

Multi-Functional Cutter for High Efficiency Machining

VPX300

Recommended Cutting Conditions

■ Dry Cutting Cutting Speed

Workpiece Material	Properties	Cutting Conditions	Insert		Cutting Width ae				
			Grade	Chip Breaker	.25-.5DC		.5-.75DC		
					Cutting Speed vc (SFM)	Cutting Speed vc (SFM)	DC(Sblt)	DC(Sblt)	
Mild Steels	Hardness ≤180HB	● ●	MP6120 VP15TF	M	755 (590-885)	720 (660-850)	590 (460-690)	590 (460-690)	DC(Sblt)
			MP6130	M	655 (490-785)	620 (660-650)	490 (360-590)	490 (360-590)	DC(Sblt)
Carbon Steels Alloy Steels Alloy Tool Steels	Hardness ≤350HB (Annealing)	● ●	MP6120 VP15TF	M	590 (460-690)	560 (425-655)	460 (360-525)	460 (360-590)	DC(Sblt)
			MP6130	M	490 (360-590)	460 (330-560)	360 (260-425)	360 (260-425)	DC(Sblt)
Pre-hardened Steels	Hardness 35-45HRC	● ●	MP6120 VP15TF	M	395 (295-460)	360 (260-425)	330 (230-395)	330 (230-395)	DC(Sblt)
			MP6130	M	330 (260-395)	295 (230-360)	260 (195-330)	260 (195-330)	DC(Sblt)
Austenitic Stainless Steels	Hardness ≤200HB	● ● ● ●	MP7130 VP15TF	M	590 (460-690)	560 (425-655)	460 (360-525)	460 (360-525)	DC(Sblt)
			MP7130 VP15TF	M	490 (360-590)	460 (330-525)	360 (260-425)	360 (260-425)	DC(Sblt)
Duplex Stainless Steels	Hardness ≤280HB	● ● ● ●	MP7130 VP15TF	M	460 (360-560)	425 (395-490)	330 (230-395)	330 (230-395)	DC(Sblt)
			MP7130 VP15TF	M	590 (460-690)	560 (425-655)	460 (360-525)	460 (360-525)	DC(Sblt)
Ferritic and Martensitic Stainless Steels	Hardness <450HB	● ● ● ●	MP7130 VP15TF	M	425 (330-525)	395 (260-460)	295 (195-360)	295 (195-360)	DC(Sblt)
			MP7130 VP15TF	M	820 (655-985)	785 (620-950)	690 (525-850)	690 (525-850)	DC(Sblt)
Gray Cast Irons	Tensile Strength ≤350MPa	● ● ● ●	MC5020	M	655 (490-820)	620 (460-785)	525 (360-690)	525 (360-690)	DC(Sblt)
			VP15TF	M	590 (490-655)	560 (460-620)	490 (395-560)	490 (395-560)	DC(Sblt)
Ductile Cast Irons	Tensile Strength ≤800MPa	● ● ● ●	MC5020	M	425 (330-490)	395 (295-460)	330 (260-395)	330 (260-395)	DC(Sblt)
			VP15TF	M	1970 (1310-3280)	1970 (1310-3280)	1970 (1310-3280)	1970 (1310-3280)	DC(Sblt)
Aluminum Alloys	Content Si<5%	● ● ● ●	TF15	M	265 (230-330)	260 (195-330)	230 (165-260)	230 (165-260)	DC(Sblt)
			VP15TF	M	265 (230-330)	260 (195-330)	230 (165-260)	230 (165-260)	DC(Sblt)
Hardened Steels	Hardness 40-55HRC	● ● ● ●	VP15TF	M	265 (230-330)	260 (195-330)	230 (165-260)	230 (165-260)	DC(Sblt)
			VP15TF	M	265 (230-330)	260 (195-330)	230 (165-260)	230 (165-260)	DC(Sblt)

Note 1) These cutting conditions should be referenced for standard shank types (last letter in designation is S) and arbor shank types. If there is a corner radius during pocket milling, after conditions accordingly.
 Note 2) Chatter, 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
 Note 3) A type with fewer teeth is recommended when the depth of cut in the radius direction (ae) is 5 DC or more.
 Note 4) Wet cutting is recommended, when focusing on the surface finish. (Tool life is shorter than for dry cutting).
 Note 5) When using under higher than recommended cutting conditions, or for long periods of time, the damp screw may become fatigued and break during machining. Please change out the damp screw periodically.

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Cutting Conditions (Guide) :
 ● : Stable Cutting ● : General Cutting ●* : Unstable Cutting

Depth of Cut / Feed per Tooth

Workpiece Material	Properties	Cutting Width ae	Cutting Conditions	Cutter Diameter DC			
				ø1,000 (ø25mm)			
				Depth of Cut ap	Feed per Tooth, fz (f/rev)	Feed per Tooth, fz (f/rev)	
P	Mild Steels	Hardness ≤180HB	● ● ● ●	≤.25DC	.004-.008	≤.433	
				.25-.5DC	.004-.006	≤.433	
	Carbon Steels Alloy Steels Alloy Tool Steels	Hardness ≤350HB (Annealing)	● ● ● ●	≤.25DC	.002-.004	≤.433	
				.25-.5DC	.004-.006	≤.433	
	Pre-hardened Steels	Hardness 35-45HRC	● ● ● ●	≤.25DC	.002-.004	≤.433	
				.25-.5DC	.004-.006	≤.433	
	M	Austenitic Stainless Steels	Hardness ≤200HB	● ● ● ●	≤.25DC	.003-.006	≤.433
					.25-.5DC	.003-.005	≤.433
		Duplex Stainless Steels	Hardness ≤280HB	● ● ● ●	≤.25DC	.003-.006	≤.433
					.25-.5DC	.003-.005	≤.433
Ferritic and Martensitic Stainless Steels		Hardness <450HB	● ● ● ●	≤.25DC	.003-.006	≤.433	
				.25-.5DC	.003-.005	≤.433	
Precipitation Hardening Stainless Steels		Hardness 40-55HRC	● ● ● ●	≤.25DC	.003-.006	≤.433	
				.25-.5DC	.003-.005	≤.433	

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 • 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
 Note 3) A type with fewer teeth is recommended when the depth of cut in the radius direction (ae) is 5 DC or more.
 Note 4) Wet cutting is recommended, when focusing on the surface finish. (Tool life is shorter than for dry cutting).
 Note 5) When using under higher than recommended cutting conditions, or for long periods of time, the damp screw may become fatigued and break during machining. Please change out the damp screw periodically.

Multi-Functional Cutter for High Efficiency Machining

VPX300

Recommended Cutting Conditions

Dry Cutting

Depth of Cut / Feed per Tooth

Workpiece Material	Properties	Cutting Width ae	Cutting Conditions	Cutter Diameter DC φ1,125-φ3,000 (φ28mm-φ80mm)		
				Depth of Cut ap	Feed per Tooth, fz (IPT)	
Gray Cast Irons	Tensile Strength ≤380MPa	≤.25DC	● ●	≤.433	.004- .008	
			● ●	.003- .006	.004- .010	
			● ●	.003- .006	.004- .010	
		.25- .5DC	● ●	≤.433	.003- .005	.004- .008
			● ●	≤.433	.003- .005	.004- .008
			● ●	≤.315	.002- .004	.003- .006
		.5- .75DC	● ●	≤.197	.002- .004	.003- .006
			● ●	≤.197	.002- .003	.003- .005
			● ●	≤.433	.004- .010	.004- .008
		DC(Slot)	● ●	≤.433	.004- .006	.004- .008
			● ●	≤.433	.003- .005	.004- .006
Ductile Cast Irons	Tensile Strength ≤800MPa	≤.25DC	● ●	.004- .008	.004- .008	
			● ●	.003- .005	.004- .006	
			● ●	.003- .005	.004- .006	
		.5- .75DC	● ●	.003- .005	.003- .005	
			● ●	.003- .005	.003- .005	
			● ●	≤.197	.002- .004	.003- .005
DC(Slot)	● ●	≤.197	.002- .003	.002- .004		
	● ●	≤.433	.004- .010	.004- .008		
	● ●	≤.433	.004- .008	.004- .008		
Aluminum Alloys	Content Si < 5%	≤.25DC	● ●	.004- .008	.004- .008	
			● ●	.004- .008	.004- .008	
			● ●	.004- .008	.004- .008	
		.25- .5DC	● ●	.004- .008	.004- .008	
			● ●	.004- .008	.004- .008	
			● ●	.004- .008	.004- .008	
.5- .75DC	● ●	.002- .006	.003- .006			
	● ●	.002- .006	.003- .006			
	● ●	.002- .006	.003- .006			
Hardened Steels	Hardness 40-55HRC	≤.25DC	● ●	.003- .005	.003- .005	
			● ●	.003- .005	.003- .005	
			● ●	.002- .004	.002- .004	
		.25- .5DC	● ●	.002- .004	.002- .004	
			● ●	.002- .004	.002- .004	
			● ●	.002- .003	.002- .003	
.5- .75DC	● ●	.002- .004	.002- .004			
	● ●	.002- .004	.002- .004			
	● ●	.002- .003	.002- .003			

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 Note 2) 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
 • Corner radius of workpiece

Note 3) A type with fewer teeth is recommended when the depth of cut in the radius direction (ae) is .5 DC or more.
 Note 4) Wet cutting is recommended, when focusing on the surface finish. (Tool life is shorter than for dry cutting.)
 Note 5) When using under higher than recommended cutting conditions, or for long periods of time, the damp screw may become fatigued and break during machining. Please change out the damp screw periodically.

Wet Cutting

Cutting Speed

Workpiece Material	Properties	Cutting Conditions	Insert	Cutting Width ae			
				.25- .5DC	.5- .75DC		
Mild Steels	Hardness ≤180HB	● ●	MP6120	460 (330-620)	330 (230-395)		
		● ●	VP15TF	460 (330-620)	330 (230-395)		
		● ●	MP6130	425 (295-590)	330 (230-395)		
		Carbon Steels Alloy Steels	Hardness 180-350HB ≤350HB (Annealing)	● ●	MP6120	395 (295-460)	330 (230-395)
				● ●	VP15TF	360 (260-425)	330 (230-395)
				● ●	MP6130	395 (295-460)	330 (230-395)
		Pre-hardened Steels	Hardness 35-45HRC	● ●	MP6120	295 (230-360)	260 (195-330)
				● ●	VP15TF	330 (260-395)	260 (195-330)
				● ●	MP6130	330 (260-395)	260 (195-330)
		Austenitic Stainless Steels	Hardness ≤200HB	● ●	MP7130	395 (330-490)	295 (230-395)
				● ●	VP15TF	360 (295-460)	295 (230-395)
				● ●	MP151F	330 (260-425)	230 (165-330)
		Duplex Stainless Steels	Hardness ≤280HB	● ●	MP7130	330 (260-425)	230 (165-330)
● ●	VP15TF			330 (260-425)	230 (165-330)		
● ●	MP151F			395 (330-490)	295 (230-395)		
Ferritic and Martensitic Stainless Steels	-	● ●	MP7130	395 (330-490)	295 (230-395)		
		● ●	VP15TF	360 (295-460)	295 (230-395)		
		● ●	MP151F	330 (260-425)	295 (230-395)		
Precipitation Hardening Stainless Steels	Hardness ≤460HB	● ●	MP7130	295 (230-395)	195 (130-295)		
		● ●	VP15TF	260 (195-360)	195 (130-295)		
		● ●	VP15TF	260 (195-360)	195 (130-295)		
Gray Cast Irons	Tensile Strength ≤360MPa	● ●	MC5020	590 (525-720)	490 (425-620)		
		● ●	VP15TF	425 (330-490)	330 (260-395)		
		● ●	VP15TF	425 (330-490)	330 (260-395)		
Ductile Cast Irons	Tensile Strength ≤600MPa	● ●	MC5020	490 (425-560)	425 (360-490)		
		● ●	VP15TF	330 (230-425)	260 (195-395)		
		● ●	VP15TF	360 (260-460)	260 (195-395)		
Aluminum Alloys	Content Si < 5%	● ●	TF15	970 (910-1030)	970 (910-1030)		
		● ●	MP9120	165 (130-230)	165 (130-230)		
		● ●	VP15TF	165 (130-230)	165 (130-230)		
Titanium Alloys (Ti-6Al-4V, etc.)	-	● ●	MP9130	130 (100-195)	130 (100-195)		
		● ●	VP15TF	100 (65-130)	100 (65-130)		
		● ●	MP9120	100 (65-130)	100 (65-130)		
Titanium Alloys (Ti-5Al-5V-3Mo-3Cr, etc.)	-	● ●	VP15TF	100 (65-130)	100 (65-130)		
		● ●	MP9130	100 (65-130)	100 (65-130)		
		● ●	MP9120	130 (100-195)	130 (100-195)		
Heat Resistant Alloys	-	● ●	VP15TF	130 (100-195)	130 (100-195)		
		● ●	MP9130	100 (65-130)	100 (65-130)		
		● ●	MP9120	280 (195-330)	230 (165-260)		
Hardened Steels	Hardness 40-55HRC	● ●	VP15TF	295 (230-330)	230 (165-260)		

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 • 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
 • Corner radius of workpiece

Note 3) A type with fewer teeth is recommended when the depth of cut in the radius direction (ae) is .5 DC or more.
 Note 4) Wet cutting is recommended, when focusing on the surface finish. (Tool life is shorter than for dry cutting.)
 Note 5) When using under higher than recommended cutting conditions, or for long periods of time, the damp screw may become fatigued and break during machining. Please change out the damp screw periodically.

Cutting Conditions (Guide):
 ● : Stable Cutting ● : General Cutting ●* : Unstable Cutting

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VPX300

Recommended Cutting Conditions

Wet Cutting

Depth of Cut / Feed per Tooth

Workpiece Material	Properties	Cutter Diameter DC ø1125-ø3,000 (ø28mm-ø80mm)			
		ø1,000 (ø25mm)	Depth of Cut ap	Feed per Tooth, fz (IPT)	Feed per Tooth, fz (IPT)
P Mild Steels	Hardness ≤180HB	≤.25DC	≤.433	.004-0.08	.004-0.12
		.25-5DC	≤.433	.004-0.06	.004-0.10
	DC(Skt)	≤.315	≤.315	.003-0.05	.004-0.08
		≤.197	≤.197	.002-0.04	.003-0.06
Carbon Steels Alloy Steels Alloy Tool Steels	Hardness 180-280HB	≤.25DC	≤.433	.004-0.06	.004-0.10
		.25-5DC	≤.433	.003-0.05	.004-0.08
	DC(Skt)	≤.315	≤.315	.002-0.04	.003-0.06
		≤.197	≤.197	.002-0.04	.003-0.06
Carbon Steels Alloy Steels Alloy Tool Steels	Hardness 280-310HB (Annealing)	≤.25DC	≤.433	.004-0.06	.004-0.10
		.25-5DC	≤.433	.003-0.05	.004-0.08
	DC(Skt)	≤.315	≤.315	.002-0.04	.003-0.06
		≤.197	≤.197	.002-0.04	.003-0.06
Pre-hardened Steels	Hardness 35-45HRC	≤.25DC	≤.433	.004-0.06	.004-0.10
		.25-5DC	≤.433	.003-0.05	.004-0.08
	DC(Skt)	≤.315	≤.315	.002-0.04	.003-0.06
		≤.197	≤.197	.002-0.04	.003-0.06
M Austenitic Stainless Steels	-	≤.25DC	≤.433	.004-0.08	.004-0.12
		.25-5DC	≤.433	.003-0.06	.004-0.10
	DC(Skt)	≤.315	≤.315	.002-0.04	.003-0.06
		≤.197	≤.197	.002-0.04	.003-0.06
Duplex Stainless Steels	Hardness ≤280HB	≤.25DC	≤.433	.003-0.06	.003-0.06
		.25-5DC	≤.433	.003-0.05	.003-0.06
	DC(Skt)	≤.315	≤.315	.002-0.04	.003-0.06
		≤.197	≤.197	.002-0.04	.003-0.06
Ferritic and Martensitic Stainless Steels	-	≤.25DC	≤.433	.003-0.06	.003-0.06
		.25-5DC	≤.433	.003-0.05	.003-0.06
	DC(Skt)	≤.315	≤.315	.002-0.04	.003-0.06
		≤.197	≤.197	.002-0.04	.003-0.06
Precipitation Hardening Stainless Steels	Hardness <450HB	≤.25DC	≤.433	.004-0.06	.004-0.06
		.25-5DC	≤.433	.003-0.05	.003-0.05
	DC(Skt)	≤.315	≤.433	.002-0.04	.003-0.05
		≤.197	≤.197	.002-0.04	.002-0.04

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 • Rigidity of machine, workpiece material or attachment of workpiece material is low

Note 3) A type with fewer teeth is recommended when the depth of cut in the radius direction (ae) is .5 DC or more.
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Workpiece Material	Properties	Cutting Width ae	Cutting Conditions	Cutter Diameter DC ø1,125-ø3,000 (ø28mm-ø80mm)		
				ø1,000 (ø25mm)	Depth of Cut ap	Feed per Tooth, fz (IPT)
K Gray Cast Irons	Tensile Strength ≤350MPa	.25-5DC	● ●	≤.433	.004-0.08	.004-0.12
				≤.433	.003-0.06	.004-0.10
	DC(Skt)	≤.315	.003-0.05	.004-0.08		
		≤.197	.002-0.04	.003-0.06		
Ductile Cast Irons	Tensile Strength ≤800MPa	.25-5DC	● ●	≤.433	.004-0.08	.004-0.12
				≤.433	.003-0.05	.004-0.10
	DC(Skt)	≤.315	.003-0.05	.004-0.08		
		≤.197	.002-0.04	.003-0.05		
N Aluminum Alloys	Content Si<5%	.25-5DC	● ●	≤.433	.004-0.08	.004-0.10
				≤.433	.004-0.08	.004-0.08
	DC(Skt)	≤.315	.004-0.06	.004-0.06		
		≤.197	.002-0.04	.003-0.05		
S Titanium Alloys (Ti-6Al-4V etc.)	-	.25-5DC	● ●	≤.433	.003-0.05	.003-0.05
				≤.315	.002-0.04	.002-0.04
	DC(Skt)	≤.315	.003-0.05	.003-0.05		
		≤.197	.002-0.06	.003-0.06		
Titanium Alloys (Ti-5Al-5V-5Mo-3Cr etc.)	-	.25-5DC	● ●	≤.433	.003-0.05	.003-0.05
				≤.315	.002-0.04	.002-0.04
	DC(Skt)	≤.315	.003-0.05	.003-0.05		
		≤.197	.002-0.04	.002-0.04		
H Heat Resistant Alloys	-	.25-5DC	● ●	≤.433	.003-0.05	.003-0.05
				≤.315	.002-0.04	.002-0.04
	DC(Skt)	≤.315	.003-0.05	.003-0.05		
		≤.197	.002-0.04	.002-0.04		
Hardened Steels	Hardness 40-55HRC	.25-5DC	● ●	≤.433	.003-0.05	.003-0.05
				≤.315	.002-0.04	.002-0.04
	DC(Skt)	≤.315	.003-0.05	.003-0.05		
		≤.197	.002-0.04	.002-0.04		

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 • 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

Note 3) A type with fewer teeth is recommended when the depth of cut in the radius direction (ae) is .5 DC or more.
 Note 4) Wet cutting is recommended, when focusing on the surface finish. (Tool life is shorter than for dry cutting).
 Note 5) When using under higher than recommended cutting conditions, or for long periods of time, the damp screw may become fatigued and break during machining. Please change out the damp screw periodically.