.010 (.008–.012)	≤.197
	.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	.008 (.006–.010)	≤.157	.010 (.008–.012)	≤.197
	.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	.008 (.006–.010)	≤.157	.010 (.008–.012)	≤.197
	.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	.008 (.006–.010)	≤.157	.010 (.008–.012)	≤.197
	L,M Breaker		M Breaker					
	.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	–	–	–	–
	.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	–	–	–	–
	.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	–	–	–	–
	.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	–	–	–	–
	.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	–	–	–	–
	.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	–	–	–	–
	.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	–	–	–	–
	.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	–	–	–	–
	L,M Breaker		M Breaker		M,R Breaker		R,H Breaker	
	.006 (.004–.008)	≤.079	.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.157	.010 (.008–.012)	≤.197
	.006 (.004–.008)	≤.079	.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.157	.010 (.008–.012)	≤.197
	.006 (.004–.008)	≤.079	.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.157	.010 (.008–.012)	≤.197
	.006 (.004–.008)	≤.079	.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.157	.010 (.008–.012)	≤.197
	.006 (.004–.008)	≤.079	.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.157	.010 (.008–.012)	≤.197
	.006 (.004–.008)	≤.079	.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.157	.010 (.008–.012)	≤.197
	L Breaker		L Breaker		L Breaker		L Breaker	
	.006 (.004–.008)	≤.079	.008 (.006–.010)	≤.118	.008 (.006–.010)	≤.157	.010 (.008–.012)	≤.197
	L,M Breaker		M Breaker					
	.002 (.002–.004)	≤.059	.004 (.002–.006)	≤.079	–	–	–	–
	.002 (.002–.004)	≤.059	.004 (.002–.006)	≤.079	–	–	–	–
	.002 (.002–.004)	≤.059	.004 (.002–.006)	≤.079	–	–	–	–
	.002 (.002–.004)	≤.059	.004 (.002–.006)	≤.079	–	–	–	–

■ WSX445 Cutting Speed
Dry and Wet Cutting

(inch)

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

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

(inch)

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