

VPX200

RECOMMENDED CUTTING CONDITIONS WET CUTTING



These cutting conditions are reference for standard shank types (last letter in designation is S) and arbor shank types. If there is chatter, insert chipping, etc. during machining, alter the conditions accordingly.

Chattering and vibration is more likely under the following circumstances: When the tool overhang is long (using a long shank, screw-in type, etc.), the rigidity of the machine, work material or attachment of work material is low, or during the machining of corners during pocket machining. Use cutting conditions at the minimum recommendation or below.

CUTTING SPEED

Material	Properties	Cutting conditions	Grade	Vc				
				ae<0.25 DC	ae≥0.25-0.5 DC	ae≥0.5-0.75 DC	ae=1.0 DC	
P	Mild steel	≤180HB	● ● MP6120	140 (100-190)	130 (90-180)	100 (70-120)	100 (70-120)	
			● ● VP15TF	140 (100-190)	130 (90-180)	100 (70-120)	100 (70-120)	
			✱ MP6130	140 (100-190)	130 (90-180)	100 (70-120)	100 (70-120)	
	Carbon steel Alloy steel Alloy tool steel	180-350HB ≤350HB	● ● MP6120	120 (90-140)	110 (80-130)	100 (70-120)	100 (70-120)	
			● ● VP15TF	120 (90-140)	110 (80-130)	100 (70-120)	100 (70-120)	
			✱ MP6130	120 (90-140)	110 (80-130)	100 (70-120)	100 (70-120)	
	Pre-hardened steel	35-45HRC	● ● MP6120	100 (80-120)	90 (70-110)	80 (60-100)	80 (60-100)	
			● ● VP15TF	100 (80-120)	90 (70-110)	80 (60-100)	80 (60-100)	
			✱ MP6130	100 (80-120)	90 (70-110)	80 (60-100)	80 (60-100)	
M	Austenitic stainless steel	≤200HB	● ● ✱ MP7130	120 (100-150)	110 (90-140)	90 (70-120)	90 (70-120)	
			● ● VP15TF	120 (100-150)	110 (90-140)	90 (70-120)	90 (70-120)	
		>200HB	● ● ✱ MP7130	100 (80-130)	90 (70-110)	70 (50-100)	70 (50-100)	
			● ● VP15TF	100 (80-130)	90 (70-110)	70 (50-100)	70 (50-100)	
	Duplex stainless steel	≤280HB	● ● ✱ MP7130	100 (80-130)	90 (70-120)	70 (50-100)	70 (50-100)	
			● ● VP15TF	100 (80-130)	90 (70-120)	70 (50-100)	70 (50-100)	
	Ferritic and martensitic stainless steel	—	● ● ✱ MP7130	120 (100-150)	110 (90-140)	90 (70-120)	90 (70-120)	
			● ● VP15TF	120 (100-150)	110 (90-140)	90 (70-120)	90 (70-120)	
	Precipitation hardening stainless steel	<450HB	● ● ✱ MP7130	90 (70-120)	80 (60-110)	60 (40- 90)	60 (40- 90)	
			● ● VP15TF	90 (70-120)	80 (60-110)	60 (40- 90)	60 (40- 90)	
	K	Gray cast iron	≤350MPa	● ● MC5020	180 (160-220)	170 (150-210)	150 (130-190)	150 (130-190)
				● ● ✱ VP15TF	130 (100-150)	120 (90-140)	100 (80-120)	100 (80-120)
Ductile cast iron		≤800MPa	● ● MC5020	160 (140-180)	150 (130-170)	130 (110-150)	130 (110-150)	
			● ● ✱ VP15TF	110 (80-140)	100 (70-130)	80 (60-120)	80 (60-120)	
N	Aluminium alloy	Si<5 %	● ● ✱ TF15	600 (400-1000)	600 (400-1000)	600 (400-1000)	600 (400-1000)	
S	Titanium alloy (Ti-6Al-4V)	—	● ● MP9120	50 (40- 70)	50 (40- 70)	50 (40- 70)	50 (40- 70)	
			● ● VP15TF	50 (40- 70)	50 (40- 70)	50 (40- 70)	50 (40- 70)	
			✱ MP9130	40 (30- 60)	40 (30- 60)	40 (30- 60)	40 (30- 60)	
	Titanium alloy (Ti-5Al-5V-5Mo-3Cr)	—	● ● MP9120	30 (20- 40)	30 (20- 40)	30 (20- 40)	30 (20- 40)	
			● ● VP15TF	30 (20- 40)	30 (20- 40)	30 (20- 40)	30 (20- 40)	
			✱ MP9130	30 (20- 40)	30 (20- 40)	30 (20- 40)	30 (20- 40)	
Heat resistant alloy	—	● ● MP9120	40 (30- 60)	40 (30- 60)	40 (30- 60)	40 (30- 60)		
		● ● ✱ VP15TF	40 (30- 60)	40 (30- 60)	40 (30- 60)	40 (30- 60)		
H	Hardened steel	40-55HRC	● ● ✱ VP15TF	90 (70-100)	85 (60-100)	70 (50- 80)	70 (50- 80)	

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DEPTH OF CUT / FEED PER TOOTH

Material	Properties	Cutting conditions	ae	DC=Ø20-Ø28		DC=Ø32-Ø50	
				ap	fz	ap	fz
P	Mild steel	≤180HB	● ● ✱ ≤0.25 DC	≤14	0.13 [0.10—0.15]	≤APMX	0.15 [0.10—0.2]
			● ● ✱ 0.25—0.5 DC	≤8	0.10 [0.08—0.12]	≤28	0.13 [0.10—0.15]
			● ● ✱ 0.5—0.75 DC	≤6	0.10 [0.08—0.12]	≤14	0.10 [0.08—0.12]
			● ● ✱ 1.0 DC	≤4	0.08 [0.06—0.10]	≤4	0.08 [0.06—0.10]
	Carbon steel Alloy steel Alloy tool steel	180—280HB	● ● ✱ ≤0.25 DC	≤14	0.13 [0.10—0.15]	≤APMX	0.15 [0.10—0.2]
			● ● ✱ 0.25—0.5 DC	≤8	0.10 [0.08—0.12]	≤28	0.13 [0.10—0.15]
			● ● ✱ 0.5—0.75 DC	≤6	0.10 [0.08—0.12]	≤14	0.10 [0.08—0.12]
			● ● ✱ 1.0 DC	≤4	0.08 [0.06—0.10]	≤4	0.08 [0.06—0.10]
	Carbon steel Alloy steel Alloy tool steel	280—350HB ≤350HB	● ● ✱ ≤0.25 DC	≤14	0.13 [0.1 —0.15]	≤APMX	0.13 [0.10—0.15]
			● ● ✱ 0.25—0.5 DC	≤8	0.10 [0.08—0.12]	≤28	0.10 [0.08—0.12]
			● ● ✱ 0.5—0.75 DC	≤6	0.10 [0.08—0.12]	≤14	0.08 [0.06—0.10]
			● ● ✱ 1.0 DC	≤4	0.08 [0.06—0.10]	≤4	0.08 [0.06—0.10]
Pre-hardened steel	35—45HRC	● ● ✱ ≤0.25 DC	≤14	0.13 [0.10—0.15]	≤APMX	0.13 [0.10—0.15]	
		● ● ✱ 0.25—0.5 DC	≤8	0.10 [0.08—0.12]	≤28	0.10 [0.08—0.12]	
		● ● ✱ 0.5—0.75 DC	≤6	0.10 [0.08—0.12]	≤14	0.08 [0.06—0.10]	
		● ● ✱ 1.0 DC	≤4	0.08 [0.06—0.10]	≤4	0.08 [0.06—0.10]	
M	Austenitic stainless steel	—	● ● ✱ ≤0.25 DC	≤14	0.13 [0.10—0.15]	≤APMX	0.15 [0.10—0.2]
			✱ 0.25—0.5 DC	≤14	0.10 [0.08—0.12]	≤APMX	0.12 [0.08—0.15]
			● ● ✱ 0.5—0.75 DC	≤8	0.10 [0.08—0.12]	≤28	0.12 [0.08—0.15]
			✱ 1.0 DC	≤8	0.08 [0.06—0.10]	≤28	0.10 [0.08—0.12]
			● ● ✱ ≤0.25 DC	≤6	0.08 [0.06—0.10]	≤14	0.10 [0.08—0.12]
			✱ 0.25—0.5 DC	≤6	0.07 [0.06—0.08]	≤14	0.08 [0.06—0.10]
			● ● ✱ 0.5—0.75 DC	≤4	0.08 [0.06—0.10]	≤4	0.08 [0.06—0.10]
			✱ 1.0 DC	≤4	0.07 [0.06—0.08]	≤4	0.07 [0.06—0.08]
	Duplex stainless steel	≤280HB	● ● ✱ ≤0.25 DC	≤14	0.13 [0.10—0.15]	≤APMX	0.15 [0.10—0.2]
			✱ 0.25—0.5 DC	≤14	0.10 [0.08—0.12]	≤APMX	0.12 [0.08—0.15]
			● ● ✱ 0.5—0.75 DC	≤8	0.10 [0.08—0.12]	≤28	0.12 [0.08—0.15]
			✱ 1.0 DC	≤8	0.08 [0.06—0.10]	≤28	0.10 [0.08—0.12]
Ferritic and martensitic stainless steel	—	● ● ✱ ≤0.25 DC	≤6	0.08 [0.06—0.10]	≤14	0.10 [0.08—0.12]	
		✱ 0.25—0.5 DC	≤6	0.07 [0.06—0.08]	≤14	0.08 [0.06—0.10]	
		● ● ✱ 0.5—0.75 DC	≤4	0.08 [0.06—0.10]	≤4	0.08 [0.06—0.10]	
		✱ 1.0 DC	≤4	0.07 [0.06—0.08]	≤4	0.07 [0.06—0.08]	
		● ● ✱ ≤0.25 DC	≤14	0.13 [0.10—0.15]	≤APMX	0.15 [0.10—0.20]	
		✱ 0.25—0.5 DC	≤14	0.10 [0.08—0.12]	≤APMX	0.12 [0.08—0.15]	
		● ● ✱ 0.5—0.75 DC	≤8	0.10 [0.08—0.12]	≤28	0.12 [0.08—0.15]	
		✱ 1.0 DC	≤8	0.08 [0.06—0.10]	≤28	0.10 [0.08—0.12]	
Precipitation hardening stainless steel	≤450HB	● ● ✱ ≤0.25 DC	≤14	0.13 [0.10—0.15]	≤APMX	0.13 [0.10—0.15]	
		✱ 0.25—0.5 DC	≤14	0.10 [0.08—0.12]	≤APMX	0.10 [0.08—0.12]	
		● ● ✱ 0.5—0.75 DC	≤8	0.10 [0.08—0.12]	≤28	0.10 [0.08—0.12]	
		✱ 1.0 DC	≤8	0.08 [0.06—0.10]	≤28	0.10 [0.08—0.12]	
		● ● ✱ ≤0.25 DC	≤6	0.08 [0.06—0.10]	≤14	0.08 [0.06—0.10]	
		✱ 0.25—0.5 DC	≤6	0.07 [0.06—0.08]	≤14	0.07 [0.06—0.08]	
		● ● ✱ 0.5—0.75 DC	≤4	0.08 [0.06—0.10]	≤4	0.08 [0.06—0.10]	
		✱ 1.0 DC	≤4	0.07 [0.06—0.08]	≤4	0.07 [0.06—0.08]	

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DEPTH OF CUT / FEED PER TOOTH

Material	Properties	Cutting conditions	ae	DC=Ø20-Ø28		DC=Ø32-Ø50		
				ap	fz	ap	fz	
K Gray cast iron	≤350MPa	● ● ✖	≤0.25 DC	≤14	0.13 (0.10—0.15)	≤APMX	0.15 (0.1 —0.2)	
		✖	0.25—0.5 DC	≤14	0.10 (0.08—0.12)	≤APMX	0.12 (0.08—0.15)	
		● ● ●	0.5—0.75 DC	≤8	0.10 (0.08—0.12)	≤28	0.12 (0.08—0.15)	
		✖	1.0 DC	≤8	0.08 (0.06—0.10)	≤28	0.10 (0.08—0.12)	
		● ● ●	≤0.25 DC	≤6	0.10 (0.08—0.12)	≤14	0.10 (0.08—0.12)	
		✖	0.25—0.5 DC	≤6	0.08 (0.06—0.10)	≤14	0.08 (0.06—0.10)	
		● ● ●	0.5—0.75 DC	≤4	0.08 (0.06—0.10)	≤4	0.08 (0.06—0.10)	
		✖	1.0 DC	≤4	0.07 (0.06—0.08)	≤4	0.07 (0.06—0.08)	
	Ductile cast iron	≤800MPa	● ● ●	≤0.25 DC	≤14	0.13 (0.10—0.15)	≤APMX	0.15 (0.10—0.20)
			✖	0.25—0.5 DC	≤14	0.10 (0.08—0.12)	≤APMX	0.13 (0.10—0.15)
			● ● ●	0.5—0.75 DC	≤8	0.10 (0.08—0.12)	≤28	0.13 (0.10—0.15)
			✖	1.0 DC	≤8	0.08 (0.06—0.10)	≤28	0.10 (0.08—0.12)
			● ● ●	≤0.25 DC	≤6	0.10 (0.08—0.12)	≤14	0.10 (0.08—0.12)
			✖	0.25—0.5 DC	≤6	0.08 (0.06—0.10)	≤14	0.08 (0.06—0.10)
N Aluminium alloy	Si<5 %	● ● ●	≤0.25 DC	≤14	0.15 (0.10—0.20)	≤APMX	0.18 (0.10—0.25)	
		✖	0.25—0.5 DC	≤14	0.13 (0.10—0.15)	≤APMX	0.15 (0.10—0.20)	
		● ● ●	0.5—0.75 DC	≤8	0.13 (0.10—0.15)	≤28	0.15 (0.10—0.20)	
		✖	1.0 DC	≤8	0.10 (0.08—0.12)	≤28	0.13 (0.10—0.15)	
		● ● ●	≤0.25 DC	≤6	0.10 (0.08—0.12)	≤14	0.11 (0.06—0.15)	
		✖	0.25—0.5 DC	≤6	0.08 (0.06—0.10)	≤14	0.11 (0.06—0.15)	
		● ● ●	0.5—0.75 DC	≤4	0.08 (0.06—0.10)	≤4	0.11 (0.06—0.15)	
		✖	1.0 DC	≤4	0.07 (0.06—0.08)	≤4	0.09 (0.06—0.12)	
S Titanium alloy (Ti-6Al-4V)	—	● ● ● ✖	≤0.25 DC	≤14	0.12 (0.08—0.15)	≤APMX	0.12 (0.08—0.15)	
		● ● ● ✖	0.25—0.5 DC	≤8	0.10 (0.08—0.12)	≤28	0.10 (0.08—0.12)	
		● ● ● ✖	0.5—0.75 DC	≤6	0.08 (0.06—0.10)	≤14	0.08 (0.06—0.10)	
		● ● ● ✖	1.0 DC	≤4	0.08 (0.06—0.10)	≤4	0.08 (0.06—0.10)	
	Titanium alloy (Ti-5Al-5V-5Mo-3Cr)	—	● ● ● ✖	≤0.25 DC	≤14	0.10 (0.08—0.12)	≤APMX	0.10 (0.08—0.12)
			● ● ● ✖	0.25—0.5 DC	≤8	0.10 (0.08—0.12)	≤28	0.10 (0.08—0.12)
			● ● ● ✖	0.5—0.75 DC	≤6	0.08 (0.06—0.10)	≤14	0.08 (0.06—0.10)
			● ● ● ✖	1.0 DC	≤4	0.08 (0.06—0.10)	≤4	0.08 (0.06—0.10)
	Heat resistant alloy	—	● ● ● ✖	≤0.25 DC	≤14	0.10 (0.08—0.12)	≤APMX	0.10 (0.08—0.12)
			● ● ● ✖	0.25—0.5 DC	≤8	0.10 (0.08—0.12)	≤28	0.10 (0.08—0.12)
			● ● ● ✖	0.5—0.75 DC	≤6	0.08 (0.06—0.10)	≤14	0.08 (0.06—0.10)
			● ● ● ✖	1.0 DC	≤4	0.08 (0.06—0.10)	≤4	0.08 (0.06—0.10)