New products for machining technicians

NEW

OptiLine – P166 - End- and Ball nosed Milling Cutter

P166

54

55

83+84

OptiLine – P166 – a 6-fluted solid carbide end mill specifically designed for difficult-to-machine materials. Applications include trochoidal and high-efficiency milling.

OptiLine High Performance Solid Carbide End Mills in Inch Sizes

These end mills are versatile in milling strategies yet optimized for multiple materials. The are made for universal machining in 4, 5, 6, and 7 flutes. They are all Dragonskin coated and edge prepped and are useful in a variety of machining strategies – HEM, Trochoidal, helical interpolation.
Chip splitters available for the new six flute for trochoidal machining)

https://cts.ceratizit.com/us/inch-assortment

Table of contents

More Tools can be found in the Metric Catalog.

CERATIZIT \ Performance

Premium quality tools for high performance.

The premium quality tools from the **CERATIZIT Performance** product line have been designed for specific applications and are distinguished by their outstanding performance. If you make high demands on the performance of your production and want to achieve the very best results, we recommend the Premium tools in this product line.

CERATIZIT \ Standard

Quality tools for standard applications.

The quality tools of the **CERATIZIT Standard** product line are high quality, powerful and reliable and enjoy the highest trust of our customers worldwide. Tools from this product line are the first choice for many standard applications and guarantee optimal results.

Symbol explanation

Shank

Shank type

Length: extra short / short / medium / long / extra long

Cutting edge preparation

Square end

Corner chamfer (CHW = chamfer width in inch)

Corner radius

Full Radius

Application

High volume machining

Machining example

The red arrows describe the possible feed directions

Number of flutes

Cutting geometry
λ_s = Helix Angle
γ_s = Rake Angle

Variable helix angle

Unequal Helix

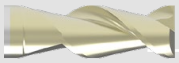
ZEFP = Number of flutes
● = **Main Application**
○ = Extended application

Toolfinder

softer — Material to machine — harder

Finish milling

P		•	• Steel
M		•	• Stainless steel
K		•	• Cast iron
N	•	•	• Non-ferrous metals
S		•	• Heat resistant alloys
H			Hardened steel
O			Non metal materials


9–19


20–39


77–101


102–103


104–109


40–50

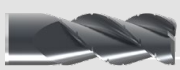

90–101

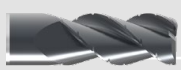

102–103


104–109

Rough and finish machining

P		•	• Steel
M		•	• Stainless steel
K		•	• Cast iron
N	•		Non-ferrous metals
S		•	• Heat resistant alloys
H			Hardened steel
O			Non metal materials


57+58


59–68

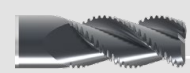

36–49

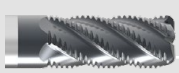

51–54


84

Rough machining

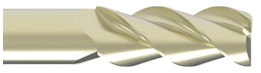
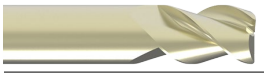
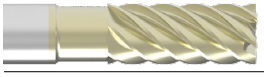
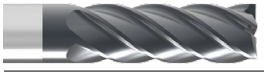
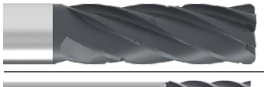
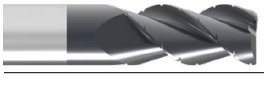
P	•	Steel
M	•	Stainless steel
K	•	Cast iron
N	•	Non-ferrous metals
S	•	Heat resistant alloys
H		Hardened steel
O		Non metal materials


64–66

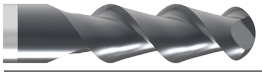

67–76

14

Overview High Performance Milling Cutters

	Series	Tool type	Number of flutes ZEFP	Diameter in inch Ø DC	Steel	Stainless steel	Cast iron	Non-ferrous metals	Heat-resistant	Tempered steel	Non-metal materials	Square end	Corner chamfer	Corner radius	Full Radius	Length	Tool design	coated	uncoated	CERATIZIT \ Standard	CERATIZIT \ Performance
	P220	AL	2	1/8"–3/4"			HA	●					■			■			□		9
	S142	AL	2	1/8"–1"			HA	●				■				■		■	□	10+11	
	P109	AL	3	1/8"–1"			HA	●				■				■		■			12+13
	P362	AL	3	3/16"–1"			HA	●				■				■	HPC	■			14
	P362	AL	3	3/16"–1"			HA	●						■		■	HPC	■			15–18
	P376	AL	6	1/4"–1"			HA	●				■				■		■			19
	S642	UN	2	1/16"–1"	●	●	HA	●	●			■				■		■		20+21	
	S642	UN	2	1/8"–3/4"	●	●	HA	●	●					■		■		■		22+23	
	S643	UN	3	1/16"–1"	●	●	HA	●	●			■				■		■		24+25	
	S643	UN	3	1/8"–1"	●	●	HA	●	●					■		■		■		26+27	
	S644	UN	4	1/32"–1"	●	●	HA	●	●			■				■		■		28+29	
	S644	UN	4	1/8"–1"	●	●	HA	●	●					■		■		■		30–38	
	S645	UN	5	1/8"–1"	●	●	HA					■				■		■		39	
	P007	UN	4	1/8"–1"	●	●	HA	○	●			■				■	HPC	■			40
	P007	UN	4	1/8"–1"	●	●	HA	○	●					■		■	HPC	■			41–44
	P556	UN	5	1/4"–1"	●	●	HA		●			■				■	HPC	■			45
	P556	UN	5	1/4"–1"	●	●	HA		●					■		■	HPC	■			46–50
	P166	UN	6	1/4"–1"	●	●	HA		●			■				■	HPC	■			51
	P166	UN	6	1/4"–1"	●	●	HA		●					■		■	HPC	■			52–54
	P160	UN	7	1/4"–1"	●	●	HA		●			■				■	HPC	■			55
	P161	UN	7	1/4"–1"	●	●	HA		●					■		■		■			56
	P119	AL	3	1/8"–1"			HA	●						■		■		■			57+58

Overview High Performance Milling Cutters

	Series	Tool type	Number of flutes ZEFP	Diameter in inch Ø DC	Steel	Stainless steel	Cast iron	Non-ferrous metals	Heat-resistant	Tempered steel	Non-metal materials	Square end	Corner chamfer	Corner radius	Full Radius	Length	Tool design	coated	uncoated	CERATIZIT \ Standard	CERATIZIT \ Performance
	P117	UN	3	1/8"–3/4"	●	●	●	○	●					■				■			59
					HA																
	P120	UN	4	1/8"–1"	●		●							■				■			60–62
					HA				HB												
	P121	UN	5	3/4"–1"	●	●	●		●					■				■			63
									HB												
	P102	AL	3	3/16"–1"				●						■				■			64–66
					HA				HB												
	P190	UN	4	3/16"–1"	●		●					■						■			67
					HA																
	P191	UN	4	3/16"–1"	●		●							■				■			68
					HA																
	P100	UN	3	3/16"	●		●							■				■			69
					HA																
	P100	UN	4	1/4"–3/4"	●		●							■				■			70+71
					HA				HB												
	P100	UN	5	1"	●		●							■				■			72
									HB												
	P101	UN	3	3/16"	●		●							■				■			73
					HA																
	P101	UN	4	1/4"–3/4"	●		●							■				■			74+75
					HA				HB												
	P101	UN	5	1"	●		●							■				■			76
									HB												
	S662	UN	2	1/16"–1"	●	●	●	●	●						■			■			77+78
					HA																
	S663	UN	3	1/8"–1"	●	●	●	●	●						■			■			79+80
					HA																
	P157	UN	4	1/8"–1"	●	●	●	●							■		HPC	■			81
					HA																
	S664	UN	4	1/32"–1"	●	●	●	●							■			■			82+83
					HA																
	P166	UN	6	1/4"–1"	●	●	●		●						■		HPC	■			84
					HA																
	P250	ST	2	1/8"–1/2"	●	●	●	●	●						■			■			85
					HA																
	P251	UN	2	0.031"–0.188"	●	●	●	●	●						■			■			86
					HA																
	P252	UN	2	0.031"–0.188"	●	●	●	●	●						■			■			87
					HA																
	P253	UN	2	0.031"–0.188"	●	●	●	●	●						■			■			88
					HA																
	P254	UN	2	0.031"–0.188"	●	●	●	●	●						■			■			89
					HA																

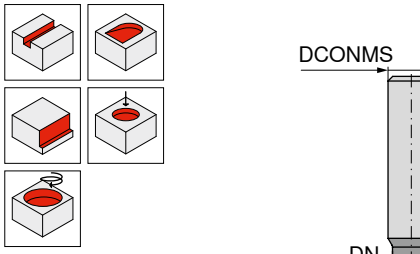
14

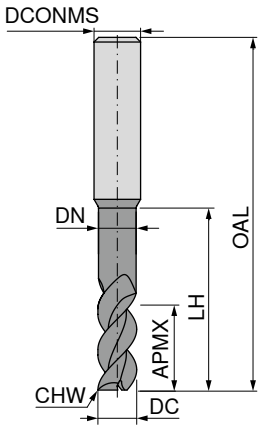
Overview High Performance Milling Cutters

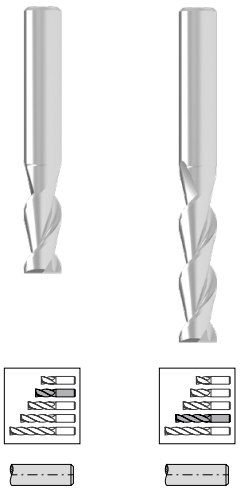
	Series	Tool type	Number of flutes ZEFP	Diameter in inch Ø DC	Steel	Stainless steel	Cast iron	Non-ferrous metals	Heat-resistant	Tempered steel	Non-metal materials	Square end	Corner chamfer	Corner radius	Full Radius	Length	Tool design	coated	uncoated	CERATIZIT \ Standard	CERATIZIT \ Performance
	P501	UN	4	0.005"–0.120"	●	●	●	●	●			■						■			90–92
	P504	UN	4	0.005"–0.120"	●	●	●	●	●			■						■			93–95
	P503	UN	4	0.005"–0.120"	●	●	●	●	●						■			■			96–98
	P506	UN	4	0.005–0.120	●	●	●	●	●						■			■			99–101
	P137	UN	2	0.010–0.155	●		●											■	□		102
	P139	UN	4	0.010–0.155	●		●											■	□		103
	P132	UN	2	1/8–1/2	●		●											■	□		104
	P133	UN	4	1/4–1/2	●		●											■	□		105
	P134	UN	2	1/8–1/2	●		●											■	□		106
	P135	UN	4	1/4–1/2	●		●											■	□		107
	P130	UN	2	1/4–1/2	●		●											■	□		108
	P131	UN	4	1/4–1/2	●		●											■	□		109

End milling cutter

P220 | AL | λ_s=50° γ_s=7°





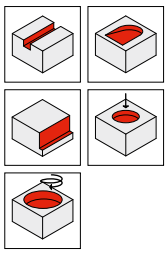


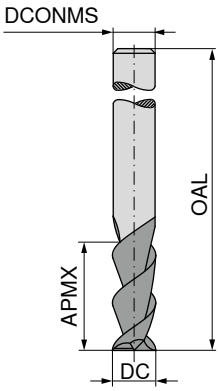
DC +0.000/-0.002 inch	APMX inch	DN inch	LH inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	CHW inch	ZEFP	59 003 ...	59 003 ...
1/8	3/8	0.120	3/4	2	1/8	0.006	2	**12530**	
3/16	7/16	0.180	3/4	2	3/16	0.006	2	**18824**	
1/4	1/2	0.240	13/16	2 1/2	1/4	0.006	2		**25020**
5/16	3/4	0.300	1	3	5/16	0.006	2		**31324**
3/8	7/8	0.360	1 1/8	3	3/8	0.006	2		**37523**
1/2	1	0.480	1 3/8	3	1/2	0.006	2	**50020**	
1/2	1 1/4	0.480	1 5/8	3 1/2	1/2	0.006	2		**50025**
5/8	1 1/4	0.600	1 7/8	4	5/8	0.006	2		**62520**
3/4	1 1/2	0.720	2 1/4	5	3/4	0.006	2		**75020**
P									
M									
K									
N								●	●
S									
H									
O									

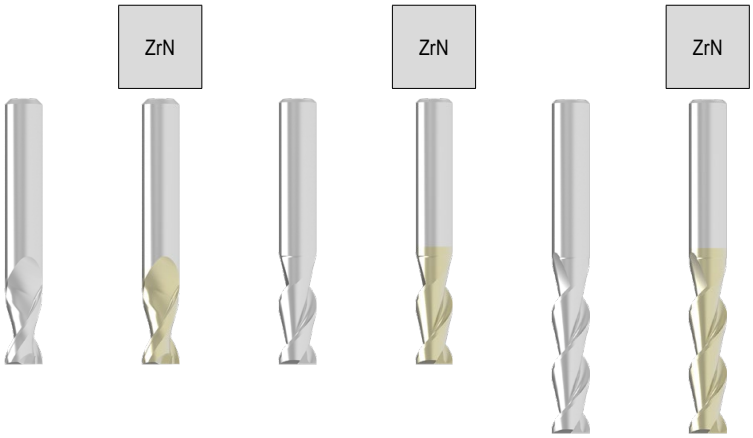
→ v_c/f_z Page 111

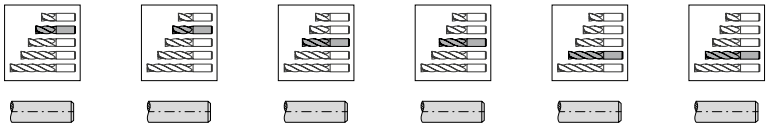
End milling cutter

S142 | AL | λ_s=40° γ_s=12°







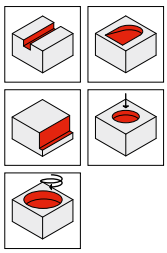


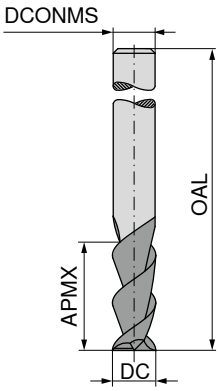
DC +0.000/-0.002 inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 053 ...	59 054 ...	59 053 ...	59 054 ...	59 053 ...	59 054 ...
1/8	1/4	1 1/2	1/8	2	12520	12520				
1/8	3/8	1 1/2	1/8	2					12530	12530
5/32	5/16	2	3/16	2	15620	15620				
5/32	9/16	2	3/16	2					15636	15636
3/16	5/16	2	3/16	2	18817	18817				
3/16	9/16	2	3/16	2					18830	18830
7/32	3/8	2	1/4	2	21917	21917				
1/4	3/8	2	1/4	2	25015	25015				
1/4	3/4	2 1/2	1/4	2					25030	25030
5/16	13/16	2 1/2	5/16	2	31326	31326				
5/16	1 1/4	4	5/16	2					31340	31340
11/32	1	2 1/2	3/8	2	34429	34429				
3/8	1/2	2 1/2	3/8	2	37513	37513				
3/8	1	2 1/2	3/8	2			37527	37527		
3/8	1 1/2	4	3/8	2					37540	37540
1/2	5/8	2 1/2	1/2	2	50013	50013				
1/2	1 1/4	3	1/2	2				50025	50025	
1/2	2	4	1/2	2			50040			50040
5/8	1 5/8	3 1/2	5/8	2					62526	62526
3/4	1	4	3/4	2	75013	75013				
3/4	1 5/8	4	3/4	2			75022	75022		
3/4	3	6	3/4	2					75040	75040
1	2	5	1	2					99920	99920
P										
M										
K										
N					●	●	●	●	●	●
S										
H										
O										

→ v_c/f_z Page 112

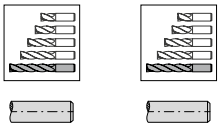
End milling cutter

S142 | AL | λ_s=40° γ_s=12°





ZrN



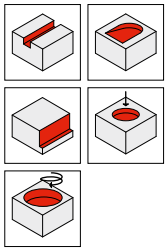
DC +0.000/-0.002 inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 053 ...	59 054 ...
1/4	1 1/4	3 1/2	1/4	2	**25050**	**25050**
5/16	2 1/8	4	5/16	2	**31368**	**31368**
3/8	2 1/2	6	3/8	2	**37567**	**37567**
1/2	3	6	1/2	2	**50060**	**50060**
3/4	4	7	3/4	2	**75053**	**75053**
1	3	6	1	2	**99930**	**99930**

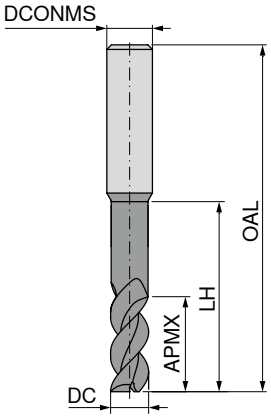
P		
M		
K		
N	●	●
S		
H		
O		

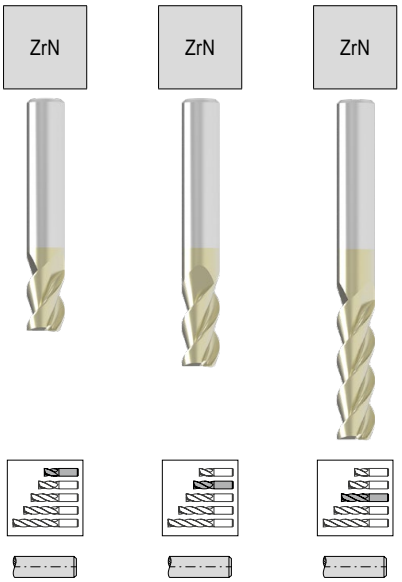
→ v_c/f_z Page 112

End milling cutter

P109 AL λ_s=40° γ_s=15°







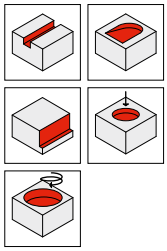
DC +0.000/-0.002 inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 027 ...	59 027 ...	59 027 ...
1/8	1/4	1 1/2	1/8	3		12520	
5/32	3/8	2	3/16	3		15624	
3/16	3/8	2	3/16	3		18820	
7/32	3/8	2	1/4	3		21917	
1/4	3/8	2	1/4	3	25015		
1/4	3/4	2 1/2	1/4	3		25030	
1/4	1 1/4	3	1/4	3			25050
9/32	1/2	2 1/2	5/16	3		28118	
5/16	1/2	2 1/2	5/16	3		31316	
3/8	5/8	2	3/8	3	37517		
3/8	7/8	2 1/2	3/8	3		37523	
3/8	1 1/2	3 1/2	3/8	3			37540
7/16	1	2 3/4	7/16	3		43823	
1/2	5/8	2 1/2	1/2	3		50013	
1/2	1 1/2	3 1/2	1/2	3			50030
5/8	7/8	3	5/8	3		62514	
5/8	1 3/4	4	5/8	3			62528
3/4	1	3	3/4	3		75013	
3/4	2 1/2	5	3/4	3			75033
1	2 3/4	5	1	3			99928

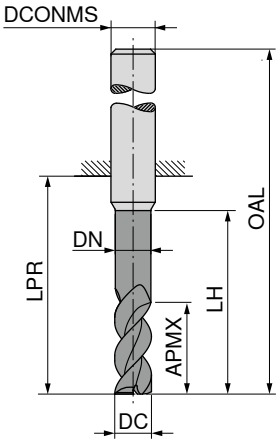
P			
M			
K			
N	●	●	●
S			
H			
O			

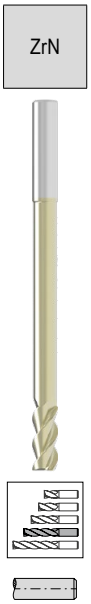
→ v_c/f_z Page 113

End milling cutter

P109 | AL | λ_s=40° γ_s=15°







DC +0.000/-0.002 inch	APMX inch	DN inch	LH inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 027 ...	59 027 ...
1/8	1/2			1 1/2	1/8	3	12540	
5/32	1/2			2	3/16	3	15632	
3/16	5/8			2	3/16	3	18833	
7/32	3/4			2 1/2	1/4	3	21934	
1/4	3/4	0.240	2 1/8	4	1/4	3	25130	
1/4	1 1/2			3 1/2	1/4	3		25060
9/32	3/4			2 1/2	5/16	3	28127	
5/16	3/4			2 1/2	5/16	3	31324	
3/8	1	0.360	2 3/8	6	3/8	3	37527	
3/8	2			4	3/8	3		37553
1/2	1 1/4			3	1/2	3	50025	
1/2	2			4	1/2	3		50040
9/16	1 1/4			3 1/2	9/16	3	56322	
5/8	1 1/4			3 1/2	5/8	3	62520	
5/8	2 1/2			5	5/8	3		62540
3/4	1 5/8			4	3/4	3	75022	
3/4	3 1/4			6	3/4	3		75043
1	1 3/4			4	1	3	99918	
1	3 3/8			6	1	3		99934

P		
M		
K		
N	●	●
S		
H		
O		

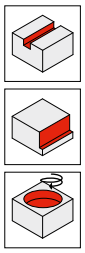
→ v_c/f_z Page 113

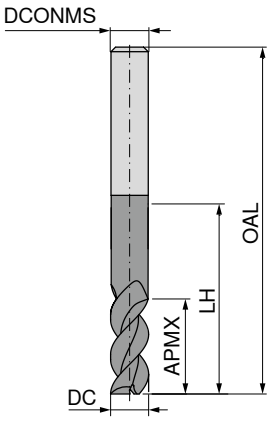
14

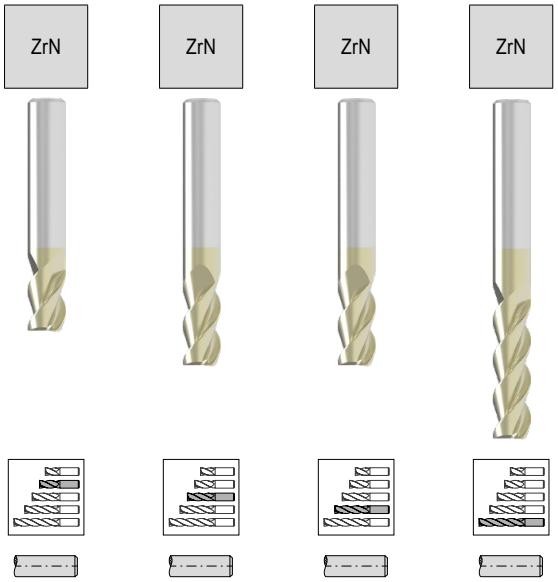
AluLine – End milling cutter

End mills ideal for machining aluminum and non-ferrous metals. The US inch version offers a ZrN coating reduced drag and aids in chip control.

P362 | AL | α β ≠ | λ_s var. | λ_s=43° 45° 48° γ_s=13° | HPC







DC +0.000/-0.002 inch	LH inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 004 ...	59 004 ...	59 004 ...	59 004 ...
3/16		3/8	2	3/16	3	18820			
3/16	0.025	3/8	2	3/16	3			18920	
3/16		3/4	2 1/2	3/16	3			18840	
3/16		1	3	3/16	3				18853
1/4	0.030	3/8	2 1/2	1/4	3			25115	
1/4	0.044	3/8	3	1/4	3				25215
1/4	0.084	3/8	4	1/4	3				25315
1/4		3/8	2	1/4	3	25015			
1/4		3/4	2 1/2	1/4	3			25030	
1/4		1	3	1/4	3				25040
5/16	0.044	7/16	2 1/2	5/16	3			31414	
5/16		7/16	2 1/2	5/16	3	31314			
5/16	0.084	7/16	4	5/16	3				31514
3/8	0.044	1/2	3	3/8	3				37613
3/8	0.086	1/2	4	3/8	3				37713
3/8		1/2	2	3/8	3	37513			
3/8		1	2 1/2	3/8	3			37527	
3/8		1 1/2	3 1/2	3/8	3				37540
1/2	0.059	5/8	3	1/2	3				50113
1/2	0.089	5/8	4	1/2	3				50213
1/2	0.133	5/8	5	1/2	3				50313
1/2		5/8	2 1/2	1/2	3	50013			
1/2	0.157	5/8	6	1/2	3				50413
1/2		1	3	1/2	3		50020		
1/2		1 1/4	3	1/2	3			50025	
1/2		1 5/8	4	1/2	3				50033
1/2		2	4	1/2	3				50040
5/8	0.064	3/4	4	5/8	3				62612
5/8	0.094	3/4	6	5/8	3				62712
5/8		3/4	3	5/8	3	62512			
5/8		1 1/4	3 1/2	5/8	3		62520		
5/8		1 5/8	4	5/8	3			62526	
3/4		1	3	3/4	3	75013			
3/4	0.079	1	4	3/4	3				75113
3/4	0.103	1	6	3/4	3				75213
3/4		1 5/8	4	3/4	3			75022	
3/4		2 1/4	5	3/4	3				75030
1		1 1/4	4	1	3	99913			
1	0.103	1 1/4	5	1	3				99927
1	0.148	1 1/4	7	1	3				99940
1		2	5	1	3			99920	
1		3 1/4	6	1	3				99933

P				
M				
K				
N	●	●	●	●
S				
H				
O				

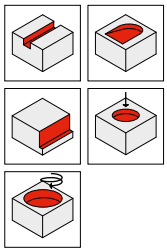
→ v_c/f_z Page 114

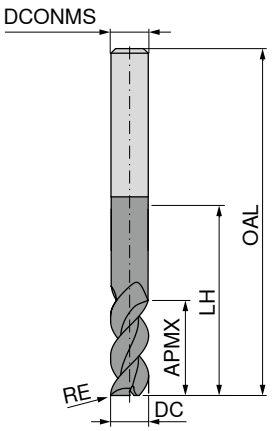
AluLine – End milling cutter with corner radius

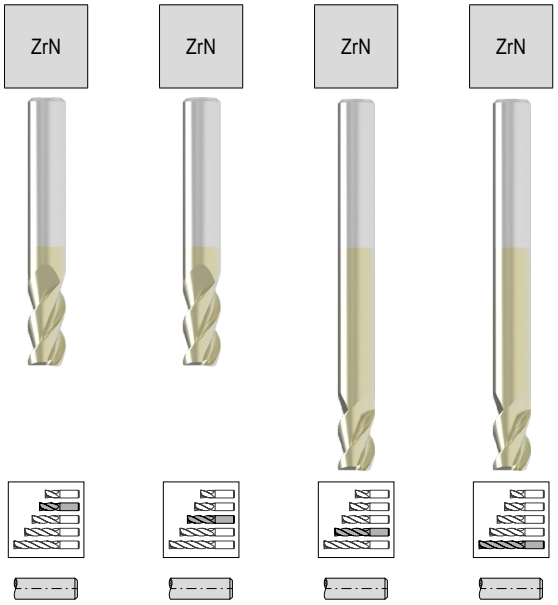
End mills ideal for machining aluminum and non-ferrous metals. The US inch version offers a ZrN coating reduced drag and aids in chip control.

▲ Radius accuracy: +/- 0.001 for Ø ≤ 0.060
+/- 0.0015 for Ø > 0.060

P362 | AL | α ≠ β | λ_s var. | λ_s=43° 45° 48° γ_s=13° | HPC







DC +0.000/-0.002 inch	RE inch	LH inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 004 ...	59 004 ...	59 004 ...	59 004 ...
3/16	0.010	0.625	3/8	2	3/16	3			92120	
3/16	0.015		3/8	2	3/16	3	90020			
3/16	0.030		3/8	2	3/16	3	90120			
3/16	0.015		3/4	2 1/2	3/16	3			90040	
3/16	0.030		3/4	2 1/2	3/16	3			90140	
3/16	0.015		1	3	3/16	3				90053
3/16	0.030		1	3	3/16	3				90153
1/4	0.010	0.750	3/8	2 1/2	1/4	3			92115	
1/4	0.010	1.125	3/8	3	1/4	3			92315	
1/4	0.010	2.125	3/8	4	1/4	3				92515
1/4	0.015		3/8	2	1/4	3	90015			
1/4	0.030		3/8	2	1/4	3	90115			
1/4	0.030	0.750	3/8	2 1/2	1/4	3			92215	
1/4	0.030	1.125	3/8	3	1/4	3			92415	
1/4	0.030	2.125	3/8	4	1/4	3				92615
1/4	0.060		3/8	2	1/4	3	90215			
1/4	0.015		3/4	2 1/2	1/4	3			90030	
1/4	0.030		3/4	2 1/2	1/4	3			90130	
1/4	0.060		3/4	2 1/2	1/4	3			90230	
1/4	0.015		1	3	1/4	3				90240
1/4	0.030		1	3	1/4	3				90340
1/4	0.060		1	3	1/4	3				90440
5/16	0.010		7/16	2 1/2	5/16	3	92114			
5/16	0.010	1.125	7/16	2 1/2	5/16	3			92314	
5/16	0.010	2.125	7/16	4	5/16	3				92514
5/16	0.030	1.125	7/16	2 1/2	5/16	3			92414	
5/16	0.030		7/16	2 1/2	5/16	3	92214			
5/16	0.030	2.125	7/16	4	5/16	3				92614
3/8	0.010		1/2	2	3/8	3	92113			
3/8	0.010	1.125	1/2	3	3/8	3			92213	
3/8	0.010	2.188	1/2	4	3/8	3				92513
3/8	0.015		1/2	2	3/8	3	90013			
3/8	0.030		1/2	2	3/8	3	90113			
3/8	0.030	1.125	1/2	3	3/8	3			92313	
3/8	0.030	2.188	1/2	4	3/8	3				92613
3/8	0.060		1/2	2	3/8	3	90213			
3/8	0.060	1.125	1/2	3	3/8	3			92413	
3/8	0.060	2.188	1/2	4	3/8	3				92713
3/8	0.090		1/2	2	3/8	3	90313			
3/8	0.015		1	2 1/2	3/8	3	90027			
3/8	0.030		1	2 1/2	3/8	3	90127			

P				
M				
K				
N	●	●	●	●
S				
H				
O				

→ v_c/f_z Page 114

14

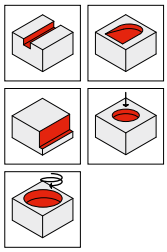
Continued on next page

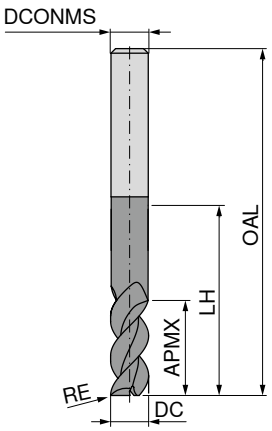
AluLine – End milling cutter with corner radius

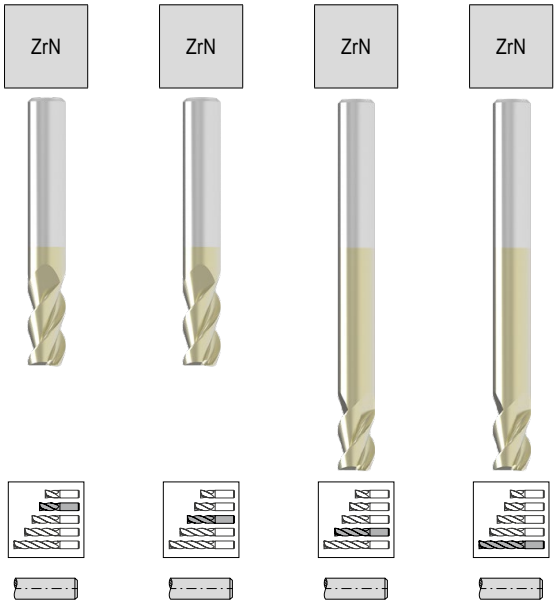
End mills ideal for machining aluminum and non-ferrous metals. The US inch version offers a ZrN coating reduced drag and aids in chip control.

▲ Radius accuracy: +/- 0.001 for Ø ≤ 0.060
+/- 0.0015 for Ø > 0.060

P362 | AL | α ≠ β | λ_s var. | λ_s=43° 45° 48° γ_s=13° | HPC







DC +0.000/-0.002 inch	RE inch	LH inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 004 ...	59 004 ...	59 004 ...	59 004 ...
3/8	0.060		1	2 1/2	3/8	3	90227			
3/8	0.090		1	2 1/2	3/8	3	90327			
3/8	0.010		1	2 1/2	3/8	3			92127	
3/8	0.015		1 1/2	3 1/2	3/8	3				90540
3/8	0.030		1 1/2	3 1/2	3/8	3				90640
3/8	0.060		1 1/2	3 1/2	3/8	3				90740
3/8	0.090		1 1/2	3 1/2	3/8	3				90840
3/8	0.010		1 1/2	3 1/2	3/8	3				92140
1/2	0.010	3.375	5/8	5	1/2	3				93613
1/2	0.015		5/8	2 1/2	1/2	3	90413			
1/2	0.030		5/8	2 1/2	1/2	3	90513			
1/2	0.030	1.500	5/8	3	1/2	3				92813
1/2	0.030	2.250	5/8	4	1/2	3				93213
1/2	0.030	3.375	5/8	5	1/2	3				93713
1/2	0.030	4.000	5/8	6	1/2	3				94113
1/2	0.060		5/8	2 1/2	1/2	3	90613			
1/2	0.060	1.500	5/8	3	1/2	3				92913
1/2	0.060	2.250	5/8	4	1/2	3				93313
1/2	0.060	3.375	5/8	5	1/2	3				93813
1/2	0.060	4.000	5/8	6	1/2	3				94213
1/2	0.090		5/8	2 1/2	1/2	3	90713			
1/2	0.090	1.500	5/8	3	1/2	3				93013
1/2	0.090	2.250	5/8	4	1/2	3				93413
1/2	0.090	3.375	5/8	5	1/2	3				93913
1/2	0.090	4.000	5/8	6	1/2	3				94313
1/2	0.120	1.500	5/8	3	1/2	3				93113
1/2	0.120	2.250	5/8	4	1/2	3				93513
1/2	0.120	3.375	5/8	5	1/2	3				94013
1/2	0.120	4.000	5/8	6	1/2	3				94413
1/2	0.125		5/8	2 1/2	1/2	3	90813			
1/2	0.015		1	3	1/2	3		90220		
1/2	0.030		1	3	1/2	3		90320		
1/2	0.060		1	3	1/2	3		90420		
1/2	0.090		1	3	1/2	3		90520		
1/2	0.125		1	3	1/2	3		90620		
1/2	0.015		1 1/4	3	1/2	3			90025	
1/2	0.030		1 1/4	3	1/2	3			90125	
1/2	0.060		1 1/4	3	1/2	3			90225	
1/2	0.090		1 1/4	3	1/2	3			90325	
1/2	0.125		1 1/4	3	1/2	3			90425	
1/2	0.015		1 5/8	4	1/2	3				90033

P				
M				
K				
N	●	●	●	●
S				
H				
O				

→ v_c/f_z Page 114

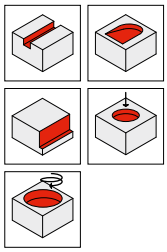
Continued on next page

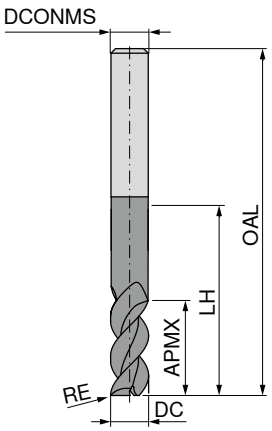
AluLine – End milling cutter with corner radius

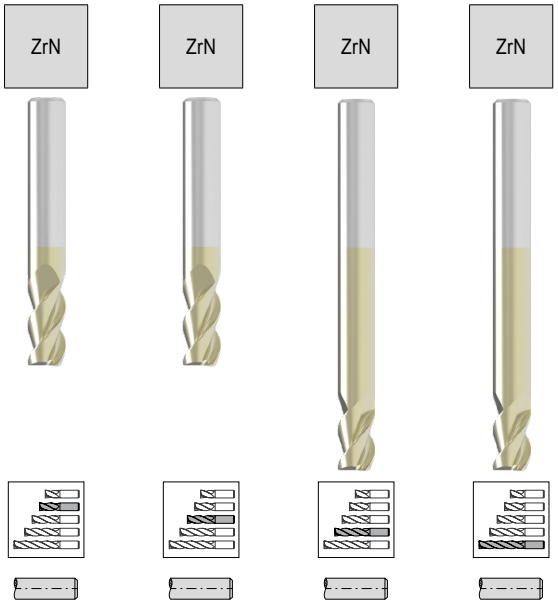
End mills ideal for machining aluminum and non-ferrous metals. The US inch version offers a ZrN coating reduced drag and aids in chip control.

▲ Radius accuracy: +/- 0.001 for Ø ≤ 0.060
+/- 0.0015 for Ø > 0.060

P362 | AL | α ≠ β | λ_s var. | λ_s=43° 45° 48° γ_s=13° | HPC







DC +0.000/-0.002 inch	RE inch	LH inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 004 ...	59 004 ...	59 004 ...	59 004 ...
1/2	0.030		1 5/8	4	1/2	3				90133
1/2	0.060		1 5/8	4	1/2	3				90233
1/2	0.090		1 5/8	4	1/2	3				90333
1/2	0.125		1 5/8	4	1/2	3				90433
1/2	0.015		2	4	1/2	3				90940
1/2	0.030		2	4	1/2	3				91040
1/2	0.060		2	4	1/2	3				91140
1/2	0.090		2	4	1/2	3				91240
1/2	0.125		2	4	1/2	3				91340
5/8	0.030		3/4	3	5/8	3	90012			
5/8	0.060		3/4	3	5/8	3	90112			
5/8	0.060	1.625	3/4	4	5/8	3				92112
5/8	0.060	2.375	3/4	6	5/8	3				92512
5/8	0.090		3/4	3	5/8	3	90212			
5/8	0.090	1.625	3/4	4	5/8	3				92212
5/8	0.090	2.375	3/4	6	5/8	3				92612
5/8	0.120	1.625	3/4	4	5/8	3				92312
5/8	0.120	2.375	3/4	6	5/8	3				92712
5/8	0.125		3/4	3	5/8	3	90312			
5/8	0.190	1.625	3/4	4	5/8	3				92412
5/8	0.190	2.375	3/4	6	5/8	3				92812
5/8	0.030		1 1/4	3 1/2	5/8	3		90720		
5/8	0.060		1 1/4	3 1/2	5/8	3		90820		
5/8	0.090		1 1/4	3 1/2	5/8	3		90920		
5/8	0.125		1 1/4	3 1/2	5/8	3		91020		
5/8	0.030		1 5/8	4	5/8	3			90026	
5/8	0.060		1 5/8	4	5/8	3			90126	
5/8	0.090		1 5/8	4	5/8	3			90226	
5/8	0.125		1 5/8	4	5/8	3			90326	
3/4	0.030		1	3	3/4	3	90913			
3/4	0.060		1	3	3/4	3	91013			
3/4	0.090		1	3	3/4	3	91113			
3/4	0.125		1	3	3/4	3	91213			
3/4	0.190		1	3	3/4	3	91313			
3/4	0.250		1	3	3/4	3	91413			
3/4	0.060	2.000	1	4	3/4	3				94513
3/4	0.060	2.625	1	6	3/4	3				94913
3/4	0.090	2.000	1	4	3/4	3				94613
3/4	0.090	2.625	1	6	3/4	3				95013
3/4	0.120	2.000	1	4	3/4	3				94713
3/4	0.120	2.625	1	6	3/4	3				95113

P				
M				
K				
N	●	●	●	●
S				
H				
O				

→ v_c/f_z Page 114

14

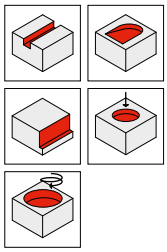
Continued on next page

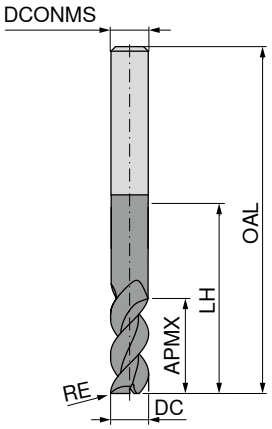
AluLine – End milling cutter with corner radius

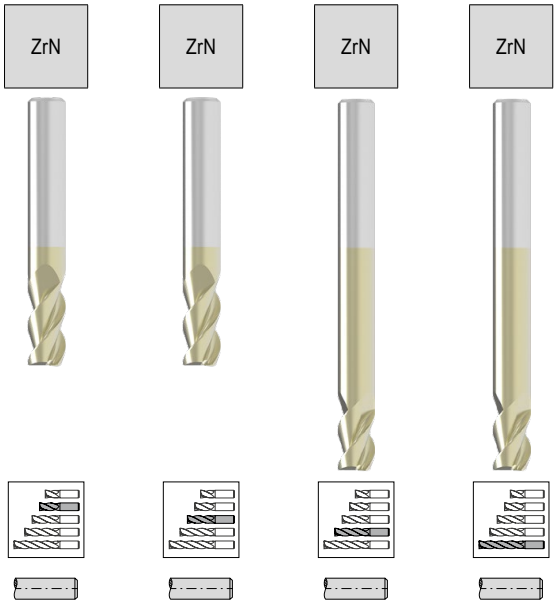
End mills ideal for machining aluminum and non-ferrous metals. The US inch version offers a ZrN coating reduced drag and aids in chip control.

▲ Radius accuracy: +/- 0.001 for Ø ≤ 0.060
+/- 0.0015 for Ø > 0.060

P362 | AL | α ≠ β | λ_s var. | λ_s=43° 45° 48° γ_s=13° | HPC







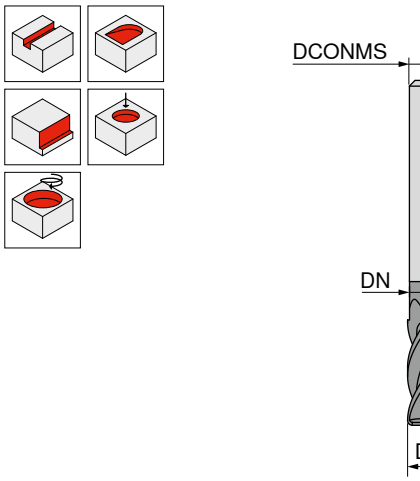
DC +0.000/-0.002 inch	RE inch	LH inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 004 ...	59 004 ...	59 004 ...	59 004 ...
3/4	0.190	2.000	1	4	3/4	3				94813
3/4	0.190	2.625	1	6	3/4	3				95213
3/4	0.030		1 5/8	4	3/4	3			90022	
3/4	0.060		1 5/8	4	3/4	3			90122	
3/4	0.090		1 5/8	4	3/4	3			90222	
3/4	0.125		1 5/8	4	3/4	3			90322	
3/4	0.190		1 5/8	4	3/4	3			90422	
3/4	0.250		1 5/8	4	3/4	3			90522	
3/4	0.030		2 1/4	5	3/4	3				90330
3/4	0.060		2 1/4	5	3/4	3				90430
3/4	0.090		2 1/4	5	3/4	3				90530
3/4	0.125		2 1/4	5	3/4	3				90630
3/4	0.190		2 1/4	5	3/4	3				90730
3/4	0.250		2 1/4	5	3/4	3				90830
1	0.030		1 1/4	4	1	3	91513			
1	0.060		1 1/4	4	1	3	91613			
1	0.090		1 1/4	4	1	3	91713			
1	0.125		1 1/4	4	1	3	91813			
1	0.190		1 1/4	4	1	3	91913			
1	0.250		1 1/4	4	1	3	92013			
1	0.060	2.625	1 1/4	5	1	3				99915
1	0.060	3.750	1 1/4	7	1	3				99939
1	0.090	2.625	1 1/4	5	1	3				99926
1	0.090	3.750	1 1/4	7	1	3				99923
1	0.120	2.625	1 1/4	5	1	3				99930
1	0.120	3.750	1 1/4	7	1	3				99938
1	0.190	2.625	1 1/4	5	1	3				99948
1	0.190	3.750	1 1/4	7	1	3				99949
1	0.030		2	5	1	3		91120		
1	0.060		2	5	1	3		91220		
1	0.090		2	5	1	3		91320		
1	0.125		2	5	1	3		91420		
1	0.190		2	5	1	3		91520		
1	0.250		2	5	1	3		91620		
1	0.030		3 1/4	6	1	3				90533
1	0.060		3 1/4	6	1	3				90633
1	0.090		3 1/4	6	1	3				90733
1	0.125		3 1/4	6	1	3				90833
1	0.190		3 1/4	6	1	3				90933
1	0.250		3 1/4	6	1	3				91033

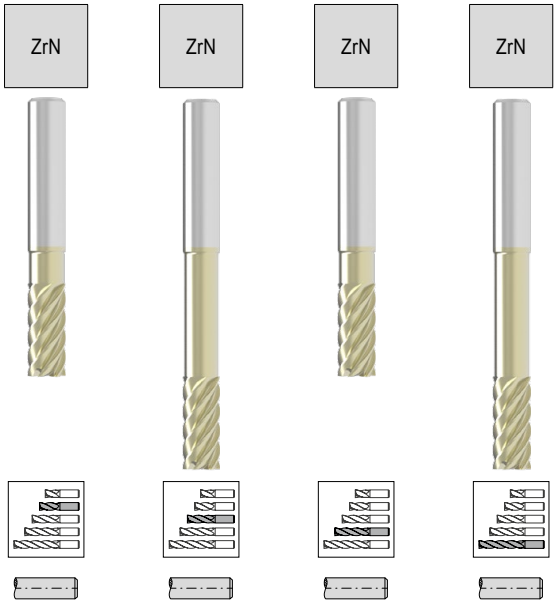
P				
M				
K				
N	●	●	●	●
S				
H				
O				

→ v_c/f_z Page 114

End milling cutter

P376 | AL | λ_s=44° γ_s=21°





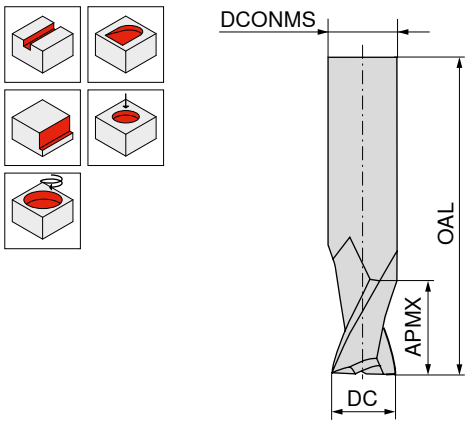
DC +0.000/-0.002 inch	APMX inch	DN inch	LH inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 005 ...	59 005 ...	59 005 ...	59 005 ...
1/4	5/8	0.240	7/8	2 1/2	1/4	6			**25025**	
1/4	5/8	0.240	1 5/8	3	1/4	6				**25125**
5/16	3/4	0.300	1	2 1/2	5/16	6			**31324**	
5/16	3/4	0.300	2 3/8	4	5/16	6				**31424**
3/8	1	0.360	1 1/4	3	3/8	6			**37527**	
3/8	1	0.360	2 1/4	4	3/8	6				**37627**
1/2	1	0.480	1 1/4	3	1/2	6	**50020**			
1/2	1 1/4	0.480	1 1/2	3 1/2	1/2	6			**50025**	
1/2	1 1/4	0.480	3	5	1/2	6		**50125**		
1/2	1 7/8			5	1/2	6				**50038**
5/8	1 1/4	0.600	1 1/2	3 1/2	5/8	6			**62520**	
5/8	1 1/4	0.600	3 5/8	6	5/8	6		**62620**		
5/8	2 1/2			6	5/8	6				**62540**
3/4	1 5/8	0.720	2	4	3/4	6			**75022**	
3/4	1 5/8	0.720	3 5/8	6	3/4	6				**75122**
1	2	0.960	3 7/8	6	1	6				**99920**
P										
M										
K										
N							●	●	●	●
S										
H										
O										

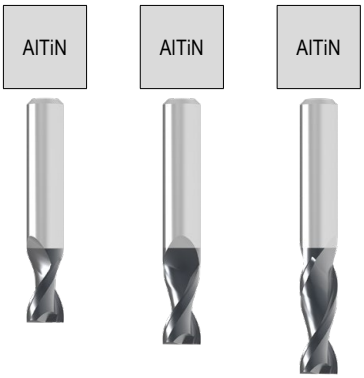
→ v_c/f_z Page 115

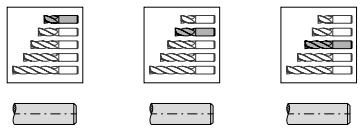
End milling cutter

▲ DC tolerance:
≤ Ø 7/64 inch: +/- 0.0005
≥ Ø 1/8 inch: 0 /- 0.002

S642 | UN | λ_s=38° γ_s=8°







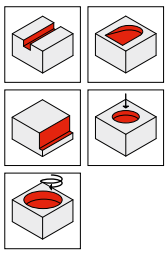
DC inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 069 ...	59 069 ...	59 069 ...
1/16	1/8	1 1/2	1/8	2		06320	
3/32	3/16	1 1/2	1/8	2		09420	
1/8	1/4	1 1/2	1/8	2	12520		
1/8	1/2	1 1/2	1/8	2		12540	
1/8	3/4	3	1/8	2			12660
5/32	3/8	2	3/16	2		15624	
3/16	3/8	2	3/16	2	18820		
3/16	5/8	2	3/16	2		18833	
3/16	1	2 1/2	3/16	2			18853
7/32	3/8	2	1/4	2		21917	
1/4	3/8	2	1/4	2		25015	
1/4	1 1/8	3	1/4	2			25045
1/4	1	4	1/4	2			25040
9/32	1/2	2	5/16	2		28118	
5/16	1/2	2	5/16	2	31316		
5/16	3/4	2 1/2	5/16	2		31324	
5/16	1 3/8	3	5/16	2			31344
5/16	1	4	5/16	2			31332
3/8	5/8	2	3/8	2	37517		
3/8	7/8	2 1/2	3/8	2		37523	
3/8	1 3/8	3	3/8	2			37537
3/8	1	4	3/8	2			37527
1/2	5/8	2 1/2	1/2	2	50013		
1/2	1	3	1/2	2		50020	
1/2	1	4	1/2	2			50120
5/8	7/8	3	5/8	2	62514		
5/8	1 1/4	3 1/2	5/8	2		62520	
5/8	2	6	5/8	2			62532
3/4	1	3	3/4	2	75013		
3/4	1 1/2	4	3/4	2		75020	
3/4	2	6	3/4	2			75027
1	1 3/4	4	1	2		99918	
1	2	6	1	2			99920
P					●	●	●
M					●	●	●
K					●	●	●
N					●	●	●
S					●	●	●
H							
O							

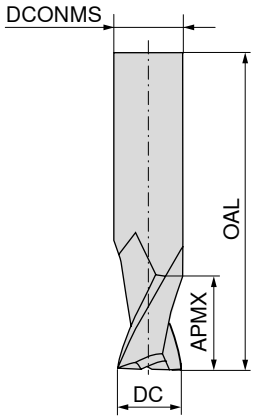
→ v_c/f_z Page 116

End milling cutter

▲ DC tolerance:
≤ Ø 7/64 inch: +/- 0.0005
≥ Ø 1/8 inch: 0 /- 0.002

S642 | UN | λ_s=38° γ_s=8°



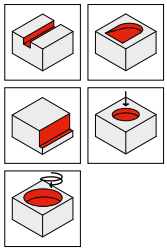


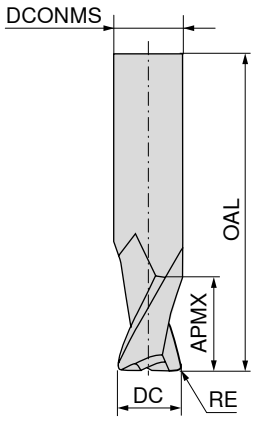
DC inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 069 ...	59 069 ...
1/16	3/16	1 1/2	1/8	2	06330	
3/32	9/32	1 1/2	1/8	2	09430	
1/8	3/4	2 1/2	1/8	2	12560	
1/8	1	3	1/8	2		12580
5/32	1/2	2	3/16	2	15632	
5/32	3/4	2 1/2	3/16	2		15648
3/16	3/4	2 1/2	3/16	2	18840	
3/16	1 1/8	3	3/16	2		18860
3/16	1	4	3/16	2		18953
7/32	5/8	2 1/2	1/4	2	21929	
7/32	1	3	1/4	2		21946
1/4	3/4	2 1/2	1/4	2	25030	
1/4	1 1/4	3	1/4	2		25050
1/4	1 1/2	4	1/4	2		25060
1/4	1 1/2	6	1/4	2		25160
9/32	3/4	2 1/2	5/16	2	28127	
9/32	1 1/4	3	5/16	2		28144
5/16	1 1/8	3	5/16	2	31336	
5/16	1 5/8	4	5/16	2		31352
5/16	1 1/2	6	5/16	2		31348
3/8	1 1/8	3	3/8	2	37530	
3/8	1 3/4	4	3/8	2		37547
3/8	1 1/2	6	3/8	2		37540
3/8	3	6	3/8	2		37580
1/2	1 1/2	3 1/2	1/2	2	50030	
1/2	2	4	1/2	2		50040
1/2	1 1/2	6	1/2	2		50130
1/2	3	6	1/2	2		50060
5/8	2 1/8	4 5/8	5/8	2	62534	
5/8	3	6	5/8	2		62548
3/4	2 1/4	5	3/4	2	75030	
3/4	3	6	3/4	2		75040
1	2 1/4	5	1	2	99923	
1	3	6	1	2		99930
P					●	●
M					●	●
K					●	●
N					●	●
S					●	●
H						
O						

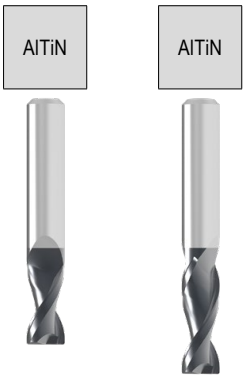
→ v_c/f_z Page 116

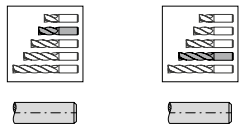
End milling cutter with corner radius

S642 | UN | λ_s=38° γ_s=8°









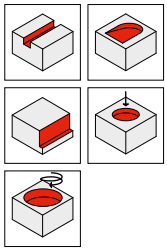
DC +0.000/-0.002 inch	RE +/- 0.001 inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 069 ...	59 069 ...
1/8	0.010	1/2	1 1/2	1/8	2	90040	
1/8	0.015	1/2	1 1/2	1/8	2	90140	
1/8	0.020	1/2	1 1/2	1/8	2	90240	
1/8	0.030	1/2	1 1/2	1/8	2	90340	
1/8	0.045	1/2	1 1/2	1/8	2	90440	
3/16	0.010	5/8	2	3/16	2	90033	
3/16	0.015	5/8	2	3/16	2	90133	
3/16	0.020	5/8	2	3/16	2	90233	
3/16	0.030	5/8	2	3/16	2	90333	
3/16	0.045	5/8	2	3/16	2	90433	
3/16	0.060	5/8	2	3/16	2	90533	
1/4	0.010	3/4	2 1/2	1/4	2		90030
1/4	0.015	3/4	2 1/2	1/4	2		90130
1/4	0.020	3/4	2 1/2	1/4	2		90230
1/4	0.030	3/4	2 1/2	1/4	2		90330
1/4	0.045	3/4	2 1/2	1/4	2		90430
1/4	0.060	3/4	2 1/2	1/4	2		90530
1/4	0.090	3/4	2 1/2	1/4	2		90630
5/16	0.010	3/4	2 1/2	5/16	2	90024	
5/16	0.015	3/4	2 1/2	5/16	2	90124	
5/16	0.020	3/4	2 1/2	5/16	2	90224	
5/16	0.030	3/4	2 1/2	5/16	2	90324	
5/16	0.045	3/4	2 1/2	5/16	2	90424	
5/16	0.060	3/4	2 1/2	5/16	2	90524	
5/16	0.090	3/4	2 1/2	5/16	2	90624	
3/8	0.010	7/8	2 1/2	3/8	2	90023	
3/8	0.015	7/8	2 1/2	3/8	2	90223	
3/8	0.020	7/8	2 1/2	3/8	2	90323	
3/8	0.030	7/8	2 1/2	3/8	2	90423	
3/8	0.045	7/8	2 1/2	3/8	2	90523	
3/8	0.060	7/8	2 1/2	3/8	2	90623	
3/8	0.090	7/8	2 1/2	3/8	2	90723	
3/8	0.125	7/8	2 1/2	3/8	2	90123	

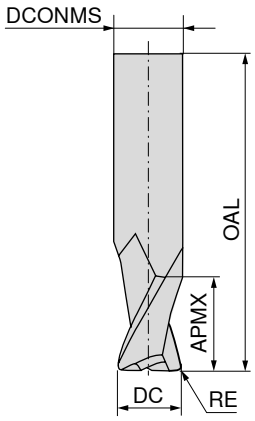
P	●	●
M	●	●
K	●	●
N	●	●
S	●	●
H		
O		

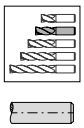
→ v_c/f_z Page 116

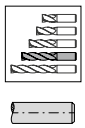
End milling cutter with corner radius

S642 | UN | λ_s=38° γ_s=8°









DC +0.000/-0.002 inch	RE +/- 0.001 inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 069 ...	59 069 ...
1/2	0.010	1	3	1/2	2	**90020**	
1/2	0.015	1	3	1/2	2	**90220**	
1/2	0.020	1	3	1/2	2	**90320**	
1/2	0.030	1	3	1/2	2	**90420**	
1/2	0.045	1	3	1/2	2	**90520**	
1/2	0.060	1	3	1/2	2	**90620**	
1/2	0.090	1	3	1/2	2	**90720**	
1/2	0.125	1	3	1/2	2	**90120**	
5/8	0.030	1 1/4	3 1/2	5/8	2		**90920**
5/8	0.045	1 1/4	3 1/2	5/8	2		**91020**
5/8	0.060	1 1/4	3 1/2	5/8	2		**91120**
5/8	0.090	1 1/4	3 1/2	5/8	2		**91220**
5/8	0.125	1 1/4	3 1/2	5/8	2		**90820**
3/4	0.030	1 1/2	4	3/4	2		**91420**
3/4	0.045	1 1/2	4	3/4	2		**91520**
3/4	0.060	1 1/2	4	3/4	2		**91620**
3/4	0.090	1 1/2	4	3/4	2		**91720**
3/4	0.125	1 1/2	4	3/4	2		**91320**
P						●	●
M						●	●
K						●	●
N						●	●
S						●	●
H							
O							

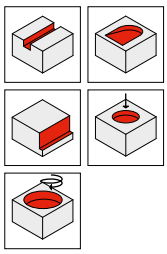
→ v_c/f_z Page 116

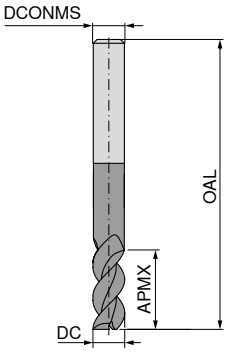
14

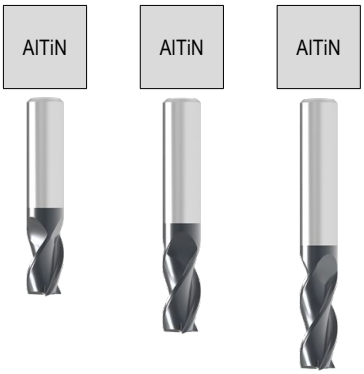
End milling cutter

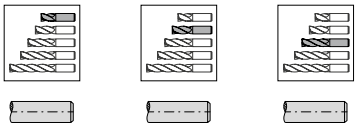
▲ DC tolerance:
≤ Ø 7/64 inch: +/- 0.0005
≥ Ø 1/8 inch: 0 /- 0.002

S643 | UN | λ_s=38° γ_s=8°









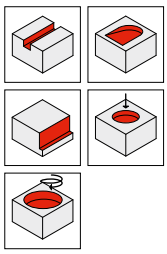
DC inch	APMX inch	OAL inch	DCONMS $_{-0.0001\ /\ -0.0004}$ inch	ZEFP	59 071 ...	59 071 ...	59 071 ...
1/16	1/8	1 1/2	1/8	3		06320	
5/64	1/4	1 1/2	1/8	3		07832	
3/32	3/16	1 1/2	1/8	3		09420	
1/8	1/4	1 1/2	1/8	3	12520		
1/8	1/2	1 1/2	1/8	3		12540	
1/8	3/4	3	1/8	3			12660
5/32	3/8	2	3/16	3		15624	
3/16	3/8	2	3/16	3	18820		
3/16	5/8	2	3/16	3		18833	
3/16	1	2 1/2	3/16	3			18853
7/32	3/8	2	1/4	3		21917	
1/4	3/8	2	1/4	3	25015		
1/4	3/4	2 1/2	1/4	3		25030	
1/4	1 1/8	3	1/4	3			25045
9/32	1/2	2	5/16	3		28118	
5/16	1/2	2	5/16	3	31316		
5/16	3/4	2 1/2	5/16	3		31324	
5/16	1 1/8	3	5/16	3			31336
3/8	5/8	2	3/8	3	37517		
3/8	7/8	2 1/2	3/8	3		37523	
3/8	1 1/8	3	3/8	3			37530
3/8	1 1/2	6	3/8	3			37540
1/2	5/8	2 1/2	1/2	3	50013		
1/2	1	3	1/2	3		50020	
1/2	1 1/2	6	1/2	3			50030
5/8	7/8	3	5/8	3	62514		
5/8	1 1/4	3 1/2	5/8	3		62520	
5/8	2 1/8	4 5/8	5/8	3			62534
3/4	1	3	3/4	3	75013		
3/4	1 1/2	4	3/4	3		75020	
3/4	2 1/4	5	3/4	3			75030
1	1 3/4	4	1	3		99918	
1	2 1/4	5	1	3			99923
P					●	●	●
M					●	●	●
K					●	●	●
N					●	●	●
S					●	●	●
H							
O							

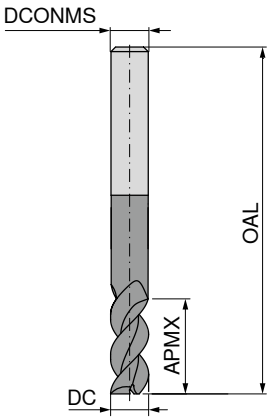
→ v_c/f_z Page 117

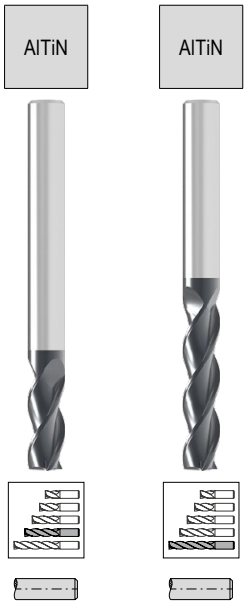
End milling cutter

▲ DC tolerance:
≤ Ø 7/64 inch: +/- 0.0005
≥ Ø 1/8 inch: 0 /- 0.002

S643 | UN | λ_s=38° γ_s=8°





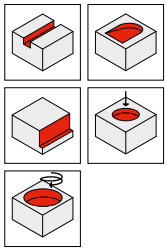


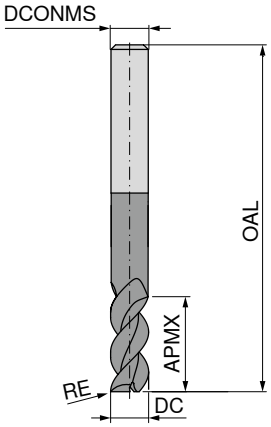
DC inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 071 ...	59 071 ...
1/16	3/16	1 1/2	1/8	3	**06330**	
3/32	9/32	1 1/2	1/8	3	**09430**	
1/8	3/4	2 1/2	1/8	3	**12560**	
1/8	1	3	1/8	3		**12580**
5/32	1/2	2	3/16	3	**15632**	
3/16	3/4	2 1/2	3/16	3	**18840**	
3/16	1	4	3/16	3		**18953**
3/16	1 1/8	3	3/16	3		**18860**
7/32	5/8	2 1/2	1/4	3	**21929**	
1/4	1	4	1/4	3	**25040**	
1/4	1 1/2	6	1/4	3		**25160**
1/4	1 1/2	4	1/4	3		**25060**
9/32	3/4	2 1/2	5/16	3	**28127**	
5/16	1	4	5/16	3	**31332**	
5/16	1 1/2	6	5/16	3		**31348**
5/16	1 5/8	4	5/16	3		**31352**
3/8	1	4	3/8	3	**37527**	
3/8	1 3/4	4	3/8	3		**37547**
3/8	3	6	3/8	3		**37580**
1/2	1	4	1/2	3	**50120**	
1/2	2	4	1/2	3		**50040**
1/2	3	6	1/2	3		**50060**
5/8	2	6	5/8	3	**62532**	
5/8	3	6	5/8	3		**62548**
3/4	2	6	3/4	3	**75027**	
3/4	3	6	3/4	3		**75040**
1	2	6	1	3	**99920**	
1	3	6	1	3		**99930**
P					●	●
M					●	●
K					●	●
N					●	●
S					●	●
H						
O						

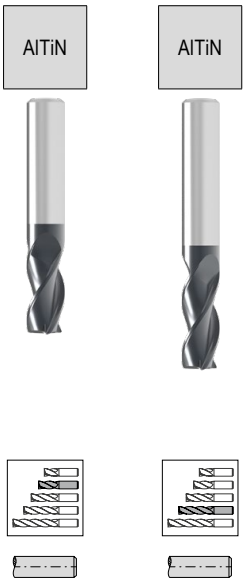
→ v_c/f_z Page 117

End milling cutter with corner radius

S643 | UN | λ_s=38° γ_s=8°







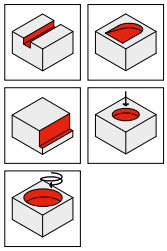
DC +0.000/-0.002 inch	RE +/- 0.001 inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 071 ...	59 071 ...
1/8	0.010	1/2	1 1/2	1/8	3	90040	
1/8	0.015	1/2	1 1/2	1/8	3	90140	
1/8	0.020	1/2	1 1/2	1/8	3	90240	
1/8	0.030	1/2	1 1/2	1/8	3	90340	
1/8	0.045	1/2	1 1/2	1/8	3	90440	
3/16	0.010	5/8	2	3/16	3	90033	
3/16	0.015	5/8	2	3/16	3	90133	
3/16	0.020	5/8	2	3/16	3	90233	
3/16	0.030	5/8	2	3/16	3	90333	
3/16	0.045	5/8	2	3/16	3	90433	
3/16	0.060	5/8	2	3/16	3	90533	
1/4	0.010	3/4	2 1/2	1/4	3		90030
1/4	0.015	3/4	2 1/2	1/4	3		90130
1/4	0.020	3/4	2 1/2	1/4	3		90230
1/4	0.030	3/4	2 1/2	1/4	3		90330
1/4	0.045	3/4	2 1/2	1/4	3		90430
1/4	0.060	3/4	2 1/2	1/4	3		90530
1/4	0.090	3/4	2 1/2	1/4	3		90630
5/16	0.010	3/4	2 1/2	5/16	3	90024	
5/16	0.015	3/4	2 1/2	5/16	3	90124	
5/16	0.020	3/4	2 1/2	5/16	3	90224	
5/16	0.030	3/4	2 1/2	5/16	3	90324	
5/16	0.045	3/4	2 1/2	5/16	3	90424	
5/16	0.060	3/4	2 1/2	5/16	3	90524	
5/16	0.090	3/4	2 1/2	5/16	3	90624	
3/8	0.010	7/8	2 1/2	3/8	3	90023	
3/8	0.015	7/8	2 1/2	3/8	3	90223	
3/8	0.020	7/8	2 1/2	3/8	3	90323	
3/8	0.030	7/8	2 1/2	3/8	3	90423	
3/8	0.045	7/8	2 1/2	3/8	3	90523	
3/8	0.060	7/8	2 1/2	3/8	3	90623	
3/8	0.090	7/8	2 1/2	3/8	3	90723	
3/8	0.125	7/8	2 1/2	3/8	3	90123	

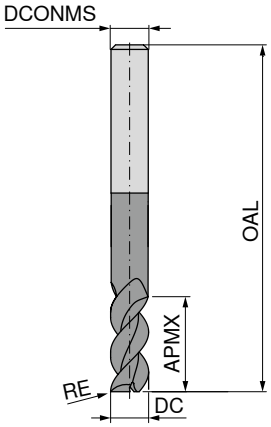
P	●	●
M	●	●
K	●	●
N	●	●
S	●	●
H		
O		

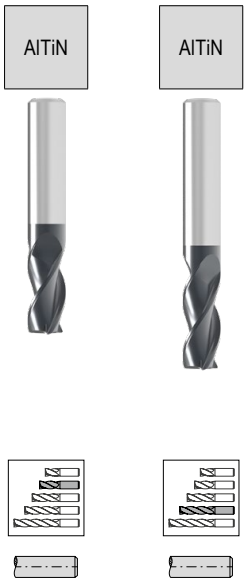
→ v_c/f_z Page 117

End milling cutter with corner radius

S643 | UN | λ_s=38° γ_s=8°







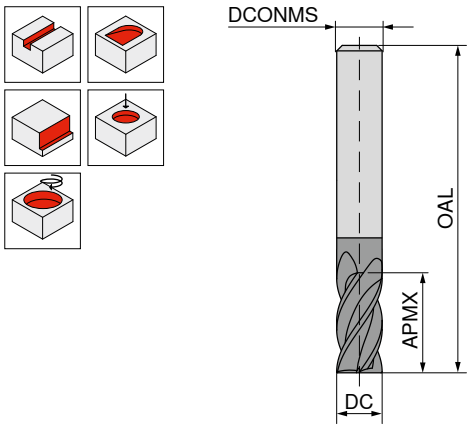
DC +0.000/-0.002 inch	RE +/- 0.001 inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 071 ...	59 071 ...
1/2	0.010	1	3	1/2	3	90020	
1/2	0.015	1	3	1/2	3	90220	
1/2	0.020	1	3	1/2	3	90320	
1/2	0.030	1	3	1/2	3	90420	
1/2	0.045	1	3	1/2	3	90520	
1/2	0.060	1	3	1/2	3	90620	
1/2	0.090	1	3	1/2	3	90720	
1/2	0.125	1	3	1/2	3	90120	
5/8	0.015	1 1/4	3 1/2	5/8	3		90920
5/8	0.020	1 1/4	3 1/2	5/8	3		91020
5/8	0.030	1 1/4	3 1/2	5/8	3		91120
5/8	0.045	1 1/4	3 1/2	5/8	3		91220
5/8	0.060	1 1/4	3 1/2	5/8	3		91320
5/8	0.090	1 1/4	3 1/2	5/8	3		91420
5/8	0.125	1 1/4	3 1/2	5/8	3		90820
3/4	0.020	1 1/2	4	3/4	3		91620
3/4	0.030	1 1/2	4	3/4	3		91720
3/4	0.045	1 1/2	4	3/4	3		91820
3/4	0.060	1 1/2	4	3/4	3		91920
3/4	0.090	1 1/2	4	3/4	3		92020
3/4	0.125	1 1/2	4	3/4	3		91520
1	0.030	1 3/4	4	1	3	90118	
1	0.045	1 3/4	4	1	3	90218	
1	0.060	1 3/4	4	1	3	90318	
1	0.090	1 3/4	4	1	3	90418	
1	0.125	1 3/4	4	1	3	90018	
P						●	●
M						●	●
K						●	●
N						●	●
S						●	●
H							
O							

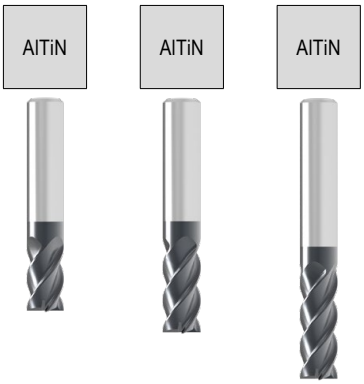
→ v_c/f_z Page 117

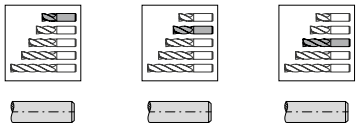
End milling cutter

▲ DC tolerance:
≤ Ø 7/64 inch: +/- 0.0005
≥ Ø 1/8 inch: 0 /- 0.002

S644 | UN | λ_s=38° γ_s=8°







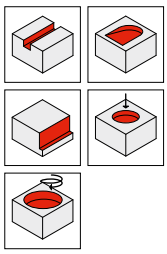
DC inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 073 ...	59 073 ...	59 073 ...
1/32	1/16	1 1/2	1/8	4		03120	
3/64	3/32	1 1/2	1/8	4		04720	
1/16	1/8	1 1/2	1/8	4		06320	
5/64	1/4	1 1/2	1/8	4		07832	
3/32	3/16	1 1/2	1/8	4		09420	
7/64	3/16	1 1/2	1/8	4		10917	
1/8	1/4	1 1/2	1/8	4	12520		
1/8	1/2	1 1/2	1/8	4		12540	
1/8	3/4	3	1/8	4			12660
5/32	3/8	2	3/16	4		15624	
3/16	3/8	2	3/16	4	18820		
3/16	5/8	2	3/16	4		18833	
3/16	1	2 1/2	3/16	4			18853
7/32	3/8	2	1/4	4		21917	
1/4	3/8	2	1/4	4	25015		
1/4	3/4	2 1/2	1/4	4		25030	
1/4	1 1/4	3	1/4	4			25050
1/4	1	4	1/4	4			25040
9/32	1/2	2	5/16	4		28118	
5/16	1/2	2	5/16	4	31316		
5/16	3/4	2 1/2	5/16	4		31324	
5/16	1 3/8	3	5/16	4			31344
5/16	1	4	5/16	4			31332
3/8	5/8	2	3/8	4	37517		
3/8	7/8	2 1/2	3/8	4		37523	
3/8	1 1/8	3	3/8	4			37530
3/8	1 3/8	3	3/8	4			37537
1/2	5/8	2 1/2	1/2	4	50013		
1/2	1	3	1/2	4		50020	
1/2	1 1/2	3 1/2	1/2	4			50030
1/2	1 1/2	6	1/2	4			50130
5/8	7/8	3	5/8	4	62514		
5/8	1 1/4	3 1/2	5/8	4		62520	
5/8	2 1/8	4 5/8	5/8	4			62534
3/4	1	3	3/4	4	75013		
3/4	1 1/2	4	3/4	4		75020	
3/4	2 1/4	5	3/4	4			75030
1	1 3/4	4	1	4		99918	
1	2 1/4	5	1	4			99923
P					●	●	●
M					●	●	●
K					●	●	●
N					●	●	●
S					●	●	●
H							
O							

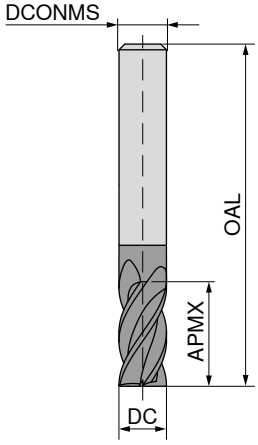
→ v_c/f_z Page 118

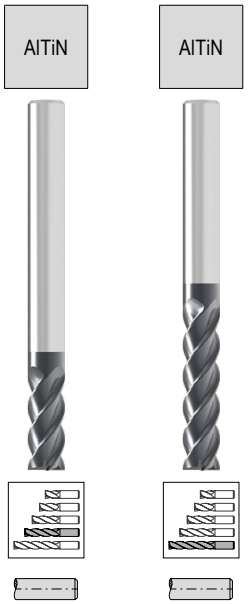
End milling cutter

▲ DC tolerance:
≤ Ø 7/64 inch: +/- 0.0005
≥ Ø 1/8 inch: 0 /- 0.002

S644 | UN | λ_s=38° γ_s=8°







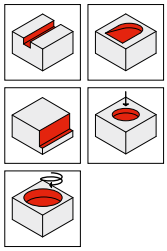
DC inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 073 ...	59 073 ...
1/32	3/32	1 1/2	1/8	4	03130	
3/64	9/64	1 1/2	1/8	4	04730	
1/16	3/16	1 1/2	1/8	4	06330	
3/32	9/32	1 1/2	1/8	4	09430	
7/64	3/8	1 1/2	1/8	4	10934	
1/8	3/4	2 1/2	1/8	4	12560	
1/8	1	3	1/8	4		12580
5/32	1/2	2	3/16	4	15632	
5/32	3/4	2 1/2	3/16	4		15648
3/16	3/4	2 1/2	3/16	4	18840	
3/16	1 1/8	3	3/16	4		18860
3/16	1	4	3/16	4		18953
7/32	5/8	2 1/2	1/4	4	21929	
7/32	1	3	1/4	4		21946
1/4	1 1/8	3	1/4	4	25045	
1/4	1 1/2	4	1/4	4		25060
1/4	1 1/2	6	1/4	4		25160
9/32	3/4	2 1/2	5/16	4	28127	
9/32	1 1/4	3	5/16	4		28144
5/16	1 1/8	3	5/16	4	31336	
5/16	1 5/8	4	5/16	4		31352
5/16	1 1/2	6	5/16	4		31348
3/8	1	4	3/8	4	37527	
3/8	1 3/4	4	3/8	4		37547
3/8	1 1/2	6	3/8	4		37540
3/8	3	6	3/8	4		37580
1/2	1	4	1/2	4	50120	
1/2	2	4	1/2	4		50040
1/2	3	6	1/2	4		50060
5/8	2	6	5/8	4	62532	
5/8	3	6	5/8	4		62548
3/4	2	6	3/4	4	75027	
3/4	3	6	3/4	4		75040
1	2	6	1	4	99920	
1	3	6	1	4		99930

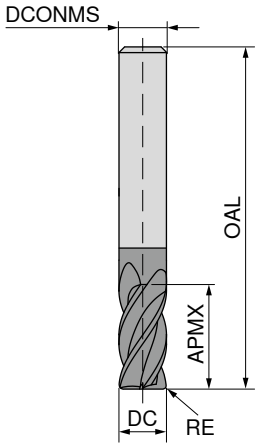
P	●	●
M	●	●
K	●	●
N	●	●
S	●	●
H		
O		

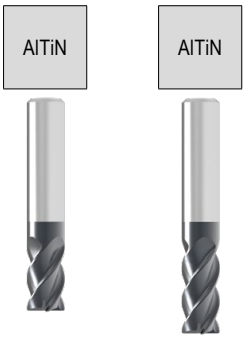
→ v_c/f_z Page 118

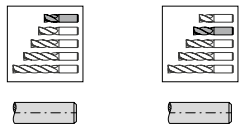
End milling cutter with corner radius

S644 | UN | λ_s=38° γ_s=8°









DC +0.000/-0.002 inch	RE +/- 0.001 inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 073 ...	59 073 ...
1/8	0.010	1/4	1 1/2	1/8	4		92120
1/8	0.015	1/4	1 1/2	1/8	4		92220
1/8	0.020	1/4	1 1/2	1/8	4		92320
1/8	0.030	1/4	1 1/2	1/8	4		92420
1/8	0.045	1/4	1 1/2	1/8	4		92520
3/16	0.010	3/8	2	3/16	4		92620
3/16	0.015	3/8	2	3/16	4		92720
3/16	0.020	3/8	2	3/16	4		92820
3/16	0.030	3/8	2	3/16	4		92920
3/16	0.045	3/8	2	3/16	4		93020
3/16	0.060	3/8	2	3/16	4		93120
1/4	0.010	3/8	2	1/4	4	90015	
1/4	0.015	3/8	2	1/4	4	90115	
1/4	0.020	3/8	2	1/4	4	90215	
1/4	0.030	3/8	2	1/4	4	90315	
1/4	0.045	3/8	2	1/4	4	90415	
1/4	0.060	3/8	2	1/4	4	90515	
1/4	0.090	3/8	2	1/4	4	90615	
1/4	0.010	3/4	2 1/2	1/4	4		90030
1/4	0.015	3/4	2 1/2	1/4	4		90130
1/4	0.020	3/4	2 1/2	1/4	4		90230
1/4	0.030	3/4	2 1/2	1/4	4		90330
1/4	0.045	3/4	2 1/2	1/4	4		90430
1/4	0.060	3/4	2 1/2	1/4	4		90530
1/4	0.090	3/4	2 1/2	1/4	4		90630
5/16	0.010	1/2	2	5/16	4	90016	
5/16	0.015	1/2	2	5/16	4	90216	
5/16	0.020	1/2	2	5/16	4	90316	
5/16	0.030	1/2	2	5/16	4	90416	
5/16	0.045	1/2	2	5/16	4	90516	
5/16	0.060	1/2	2	5/16	4	90616	
5/16	0.090	1/2	2	5/16	4	90716	
5/16	0.125	1/2	2	5/16	4	90116	
5/16	0.010	3/4	2 1/2	5/16	4		90024
5/16	0.015	3/4	2 1/2	5/16	4		90124
5/16	0.020	3/4	2 1/2	5/16	4		90224
5/16	0.030	3/4	2 1/2	5/16	4		90324
5/16	0.045	3/4	2 1/2	5/16	4		90424
5/16	0.060	3/4	2 1/2	5/16	4		90524
5/16	0.090	3/4	2 1/2	5/16	4		90624
3/8	0.010	5/8	2	3/8	4	90017	

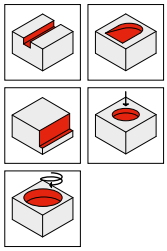
P	●	●
M	●	●
K	●	●
N	●	●
S	●	●
H		
O		

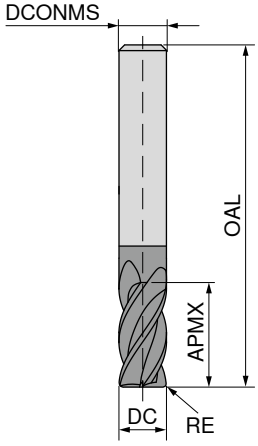
→ v_c/f_z Page 118

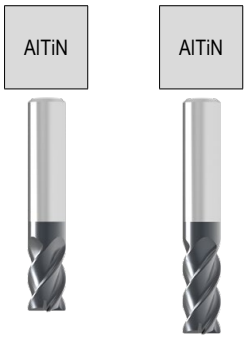
Continued on next page

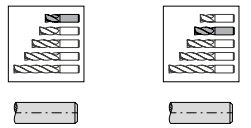
End milling cutter with corner radius

S644 | UN | λ_s=38° γ_s=8°









DC +0.000/-0.002 inch	RE +/- 0.001 inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 073 ...	59 073 ...
3/8	0.015	5/8	2	3/8	4	90217	
3/8	0.020	5/8	2	3/8	4	90317	
3/8	0.030	5/8	2	3/8	4	90417	
3/8	0.045	5/8	2	3/8	4	90517	
3/8	0.060	5/8	2	3/8	4	90617	
3/8	0.090	5/8	2	3/8	4	90717	
3/8	0.125	5/8	2	3/8	4	90117	
3/8	0.010	7/8	2 1/2	3/8	4		90023
3/8	0.015	7/8	2 1/2	3/8	4		90223
3/8	0.020	7/8	2 1/2	3/8	4		90323
3/8	0.030	7/8	2 1/2	3/8	4		90423
3/8	0.045	7/8	2 1/2	3/8	4		90523
3/8	0.060	7/8	2 1/2	3/8	4		90623
3/8	0.090	7/8	2 1/2	3/8	4		90723
3/8	0.125	7/8	2 1/2	3/8	4		90123
1/2	0.010	5/8	2 1/2	1/2	4	90013	
1/2	0.015	5/8	2 1/2	1/2	4	90213	
1/2	0.020	5/8	2 1/2	1/2	4	90313	
1/2	0.030	5/8	2 1/2	1/2	4	90413	
1/2	0.045	5/8	2 1/2	1/2	4	90513	
1/2	0.060	5/8	2 1/2	1/2	4	90613	
1/2	0.090	5/8	2 1/2	1/2	4	90713	
1/2	0.125	5/8	2 1/2	1/2	4	90113	
1/2	0.010	1	3	1/2	4		90020
1/2	0.015	1	3	1/2	4		90220
1/2	0.020	1	3	1/2	4		90320
1/2	0.030	1	3	1/2	4		90420
1/2	0.045	1	3	1/2	4		90520
1/2	0.060	1	3	1/2	4		90620
1/2	0.090	1	3	1/2	4		90720
1/2	0.125	1	3	1/2	4		90120
1/2	0.010	1	4	1/2	4		93720
1/2	0.015	1	4	1/2	4		93920
1/2	0.020	1	4	1/2	4		94020
1/2	0.030	1	4	1/2	4		94120
1/2	0.045	1	4	1/2	4		94220
1/2	0.060	1	4	1/2	4		94320
1/2	0.090	1	4	1/2	4		94420
1/2	0.125	1	4	1/2	4		93820
5/8	0.015	1 1/4	3 1/2	5/8	4		90920
5/8	0.020	1 1/4	3 1/2	5/8	4		91020

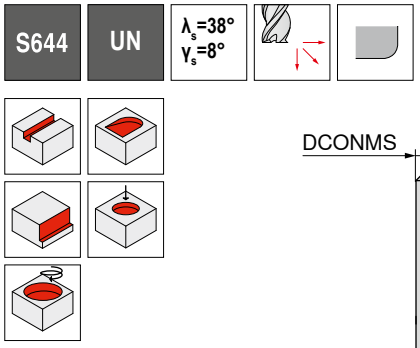
P	●	●
M	●	●
K	●	●
N	●	●
S	●	●
H		
O		

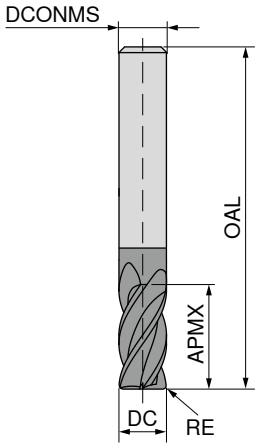
→ v_c/f_z Page 118

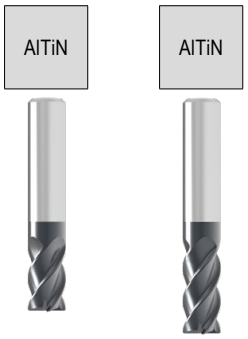
14

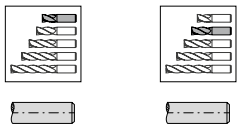
Continued on next page

End milling cutter with corner radius







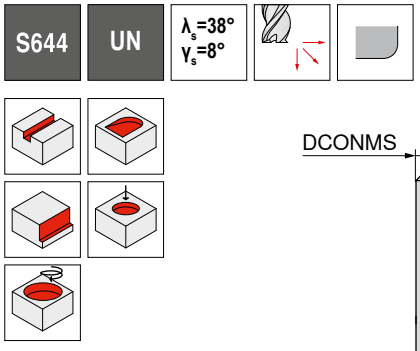


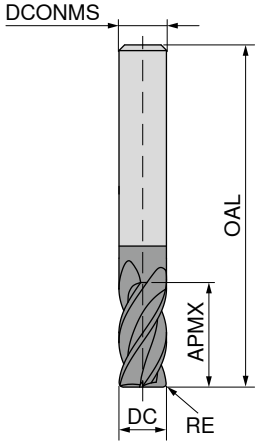
DC +0.000/-0.002 inch	RE +/- 0.001 inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 073 ...	59 073 ...
5/8	0.030	1 1/4	3 1/2	5/8	4		**91120**
5/8	0.045	1 1/4	3 1/2	5/8	4		**91220**
5/8	0.060	1 1/4	3 1/2	5/8	4		**91320**
5/8	0.090	1 1/4	3 1/2	5/8	4		**91420**
5/8	0.125	1 1/4	3 1/2	5/8	4		**90820**
3/4	0.020	1 1/2	4	3/4	4		**91620**
3/4	0.030	1 1/2	4	3/4	4		**91720**
3/4	0.045	1 1/2	4	3/4	4		**91820**
3/4	0.060	1 1/2	4	3/4	4		**91920**
3/4	0.090	1 1/2	4	3/4	4		**92020**
3/4	0.125	1 1/2	4	3/4	4		**91520**
1	0.030	1 3/4	4	1	4		**90118**
1	0.045	1 3/4	4	1	4		**90218**
1	0.060	1 3/4	4	1	4		**90318**
1	0.090	1 3/4	4	1	4		**90418**
1	0.125	1 3/4	4	1	4		**90018**
P						●	●
M						●	●
K						●	●
N						●	●
S						●	●
H							
O							

→ v_c/f_z Page 118

End milling cutter with corner radius

S644 | UN | λ_s=38° γ_s=8°





DC +0.000/-0.002 inch	RE +/- 0.001 inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 073 ...	59 073 ...
1/8	0.010	1/2	1 1/2	1/8	4		90040
1/8	0.015	1/2	1 1/2	1/8	4		90140
1/8	0.020	1/2	1 1/2	1/8	4		90240
1/8	0.030	1/2	1 1/2	1/8	4		90340
3/16	0.010	5/8	2	3/16	4	90033	
3/16	0.015	5/8	2	3/16	4	90133	
3/16	0.020	5/8	2	3/16	4	90233	
3/16	0.030	5/8	2	3/16	4	90333	
3/16	0.045	5/8	2	3/16	4	90433	
3/16	0.060	5/8	2	3/16	4	90533	
3/16	0.010	1	4	3/16	4		90153
3/16	0.015	1	4	3/16	4		90253
3/16	0.020	1	4	3/16	4		90353
3/16	0.030	1	4	3/16	4		90453
3/16	0.045	1	4	3/16	4		90553
3/16	0.060	1	4	3/16	4		90653
1/4	0.010	1	4	1/4	4	91840	
1/4	0.015	1	4	1/4	4	91940	
1/4	0.020	1	4	1/4	4	92040	
1/4	0.030	1	4	1/4	4	92140	
1/4	0.045	1	4	1/4	4	92240	
1/4	0.060	1	4	1/4	4	92340	
1/4	0.090	1	4	1/4	4	92440	
1/4	0.010	1 1/8	3	1/4	4		90045
1/4	0.015	1 1/8	3	1/4	4		90145
1/4	0.020	1 1/8	3	1/4	4		90245
1/4	0.030	1 1/8	3	1/4	4		90345
1/4	0.045	1 1/8	3	1/4	4		90445
1/4	0.060	1 1/8	3	1/4	4		90545
1/4	0.090	1 1/8	3	1/4	4		90645
5/16	0.010	1	4	5/16	4	90032	
5/16	0.015	1	4	5/16	4	90232	
5/16	0.020	1	4	5/16	4	90332	
5/16	0.030	1	4	5/16	4	90432	
5/16	0.045	1	4	5/16	4	90532	
5/16	0.060	1	4	5/16	4	90632	
5/16	0.090	1	4	5/16	4	90732	
5/16	0.125	1	4	5/16	4	90132	
5/16	0.010	1 1/8	3	5/16	4	90036	
5/16	0.015	1 1/8	3	5/16	4	90236	
5/16	0.020	1 1/8	3	5/16	4	90336	

P	●	●
M	●	●
K	●	●
N	●	●
S	●	●
H		
O		

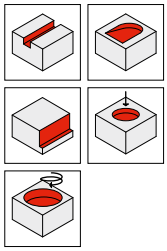
→ v_c/f_z Page 118

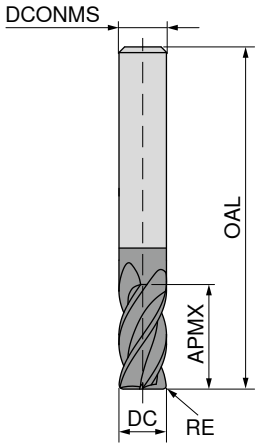
14

Continued on next page

End milling cutter with corner radius

S644 | UN | λ_s=38° γ_s=8°





DC +0.000/-0.002 inch	RE +/- 0.001 inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 073 ...	59 073 ...
5/16	0.030	1 1/8	3	5/16	4	90436	
5/16	0.045	1 1/8	3	5/16	4	90536	
5/16	0.060	1 1/8	3	5/16	4	90636	
5/16	0.090	1 1/8	3	5/16	4	90736	
5/16	0.125	1 1/8	3	5/16	4	90136	
5/16	0.010	1 1/2	6	5/16	4		90748
5/16	0.015	1 1/2	6	5/16	4		90948
5/16	0.020	1 1/2	6	5/16	4		91048
5/16	0.030	1 1/2	6	5/16	4		91148
5/16	0.045	1 1/2	6	5/16	4		91248
5/16	0.060	1 1/2	6	5/16	4		91348
5/16	0.090	1 1/2	6	5/16	4		91448
5/16	0.125	1 1/2	6	5/16	4		90848
3/8	0.010	1	4	3/8	4	90027	
3/8	0.015	1	4	3/8	4	90227	
3/8	0.020	1	4	3/8	4	90327	
3/8	0.030	1	4	3/8	4	90427	
3/8	0.045	1	4	3/8	4	90527	
3/8	0.060	1	4	3/8	4	90627	
3/8	0.090	1	4	3/8	4	90727	
3/8	0.125	1	4	3/8	4	90127	
3/8	0.010	1 1/8	3	3/8	4	90730	
3/8	0.015	1 1/8	3	3/8	4	90930	
3/8	0.020	1 1/8	3	3/8	4	91030	
3/8	0.030	1 1/8	3	3/8	4	91130	
3/8	0.045	1 1/8	3	3/8	4	91230	
3/8	0.060	1 1/8	3	3/8	4	91330	
3/8	0.090	1 1/8	3	3/8	4	91430	
3/8	0.125	1 1/8	3	3/8	4	90830	
3/8	0.010	1 1/2	6	3/8	4		92540
3/8	0.015	1 1/2	6	3/8	4		92740
3/8	0.020	1 1/2	6	3/8	4		92840
3/8	0.030	1 1/2	6	3/8	4		92940
3/8	0.045	1 1/2	6	3/8	4		93040
3/8	0.060	1 1/2	6	3/8	4		93140
3/8	0.090	1 1/2	6	3/8	4		93240
3/8	0.125	1 1/2	6	3/8	4		92640
3/8	0.010	1 3/4	4	3/8	4		90047
3/8	0.015	1 3/4	4	3/8	4		90247
3/8	0.020	1 3/4	4	3/8	4		90347
3/8	0.030	1 3/4	4	3/8	4		90447

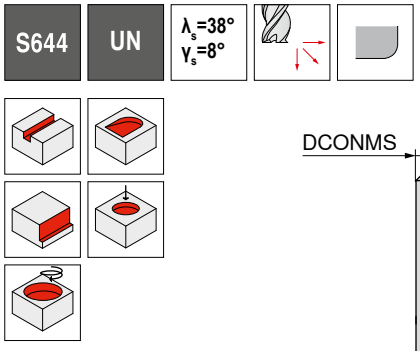
P	●	●
M	●	●
K	●	●
N	●	●
S	●	●
H		
O		

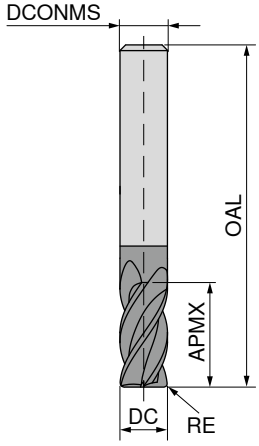
→ v_c/f_z Page 118

Continued on next page

End milling cutter with corner radius

S644 | UN | λ_s=38° γ_s=8°





DC +0.000/-0.002 inch	RE +/- 0.001 inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 073 ...	59 073 ...
3/8	0.045	1 3/4	4	3/8	4		90547
3/8	0.060	1 3/4	4	3/8	4		90647
3/8	0.090	1 3/4	4	3/8	4		90747
3/8	0.125	1 3/4	4	3/8	4		90147
1/2	0.010	1 1/2	6	1/2	4	92630	
1/2	0.015	1 1/2	6	1/2	4	92830	
1/2	0.020	1 1/2	6	1/2	4	92930	
1/2	0.030	1 1/2	6	1/2	4	93030	
1/2	0.045	1 1/2	6	1/2	4	93130	
1/2	0.060	1 1/2	6	1/2	4	93230	
1/2	0.090	1 1/2	6	1/2	4	93330	
1/2	0.125	1 1/2	6	1/2	4	92730	
1/2	0.010	2	4	1/2	4		90440
1/2	0.015	2	4	1/2	4		90640
1/2	0.020	2	4	1/2	4		90740
1/2	0.030	2	4	1/2	4		90840
1/2	0.045	2	4	1/2	4		90940
1/2	0.060	2	4	1/2	4		91040
1/2	0.090	2	4	1/2	4		91140
1/2	0.125	2	4	1/2	4		90540
5/8	0.015	2	6	5/8	4	90932	
5/8	0.020	2	6	5/8	4	91032	
5/8	0.030	2	6	5/8	4	91132	
5/8	0.045	2	6	5/8	4	91232	
5/8	0.060	2	6	5/8	4	91332	
5/8	0.090	2	6	5/8	4	91432	
5/8	0.125	2	6	5/8	4	90832	
5/8	0.015	2 1/8	4 5/8	5/8	4		90134
5/8	0.020	2 1/8	4 5/8	5/8	4		90234
5/8	0.030	2 1/8	4 5/8	5/8	4		90334
5/8	0.045	2 1/8	4 5/8	5/8	4		90434
5/8	0.060	2 1/8	4 5/8	5/8	4		90534
5/8	0.090	2 1/8	4 5/8	5/8	4		90634
5/8	0.125	2 1/8	4 5/8	5/8	4		90034
3/4	0.020	2	6	3/4	4	90927	
3/4	0.030	2	6	3/4	4	91027	
3/4	0.045	2	6	3/4	4	91127	
3/4	0.060	2	6	3/4	4	91227	
3/4	0.090	2	6	3/4	4	91327	
3/4	0.125	2	6	3/4	4	90827	
3/4	0.020	2 1/4	5	3/4	4		91630

P	●	●
M	●	●
K	●	●
N	●	●
S	●	●
H		
O		

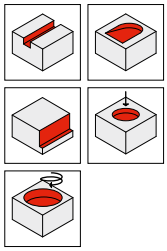
→ v_c/f_z Page 118

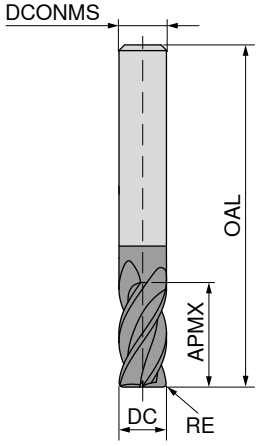
14

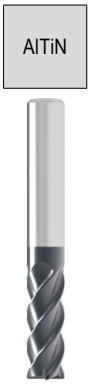
Continued on next page

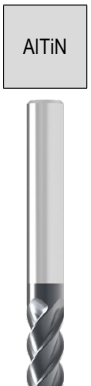
End milling cutter with corner radius

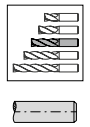
S644 | UN | λ_s=38° γ_s=8°

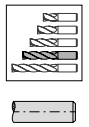












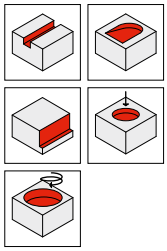
DC +0.000/-0.002 inch	RE +/- 0.001 inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 073 ...	59 073 ...
3/4	0.030	2 1/4	5	3/4	4		**91730**
3/4	0.045	2 1/4	5	3/4	4		**91830**
3/4	0.060	2 1/4	5	3/4	4		**91930**
3/4	0.090	2 1/4	5	3/4	4		**92030**
3/4	0.125	2 1/4	5	3/4	4		**91530**
1	0.030	2	6	1	4	**93320**	
1	0.045	2	6	1	4	**93420**	
1	0.060	2	6	1	4	**93520**	
1	0.090	2	6	1	4	**93620**	
1	0.125	2	6	1	4	**93220**	
1	0.030	2 1/4	5	1	4		**90923**
1	0.045	2 1/4	5	1	4		**91023**
1	0.060	2 1/4	5	1	4		**91123**
1	0.090	2 1/4	5	1	4		**91223**
1	0.125	2 1/4	5	1	4		**90823**

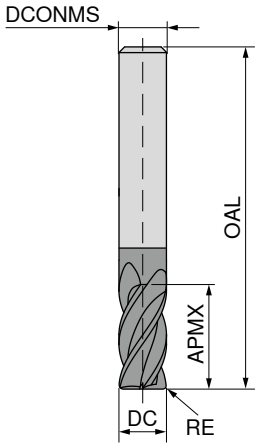
P	●	●
M	●	●
K	●	●
N	●	●
S	●	●
H		
O		

→ v_c/f_z Page 118

End milling cutter with corner radius

S644 | UN | λ_s=38° γ_s=8°





AlTiN

59 073 ...

DC +0.000/-0.002 inch	RE +/- 0.001 inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	
1/8	0.010	1	3	1/8	4	90180
1/8	0.015	1	3	1/8	4	90280
1/8	0.020	1	3	1/8	4	90380
1/8	0.030	1	3	1/8	4	90480
1/8	0.045	1	3	1/8	4	90580
3/16	0.010	1 1/8	3	3/16	4	90160
3/16	0.015	1 1/8	3	3/16	4	90260
3/16	0.020	1 1/8	3	3/16	4	90360
3/16	0.030	1 1/8	3	3/16	4	90460
3/16	0.045	1 1/8	3	3/16	4	90560
3/16	0.060	1 1/8	3	3/16	4	90660
1/4	0.010	1 1/2	4	1/4	4	90760
1/4	0.015	1 1/2	4	1/4	4	90860
1/4	0.020	1 1/2	4	1/4	4	90960
1/4	0.030	1 1/2	4	1/4	4	91060
1/4	0.045	1 1/2	4	1/4	4	91160
1/4	0.060	1 1/2	4	1/4	4	91260
1/4	0.090	1 1/2	4	1/4	4	91360
1/4	0.010	1 1/2	6	1/4	4	92260
1/4	0.015	1 1/2	6	1/4	4	92360
1/4	0.020	1 1/2	6	1/4	4	92460
1/4	0.030	1 1/2	6	1/4	4	92560
1/4	0.045	1 1/2	6	1/4	4	92660
1/4	0.060	1 1/2	6	1/4	4	92760
1/4	0.090	1 1/2	6	1/4	4	92860
5/16	0.010	1 5/8	4	5/16	4	90152
5/16	0.015	1 5/8	4	5/16	4	90352
5/16	0.020	1 5/8	4	5/16	4	90452
5/16	0.030	1 5/8	4	5/16	4	90552
5/16	0.045	1 5/8	4	5/16	4	90652
5/16	0.060	1 5/8	4	5/16	4	90752
5/16	0.090	1 5/8	4	5/16	4	90852
5/16	0.125	1 5/8	4	5/16	4	90252
3/8	0.010	3	6	3/8	4	90680
3/8	0.015	3	6	3/8	4	90880
3/8	0.020	3	6	3/8	4	90980
3/8	0.030	3	6	3/8	4	91080
3/8	0.045	3	6	3/8	4	91180
3/8	0.060	3	6	3/8	4	91280
3/8	0.090	3	6	3/8	4	91380
3/8	0.125	3	6	3/8	4	90780

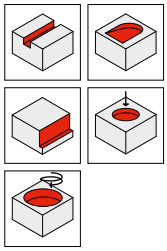
P	●
M	●
K	●
N	●
S	●
H	
O	

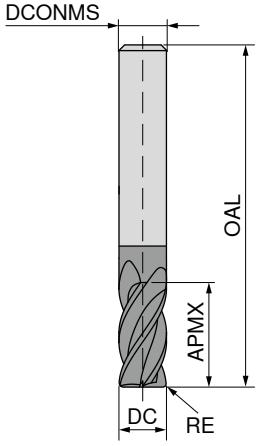
→ v_c/f_z Page 118

Continued on next page

End milling cutter with corner radius

S644 | UN | λ_s=38° γ_s=8°





AlTiN

59 073 ...

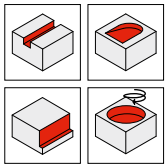
DC +0.000/-0.002 inch	RE +/- 0.001 inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	
1/2	0.010	3	6	1/2	4	91460
1/2	0.015	3	6	1/2	4	91660
1/2	0.020	3	6	1/2	4	91760
1/2	0.030	3	6	1/2	4	91860
1/2	0.045	3	6	1/2	4	91960
1/2	0.060	3	6	1/2	4	92060
1/2	0.090	3	6	1/2	4	92160
1/2	0.125	3	6	1/2	4	91560
5/8	0.015	3	6	5/8	4	90148
5/8	0.020	3	6	5/8	4	90248
5/8	0.030	3	6	5/8	4	90348
5/8	0.045	3	6	5/8	4	90448
5/8	0.060	3	6	5/8	4	90548
5/8	0.090	3	6	5/8	4	90648
5/8	0.125	3	6	5/8	4	90048
3/4	0.020	3	6	3/4	4	91340
3/4	0.030	3	6	3/4	4	91440
3/4	0.045	3	6	3/4	4	91540
3/4	0.060	3	6	3/4	4	91640
3/4	0.090	3	6	3/4	4	91740
3/4	0.125	3	6	3/4	4	91240
1	0.030	3	6	1	4	92230
1	0.045	3	6	1	4	92330
1	0.060	3	6	1	4	92430
1	0.090	3	6	1	4	92530
1	0.125	3	6	1	4	92130

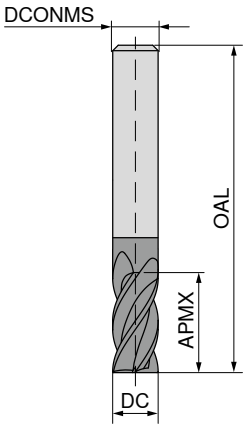
P	●
M	●
K	●
N	●
S	●
H	
O	

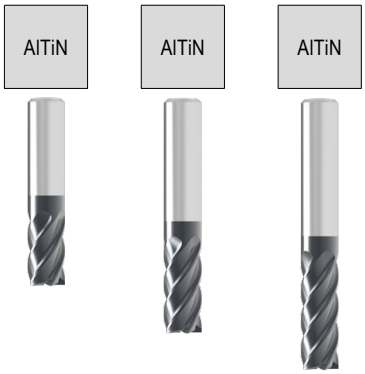
→ v_c/f_z Page 118

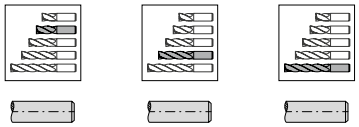
End milling cutter

S645 | UN | λ_s=43° γ_s=8°









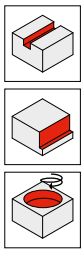
DC +0.000/-0.002 inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 075 ...	59 075 ...	59 075 ...
1/8	1/4	1 1/2	1/8	5	12520		
1/8	1/2	1 1/2	1/8	5		12540	
5/32	5/16	2	3/16	5	15620		
5/32	9/16	2	3/16	5		15636	
3/16	5/16	2	3/16	5	18817		
3/16	9/16	2	3/16	5		18830	
7/32	3/8	2	1/4	5	21917		
7/32	3/4	2 1/2	1/4	5		21934	
1/4	3/8	2	1/4	5	25015		
1/4	3/4	2 1/2	1/4	5		25030	
1/4	1 1/4	4	1/4	5			25050
5/16	7/16	2	5/16	5	31314		
5/16	13/16	2 1/2	5/16	5		31326	
3/8	1/2	2	3/8	5	37513		
3/8	1	2 1/2	3/8	5		37527	
3/8	1 1/2	4	3/8	5			37540
1/2	5/8	2 1/2	1/2	5	50013		
1/2	1 1/4	3	1/2	5		50025	
1/2	2	4	1/2	5			50040
5/8	3/4	3	5/8	5	62512		
5/8	1 5/8	3 1/2	5/8	5		62526	
5/8	2 1/2	5	5/8	5			62540
3/4	1	3	3/4	5	75013		
3/4	1 5/8	4	3/4	5		75022	
3/4	3 1/4	6	3/4	5			75043
1	1 1/4	3	1	5	99913		
1	2	4	1	5		99920	
1	3 1/4	6	1	5			99933
P					●	●	●
M					●	●	●
K					●	●	●
N							
S							
H							
O							

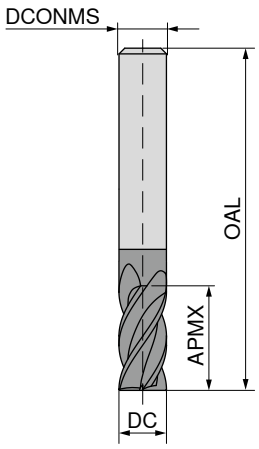
→ v_c/f_z Page 119

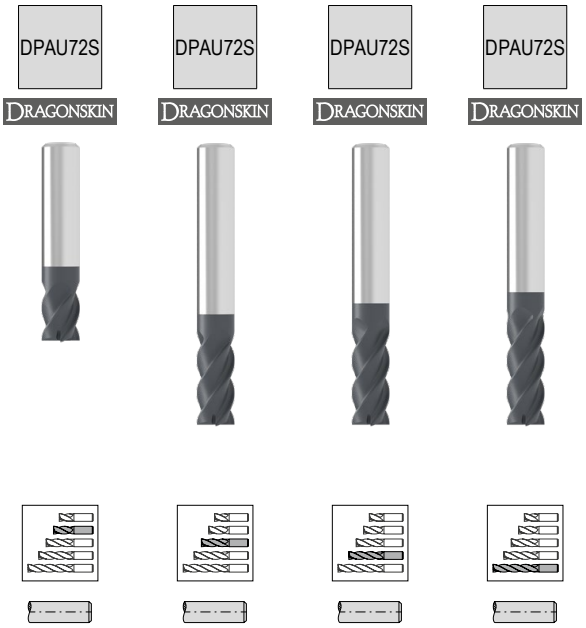
OptiLine – End milling cutter

End mills for universal machining of ISO S materials that feature variable helix and pitch and are optimized for maximum stability for demanding operations.

P007 | UN | α β ≠ | λ_s var. | λ_s = 35° 38° γ_s = 9° | HPC







DC +0.000/-0.002 inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 002 ...	59 002 ...	59 002 ...	59 002 ...
1/8	1/4	1 1/2	1/8	4	12520			
1/8	1/2	2 1/2	1/8	4				12640
3/16	5/16	2	3/16	4	18817			
3/16	5/8	2 1/2	3/16	4			18833	
1/4	3/8	2	1/4	4	25015			
1/4	1/2	2 1/2	1/4	4		25020		
1/4	3/4	2 1/2	1/4	4			25030	
1/4	1	3	1/4	4				25040
5/16	1/2	2	5/16	4	31316			
5/16	3/4	2 1/2	5/16	4		31324		
5/16	1 1/4	3	5/16	4			31340	
3/8	1/2	2	3/8	4	37513			
3/8	7/8	3	3/8	4		37523		
3/8	1	3	3/8	4			37527	
3/8	1 1/4	3	3/8	4				37533
7/16	1	2 3/4	7/16	4			43823	
7/16	2	4	7/16	4				43846
1/2	5/8	2 1/2	1/2	4	50013			
1/2	1	3	1/2	4		50020		
1/2	1 1/4	3	1/2	4			50025	
1/2	1 5/8	4	1/2	4				50033
5/8	3/4	3	5/8	4	62512			
5/8	1 1/4	3 1/2	5/8	4		62520		
5/8	1 5/8	3 1/2	5/8	4			62526	
5/8	2	4	5/8	4				62532
5/8	3 1/4	6	5/8	4				62552
3/4	7/8	3	3/4	4	75012			
3/4	1 1/4	4	3/4	4		75017		
3/4	1 5/8	4	3/4	4			75022	
3/4	2 1/4	5	3/4	4				75030
3/4	3 1/4	6	3/4	4				75043
1	1 1/2	4	1	4	99915			
1	2	4 1/2	1	4		99920		
1	2 5/8	5	1	4			99926	
1	3	6	1	4				99930
1	4 1/4	7	1	4				99943

P	●	●	●	●
M	●	●	●	●
K	○	○	○	○
N	●	●	●	●
S	●	●	●	●
H				
O				

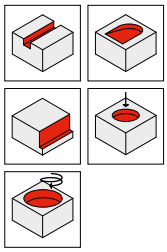
→ v_c/f_z Page 120

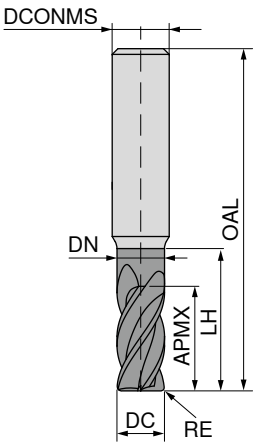
OptiLine – End milling cutter with corner radius

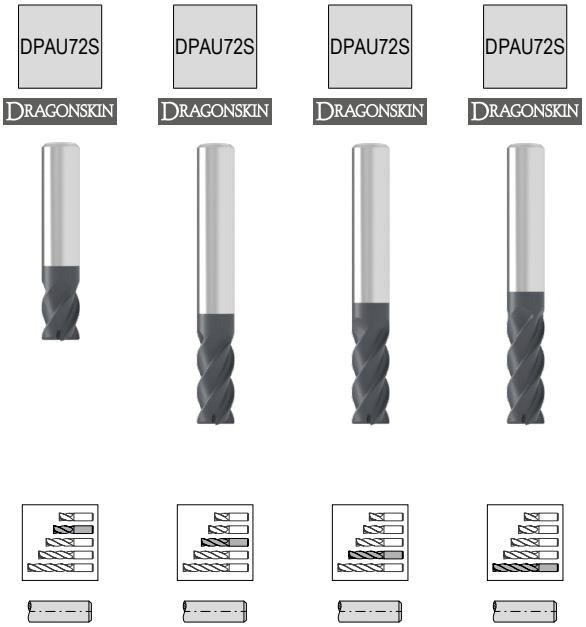
End mills for universal machining of ISO S materials that feature variable helix and pitch and are optimized for maximum stability for demanding operations.

▲ Radius accuracy: +/- 0.001 for Ø ≤ 0.060
+/- 0.0015 for Ø > 0.060

P007 | UN | α β ≠ | λ_s var. | λ_s 35° 38° γ_s 9° | HPC







DC +0.000/-0.002 inch	RE inch	DN inch	LH inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 002 ...	59 002 ...	59 002 ...	59 002 ...
1/8	0.010	0.120	0.375	0.156	3	1/8	4	92012			
1/8	0.010	0.120	0.500	0.156	3	1/8	4		92112		
1/8	0.010	0.120	0.625	0.156	3	1/8	4			92212	
1/8	0.010			1/4	1 1/2	1/8	4	90020			
1/8	0.030			1/4	1 1/2	1/8	4	90120			
1/8	0.010			1/2	2 1/2	1/8	4			90040	
1/8	0.030			1/2	2 1/2	1/8	4				90140
3/16	0.010	0.180	0.500	0.219	3	3/16	4		92312		
3/16	0.010	0.180	0.750	0.219	3	3/16	4			92412	
3/16	0.010	0.180	1.000	0.219	3	3/16	4				92512
3/16	0.010			5/16	2	3/16	4	90017			
3/16	0.030			5/16	2	3/16	4	90117			
3/16	0.010			5/8	2 1/2	3/16	4			90033	
3/16	0.030			5/8	2 1/2	3/16	4			90133	
1/4	0.020			3/8	2	1/4	4	90015			
1/4	0.030			3/8	2	1/4	4	90115			
1/4	0.060			3/8	2	1/4	4	90215			
1/4	0.020	0.240	0.750	3/8	3	1/4	4			92015	
1/4	0.020	0.240	1.125	3/8	4	1/4	4				92115
1/4	0.020	0.240	1.625	3/8	4	1/4	4				92215
1/4	0.020	0.240	2.125	3/8	4	1/4	4				92315
1/4	0.020			1/2	2 1/2	1/4	4		90220		
1/4	0.030			1/2	2 1/2	1/4	4		90320		
1/4	0.060			1/2	2 1/2	1/4	4		90420		
1/4	0.020			3/4	2 1/2	1/4	4			90030	
1/4	0.030			3/4	2 1/2	1/4	4			90130	
1/4	0.060			3/4	2 1/2	1/4	4			90230	
1/4	0.020			1	3	1/4	4				90240
1/4	0.030			1	3	1/4	4				90340
1/4	0.060			1	3	1/4	4				90440
1/4	0.030	0.950	4.125	1 1/4	6	1	4				99941
5/16	0.020			1/2	2	5/16	4	90016			
5/16	0.030			1/2	2	5/16	4	90116			
5/16	0.060			1/2	2	5/16	4	90216			
5/16	0.020			3/4	2 1/2	5/16	4		90024		
5/16	0.030			3/4	2 1/2	5/16	4		90124		
5/16	0.060			3/4	2 1/2	5/16	4		90224		
5/16	0.020			1 1/4	3	5/16	4			90540	
5/16	0.030			1 1/4	3	5/16	4			90640	
5/16	0.060			1 1/4	3	5/16	4			90740	
3/8	0.020			1/2	2	3/8	4	90013			
3/8	0.030			1/2	2	3/8	4	90113			
3/8	0.060			1/2	2	3/8	4	90213			
3/8	0.090			1/2	2	3/8	4	90313			
3/8	0.030	0.360	1.125	1/2	4	3/8	4				92013

P	●	●	●	●
M	●	●	●	●
K	○	○	○	○
N	●	●	●	●
S	●	●	●	●
H				
O				

→ v_c/f_z Page 120

14

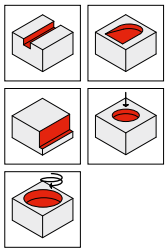
Continued on next page

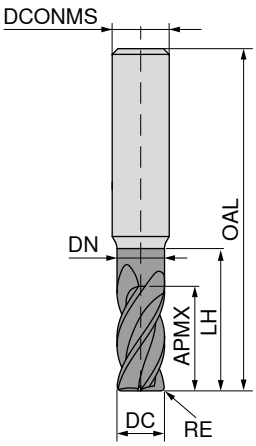
OptiLine – End milling cutter with corner radius

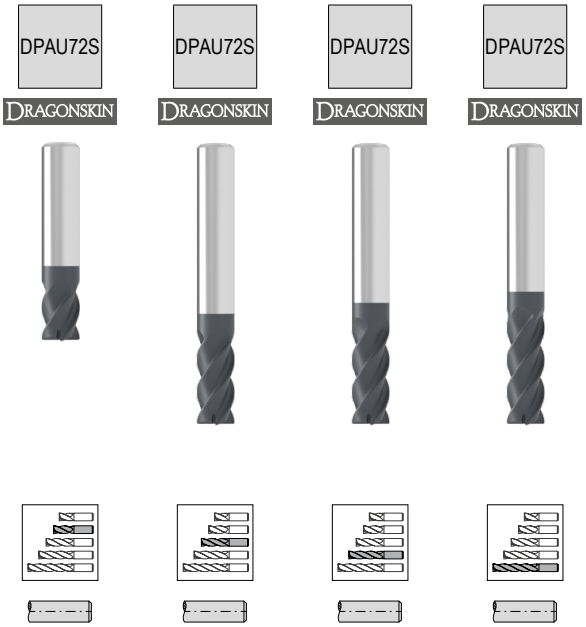
End mills for universal machining of ISO S materials that feature variable helix and pitch and are optimized for maximum stability for demanding operations.

▲ Radius accuracy: +/- 0.001 for Ø ≤ 0.060
+/- 0.0015 for Ø > 0.060

P007 | UN | α β ≠ | λ_s var. | λ_s 35° 38° γ_s 9° | HPC







DC +0.000/-0.002 inch	RE inch	DN inch	LH inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 002 ...	59 002 ...	59 002 ...	59 002 ...
3/8	0.030	0.360	2.125	1/2	4	3/8	4				92113
3/8	0.030	0.360	3.125	1/2	6	3/8	4				92213
3/8	0.030	0.360	4.125	1/2	6	3/8	4				92313
3/8	0.020			7/8	3	3/8	4		90023		
3/8	0.030			7/8	3	3/8	4		90123		
3/8	0.060			7/8	3	3/8	4		90223		
3/8	0.090			7/8	3	3/8	4		90323		
3/8	0.020			1	3	3/8	4			90027	
3/8	0.030			1	3	3/8	4			90127	
3/8	0.060			1	3	3/8	4			90227	
3/8	0.090			1	3	3/8	4			90327	
3/8	0.020			1 1/4	3	3/8	4				90233
3/8	0.030			1 1/4	3	3/8	4				90333
3/8	0.060			1 1/4	3	3/8	4				90433
3/8	0.090			1 1/4	3	3/8	4				90533
1/2	0.020			5/8	2 1/2	1/2	4	90413			
1/2	0.030			5/8	2 1/2	1/2	4	90513			
1/2	0.060			5/8	2 1/2	1/2	4	90613			
1/2	0.090			5/8	2 1/2	1/2	4	90713			
1/2	0.125			5/8	2 1/2	1/2	4	90813			
1/2	0.030	0.480	1.500	5/8	4	1/2	4		92413		
1/2	0.030	0.480	2.250	5/8	4	1/2	4				92513
1/2	0.030	0.480	3.375	5/8	6	1/2	4				92613
1/2	0.030	0.480	4.125	5/8	6	1/2	4				92713
1/2	0.020			1	3	1/2	4		90520		
1/2	0.030			1	3	1/2	4		90620		
1/2	0.060			1	3	1/2	4		90720		
1/2	0.090			1	3	1/2	4		90820		
1/2	0.125			1	3	1/2	4		90920		
1/2	0.020			1 1/4	3	1/2	4			90025	
1/2	0.030			1 1/4	3	1/2	4			90125	
1/2	0.060			1 1/4	3	1/2	4			90225	
1/2	0.090			1 1/4	3	1/2	4			90325	
1/2	0.125			1 1/4	3	1/2	4			90425	
1/2	0.020			1 5/8	4	1/2	4				90633
1/2	0.030			1 5/8	4	1/2	4				90733
1/2	0.060			1 5/8	4	1/2	4				90833
1/2	0.090			1 5/8	4	1/2	4				90933
1/2	0.125			1 5/8	4	1/2	4				91033
5/8	0.030			3/4	3	5/8	4	90012			
5/8	0.060			3/4	3	5/8	4	90112			
5/8	0.090			3/4	3	5/8	4	90212			
5/8	0.125			3/4	3	5/8	4	90312			
5/8	0.030	0.600	1.625	3/4	4	5/8	4				92612
5/8	0.030	0.600	2.375	3/4	6	5/8	4				92712

P	●	●	●	●
M	●	●	●	●
K	○	○	○	○
N	●	●	●	●
S	●	●	●	●
H				
O				

→ v_c/f_z Page 120

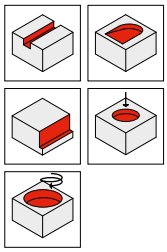
Continued on next page

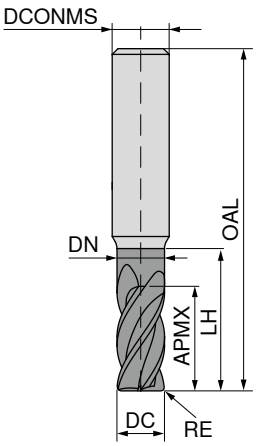
OptiLine – End milling cutter with corner radius

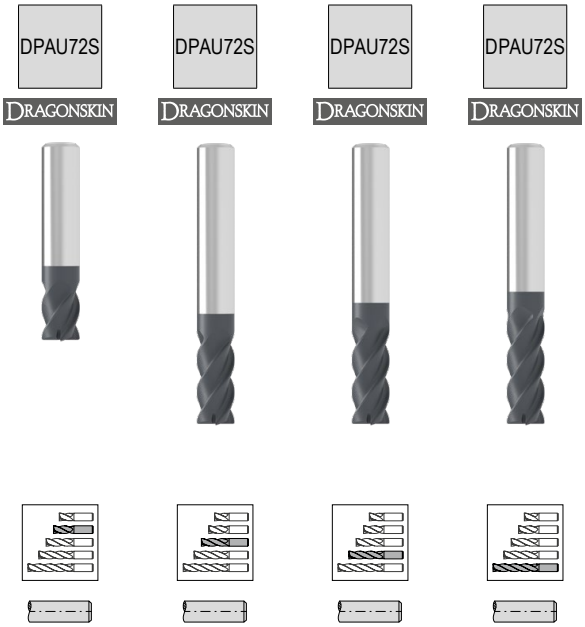
End mills for universal machining of ISO S materials that feature variable helix and pitch and are optimized for maximum stability for demanding operations.

▲ Radius accuracy: +/- 0.001 for Ø ≤ 0.060
+/- 0.0015 for Ø > 0.060

P007 | UN | α β ≠ | λ_s var. | λ_s 35° 38° γ_s 9° | HPC







DC +0.000/-0.002 inch	RE inch	DN inch	LH inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 002 ...	59 002 ...	59 002 ...	59 002 ...
5/8	0.030	0.600	3.375	3/4	6	5/8	4				92812
5/8	0.030	0.600	4.125	3/4	6	5/8	4				92912
5/8	0.030			1 1/4	3 1/2	5/8	4		91020		
5/8	0.060			1 1/4	3 1/2	5/8	4		91120		
5/8	0.090			1 1/4	3 1/2	5/8	4		91220		
5/8	0.125			1 1/4	3 1/2	5/8	4		91320		
5/8	0.030			1 5/8	3 1/2	5/8	4			90026	
5/8	0.060			1 5/8	3 1/2	5/8	4			90126	
5/8	0.090			1 5/8	3 1/2	5/8	4			90226	
5/8	0.125			1 5/8	3 1/2	5/8	4				90326
5/8	0.030			2	4	5/8	4				90032
5/8	0.060			2	4	5/8	4				90132
5/8	0.090			2	4	5/8	4				90232
5/8	0.125			2	4	5/8	4				90332
5/8	0.030			3 1/4	6	5/8	4				90052
5/8	0.060			3 1/4	6	5/8	4				90152
5/8	0.090			3 1/4	6	5/8	4				90252
5/8	0.125			3 1/4	6	5/8	4				90352
3/4	0.030			7/8	3	3/4	4	90412			
3/4	0.060			7/8	3	3/4	4	90512			
3/4	0.090			7/8	3	3/4	4	90612			
3/4	0.125			7/8	3	3/4	4	90712			
3/4	0.190			7/8	3	3/4	4	90812			
3/4	0.250			7/8	3	3/4	4	90912			
3/4	0.030	0.720	2.000	1	4	3/4	4				92813
3/4	0.030	0.720	2.500	1	6	3/4	4				92913
3/4	0.030	0.720	3.375	1	6	3/4	4				93013
3/4	0.030	0.720	4.125	1	6	3/4	4				93113
3/4	0.030			1 1/4	4	3/4	4		90217		
3/4	0.060			1 1/4	4	3/4	4		90317		
3/4	0.090			1 1/4	4	3/4	4		90417		
3/4	0.125			1 1/4	4	3/4	4		90517		
3/4	0.190			1 1/4	4	3/4	4		90617		
3/4	0.250			1 1/4	4	3/4	4		90717		
3/4	0.030			1 5/8	4	3/4	4			90022	
3/4	0.060			1 5/8	4	3/4	4			90122	
3/4	0.090			1 5/8	4	3/4	4			90222	
3/4	0.125			1 5/8	4	3/4	4			90322	
3/4	0.190			1 5/8	4	3/4	4			90422	
3/4	0.250			1 5/8	4	3/4	4			90522	
3/4	0.030			2 1/4	5	3/4	4				90330
3/4	0.060			2 1/4	5	3/4	4				90430
3/4	0.090			2 1/4	5	3/4	4				90530
3/4	0.125			2 1/4	5	3/4	4				90630
3/4	0.190			2 1/4	5	3/4	4				90730

P	●	●	●	●
M	●	●	●	●
K	○	○	○	○
N	●	●	●	●
S	●	●	●	●
H				
O				

→ v_c/f_z Page 120

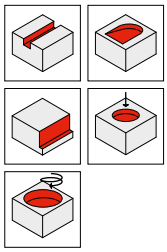
Continued on next page

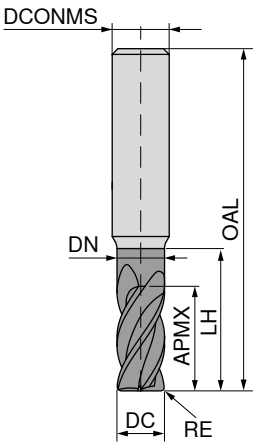
OptiLine – End milling cutter with corner radius

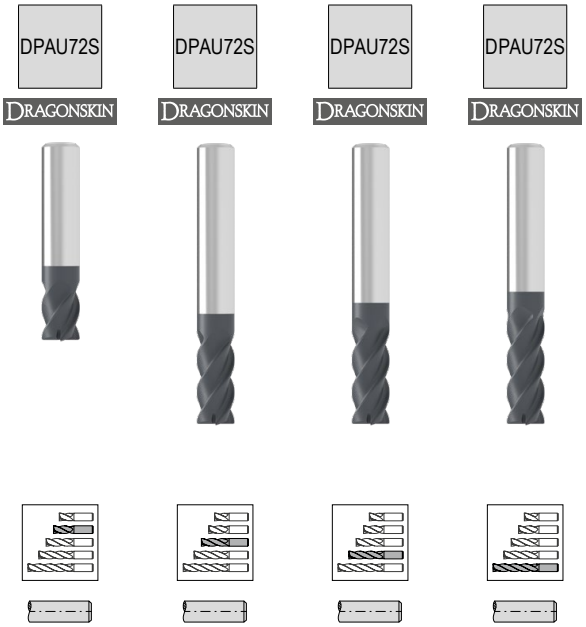
End mills for universal machining of ISO S materials that feature variable helix and pitch and are optimized for maximum stability for demanding operations.

▲ Radius accuracy: +/- 0.001 for Ø ≤ 0.060
+/- 0.0015 for Ø > 0.060

P007 | UN | α β ≠ | λ_s var. | λ_s 35° 38° γ_s 9° | HPC







DC +0.000/-0.002 inch	RE inch	DN inch	LH inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 002 ...	59 002 ...	59 002 ...	59 002 ...
3/4	0.250			2 1/4	5	3/4	4				90830
3/4	0.030			3 1/4	6	3/4	4				90043
3/4	0.060			3 1/4	6	3/4	4				90143
3/4	0.090			3 1/4	6	3/4	4				90243
3/4	0.125			3 1/4	6	3/4	4				90343
3/4	0.190			3 1/4	6	3/4	4				90443
3/4	0.250			3 1/4	6	3/4	4				90543
1	0.030	0.950	2.250	1 1/4	4	1	4				99923
1	0.030	0.950	2.625	1 1/4	6	1	4				99913
1	0.030	0.950	3.375	1 1/4	6	1	4				99934
1	0.030			1 1/2	4	1	4	90315			
1	0.060			1 1/2	4	1	4	90415			
1	0.090			1 1/2	4	1	4	90515			
1	0.125			1 1/2	4	1	4	90615			
1	0.190			1 1/2	4	1	4	90715			
1	0.250			1 1/2	4	1	4	90815			
1	0.030			2	4 1/2	1	4		91420		
1	0.060			2	4 1/2	1	4		91520		
1	0.090			2	4 1/2	1	4		91620		
1	0.125			2	4 1/2	1	4		91720		
1	0.190			2	4 1/2	1	4		91820		
1	0.250			2	4 1/2	1	4		91920		
1	0.030			2 5/8	5	1	4			90426	
1	0.060			2 5/8	5	1	4			90526	
1	0.090			2 5/8	5	1	4			90626	
1	0.125			2 5/8	5	1	4			90726	
1	0.190			2 5/8	5	1	4			90826	
1	0.250			2 5/8	5	1	4			90926	
1	0.030			3	6	1	4				90930
1	0.060			3	6	1	4				91030
1	0.090			3	6	1	4				91130
1	0.125			3	6	1	4				91230
1	0.190			3	6	1	4				91330
1	0.250			3	6	1	4				91430
1	0.030			4 1/4	7	1	4				90643
1	0.060			4 1/4	7	1	4				90743
1	0.090			4 1/4	7	1	4				90843
1	0.125			4 1/4	7	1	4				90943
1	0.190			4 1/4	7	1	4				91043
1	0.250			4 1/4	7	1	4				91143

P	●	●	●	●
M	●	●	●	●
K	○	○	○	○
N	●	●	●	●
S	●	●	●	●
H				
O				

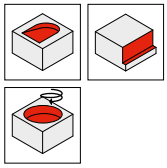
→ v_c/f_z Page 120

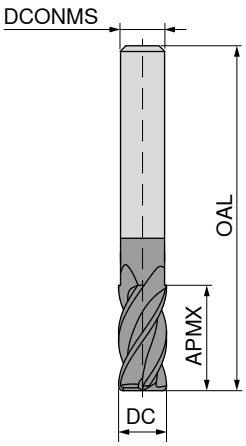
OptiLine – End milling cutter

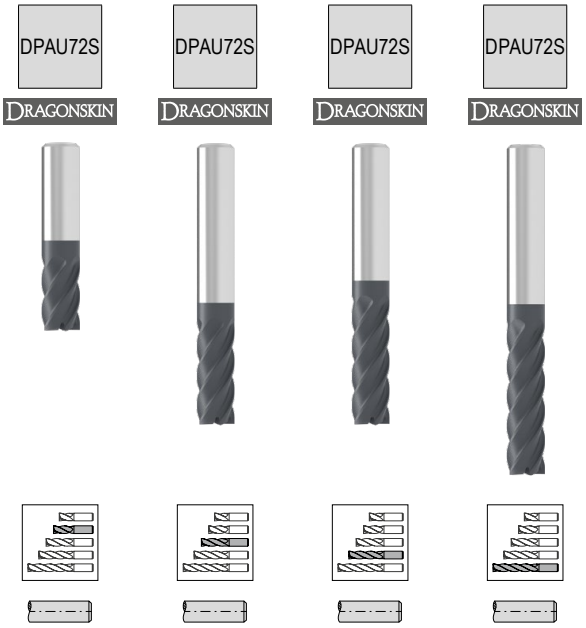
End mills for universal machining that feature a constant helix and variable pitch and are optimized for a wide range of materials.

▲ Cutting edges with irregular pitch

P556 | UN | α ≠ β | λ_s=38° γ_s=07° | HPC







DC +0.000/-0.002 inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 006 ...	59 006 ...	59 006 ...	59 006 ...
1/8	1/4	1 1/2	1/8	5	12520			
1/8	1/2	1 1/2	1/8	5		12540		
3/16	5/16	2	3/16	5	18817			
3/16	5/8	2 1/2	3/16	5		18833		
1/4	3/8	2	1/4	5	25015			
1/4	1/2	2 1/2	1/4	5		25020		
1/4	3/4	2 1/2	1/4	5			25030	
1/4	1	3	1/4	5				25040
1/4	1 1/4	3	1/4	5				25050
5/16	1/2	2	5/16	5		31316		
5/16	3/4	2 1/2	5/16	5			31324	
5/16	1 1/4	3	5/16	5				31340
3/8	1/2	2	3/8	5	37513			
3/8	1	3	3/8	5		37527		
3/8	1 1/4	3	3/8	5			37533	
3/8	1 1/2	3 1/2	3/8	5				37540
7/16	1	2 3/4	7/16	5				43823
7/16	2	4	7/16	5				43846
1/2	5/8	2 1/2	1/2	5	50013			
1/2	1	3	1/2	5		50020		
1/2	1 1/4	3	1/2	5			50025	
1/2	1 5/8	4	1/2	5				50033
1/2	2	4	1/2	5				50040
5/8	3/4	3	5/8	5	62512			
5/8	1 1/4	3 1/2	5/8	5		62520		
5/8	1 5/8	3 1/2	5/8	5			62526	
5/8	2 1/4	4	5/8	5				62536
5/8	2 1/2	5	5/8	5				62540
3/4	1	3	3/4	5	75013			
3/4	1 5/8	4	3/4	5		75022		
3/4	2 1/4	5	3/4	5			75030	
3/4	2 3/4	5	3/4	5				75037
3/4	3 1/4	6	3/4	5				75043
1	1 1/4	4	1	5	99913			
1	2	4 1/2	1	5		99920		
1	2 5/8	5	1	5			99926	
1	3 1/4	6	1	5				99933
1	4 1/4	7	1	5				99943
1 1/4	2	4 1/2	1 1/4	5				93316
1 1/4	3 3/8	6	1 1/4	5				93327
1 1/4	4 3/4	8	1 1/4	5				93338
P					●	●	●	●
M					●	●	●	●
K					●	●	●	●
N								
S					●	●	●	●
H								
O								

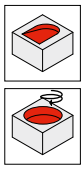
→ v_c/f_z Page 121

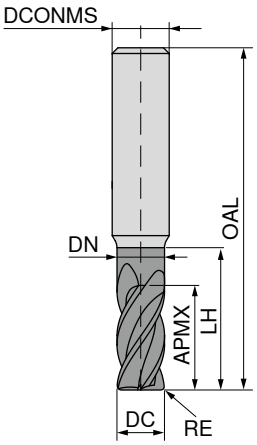
OptiLine – End milling cutter with corner radius

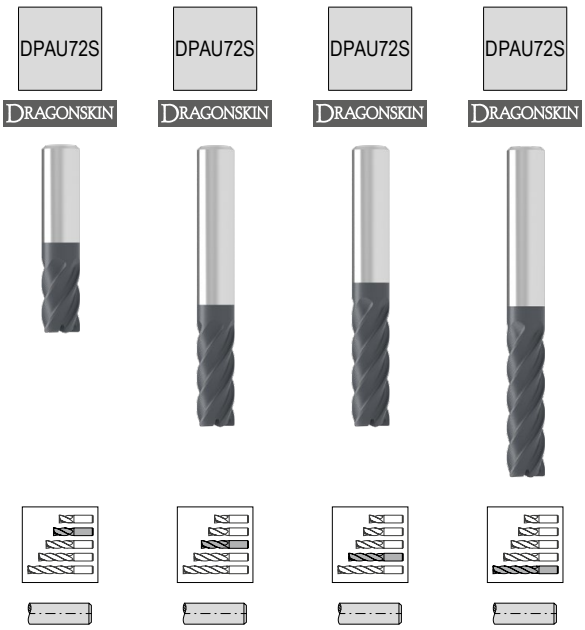
End mills for universal machining that feature a constant helix and variable pitch and are optimized for a wide range of materials.

▲ Cutting edges with irregular pitch
▲ Radius accuracy: +/- 0.001 for Ø ≤ 0.060
+/- 0.0015 for Ø > 0.060

P556 | UN | α ≠ β | λ_s=38° γ_s=07° | HPC







DC +0.000/-0.002 inch	RE inch	DN inch	LH inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 006 ...	59 006 ...	59 006 ...	59 006 ...
1/8	0.010	0.118	0.375	0.156	3	1/8	5	92112			
1/8	0.010	0.118	0.500	0.156	3	1/8	5		92212		
1/8	0.010	0.118	0.625	0.156	3	1/8	5			92312	
1/8	0.010			1/4	1 1/2	1/8	5	92120			
1/8	0.030			1/4	1 1/2	1/8	5	92220			
1/8	0.010			1/2	1 1/2	1/8	5		92140		
1/8	0.030			1/2	1 1/2	1/8	5		92240		
3/16	0.010	0.178	0.500	0.219	3	3/16	5		92412		
3/16	0.010			0.219	3	3/16	5	92612			
3/16	0.010	0.178	0.750	0.219	3	3/16	5			92512	
3/16	0.010			5/16	2	3/16	5	92117			
3/16	0.030			5/16	2	3/16	5	92217			
3/16	0.010			5/8	2 1/2	3/16	5			92133	
3/16	0.030			5/8	2 1/2	3/16	5			92233	
1/4	0.015			3/8	2	1/4	5	90015			
1/4	0.030			3/8	2	1/4	5	90115			
1/4	0.060			3/8	2	1/4	5	90215			
1/4	0.020	0.237	0.750	3/8	3	1/4	5			92115	
1/4	0.020	0.237	1.125	3/8	4	1/4	5				92215
1/4	0.020	0.237	1.625	3/8	4	1/4	5				92315
1/4	0.020	0.237	2.125	3/8	4	1/4	5				92415
1/4	0.015			1/2	2 1/2	1/4	5		90020		
1/4	0.030			1/2	2 1/2	1/4	5		90120		
1/4	0.060			1/2	2 1/2	1/4	5		90220		
1/4	0.015			3/4	2 1/2	1/4	5			90030	
1/4	0.030			3/4	2 1/2	1/4	5			90130	
1/4	0.060			3/4	2 1/2	1/4	5			90230	
1/4	0.015			1	3	1/4	5				90040
1/4	0.030			1	3	1/4	5				90140
1/4	0.060			1	3	1/4	5				90240
1/4	0.015			1 1/4	3	1/4	5				90050
1/4	0.030			1 1/4	3	1/4	5				90150
1/4	0.060			1 1/4	3	1/4	5				90250
5/16	0.020			1/2	2	5/16	5		92116		
5/16	0.030			1/2	2	5/16	5		92216		
5/16	0.060			1/2	2	5/16	5		92316		
5/16	0.020			3/4	2 1/2	5/16	5			92124	
5/16	0.030			3/4	2 1/2	5/16	5			92224	
5/16	0.060			3/4	2 1/2	5/16	5			92324	
P								●	●	●	●
M								●	●	●	●
K								●	●	●	●
N											
S								●	●	●	●
H											
O											

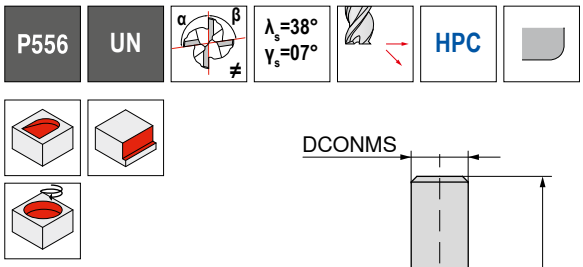
→ v_c/f_z Page 121

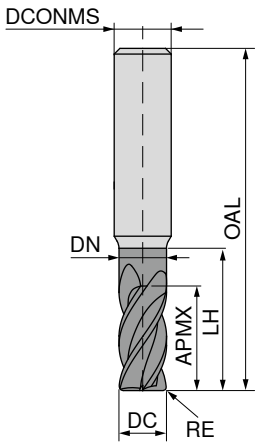
Continued on next page

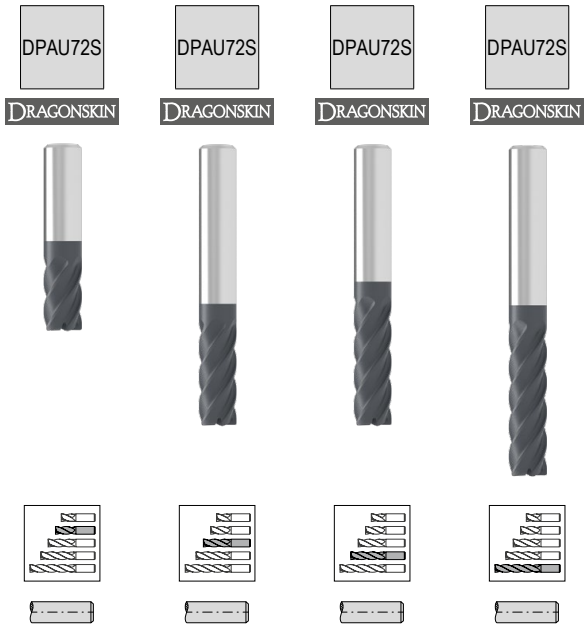
OptiLine – End milling cutter with corner radius

End mills for universal machining that feature a constant helix and variable pitch and are optimized for a wide range of materials.

▲ Cutting edges with irregular pitch
▲ Radius accuracy: +/- 0.001 for Ø ≤ 0.060
+/- 0.0015 for Ø > 0.060







DC +0.000/-0.002 inch	RE inch	DN inch	LH inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 006 ...	59 006 ...	59 006 ...	59 006 ...
5/16	0.020			1 1/4	3	5/16	5				92340
5/16	0.030			1 1/4	3	5/16	5				92440
5/16	0.060			1 1/4	3	5/16	5				92540
3/8	0.015			1/2	2	3/8	5	90013			
3/8	0.030			1/2	2	3/8	5	90113			
3/8	0.060			1/2	2	3/8	5	90213			
3/8	0.090			1/2	2	3/8	5	90313			
3/8	0.030	0.356	1.125	1/2	4	3/8	5				92113
3/8	0.030	0.356	2.125	1/2	4	3/8	5				92213
3/8	0.030	0.356	3.125	1/2	6	3/8	5				92313
3/8	0.030	0.356	4.125	1/2	6	3/8	5				92413
3/8	0.015			1	3	3/8	5		90027		
3/8	0.030			1	3	3/8	5		90127		
3/8	0.060			1	3	3/8	5		90227		
3/8	0.090			1	3	3/8	5		90327		
3/8	0.015			1 1/4	3	3/8	5			90033	
3/8	0.030			1 1/4	3	3/8	5			90133	
3/8	0.060			1 1/4	3	3/8	5			90233	
3/8	0.090			1 1/4	3	3/8	5			90333	
3/8	0.015			1 1/2	3 1/2	3/8	5				90340
3/8	0.030			1 1/2	3 1/2	3/8	5				90440
3/8	0.060			1 1/2	3 1/2	3/8	5				90540
3/8	0.090			1 1/2	3 1/2	3/8	5				90640
1/2	0.015			5/8	2 1/2	1/2	5	90413			
1/2	0.030			5/8	2 1/2	1/2	5	90513			
1/2	0.060			5/8	2 1/2	1/2	5	90613			
1/2	0.090			5/8	2 1/2	1/2	5	90713			
1/2	0.125			5/8	2 1/2	1/2	5	90813			
1/2	0.030	0.475	1.500	5/8	4	1/2	5				92513
1/2	0.030	0.475	2.250	5/8	4	1/2	5				92613
1/2	0.030	0.475	3.375	5/8	6	1/2	5				92713
1/2	0.030	0.475	4.125	5/8	6	1/2	5				92813
1/2	0.015			1	3	1/2	5		90320		
1/2	0.030			1	3	1/2	5		90420		
1/2	0.060			1	3	1/2	5		90520		
1/2	0.090			1	3	1/2	5		90620		
1/2	0.125			1	3	1/2	5		90720		
1/2	0.015			1 1/4	3	1/2	5			90025	
1/2	0.030			1 1/4	3	1/2	5			90125	
1/2	0.060			1 1/4	3	1/2	5			90225	
P								●	●	●	●
M								●	●	●	●
K								●	●	●	●
N											
S								●	●	●	●
H											
O											

→ v_c/f_z Page 121

14

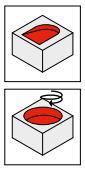
Continued on next page

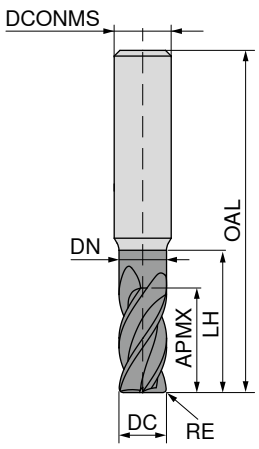
OptiLine – End milling cutter with corner radius

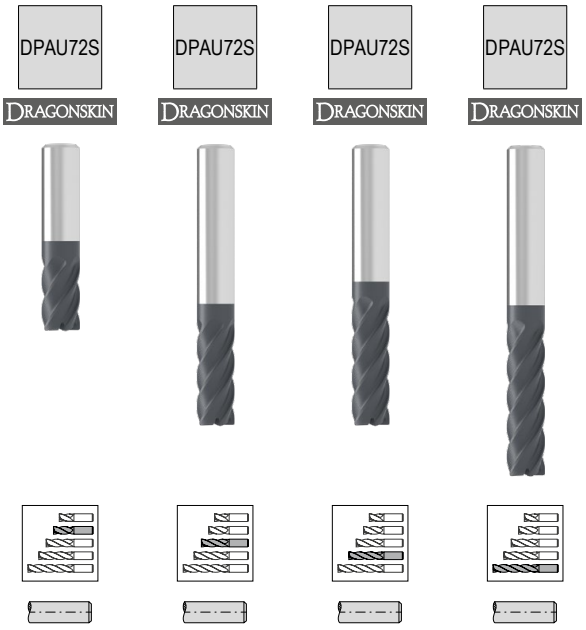
End mills for universal machining that feature a constant helix and variable pitch and are optimized for a wide range of materials.

▲ Cutting edges with irregular pitch
▲ Radius accuracy: +/- 0.001 for Ø ≤ 0.060
+/- 0.0015 for Ø > 0.060

P556 | UN | α β ≠ | λ_s=38° γ_s=07° | HPC







DC +0.000/-0.002 inch	RE inch	DN inch	LH inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 006 ...	59 006 ...	59 006 ...	59 006 ...
1/2	0.090			1 1/4	3	1/2	5			90325	
1/2	0.125			1 1/4	3	1/2	5			90425	
1/2	0.015			1 5/8	4	1/2	5				90433
1/2	0.030			1 5/8	4	1/2	5				90533
1/2	0.060			1 5/8	4	1/2	5				90633
1/2	0.090			1 5/8	4	1/2	5				90733
1/2	0.125			1 5/8	4	1/2	5				90833
1/2	0.015			2	4	1/2	5				90740
1/2	0.030			2	4	1/2	5				90840
1/2	0.060			2	4	1/2	5				90940
1/2	0.090			2	4	1/2	5				91040
1/2	0.125			2	4	1/2	5				91140
5/8	0.030			3/4	3	5/8	5	90012			
5/8	0.060			3/4	3	5/8	5	90112			
5/8	0.090			3/4	3	5/8	5	90212			
5/8	0.125			3/4	3	5/8	5	90312			
5/8	0.030	0.593	1.625	3/4	4	5/8	5				92712
5/8	0.030	0.593	2.375	3/4	6	5/8	5				92812
5/8	0.030	0.593	3.375	3/4	6	5/8	5				92912
5/8	0.030	0.593	4.125	3/4	6	5/8	5				93012
5/8	0.030			1 1/4	3 1/2	5/8	5		90820		
5/8	0.060			1 1/4	3 1/2	5/8	5		90920		
5/8	0.090			1 1/4	3 1/2	5/8	5		91020		
5/8	0.125			1 1/4	3 1/2	5/8	5		91120		
5/8	0.030			1 5/8	3 1/2	5/8	5			90026	
5/8	0.060			1 5/8	3 1/2	5/8	5			90126	
5/8	0.090			1 5/8	3 1/2	5/8	5			90226	
5/8	0.125			1 5/8	3 1/2	5/8	5			90326	
5/8	0.030			2 1/4	4	5/8	5				90036
5/8	0.060			2 1/4	4	5/8	5				90136
5/8	0.090			2 1/4	4	5/8	5				90236
5/8	0.125			2 1/4	4	5/8	5				90336
5/8	0.030			2 1/2	5	5/8	5				91240
5/8	0.060			2 1/2	5	5/8	5				91340
5/8	0.090			2 1/2	5	5/8	5				91440
5/8	0.125			2 1/2	5	5/8	5				91540
3/4	0.030			1	3	3/4	5	90913			
3/4	0.060			1	3	3/4	5	91013			
3/4	0.090			1	3	3/4	5	91113			
3/4	0.125			1	3	3/4	5	91213			
P								●	●	●	●
M								●	●	●	●
K								●	●	●	●
N											
S								●	●	●	●
H											
O											

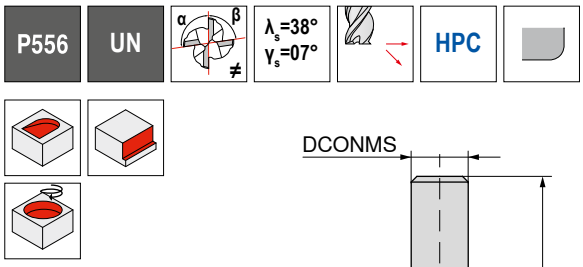
→ v_c/f_z Page 121

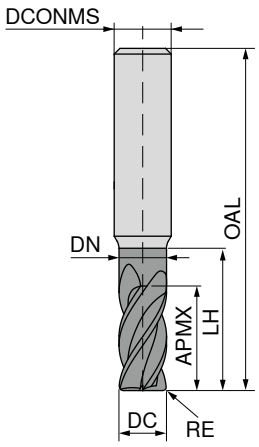
Continued on next page

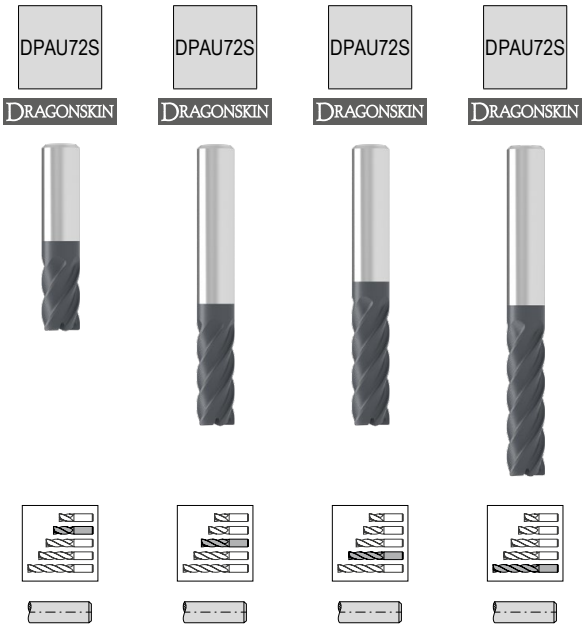
OptiLine – End milling cutter with corner radius

End mills for universal machining that feature a constant helix and variable pitch and are optimized for a wide range of materials.

▲ Cutting edges with irregular pitch
▲ Radius accuracy: +/- 0.001 for Ø ≤ 0.060
+/- 0.0015 for Ø > 0.060







DC +0.000/-0.002 inch	RE inch	DN inch	LH inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 006 ...	59 006 ...	59 006 ...	59 006 ...
3/4	0.190			1	3	3/4	5	91313			
3/4	0.250			1	3	3/4	5	91413			
3/4	0.030			1	4	3/4	5				92913
3/4	0.030	0.712	2.500	1	6	3/4	5				93013
3/4	0.030	0.712	3.375	1	6	3/4	5				93113
3/4	0.030	0.712	4.125	1	6	3/4	5				93213
3/4	0.030			1 5/8	4	3/4	5		90022		
3/4	0.060			1 5/8	4	3/4	5		90122		
3/4	0.090			1 5/8	4	3/4	5		90222		
3/4	0.125			1 5/8	4	3/4	5		90322		
3/4	0.190			1 5/8	4	3/4	5		90422		
3/4	0.250			1 5/8	4	3/4	5		90522		
3/4	0.030			2 1/4	5	3/4	5			90330	
3/4	0.060			2 1/4	5	3/4	5			90430	
3/4	0.090			2 1/4	5	3/4	5			90530	
3/4	0.125			2 1/4	5	3/4	5			90630	
3/4	0.190			2 1/4	5	3/4	5			90730	
3/4	0.250			2 1/4	5	3/4	5			90830	
3/4	0.030			2 3/4	5	3/4	5				90037
3/4	0.060			2 3/4	5	3/4	5				90137
3/4	0.090			2 3/4	5	3/4	5				90237
3/4	0.125			2 3/4	5	3/4	5				90337
3/4	0.190			2 3/4	5	3/4	5				90437
3/4	0.250			2 3/4	5	3/4	5				90537
3/4	0.030			3 1/4	6	3/4	5				90043
3/4	0.060			3 1/4	6	3/4	5				90143
3/4	0.090			3 1/4	6	3/4	5				90243
3/4	0.125			3 1/4	6	3/4	5				90343
3/4	0.190			3 1/4	6	3/4	5				90443
3/4	0.250			3 1/4	6	3/4	5				90543
1	0.030	0.950	2.250	1 1/4	4	1	5				99923
1	0.030			1 1/4	4	1	5	91513			
1	0.060			1 1/4	4	1	5	91613			
1	0.090			1 1/4	4	1	5	91713			
1	0.125			1 1/4	4	1	5	91813			
1	0.190			1 1/4	4	1	5	91913			
1	0.250			1 1/4	4	1	5	92013			
1	0.030	0.950	2.625	1 1/4	6	1	5				99927
1	0.030	0.950	3.375	1 1/4	6	1	5				99934
1	0.030	0.950	4.125	1 1/4	6	1	5				99941
P								●	●	●	●
M								●	●	●	●
K								●	●	●	●
N											
S								●	●	●	●
H											
O											

→ v_c/f_z Page 121

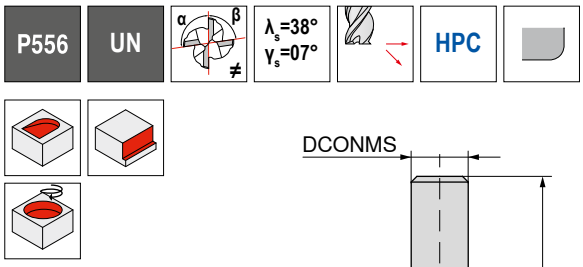
14

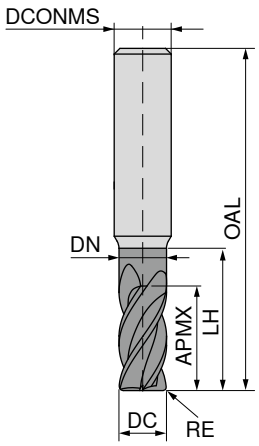
Continued on next page

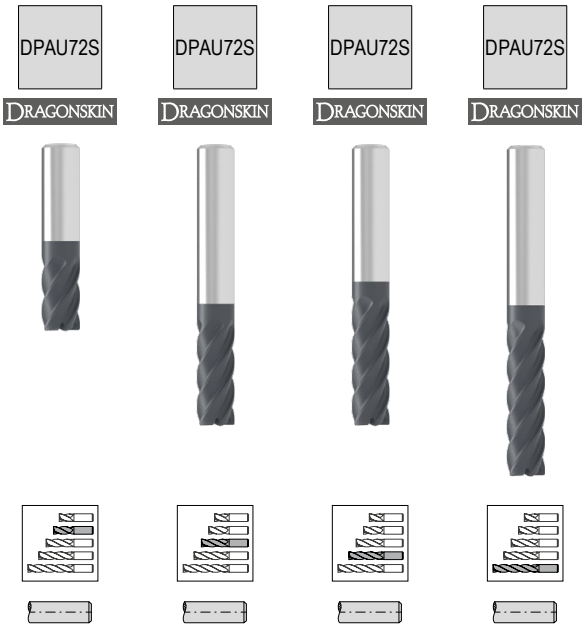
OptiLine – End milling cutter with corner radius

End mills for universal machining that feature a constant helix and variable pitch and are optimized for a wide range of materials.

▲ Cutting edges with irregular pitch
▲ Radius accuracy: +/- 0.001 for Ø ≤ 0.060
+/- 0.0015 for Ø > 0.060







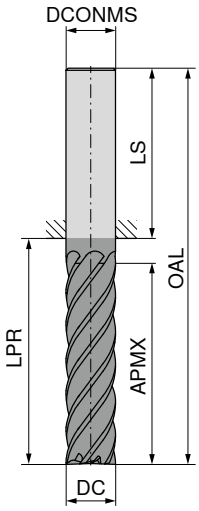
DC +0.000/-0.002 inch	RE inch	DN inch	LH inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 006 ...	59 006 ...	59 006 ...	59 006 ...
1	0.030			2	4 1/2	1	5		91220		
1	0.060			2	4 1/2	1	5		91320		
1	0.090			2	4 1/2	1	5		91420		
1	0.125			2	4 1/2	1	5		91520		
1	0.190			2	4 1/2	1	5		91620		
1	0.250			2	4 1/2	1	5		91720		
1	0.030			2 5/8	5	1	5			90426	
1	0.060			2 5/8	5	1	5			90526	
1	0.090			2 5/8	5	1	5			90626	
1	0.125			2 5/8	5	1	5			90726	
1	0.190			2 5/8	5	1	5			90826	
1	0.250			2 5/8	5	1	5			90926	
1	0.030			3 1/4	6	1	5				90933
1	0.060			3 1/4	6	1	5				91033
1	0.090			3 1/4	6	1	5				91133
1	0.125			3 1/4	6	1	5				91233
1	0.190			3 1/4	6	1	5				91333
1	0.250			3 1/4	6	1	5				91433
1	0.030			4 1/4	7	1	5				90643
1	0.060			4 1/4	7	1	5				90743
1	0.090			4 1/4	7	1	5				90843
1	0.125			4 1/4	7	1	5				90943
1	0.190			4 1/4	7	1	5				91043
1	0.250			4 1/4	7	1	5				91143
1 1/4	0.030			2	4 1/2	1 1/4	5				93416
1 1/4	0.030			3 3/8	6	1 1/4	5				93427
1 1/4	0.030			4 3/4	8	1 1/4	5				93438
P								●	●	●	●
M								●	●	●	●
K								●	●	●	●
N											
S								●	●	●	●
H											
O											

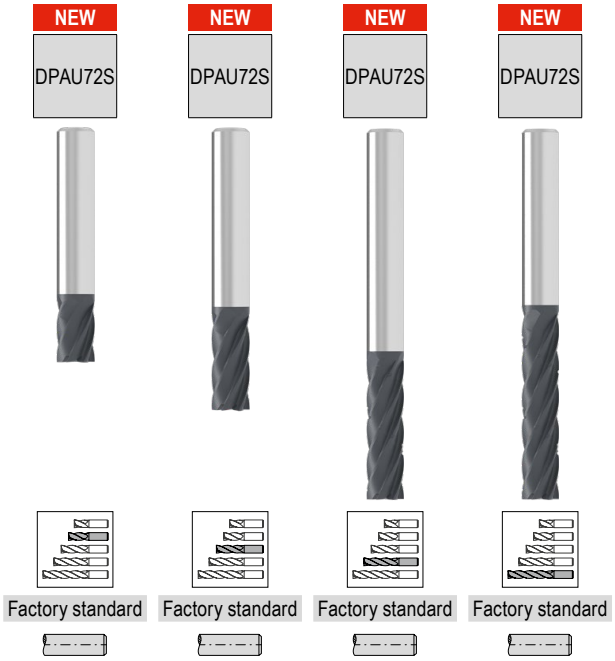
→ v_c/f_z Page 121

OptiLine – End milling cutter

End mills that feature an ultra-high fracture toughness, ensuring durability and stability and are optimized for trochoidal milling and other machining strategies in heat-resistant super alloys or titanium alloys.

P166 | UN | α β ≠ | λ_s var. | HPC





Factory standard | Factory standard | Factory standard | Factory standard

DC +.000/-.002 inch	APMX inch	LPR inch	LS inch	OAL inch	DCONMS -.0001 / -.0004 inch	ZEFP	59 082 ...	59 082 ...	59 082 ...	59 082 ...
1/4	3/8	0.583	1.417	2	1/4	6	**25015**			
1/4	1/2	1.083	1.417	2 1/2	1/4	6		**25020**		
1/4	3/4	1.083	1.417	2 1/2	1/4	6			**25030**	
1/4	1 1/4	1.583	1.417	3	1/4	6				**25050**
5/16	3/4	1.083	1.417	2 1/2	5/16	6		**31324**		
5/16	1	1.583	1.417	3	5/16	6			**31332**	
3/8	1/2	0.825	1.175	2	3/8	6	**37513**			
3/8	1	1.083	1.417	2 1/2	3/8	6		**37527**		
3/8	1 1/4	1.583	1.417	3	3/8	6			**37533**	
3/8	1 1/2	1.925	1.575	3 1/2	3/8	6				**37540**
1/2	5/8	0.735	1.765	2 1/2	1/2	6	**50013**			
1/2	1	1.235	1.765	3	1/2	6		**50020**		
1/2	1 1/4	1.425	1.575	3	1/2	6			**50025**	
1/2	1 1/2	1.625	2.375	4	1/2	6			**50030**	
1/2	2	2.235	1.765	4	1/2	6				**50040**
5/8	3/4	1.110	1.890	3	5/8	6	**62512**			
5/8	1 1/4	1.613	1.888	3 1/2	5/8	6		**62520**		
5/8	1 5/8	2.228	1.772	4	5/8	6			**62526**	
5/8	2	3.032	1.969	5	5/8	6				**62532**
3/4	1	1.228	1.773	3	3/4	6	**75013**			
3/4	1 1/4	2.032	1.969	4	3/4	6		**75017**		
3/4	1 5/8	3.032	1.969	5	3/4	6			**75022**	
3/4	2 1/4	3.032	1.969	5	3/4	6			**75030**	
3/4	3 1/4	4.032	1.969	6	3/4	6				**75043**
1	2	2.295	2.205	4 1/2	1	6	**99920**			
1	2 1/2	3.032	1.969	5	1	6		**99925**		
1	3 1/4	3.795	2.205	6	1	6			**99933**	
P							●	●	●	●
M							●	●	●	●
K							●	●	●	●
N										
S							●	●	●	●
H										
O										

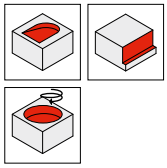
→ v_c/f_z Page 135

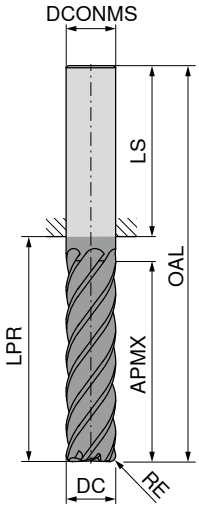
OptiLine – End milling cutter with corner radius

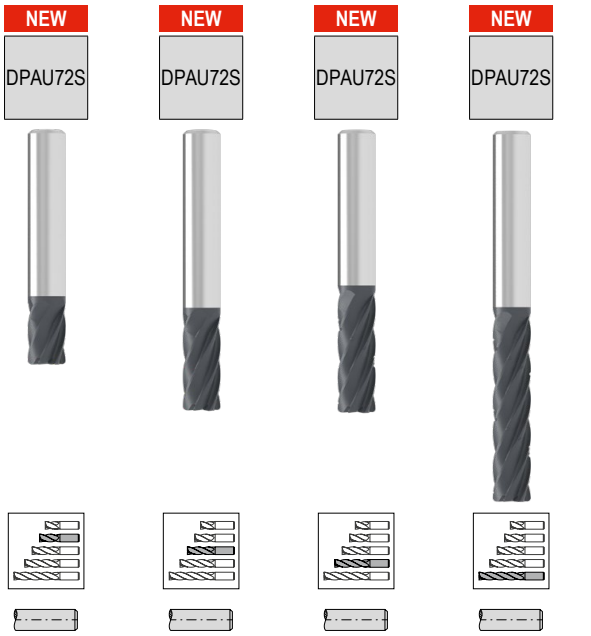
End mills that feature an ultra-high fracture toughness, ensuring durability and stability and are optimized for trochoidal milling and other machining strategies in heat-resistant super alloys or titanium alloys.

▲ Radius accuracy: +/- 0.001 for Ø ≤ 0.060 / +/- 0.0015 for Ø > 0.060

P166 | UN | α β ≠ | λ_s var. | HPC







DC +.000/-.002 inch	RE inch	APMX inch	LPR inch	LS inch	OAL inch	DCONMS -.0001 / -.0004 inch	ZEFP	59 083 ...	59 083 ...	59 083 ...	59 083 ...
1/4	0.015	3/8	0.583	1.417	2	1/4	6	90015			
1/4	0.030	3/8	0.583	1.417	2	1/4	6	90115			
1/4	0.015	1/2	1.083	1.417	2 1/2	1/4	6		90020		
1/4	0.030	1/2	1.083	1.417	2 1/2	1/4	6		90220		
1/4	0.015	3/4	1.083	1.417	2 1/2	1/4	6			90030	
1/4	0.030	3/4	1.083	1.417	2 1/2	1/4	6			90230	
1/4	0.015	1 1/4	1.583	1.417	3	1/4	6				90050
1/4	0.030	1 1/4	1.583	1.417	3	1/4	6				90150
5/16	0.015	3/4	1.083	1.417	2 1/2	5/16	6	90024			
5/16	0.030	3/4	1.083	1.417	2 1/2	5/16	6	90124			
5/16	0.015	1	1.583	1.417	3	5/16	6		90032		
5/16	0.030	1	1.583	1.417	3	5/16	6		90132		
5/16	0.060	1	1.583	1.417	3	5/16	6		90332		
3/8	0.015	1/2	0.825	1.175	2	3/8	6	90013			
3/8	0.030	1/2	0.825	1.175	2	3/8	6	90213			
3/8	0.060	1/2	0.825	1.175	2	3/8	6	90513			
3/8	0.015	1	1.083	1.417	2 1/2	3/8	6		90027		
3/8	0.030	1	1.083	1.417	2 1/2	3/8	6		90127		
3/8	0.060	1	1.083	1.417	2 1/2	3/8	6		90227		
3/8	0.015	1 1/4	1.583	1.417	3	3/8	6			90033	
3/8	0.030	1 1/4	1.583	1.417	3	3/8	6			90133	
3/8	0.060	1 1/4	1.583	1.417	3	3/8	6			90333	
3/8	0.015	1 1/2	1.925	1.575	3 1/2	3/8	6				90040
3/8	0.030	1 1/2	1.925	1.575	3 1/2	3/8	6				90240
3/8	0.060	1 1/2	1.925	1.575	3 1/2	3/8	6				90440
1/2	0.015	5/8	0.728	1.772	2 1/2	1/2	6	90113			
1/2	0.030	5/8	0.728	1.772	2 1/2	1/2	6	90313			
1/2	0.060	5/8	0.728	1.772	2 1/2	1/2	6	90613			
1/2	0.090	5/8	0.728	1.772	2 1/2	1/2	6	90813			
1/2	0.120	5/8	0.735	1.765	2 1/2	1/2	6	91013			
1/2	0.015	1	1.228	1.772	3	1/2	6		90120		
1/2	0.030	1	1.228	1.772	3	1/2	6		90320		
1/2	0.060	1	1.228	1.772	3	1/2	6		90620		
1/2	0.090	1	1.228	1.772	3	1/2	6		90920		
1/2	0.120	1	1.228	1.772	3	1/2	6		91320		
1/2	0.015	1 1/4	1.425	1.575	3	1/2	6			90025	
1/2	0.030	1 1/4	1.425	1.575	3	1/2	6		90125		
1/2	0.060	1 1/4	1.425	1.575	3	1/2	6			90325	
1/2	0.090	1 1/4	1.425	1.575	3	1/2	6			90525	
1/2	0.120	1 1/4	1.425	1.575	3	1/2	6			90725	
1/2	0.015	1 1/2	1.625	2.375	4	1/2	6				90130

P	●	●	●	●
M	●	●	●	●
K	●	●	●	●
N				
S	●	●	●	●
H				
O				

→ v_c/f_z Page 135

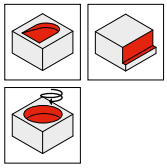
Continued on next page

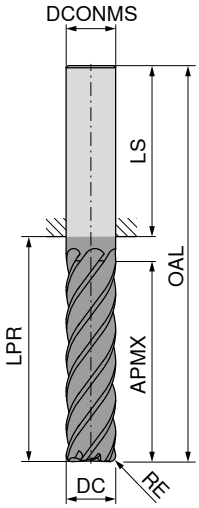
OptiLine – End milling cutter with corner radius

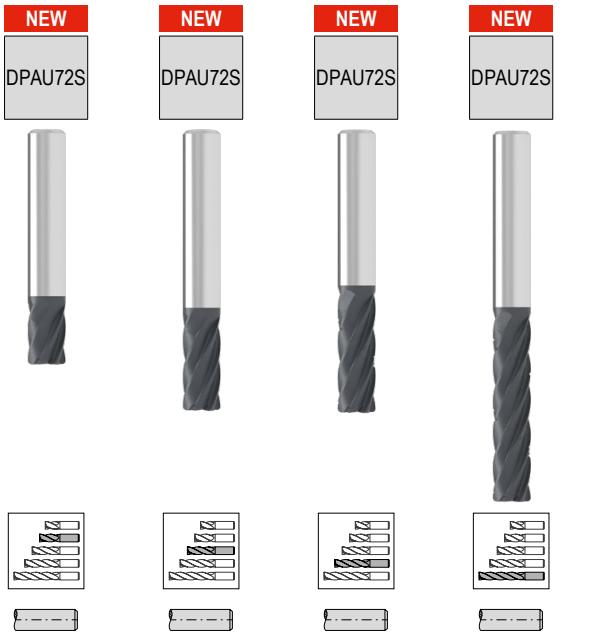
End mills that feature an ultra-high fracture toughness, ensuring durability and stability and are optimized for trochoidal milling and other machining strategies in heat-resistant super alloys or titanium alloys.

▲ Radius accuracy: +/- 0.001 for Ø ≤ 0.060 / +/- 0.0015 for Ø > 0.060

P166 | UN | α β ≠ | λ_s var. | HPC







DC +.000/-.002 inch	RE inch	APMX inch	LPR inch	LS inch	OAL inch	DCONMS -.0001 / -.0004 inch	ZEFP	59 083 ...		59 083 ...		59 083 ...		59 083 ...	
1/2	0.030	1 1/2	1.625	2.375	4	1/2	6								90330
1/2	0.060	1 1/2	1.625	2.375	4	1/2	6								90530
1/2	0.090	1 1/2	1.625	2.375	4	1/2	6								90730
1/2	0.120	1 1/2	1.625	2.375	4	1/2	6								90930
1/2	0.015	2	2.228	1.772	4	1/2	6								90140
1/2	0.030	2	2.228	1.772	4	1/2	6								90340
1/2	0.060	2	2.228	1.772	4	1/2	6								90540
1/2	0.090	2	2.228	1.772	4	1/2	6								90640
1/2	0.120	2	2.228	1.772	4	1/2	6								90740
5/8	0.030	3/4	1.122	1.890	3	5/8	6	90012							
5/8	0.060	3/4	1.122	1.890	3	5/8	6	90112							
5/8	0.090	3/4	1.122	1.890	3	5/8	6	90212							
5/8	0.120	3/4	1.110	1.890	3	5/8	6	90312							
5/8	0.030	1 1/4	1.610	1.890	3 1/2	5/8	6			90420					
5/8	0.060	1 1/4	1.610	1.890	3 1/2	5/8	6			90720					
5/8	0.090	1 1/4	1.610	1.890	3 1/2	5/8	6			91020					
5/8	0.120	1 1/4	1.610	1.890	3 1/2	5/8	6			91420					
5/8	0.030	1 5/8	2.228	1.772	4	5/8	6					90026			
5/8	0.060	1 5/8	2.228	1.772	4	5/8	6					90126			
5/8	0.090	1 5/8	2.228	1.772	4	5/8	6					90226			
5/8	0.120	1 5/8	2.228	1.772	4	5/8	6					90326			
5/8	0.030	2	3.032	1.969	5	5/8	6								90232
5/8	0.060	2	3.032	1.969	5	5/8	6								90432
5/8	0.090	2	3.032	1.969	5	5/8	6								90532
5/8	0.120	2	3.032	1.969	5	5/8	6								90632
3/4	0.030	1	1.228	1.773	3	3/4	6	90413							
3/4	0.060	1	1.228	1.773	3	3/4	6	90713							
3/4	0.090	1	1.228	1.773	3	3/4	6	90913							
3/4	0.120	1	1.228	1.773	3	3/4	6	91113							
3/4	0.160	1	1.228	1.773	3	3/4	6	91213							
3/4	0.190	1	1.228	1.773	3	3/4	6	91313							
3/4	0.250	1	1.228	1.773	3	3/4	6	91413							
3/4	0.030	1 1/4	2.032	1.969	4	3/4	6			90017					
3/4	0.060	1 1/4	2.032	1.969	4	3/4	6			90117					
3/4	0.090	1 1/4	2.032	1.969	4	3/4	6			90217					
3/4	0.120	1 1/4	2.032	1.969	4	3/4	6			90317					
3/4	0.160	1 1/4	2.032	1.969	4	3/4	6			90417					
3/4	0.190	1 1/4	2.032	1.969	4	3/4	6			90517					
3/4	0.250	1 1/4	2.032	1.969	4	3/4	6			90617					
3/4	0.030	1 5/8	3.032	1.969	5	3/4	6					90022			
3/4	0.060	1 5/8	3.032	1.969	5	3/4	6					90122			

P	●	●	●	●
M	●	●	●	●
K	●	●	●	●
N				
S	●	●	●	●
H				
O				

→ v_c/f_z Page 135

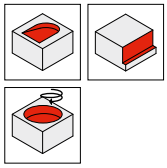
Continued on next page

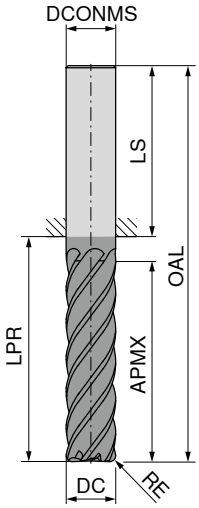
OptiLine – End milling cutter with corner radius

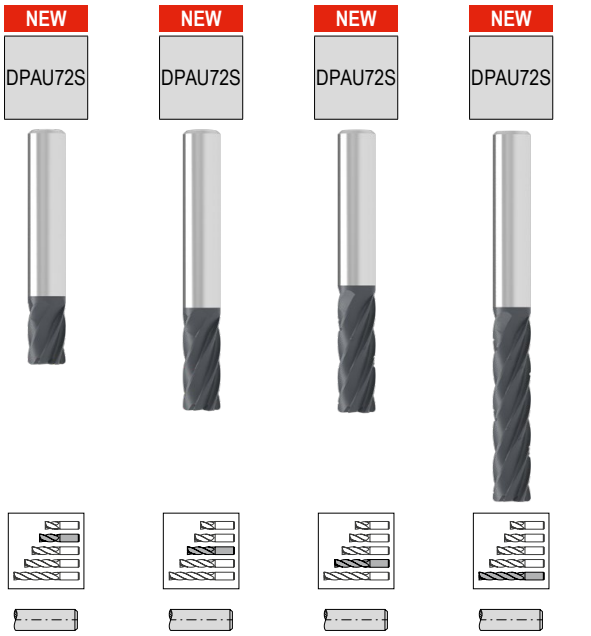
End mills that feature an ultra-high fracture toughness, ensuring durability and stability and are optimized for trochoidal milling and other machining strategies in heat-resistant super alloys or titanium alloys.

▲ Radius accuracy: +/- 0.001 for Ø ≤ 0.060 / +/- 0.0015 for Ø > 0.060

P166 | UN | α β ≠ | λ_s var. | HPC







DC +.000/-.002 inch	RE inch	APMX inch	LPR inch	LS inch	OAL inch	DCONMS -.0001 / -.0004 inch	ZEFP	59 083 ...		59 083 ...		59 083 ...		59 083 ...	
3/4	0.090	1 5/8	3.032	1.969	5	3/4	6						90222		
3/4	0.120	1 5/8	3.032	1.969	5	3/4	6						90322		
3/4	0.160	1 5/8	3.032	1.969	5	3/4	6						90422		
3/4	0.190	1 5/8	3.032	1.969	5	3/4	6						90522		
3/4	0.250	1 5/8	3.032	1.969	5	3/4	6						90622		
3/4	0.030	2 1/4	3.032	1.969	5	3/4	6								90430
3/4	0.060	2 1/4	3.032	1.969	5	3/4	6								90630
3/4	0.090	2 1/4	3.032	1.969	5	3/4	6								90830
3/4	0.120	2 1/4	3.032	1.969	5	3/4	6								91030
3/4	0.160	2 1/4	3.032	1.969	5	3/4	6								91130
3/4	0.190	2 1/4	3.032	1.969	5	3/4	6								91230
3/4	0.250	2 1/4	3.032	1.969	5	3/4	6								91330
3/4	0.030	3 1/4	4.032	1.969	6	3/4	6								90043
3/4	0.060	3 1/4	4.032	1.969	6	3/4	6								90143
3/4	0.090	3 1/4	4.032	1.969	6	3/4	6								90243
3/4	0.120	3 1/4	4.032	1.969	6	3/4	6								90343
3/4	0.160	3 1/4	4.032	1.969	6	3/4	6								90443
3/4	0.190	3 1/4	4.032	1.969	6	3/4	6								90543
3/4	0.250	3 1/4	4.032	1.969	6	3/4	6								90643
1	0.030	2	2.295	2.205	4 1/2	1	6				90520				
1	0.060	2	2.295	2.205	4 1/2	1	6				90820				
1	0.090	2	2.295	2.205	4 1/2	1	6				91220				
1	0.120	2	2.295	2.205	4 1/2	1	6				91520				
1	0.160	2	2.295	2.205	4 1/2	1	6				91620				
1	0.190	2	2.295	2.205	4 1/2	1	6				91720				
1	0.250	2	2.295	2.205	4 1/2	1	6				91820				
1	0.030	2 1/2	3.032	1.969	5	1	6						90225		
1	0.060	2 1/2	3.032	1.969	5	1	6						90425		
1	0.090	2 1/2	3.032	1.969	5	1	6						90625		
1	0.120	2 1/2	3.032	1.969	5	1	6						90825		
1	0.160	2 1/2	3.032	1.969	5	1	6						90925		
1	0.190	2 1/2	3.032	1.969	5	1	6						91025		
1	0.250	2 1/2	3.032	1.969	5	1	6						91125		
1	0.030	3 1/4	3.795	2.205	6	1	6								90233
1	0.060	3 1/4	3.795	2.205	6	1	6								90433
1	0.090	3 1/4	3.795	2.205	6	1	6								90533
1	0.120	3 1/4	3.795	2.205	6	1	6								90633
1	0.160	3 1/4	3.795	2.205	6	1	6								90733
1	0.190	3 1/4	3.795	2.205	6	1	6								90833
1	0.250	3 1/4	3.795	2.205	6	1	6								90933

P	●	●	●	●
M	●	●	●	●
K	●	●	●	●
N				
S	●	●	●	●
H				
O				

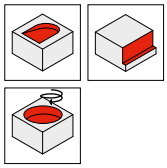
→ v_c/f_z Page 135

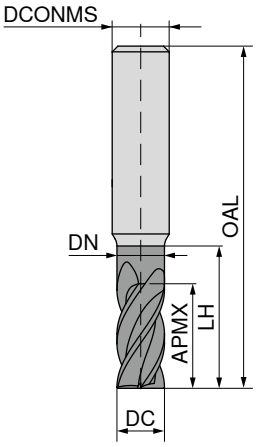
OptiLine – End milling cutter

End mills that offer maximum metal removal and are optimized for high efficiency machining (HEM) and light finishing.

▲ Cutting edges with irregular pitch

P160 | UN | λ_s=38° γ_s=10° | HPC





DC +0.000/-0.002 inch	APMX inch	DN inch	LH inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 057 ...	59 057 ...	59 057 ...
1/4	3/8			2	1/4	7	**25015**		
1/4	1/2			2	1/4	7	**25020**		
1/4	3/4			2 1/2	1/4	7	**25030**		
3/8	1/2			2	3/8	7	**37613**		
3/8	7/8			2 1/2	3/8	7	**37523**		
3/8	1 1/4			3	3/8	7		**37533**	
3/8	1/2	0.360	3 1/8	6	3/8	7			**37513**
1/2	5/8			2 1/2	1/2	7	**50113**		
1/2	1			3	1/2	7	**50020**		
1/2	1 1/4			3	1/2	7	**50025**		
1/2	1 5/8			4	1/2	7		**50033**	
1/2	5/8	0.480	3 1/8	6	1/2	7			**50013**
5/8	3/4			3	5/8	7	**62612**		
5/8	1 1/4			3 1/2	5/8	7	**62520**		
5/8	1 5/8			3 1/2	5/8	7	**62526**		
5/8	2 1/8			4	5/8	7		**62534**	
5/8	3/4	0.600	3 1/8	6	5/8	7			**62512**
3/4	1			3	3/4	7	**75113**		
3/4	1 1/4			3 1/2	3/4	7	**75017**		
3/4	1 5/8			4	3/4	7	**75022**		
3/4	2 1/4			5	3/4	7		**75030**	
3/4	1	0.720	3 1/8	6	3/4	7			**75013**
1	2			4	1	7	**99920**		
1	2 5/8			5	1	7			**99926**
1	3 1/4			6	1	7			**99933**
P							●	●	●
M							●	●	●
K							●	●	●
N									
S							●	●	●
H									
O									

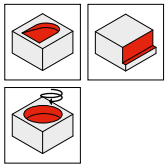
→ v_c/f_z Page 122

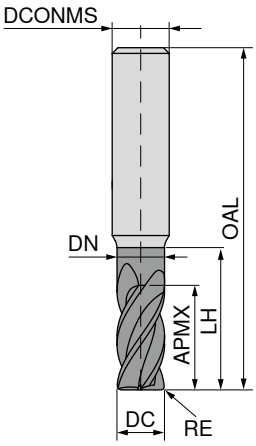
OptiLine – End milling cutter with corner radius

End mills that offer maximum metal removal and are optimized for high efficiency machining (HEM) and light finishing.

▲ Cutting edges with irregular pitch

P161 | UN | λ_s=38° γ_s=10°





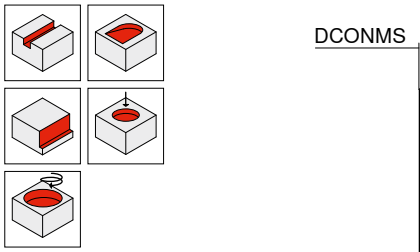
DC +0.000/-0.002 inch	RE inch	APMX inch	DN inch	LH inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 058 ...	59 058 ...	59 058 ...
1/4	0.020	3/8			2	1/4		90215		
1/4	0.020	1/2			2	1/4		90220		
1/4	0.020	3/4			2 1/2	1/4	7	25030		
1/4	0.030	3/4			2 1/2	1/4	7	90030		
1/4	0.020	1 1/8			3	1/4	7		25045	
1/4	0.030	3/8	0.240	2 1/2	4	1/4	7			90015
1/4	0.020	3/8	0.240	2 1/2	4	1/4	7			25015
3/8	0.020	1/2			2	3/8		90213		
3/8	0.020	7/8			2 1/2	3/8	7	37523		
3/8	0.030	7/8			2 1/2	3/8	7	90023		
3/8	0.030	1 1/4			3	3/8	7		90033	
3/8	0.020	1 1/4			3	3/8	7		37533	
3/8	0.020	1/2	0.360	3 1/8	6	3/8	7			37513
1/2	0.030	5/8			2 1/2	1/2		90313		
1/2	0.030	1			3	1/2		90320		
1/2	0.020	1 1/4			3	1/2	7	50025		
1/2	0.030	1 1/4			3	1/2	7	90025		
1/2	0.030	1 5/8			4	1/2	7		90133	
1/2	0.020	1 5/8			4	1/2	7		50033	
1/2	0.030	5/8	0.480	3 1/8	6	1/2	7			90013
1/2	0.020	5/8	0.480	3 1/8	6	1/2	7			50013
5/8	0.030	3/4			3	5/8		90212		
5/8	0.030	1 1/4			3 1/2	5/8		90420		
5/8	0.030	1 5/8			3 1/2	5/8	7	62526		
5/8	0.030	2 1/8			4	5/8	7		62534	
5/8	0.030	3/4	0.600	3 1/8	6	5/8	7			62512
3/4	0.030	1			3	3/4		90413		
3/4	0.030	1 1/4			3 1/2	3/4		90217		
3/4	0.030	1 5/8			4	3/4	7	75022		
3/4	0.030	2 1/4			5	3/4	7		75030	
3/4	0.030	1	0.720	3 1/8	6	3/4	7			75013
1	0.030	2 5/8			5	1	7		99926	
1	0.030	3 1/4			6	1				99933
P								●	●	●
M								●	●	●
K								●	●	●
N										
S								●	●	●
H										
O										

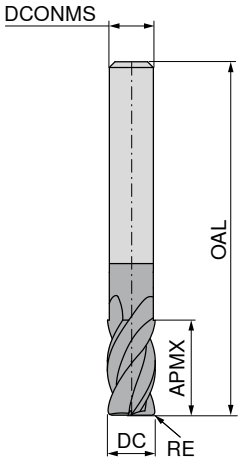
→ v_c/f_z Page 122

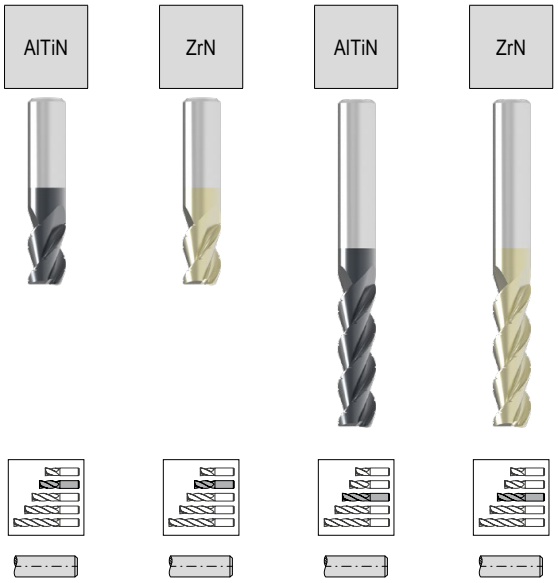
End milling cutter with corner radius

▲ with chip breaker

P119 | AL | λ_s=40° γ_s=15°







						59 029 ...		59 030 ...		59 029 ...		59 030 ...	
DC +0.000/-0.002 inch	RE ±0.001 inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP								
1/8	0.010	1/4	1 1/2	1/8	3	12520		12520					
5/32	0.010	3/8	2	3/16	3	15624		15624					
3/16	0.010	3/8	2	3/16	3	18820		18820					
7/32	0.020	3/8	2	1/4	3	21917		21917					
1/4	0.020	3/8	2	1/4	3	25015		25015					
1/4	0.020	1 1/4	3	1/4	3					25050		25050	
9/32	0.020	1/2	2 1/2	5/16	3	28118		28118					
5/16	0.020	1/2	2 1/2	5/16	3	31316		31316					
11/32	0.020	5/8	2	3/8	3	34418		34418					
3/8	0.020	5/8	2	3/8	3	37517		37517					
3/8	0.020	1 1/2	3 1/2	3/8	3					37540		37540	
7/16	0.020	1	2 3/4	7/16	3	43823		43823					
1/2	0.020	5/8	2 1/2	1/2	3	50013		50013					
1/2	0.020	1 1/2	3 1/2	1/2	3					50030		50030	
5/8	0.030	7/8	3	5/8	3	62514		62514					
5/8	0.030	1 3/4	4	5/8	3					62528		62528	
3/4	0.030	1	3	3/4	3	75013		75013					
3/4	0.030	2 1/2	5	3/4	3					75033		75033	
1	0.030	2 3/4	5	1	3					99928		99928	
P													
M													
K													
N							●		●		●		●
S													
H													
O													

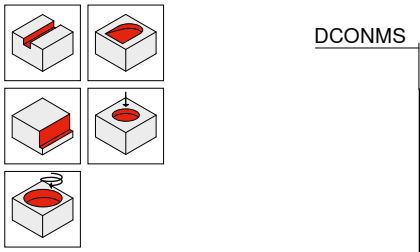
→ v_c/f_z Page 123

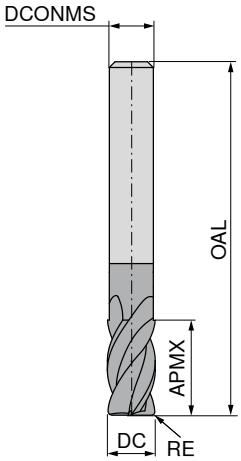
14

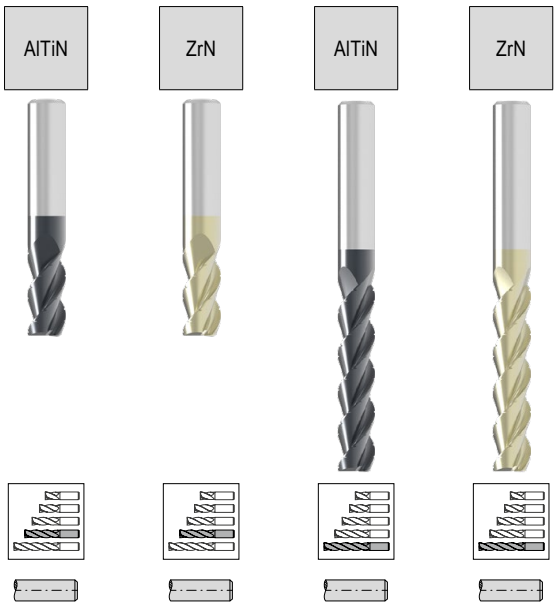
End milling cutter with corner radius

▲ with chip breaker

P119 AL λ_s=40° γ_s=15°







DC +0.000/-0.002 inch	RE ±0.001 inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 029 ...		59 030 ...		59 029 ...		59 030 ...	
1/8	0.010	1/2	1 1/2	1/8	3	**12540**		**12540**					
5/32	0.010	1/2	2	3/16	3	**15632**		**15632**					
3/16	0.010	5/8	2	3/16	3	**18833**		**18833**					
7/32	0.020	3/4	2 1/2	1/4	3	**21934**		**21934**					
1/4	0.020	3/4	2 1/2	1/4	3	**25030**		**25030**					
1/4	0.020	1 1/2	3 1/2	1/4	3						**25060**		**25060**
9/32	0.020	3/4	2 1/2	5/16	3	**28127**		**28127**					
5/16	0.020	3/4	2 1/2	5/16	3	**31324**		**31324**					
11/32	0.020	7/8	2 1/2	3/8	3	**34425**		**34425**					
3/8	0.020	7/8	2 1/2	3/8	3	**37523**		**37523**					
3/8	0.020	2	4	3/8	3						**37553**		**37553**
1/2	0.020	1 1/4	3	1/2	3	**50025**		**50025**					
1/2	0.020	2	4	1/2	3						**50040**		**50040**
9/16	0.030	1 1/4	3 1/2	9/16	3	**56322**		**56322**					
5/8	0.030	1 1/4	3 1/2	5/8	3	**62520**		**62520**					
5/8	0.030	2 1/2	5	5/8	3						**62540**		**62540**
3/4	0.030	1 5/8	4	3/4	3	**75022**		**75022**					
3/4	0.030	3 1/4	6	3/4	3						**75043**		**75043**
1	0.030	1 3/4	4	1	3	**99918**		**99918**					
1	0.030	3 3/8	6	1	3						**99934**		**99934**

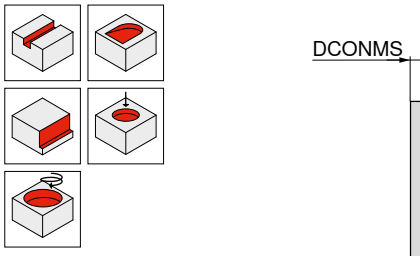
P													
M													
K													
N						●		●		●		●	
S													
H													
O													

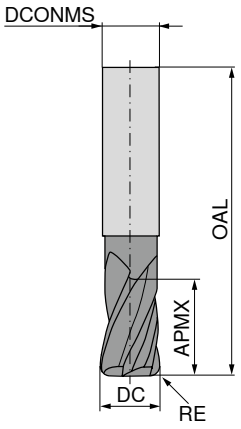
→ v_c/f_z Page 123

End milling cutter with corner radius

▲ with chip breaker

P117 | UN | λ_s=35° γ_s=8°





DC +0.000/-0.002 inch	RE ±0.001 inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 028 ...	59 028 ...
1/8	0.010	1/2	1 1/2	1/8	3	**12540**	
3/16	0.010	5/16	2	3/16	3	**18817**	
3/16	0.010	5/8	2	3/16	3		**18833**
1/4	0.020	3/8	2	1/4	3	**25015**	
1/4	0.020	3/4	2 1/2	1/4	3		**25030**
5/16	0.020	13/16	2 1/2	5/16	3	**31326**	
3/8	0.020	1	2 1/2	3/8	3	**37527**	
7/16	0.020	5/8	2 3/4	7/16	3	**43814**	
7/16	0.020	1	2 3/4	7/16	3		**43823**
1/2	0.020	5/8	2 1/2	1/2	3	**50013**	
1/2	0.020	1 1/4	3	1/2	3		**50025**
5/8	0.030	1 1/4	3 1/2	5/8	3		**62520**
3/4	0.030	1 5/8	4	3/4	3		**75022**
P						●	●
M						●	●
K						●	●
N						○	○
S						●	●
H							
O							

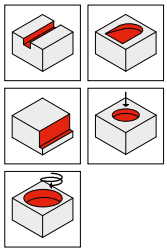
→ v_c/f_z Page 124

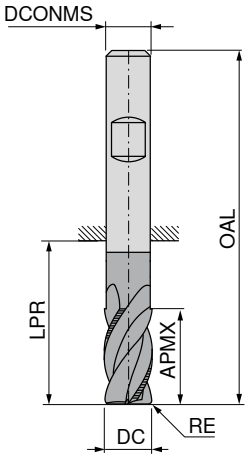
14

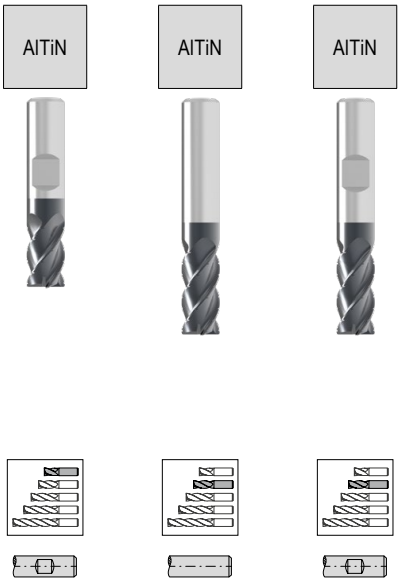
End milling cutter with corner radius

▲ with chip breaker

P120 | UN | λ_s=40° γ_s=10°







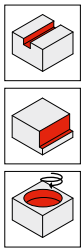
DC +0.000/-0.002 inch	RE ±0.001 inch	APMX inch	LPR inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 032 ...	59 031 ...	59 032 ...
1/8	0.010	1/4	0.520	1 1/2	1/8	4		**12520**	
5/32	0.010	3/8	0.898	2	3/16	4		**15624**	
3/16	0.010	3/8	0.898	2	3/16	4		**18820**	
7/32	0.020	3/8	1.083	2	1/4	4		**21917**	
1/4	0.020	3/8	0.583	2	1/4	4		**25015**	
9/32	0.020	1/2	1.083	2 1/2	5/16	4		**28118**	
5/16	0.020	1/2	1.083	2 1/2	5/16	4		**31316**	
11/32	0.020	5/8	0.825	2	3/8	4			**34418**
3/8	0.020	5/8	0.825	2	3/8	4	**37517**		
3/8	0.020	7/8	0.960	2 1/2	3/8	4			**37523**
7/16	0.020	1	1.165	2 3/4	7/16	4			**43823**
1/2	0.020	5/8	0.735	2 1/2	1/2	4	**50013**		
1/2	0.020	1 1/4	1.425	3	1/2	4			**50025**
5/8	0.030	7/8	1.113	3	5/8	4			**62514**
3/4	0.030	1	1.228	3	3/4	4			**75013**
P							●	●	●
M									
K							●	●	●
N									
S									
H									
O									

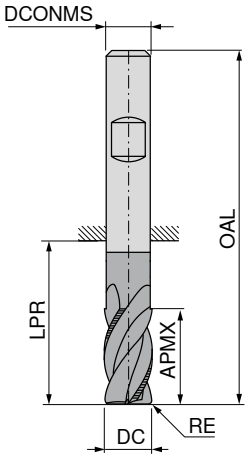
→ v_c/f_z Page 125

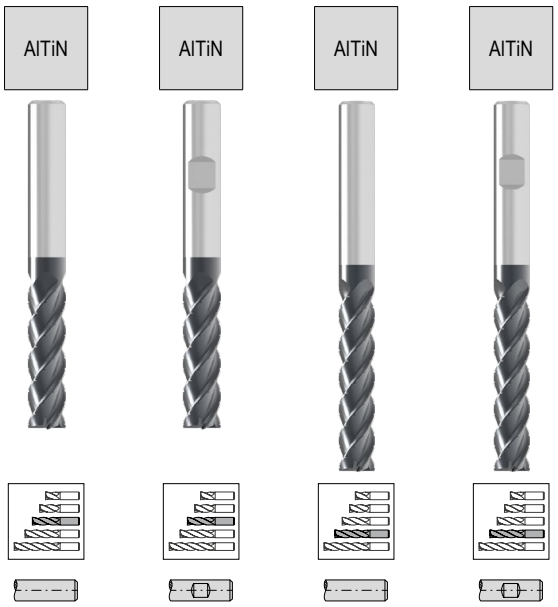
End milling cutter with corner radius

▲ with chip breaker

P120 | UN | λ_s=40° γ_s=10°







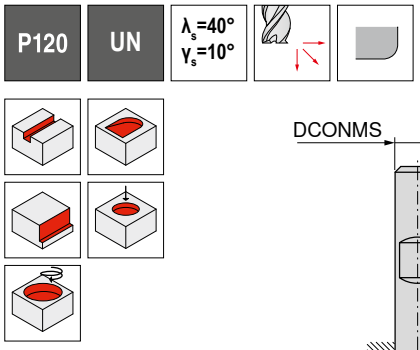
DC +0.000/-0.002 inch	RE ±0.001 inch	APMX inch	LPR inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 031 ...	59 032 ...	59 031 ...	59 032 ...
1/8	0.010	1/2	0.520	1 1/2	1/8	4			**12540**	
5/32	0.010	1/2	0.898	2	3/16	4			**15632**	
3/16	0.010	5/8	0.898	2	3/16	4			**18833**	
7/32	0.020	3/4	0.583	2 1/2	1/4	4			**21934**	
1/4	0.020	3/4	1.083	2 1/2	1/4	4	**25030**			
1/4	0.020	1 1/4	1.583	3	1/4	4			**25050**	
9/32	0.020	3/4	1.083	2 1/2	5/16	4			**28127**	
5/16	0.020	3/4	1.083	2 1/2	5/16	4			**31324**	
11/32	0.020	7/8	0.960	2 1/2	3/8	4				**34425**
3/8	0.020	1 1/2	1.925	3 1/2	3/8	4		**37540**		
3/8	0.020	2	2.460	4	3/8	4				**37553**
1/2	0.020	1 1/2	1.735	3 1/2	1/2	4		**50030**		
1/2	0.020	2	2.235	4	1/2	4				**50040**
9/16	0.030	1 1/4	1.675	3 1/2	9/16	4				**56322**
5/8	0.030	1 1/4	1.613	3 1/2	5/8	4		**62520**		
5/8	0.030	1 3/4	2.113	4	5/8	4				**62528**
3/4	0.030	1 5/8	1.978	4	3/4	4				**75022**
P							●	●	●	●
M										
K							●	●	●	●
N										
S										
H										
O										

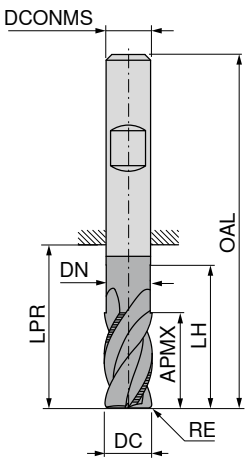
→ v_c/f_z Page 125

14

End milling cutter with corner radius

▲ with chip breaker



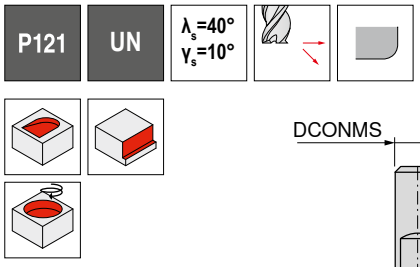


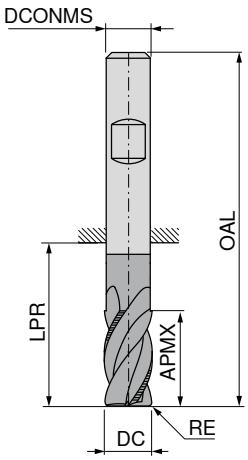
DC +0.000/-0.002 inch	RE ±0.001 inch	APMX inch	DN inch	LH inch	LPR inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 031 ...	59 032 ...
1/4	0.020	3/4	0.240	2 1/8	2.5	4	1/4	4	**25130**	
1/4	0.020	1 1/2			2.0	3 1/2	1/4	4	**25060**	
3/8	0.020	7/8	0.360	2 1/8	2.4	4	3/8	4	**37523**	
3/8	0.020	7/8	0.360	3 3/8	4.4	6	3/8	4	**37623**	
1/2	0.020	1	0.480	2 3/8	4.2	6	1/2	4	**50020**	
1/2	0.020	1	0.480	3 3/8	4.2	6	1/2	4	**50120**	
5/8	0.030	2 1/2			3.1	5	5/8	4		**62540**
3/4	0.030	1 5/8	0.720	2 1/2	3.6	6	3/4	4	**75022**	
1	0.030	1 3/4			1.7	4	1	4		**99918**
P									●	●
M										
K									●	●
N										
S										
H										
O										

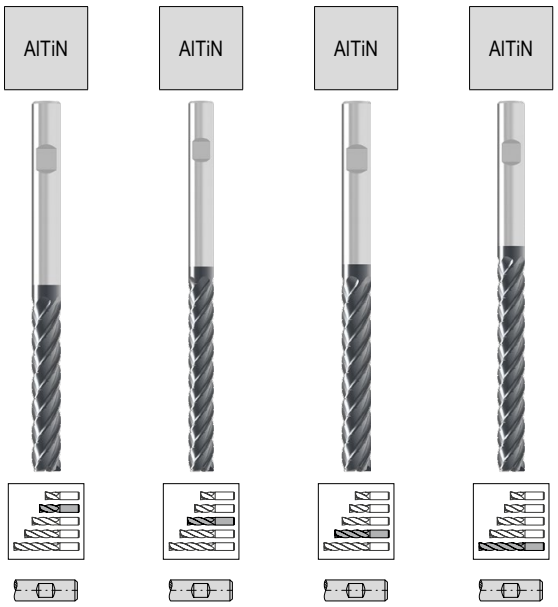
→ v_c/f_z Page 125

End milling cutter with corner radius

▲ with chip breaker







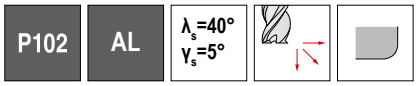
DC +0.000/-0.002 inch	RE ±0.001 inch	APMX inch	LPR inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 035 ...	59 035 ...	59 035 ...	59 035 ...
3/4	0.030	2 1/2	2.9	5	3/4	5	**75033**			
3/4	0.030	3 1/4	3.9	6	3/4	5		**75043**		
1	0.030	2 3/4	2.7	5	1	5			**99928**	
1	0.030	3 3/8	3.7	6	1	5				**99934**
P							●	●	●	●
M							●	●	●	●
K							●	●	●	●
N										
S							●	●	●	●
H										
O										

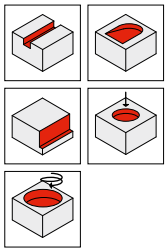
→ v_c/f_z Page 126

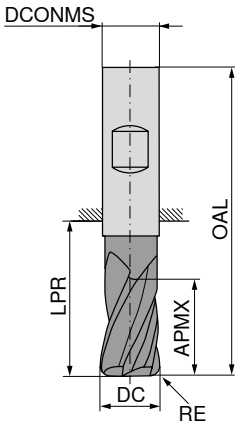
14

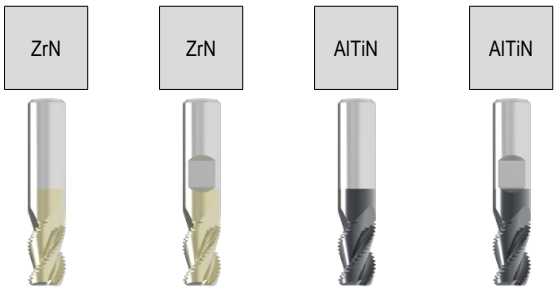
End milling cutter with corner radius

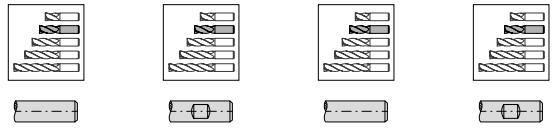
▲ with coarse pitch profile











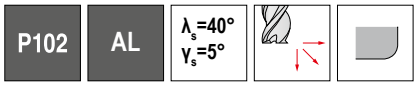
DC +0.000/-0.002 inch	RE +/-0.001 inch	APMX inch	LPR inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 023 ...	59 024 ...	59 025 ...	59 026 ...
3/16	0.030	3/8	0.898	2	3/16	3	**18820**		**18820**	
1/4	0.045	3/8	0.583	2	1/4	3	**25015**		**25015**	
5/16	0.045	1/2	0.583	2	5/16	3	**31316**		**31316**	
3/8	0.060	5/8	0.825	2	3/8	3		**37517**		**37517**
7/16	0.060	1	1.165	2 3/4	7/16	3		**43823**		**43823**
1/2	0.060	5/8	0.735	2 1/2	1/2	3		**50013**		**50013**

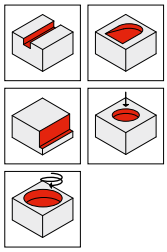
P				
M				
K				
N	●	●	●	●
S				
H				
O				

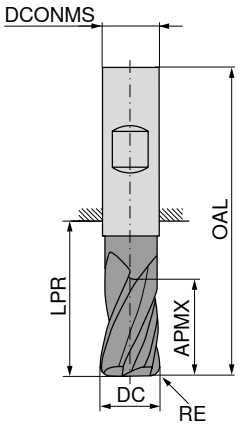
→ v_c/f_z Page 127

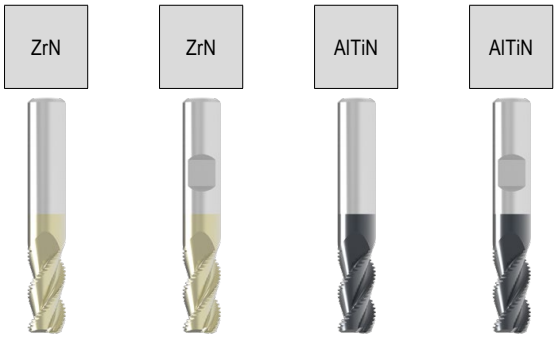
End milling cutter with corner radius

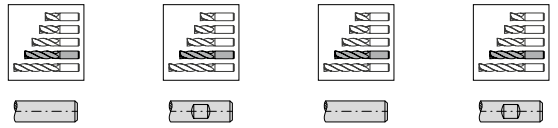
▲ with coarse pitch profile











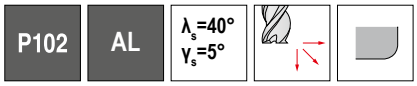
DC +0.000/-0.002 inch	RE +/-0.001 inch	APMX inch	LPR inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 023 ...	59 024 ...	59 025 ...	59 026 ...
3/16	0.030	5/8	0.898	2	3/16	3	**18833**		**18833**	
1/4	0.045	3/4	1.083	2 1/2	1/4	3	**25030**		**25030**	
5/16	0.045	3/4	1.083	2 1/2	5/16	3	**31324**		**31324**	
3/8	0.060	7/8	0.960	2 1/2	3/8	3		**37523**		**37523**
1/2	0.060	1 1/4	1.425	3	1/2	3		**50025**		**50025**
9/16	0.060	1 1/4	1.675	3 1/2	9/16	3		**56322**		**56322**
5/8	0.060	1 1/4	1.613	3 1/2	5/8	3		**62520**		**62520**
3/4	0.060	1 5/8	1.978	4	3/4	3		**75022**		**75022**
1	0.060	1 3/4	1.795	4	1	3		**99918**		**99918**
P										
M										
K										
N							●	●	●	●
S										
H										
O										

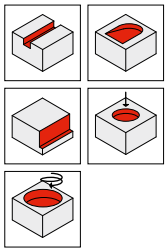
→ v_c/f_z Page 127

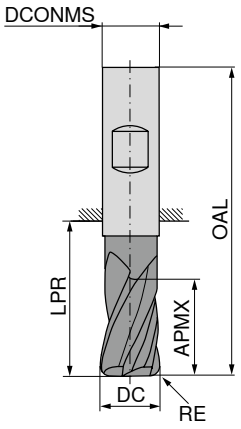
14

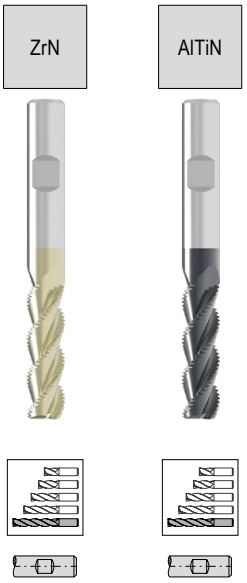
End milling cutter with corner radius

▲ with coarse pitch profile









DC +0.000/-0.002 inch	RE +/-0.001 inch	APMX inch	LPR inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 024 ...	59 026 ...
1/2	0.060	1 1/2	1.735	3 1/2	1/2	3	**50030**	**50030**
3/4	0.060	2 1/4	2.978	5	3/4	3	**75030**	**75030**
1	0.060	2 5/8	2.795	5	1	3	**99926**	**99926**

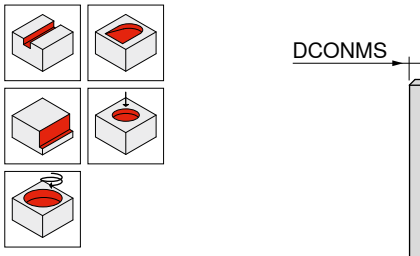
P		
M		
K		
N	●	●
S		
H		
O		

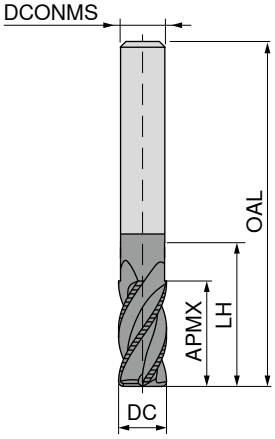
→ v_c/f_z Page 127

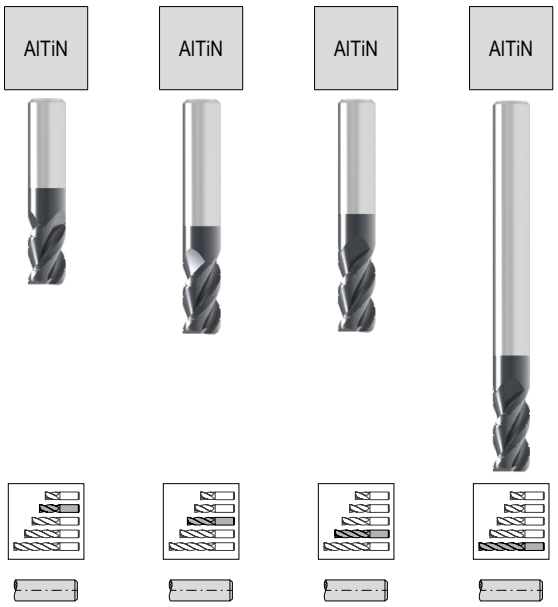
End milling cutter

▲ with chip breaker

P190 | UN | λ_s=40° γ_s=10°







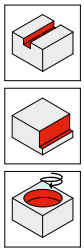
DC +0.000/-0.002 inch	APMX inch	LH inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 059 ...	59 059 ...	59 059 ...	59 059 ...
3/16	5/8		2	3/16	4	18833			
1/4	3/8		2	1/4	4	25015			
1/4	3/4		2 1/2	1/4	4			25030	
5/16	3/4		2 1/2	5/16	4	31324			
3/8	5/8		2	3/8	4	37517			
3/8	7/8		2 1/2	3/8	4			37523	
3/8	7/8	2.125	4	3/8	4				37623
1/2	5/8		2 1/2	1/2	4	50013			
1/2	1	2.375	6	1/2	4				50020
1/2	1 1/4		3	1/2	4			50025	
1/2	2		4	1/2	4		50040		
5/8	7/8		3	5/8	4	62514			
5/8	1 1/4		3 1/2	5/8	4			62520	
3/4	1		3	3/4	4	75013			
3/4	1 5/8		4	3/4	4			75022	
1	1 3/4		4	1	4			99918	
P						●	●	●	●
M									
K						●	●	●	●
N									
S									
H									
O									

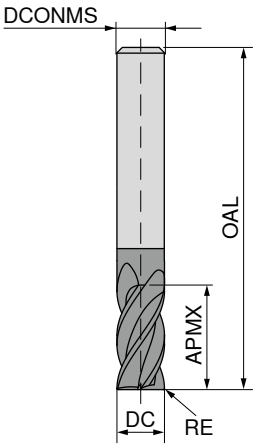
→ v_c/f_z Page 128

End milling cutter with corner radius

▲ with chip breaker

P191 | UN | λ_s=40° γ_s=10°





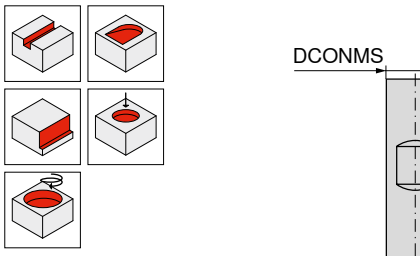
DC +0.000/-0.002 inch	RE +/- 0.001 inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 061 ...	59 061 ...	59 061 ...
3/16	0.010	5/8	2	3/16	4	**18833**		
1/4	0.020	3/4	2 1/2	1/4	4	**25030**		
5/16	0.020	3/4	2 1/2	5/16	4	**31324**		
3/8	0.020	7/8	2 1/2	3/8	4	**37523**		
3/8	0.030	7/8	2 1/2	3/8	4	**90023**		
1/2	0.030	5/8	2 1/2	1/2	4	**90013**		
1/2	0.020	5/8	2 1/2	1/2	4	**50013**		
1/2	0.030	1 1/4	3	1/2	4		**90025**	
1/2	0.020	1 1/4	3	1/2	4		**50025**	
1/2	0.030	2	4	1/2	4			**90040**
1/2	0.020	2	4	1/2	4			**50040**
5/8	0.030	1 1/4	3 1/2	5/8	4		**62520**	
3/4	0.030	1 5/8	4	3/4	4		**75022**	
1	0.030	1 3/4	4	1	4		**99918**	
P						●	●	●
M								
K						●	●	●
N								
S								
H								
O								

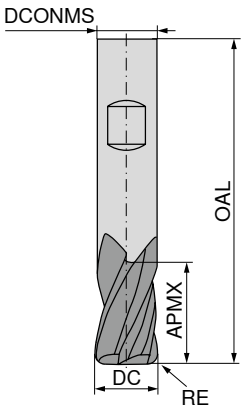
→ v_c/f_z Page 128

End milling cutter with corner radius

▲ with coarse pitch profile

P100 | UN | λ_s=30° γ_s= 5°





DC +0.000/-0.002 inch	RE +/-0.001/+/- 0.001 inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 011 ...	59 011 ...
3/16	0.030	3/8	2	3/16	3	**18820**	
3/16	0.030	5/8	2	3/16	3		**18833**
P						●	●
M							
K						●	●
N							
S							
H							
O							

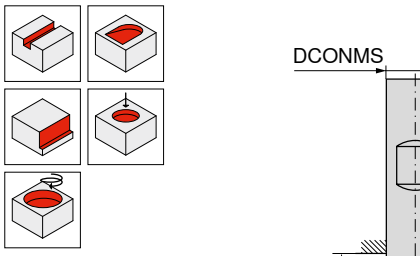
→ v_c/f_z Page 129

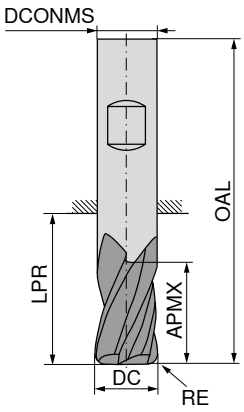
14

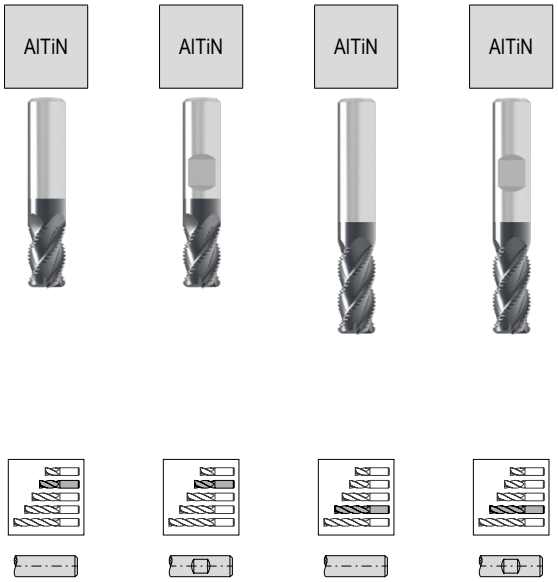
End milling cutter with corner radius

▲ with coarse pitch profile

P100 | UN | λ_s=30° γ_s= 5°







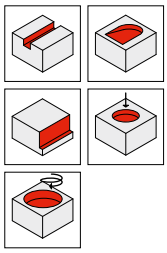
							59 012 ...	59 013 ...	59 012 ...	59 013 ...
DC +0.000/-0.002 inch	RE +/- 0.001 inch	APMX inch	LPR inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP				
1/4	0.045	3/8	0.5	2	1/4	4	**25015**			
1/4	0.045	3/4	1.0	2 1/2	1/4	4			**25030**	
5/16	0.045	1/2	1.0	2 1/2	5/16	4	**31316**			
5/16	0.045	3/4	1.0	2 1/2	5/16	4			**31324**	
3/8	0.060	5/8	0.8	2	3/8	4		**37517**		
3/8	0.060	7/8	0.9	2 1/2	3/8	4				**37523**
7/16	0.060	1	1.1	2 3/4	7/16	4		**43823**		
1/2	0.060	5/8	0.7	2 1/2	1/2	4		**50013**		
1/2	0.060	1 1/4	1.4	3	1/2	4				**50025**
9/16	0.060	1 1/4	1.6	3 1/2	9/16	4				**56322**
5/8	0.060	7/8	1.1	3	5/8	4		**62514**		
5/8	0.060	1 1/4	1.6	3 1/2	5/8	4				**62520**
3/4	0.060	1	1.2	3	3/4	4		**75013**		
3/4	0.060	1 5/8	1.9	4	3/4	4				**75022**
P							●	●	●	●
M										
K							●	●	●	●
N										
S										
H										
O										

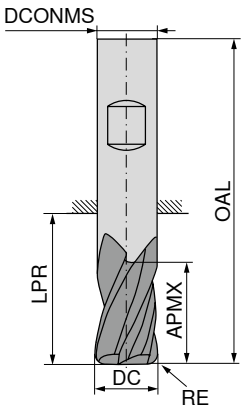
→ v_c/f_z Page 129

End milling cutter with corner radius

▲ with coarse pitch profile

P100 | UN | λ_s=30° γ_s= 5°





AlTiN

59 013 ...

DC +0.000/-0.002 inch	RE +/- 0.001 inch	APMX inch	LPR inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	
1/2	0.060	1 1/2	1.735	3 1/2	1/2	4	**50030**
5/8	0.060	2	2.113	4	5/8	4	**62532**
3/4	0.060	2 1/4	2.978	5	3/4	4	**75030**

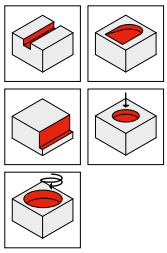
P	●
M	
K	●
N	
S	
H	
O	

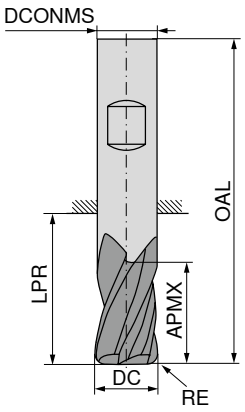
→ v_c/f_z Page 129

End milling cutter with corner radius

▲ with coarse pitch profile

P100 | UN | λ_s=30° γ_s= 5°



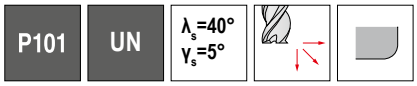


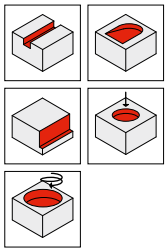
DC +0.000/-0.002 inch	RE +/- 0.001 inch	APMX inch	LPR inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 014 ...	59 014 ...
1	0.060	1 3/4	1.795	4	1	5	99918	
1	0.060	2 5/8	2.795	5	1	5		99926
P							●	●
M								
K							●	●
N								
S								
H								
O								

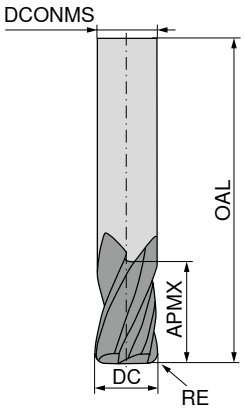
→ v_c/f_z Page 129

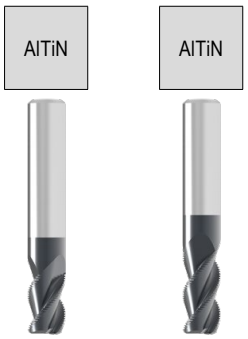
End milling cutter with corner radius

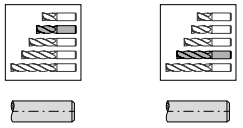
▲ with fine pitch profile











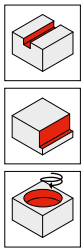
DC +0.000/-0.002 inch	RE +/- 0.001 inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 015 ...	59 015 ...
3/16	0.030	3/8	2	3/16	3	18820	
3/16	0.030	5/8	2	3/16	3		18833
P						●	●
M							
K						●	●
N							
S							
H							
O							

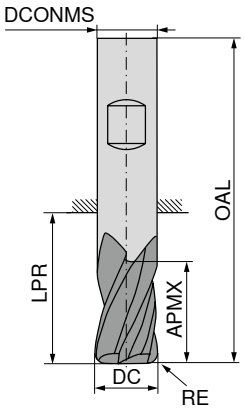
→ v_c/f_z Page 130

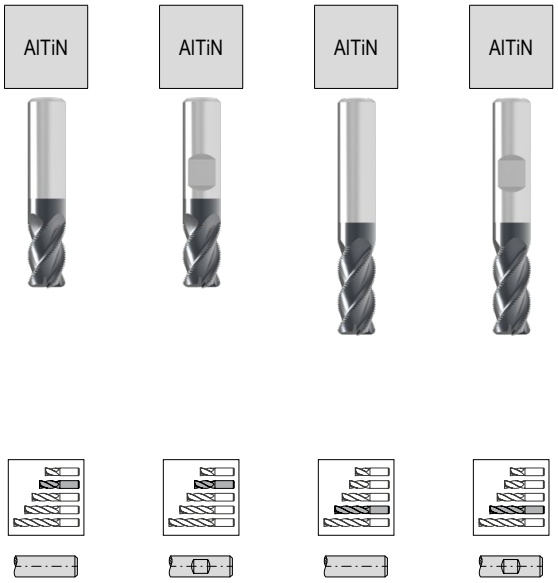
End milling cutter with corner radius

▲ with fine pitch profile

P101 | UN | λ_s=40° γ_s=5°







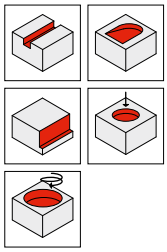
DC +0.000/-0.002 inch	RE +/- 0.001 inch	APMX inch	LPR inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 016 ...	59 017 ...	59 016 ...	59 017 ...
1/4	0.045	3/8	0.583	2	1/4	4	**25015**			
1/4	0.045	3/4	1.083	2 1/2	1/4	4			**25030**	
5/16	0.045	1/2	1.083	2 1/2	5/16	4	**31316**			
5/16	0.045	3/4	1.083	2 1/2	5/16	4			**31324**	
3/8	0.060	5/8	0.825	2	3/8	4		**37517**		
3/8	0.060	7/8	0.960	2 1/2	3/8	4				**37523**
7/16	0.060	1	1.165	2 3/4	7/16	4		**43823**		
1/2	0.060	5/8	0.735	2 1/2	1/2	4		**50013**		
1/2	0.060	1 1/4	1.425	3	1/2	4				**50025**
9/16	0.060	1 1/4	1.675	3 1/2	9/16	4				**56322**
5/8	0.060	7/8	1.113	3	5/8	4		**62514**		
5/8	0.060	1 1/4	1.613	3 1/2	5/8	4				**62520**
3/4	0.060	1	1.228	3	3/4	4		**75013**		
3/4	0.060	1 5/8	1.978	4	3/4	4				**75022**
P							●	●	●	●
M										
K							●	●	●	●
N										
S										
H										
O										

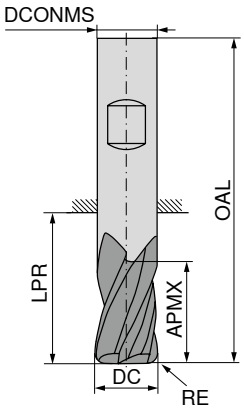
→ v_c/f_z Page 130

End milling cutter with corner radius

▲ with fine pitch profile

P101 | UN | λ_s=40° γ_s=5°





AlTiN

59 017 ...

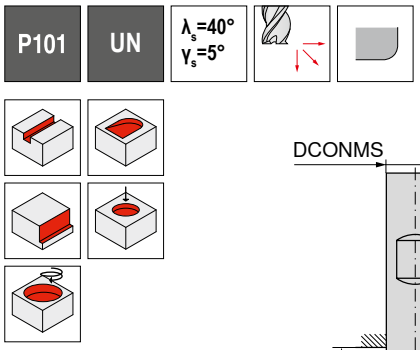
DC +0.000/-0.002 inch	RE +/- 0.001 inch	APMX inch	LPR inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	
1/2	0.060	1 1/2	1.735	3 1/2	1/2	4	**50030**
5/8	0.060	2	2.113	4	5/8	4	**62532**
3/4	0.060	2 1/4	2.978	5	3/4	4	**75030**

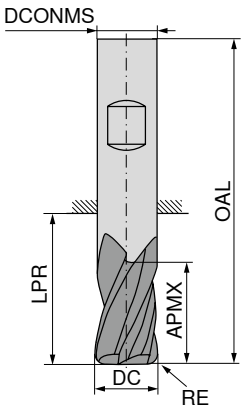
P	●
M	
K	●
N	
S	
H	
O	

→ v_c/f_z Page 130

End milling cutter with corner radius

▲ with fine pitch profile





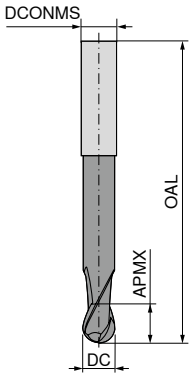
DC +0.000/-0.002 inch	RE +/- 0.001 inch	APMX inch	LPR inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 022 ...	59 022 ...
1	0.060	1 3/4	1.795	4	1	5	99918	
1	0.060	2 5/8	2.795	5	1	5		99926
P							●	●
M								
K							●	●
N								
S								
H								
O								

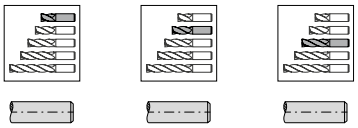
→ v_c/f_z Page 130

Ball Nosed Cutter

▲ DC tolerance:
≤ Ø 7/64 inch: +/- 0.0005
≥ Ø 1/8 inch: 0 /- 0.002
▲ Radius accuracy: +/- 0.001

S662 | UN | λ_s=38° γ_s=8°





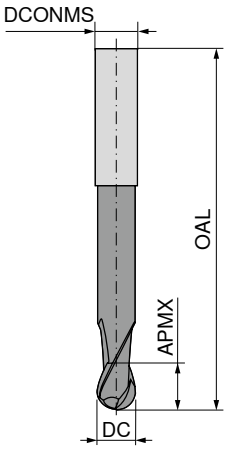
DC inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 077 ...	59 077 ...	59 077 ...
1/16	1/8	1 1/2	1/8	2		06320	
1/8	1/4	1 1/2	1/8	2	12520		
1/8	1/2	1 1/2	1/8	2		12540	
1/8	3/4	3	1/8	2			12660
3/16	3/8	2	3/16	2	18820		
3/16	5/8	2	3/16	2		18833	
3/16	1	4	3/16	2			18853
1/4	3/8	2	1/4	2	25015		
1/4	3/4	2 1/2	1/4	2		25030	
1/4	1 1/8	3	1/4	2			25045
5/16	1/2	2	5/16	2	31316		
5/16	3/4	2 1/2	5/16	2		31324	
5/16	1 1/8	3	5/16	2			31336
3/8	5/8	2	3/8	2	37517		
3/8	7/8	2 1/2	3/8	2		37523	
3/8	1 1/2	6	3/8	2			37540
1/2	5/8	2 1/2	1/2	2	50013		
1/2	1	3	1/2	2		50020	
1/2	1 1/2	6	1/2	2			50030
5/8	7/8	3	5/8	2	62514		
5/8	1 1/4	3 1/2	5/8	2		62520	
5/8	2 1/8	4 5/8	5/8	2			62534
3/4	1	3	3/4	2	75013		
3/4	1 1/2	4	3/4	2		75020	
3/4	2 1/4	5	3/4	2			75030
1	2	6	1	2			99920
1	2 1/4	5	1	2		99923	
P					●	●	●
M					●	●	●
K					●	●	●
N					●	●	●
S					●	●	●
H							
O							

→ v_c/f_z Page 131

Ball Nosed Cutter

▲ DC tolerance:
≤ Ø 7/64 inch: +/- 0.0005
≥ Ø 1/8 inch: 0 /- 0.002
▲ Radius accuracy: +/- 0.001

S662 | UN | λ_s=38° γ_s=8°



DC inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 077 ...	59 077 ...
1/16	3/16	1 1/2	1/8	2	06330	
1/8	3/4	2 1/2	1/8	2	12560	
1/8	1	3	1/8	2		12580
3/16	3/4	2 1/2	3/16	2	18840	
3/16	1 1/8	3	3/16	2		18860
1/4	1	4	1/4	2	25040	
1/4	1 1/2	4	1/4	2		25060
1/4	1 1/2	6	1/4	2		25160
5/16	1	4	5/16	2	31332	
5/16	1 1/2	6	5/16	2		31348
5/16	1 5/8	4	5/16	2		31352
3/8	1	4	3/8	2	37527	
3/8	1 1/8	3	3/8	2	37530	
3/8	1 3/4	4	3/8	2		37547
3/8	3	6	3/8	2		37580
1/2	1	4	1/2	2	50120	
1/2	2	4	1/2	2		50040
1/2	3	6	1/2	2		50060
5/8	2	6	5/8	2	62532	
5/8	3	6	5/8	2		62548
3/4	2	6	3/4	2	75027	
3/4	3	6	3/4	2		75040
1	1 3/4	4	1	2	99918	
1	3	6	1	2		99930

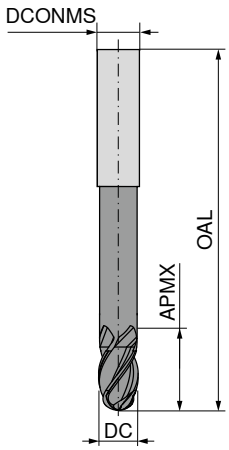
P	●	●
M	●	●
K	●	●
N	●	●
S	●	●
H		
O		

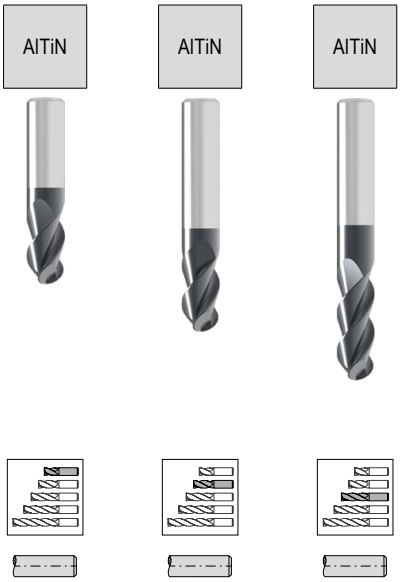
→ v_c/f_z Page 131

Ball Nosed Cutter

▲ Radius accuracy: +/- 0.001

S663 | UN | λ_s=38° γ_s=8°





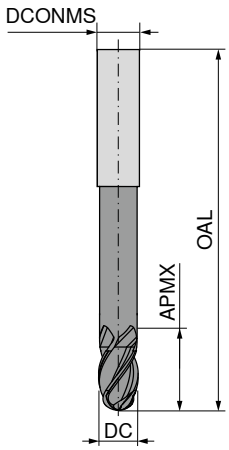
DC +0.000/-0.002 inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 079 ...	59 079 ...	59 079 ...
1/8	1/2	1 1/2	1/8	3		**12540**	
1/8	1/4	1 1/2	1/8	3	**12520**		
1/8	3/4	3	1/8	3			**12660**
3/16	5/8	2	3/16	3		**18833**	
3/16	3/8	2	3/16	3	**18820**		
3/16	1	2 1/2	3/16	3			**18853**
1/4	3/8	2	1/4	3	**25015**		
1/4	3/4	2 1/2	1/4	3		**25030**	
1/4	1	4	1/4	3			**25040**
5/16	3/4	2 1/2	5/16	3		**31324**	
3/8	5/8	2	3/8	3	**37517**		
3/8	7/8	2 1/2	3/8	3		**37523**	
3/8	1 1/8	3	3/8	3			**37530**
3/8	1 1/2	6	3/8	3			**37540**
1/2	5/8	2 1/2	1/2	3	**50013**		
1/2	1	3	1/2	3		**50020**	
1/2	1 1/2	6	1/2	3			**50030**
5/8	1 1/4	3 1/2	5/8	3		**62520**	
5/8	2 1/8	4 5/8	5/8	3			**62534**
3/4	1 1/2	4	3/4	3		**75020**	
3/4	2 1/4	5	3/4	3			**75030**
1	1 3/4	4	1	3		**99918**	
1	2 1/4	5	1	3			**99923**
P					●	●	●
M					●	●	●
K					●	●	●
N					●	●	●
S					●	●	●
H							
O							

→ v_c/f_z Page 132

Ball Nosed Cutter

▲ Radius accuracy: +/- 0.001

S663 | UN | λ_s=38° γ_s=8°



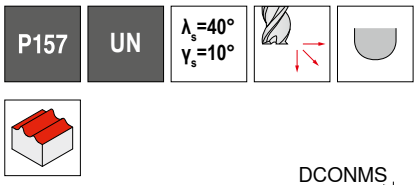
DC +0.000/-0.002 inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 079 ...	59 079 ...
1/8	3/4	2 1/2	1/8	3	**12560**	
1/8	1	3	1/8	3		**12580**
3/16	3/4	2 1/2	3/16	3	**18840**	
3/16	1 1/8	3	3/16	3		**18860**
3/16	1	4	3/16	3		**18953**
1/4	1 1/8	3	1/4	3	**25045**	
1/4	1 1/2	4	1/4	3		**25060**
1/4	1 1/2	6	1/4	3		**25160**
5/16	1	4	5/16	3	**31332**	
5/16	1 1/2	6	5/16	3		**31348**
3/8	1 3/4	4	3/8	3		**37547**
3/8	1	4	3/8	3	**37527**	
3/8	3	6	3/8	3		**37580**
1/2	1	4	1/2	3	**50120**	
1/2	2	4	1/2	3		**50040**
1/2	3	6	1/2	3		**50060**
5/8	2	6	5/8	3	**62532**	
5/8	3	6	5/8	3		**62548**
3/4	3	6	3/4	3		**75040**
3/4	2	6	3/4	3	**75027**	
1	2	6	1	3	**99920**	
1	3	6	1	3		**99930**
P					●	●
M					●	●
K					●	●
N					●	●
S					●	●
H						
O						

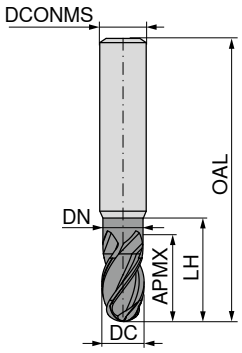
→ v_c/f_z Page 132

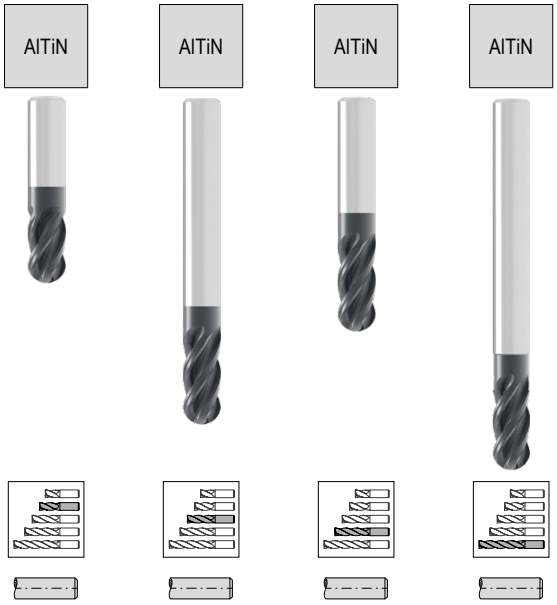
Ball Nosed Cutter

▲ Cutting edges with irregular pitch
▲ Radius accuracy: +/- 0.001"

P157 | UN | λ_s=40° γ_s=10°







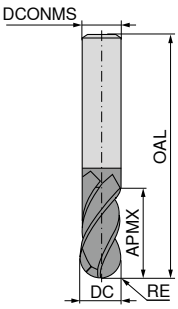
DC +0.000/-0.002 inch	APMX inch	DN inch	LH inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 055 ...		59 055 ...		59 055 ...		59 055 ...	
1/8	1/4			1 1/2	1/8	4	**12520**							
1/8	1/2			1 1/2	1/8	4						**12540**		
5/32	1/2			2	3/16	4	**15632**							
3/16	3/8			2	3/16	4	**18820**							
3/16	5/8			2	3/16	4						**18833**		
7/32	3/8			2	1/4	4	**21917**							
7/32	3/4			2 1/2	1/4	4						**21934**		
1/4	3/8			2	1/4	4	**25015**							
1/4	3/4			2 1/2	1/4	4						**25030**		
1/4	3/4	0.240	2 1/8	4	1/4	4								**25130**
5/16	3/4			2 1/2	5/16	4						**31324**		
5/16	1/2			2 1/2	5/16	4	**31316**							
3/8	5/8			2	3/8	4	**37517**							
3/8	7/8			2 1/2	3/8	4						**37523**		
3/8	7/8	0.360	2 3/8	4	3/8	4								**37623**
1/2	5/8			2 1/2	1/2	4	**50013**							
1/2	1			3	1/2	4						**50020**		
1/2	1	0.480	2 3/8	6	1/2	4			**50120**					
1/2	1	0.480	3 3/8	6	1/2	4								**50220**
9/16	1 1/4			3 1/2	9/16	4						**56322**		
5/8	1 1/4			3 1/2	5/8	4						**62520**		
5/8	1 1/4	0.600	3 3/8	6	5/8	4								**62620**
3/4	1 5/8			4	3/4	4						**75022**		
1	1 3/4			4	1	4						**99918**		
1	2 3/4			5	1	4			**99928**					
1	1 7/8	0.960	3 3/8	6	1	4								**99919**
P							●		●		●		●	
M							●		●		●		●	
K							●		●		●		●	
N							●		●		●		●	
S														
H														
O														

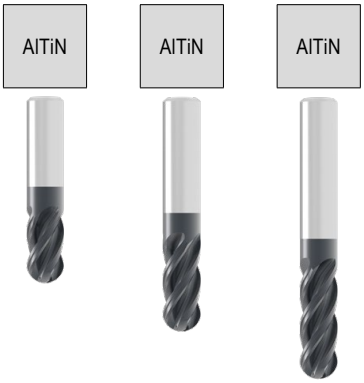
→ v_c/f_z Page 137

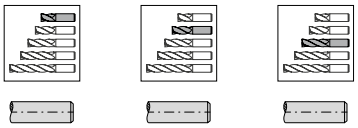
Ball Nosed Cutter

▲ DC tolerance:
≤ Ø 7/64 inch: +/- 0.0005
≥ Ø 1/8 inch: 0 /- 0.002
▲ Radius accuracy: +/- 0.001

S664 | UN | λ_s=38° γ_s=8°







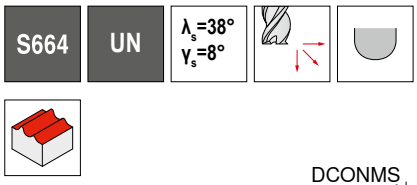
DC inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 081 ...	59 081 ...	59 081 ...
1/32	3/32	1 1/2	1/8	4		03130	
3/64	9/64	1 1/2	1/8	4		04730	
1/16	1/8	1 1/2	1/8	4		06320	
3/32	3/16	1 1/2	1/8	4		09420	
1/8	1/4	1 1/2	1/8	4	12520		
1/8	1/2	1 1/2	1/8	4		12540	
1/8	3/4	3	1/8	4			12660
5/32	3/8	2	3/16	4		15624	
3/16	3/8	2	3/16	4	18820		
3/16	5/8	2	3/16	4		18833	
3/16	1	4	3/16	4			18853
1/4	3/8	2	1/4	4	25015		
1/4	3/4	2 1/2	1/4	4		25030	
1/4	1 1/8	3	1/4	4			25045
5/16	1/2	2	5/16	4	31316		
5/16	3/4	2 1/2	5/16	4		31324	
5/16	1 1/8	3	5/16	4			31336
3/8	5/8	2	3/8	4	37517		
3/8	7/8	2 1/2	3/8	4		37523	
3/8	1 1/8	3	3/8	4			37530
3/8	1 1/2	6	3/8	4			37540
1/2	5/8	2 1/2	1/2	4	50013		
1/2	1	3	1/2	4		50020	
1/2	1 1/2	6	1/2	4			50030
5/8	7/8	3	5/8	4	62514		
5/8	1 1/4	3 1/2	5/8	4		62520	
5/8	2 1/8	4 5/8	5/8	4			62534
3/4	1	3	3/4	4	75013		
3/4	1 1/2	4	3/4	4		75020	
3/4	2 1/4	5	3/4	4			75030
1	1 3/4	4	1	4		99918	
1	2 1/4	5	1	4			99923
P					●	●	●
M					●	●	●
K					●	●	●
N					●	●	●
S							
H							
O							

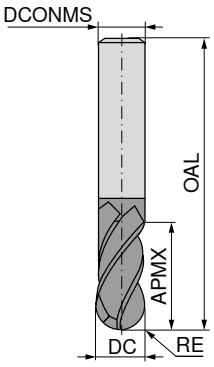
→ v_c/f_z Page 134

Ball Nosed Cutter

▲ DC tolerance:
≤ Ø 7/64 inch: +/- 0.0005
≥ Ø 1/8 inch: 0 /- 0.002
▲ Radius accuracy: +/- 0.001

S664 | UN | λ_s=38° γ_s=8°





DC inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 081 ...	59 081 ...
1/16	3/16	1 1/2	1/8	4	06330	
3/32	9/32	1 1/2	1/8	4	09430	
1/8	3/4	2 1/2	1/8	4	12560	
1/8	1	3	1/8	4		12580
5/32	1/2	2	3/16	4	15632	
3/16	3/4	2 1/2	3/16	4	18840	
3/16	1 1/8	3	3/16	4		18860
1/4	1 1/2	4	1/4	4		25060
1/4	1	4	1/4	4	25040	
1/4	1 1/2	6	1/4	4		25160
5/16	1 5/8	4	5/16	4		31352
5/16	1	4	5/16	4	31332	
5/16	1 1/2	6	5/16	4		31348
3/8	1 3/4	4	3/8	4		37547
3/8	1	4	3/8	4	37527	
3/8	3	6	3/8	4		37580
1/2	2	4	1/2	4		50040
1/2	1	4	1/2	4	50120	
1/2	3	6	1/2	4		50060
5/8	3	6	5/8	4		62548
5/8	2	6	5/8	4	62532	
3/4	3	6	3/4	4		75040
3/4	2	6	3/4	4	75027	
1	3	6	1	4		99930
1	2	6	1	4	99920	

P	●	●
M	●	●
K	●	●
N	●	●
S		
H		
O		

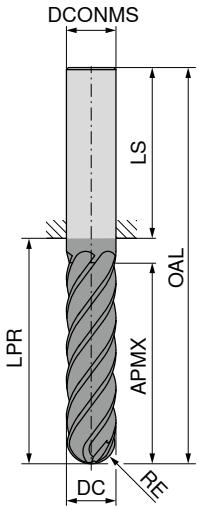
→ v_c/f_z Page 134

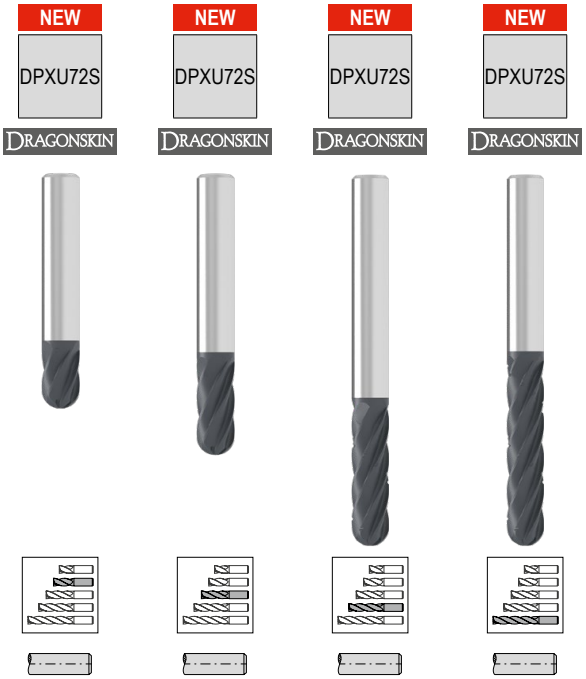
OptiLine – Ball Nosed Cutter

End mills that feature an ultra-high fracture toughness, ensuring durability and stability and are optimized for trochoidal milling and other machining strategies in heat-resistant super alloys or titanium alloys.

▲ Radius accuracy: + 0.000 / - 0.0004

P166 | UN | α β ≠ | λ_s var. | HPC





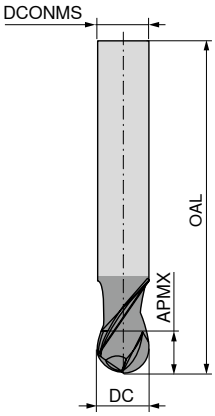
DC +.000/-.002 inch	APMX inch	OAL inch	DCONMS -.0001 / -.0004 inch	ZEFP	59 084 ...	59 084 ...	59 084 ...	59 084 ...
1/4	3/8	2	1/4	6	25015			
1/4	1/2	2 1/2	1/4	6		25020		
1/4	3/4	2 1/2	1/4	6			25030	
1/4	1 1/4	3	1/4	6				25050
5/16	3/4	2 1/2	5/16	6			31324	
5/16	1	3	5/16	6				31332
3/8	1/2	2	3/8	6	37513			
3/8	1	2 1/2	3/8	6		37527		
3/8	1 1/4	3	3/8	6			37533	
3/8	1 1/2	3 1/2	3/8	6				37540
1/2	5/8	2 1/2	1/2	6	50013			
1/2	1	3	1/2	6		50020		
1/2	1 1/4	3	1/2	6			50025	
1/2	1 1/2	4	1/2	6			50030	
1/2	2	4	1/2	6				50040
5/8	3/4	3	5/8	6	62512			
5/8	1 1/4	3 1/2	5/8	6		62520		
5/8	1 5/8	4	5/8	6			62526	
5/8	2	5	5/8	6				62532
3/4	1	3	3/4	6	75013			
3/4	1 1/4	4	3/4	6		75017		
3/4	1 5/8	5	3/4	6			75022	
3/4	2 1/4	5	3/4	6				75030
3/4	3 1/4	6	3/4	6				75043
1	2	4 1/2	1	6		99920		
1	2 1/2	5	1	6			99925	
1	3 1/4	6	1	6				99933
P					●	●	●	●
M					●	●	●	●
K					●	●	●	●
N								
S					●	●	●	●
H								
O								

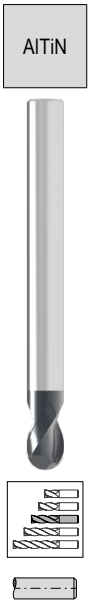
→ v_c/f_z Page 135

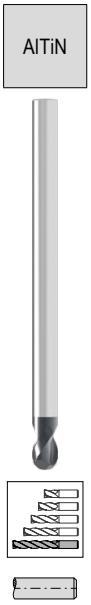
Ball Nosed Cutter

▲ Radius accuracy: + 0.000 / - 0.0004

P250 | ST | λ_s=30° γ_s= 8°







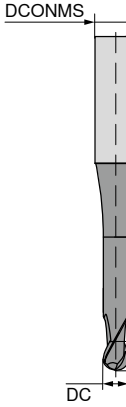
DC +0.000/-0.002 inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 063 ...	59 063 ...
1/8	1/8	3	1/8	2		**12510**
3/16	3/16	3	3/16	2		**18810**
1/4	1/4	4	1/4	2		**25010**
3/8	3/8	4	3/8	2	**37510**	
3/8	3/8	6	3/8	2		**37610**
1/2	1/2	4	1/2	2	**50010**	
1/2	1/2	6	1/2	2		**50110**
P					●	●
M					●	●
K					●	●
N					●	●
S					●	●
H						
O						

→ v_c/f_z Page 136

Ball Nosed Cutter

▲ Radius accuracy: + 0.000 / - 0.0004

P251 | UN | λ_s=30° γ_s= 8°



AlTiN

59 064 ...

DC +/-0.0005 inch	APMX inch	LH inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	
0.031	0.031	5/8	4	1/4	2	**03110**
0.060	0.060	1 1/4	4	1/4	2	**06010**
0.080	0.080	1 5/8	4	1/4	2	**08010**
0.094	0.094	1 7/8	4	1/4	2	**09410**
0.125	0.125	2 1/2	4	1/4	2	**12510**
0.188	0.188	2.265	4	1/4	2	**18810**

P	●
M	●
K	●
N	●
S	●
H	
O	

→ v_c/f_z Page 137

Ball Nosed Cutter

▲ Radius accuracy: + 0.000 / - 0.0004

P252 | UN | λ_s=30° γ_s= 8°

AlTiN

59 065 ...

DC +/-0.0005 inch	APMX inch	LH inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	
0.031	0.031	2.125	4	1/4	2	**03110**
0.060	0.060	1.875	4	1/4	2	**06010**
0.080	0.080	1.704	4	1/4	2	**08010**
0.094	0.094	1.584	4	1/4	2	**09410**
0.125	0.125	1.324	4	1/4	2	**12510**
0.188	0.188	0.785	4	1/4	2	**18810**

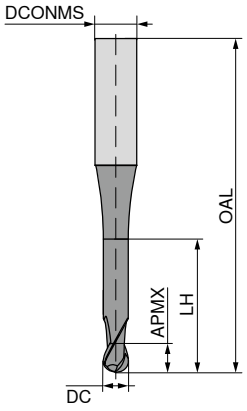
P	●
M	●
K	●
N	●
S	●
H	
O	

→ v_c/f_z Page 137

Ball Nosed Cutter

▲ Radius accuracy: + 0.000 / - 0.0004

P253 | UN | λ_s=30° γ_s= 8°



AlTiN

59 066 ...

DC +/-0.0005 inch	APMX inch	LH inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	
0.031	0.031	1.282	4	1/4	2	**03110**
0.060	0.060	1.175	4	1/4	2	**06010**
0.080	0.080	1.084	4	1/4	2	**08010**
0.094	0.094	1.018	4	1/4	2	**09410**
0.125	0.125	0.897	4	1/4	2	**12510**
0.188	0.188	0.687	4	1/4	2	**18810**

P	●
M	●
K	●
N	●
S	●
H	
O	

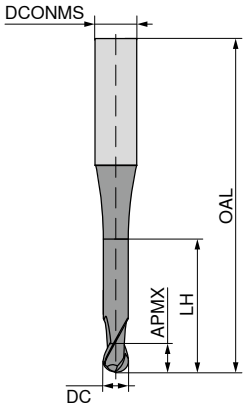
→ v_c/f_z Page 137

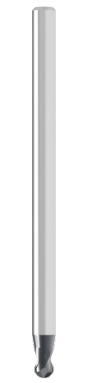
Ball Nosed Cutter 8°

▲ Radius accuracy: + 0.000 / - 0.0004

P254 | UN | λ_s=30° γ_s= 8°

AlTiN





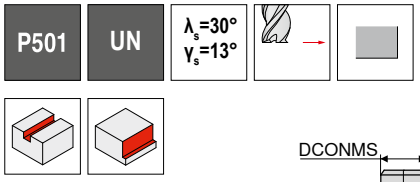
59 067 ...

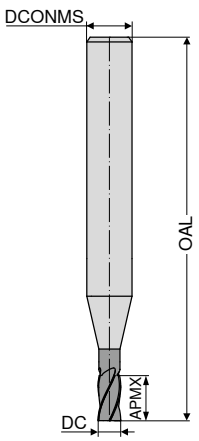
DC +/-0.0005 inch	APMX inch	LH inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	
0.031	0.031	0.773	4	1/4	2	**03110**
0.060	0.060	0.726	4	1/4	2	**06010**
0.080	0.080	0.690	4	1/4	2	**08010**
0.094	0.094	0.750	4	1/4	2	**09410**
0.125	0.125	0.636	4	1/4	2	**12510**
0.188	0.188	0.454	4	1/4	2	**18810**

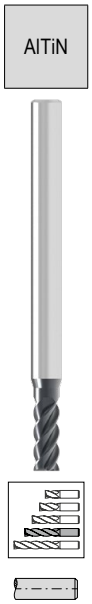
P	●
M	●
K	●
N	●
S	●
H	
O	

→ v_c/f_z Page 137

Micro end milling cutter







59 007 ...

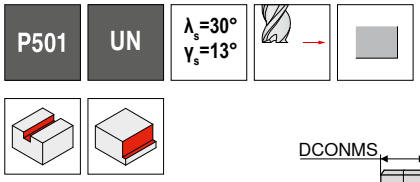
DC +/-0.0005 inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	
0.005	0.015	1 1/2	1/8	4	**00530**
0.006	0.018	1 1/2	1/8	4	**00630**
0.007	0.021	1 1/2	1/8	4	**00730**
0.008	0.024	1 1/2	1/8	4	**00830**
0.009	0.027	1 1/2	1/8	4	**00930**
0.010	0.030	1 1/2	1/8	4	**01030**
0.011	0.033	1 1/2	1/8	4	**01130**
0.012	0.036	1 1/2	1/8	4	**01230**
0.013	0.039	1 1/2	1/8	4	**01330**
0.014	0.042	1 1/2	1/8	4	**01430**
0.015	0.045	1 1/2	1/8	4	**01530**
0.016	0.048	1 1/2	1/8	4	**01630**
0.017	0.051	1 1/2	1/8	4	**01730**
0.018	0.054	1 1/2	1/8	4	**01830**
0.019	0.057	1 1/2	1/8	4	**01930**
0.020	0.060	1 1/2	1/8	4	**02030**
0.021	0.063	1 1/2	1/8	4	**02130**
0.022	0.066	1 1/2	1/8	4	**02230**
0.023	0.069	1 1/2	1/8	4	**02330**
0.024	0.072	1 1/2	1/8	4	**02430**
0.025	0.075	1 1/2	1/8	4	**02530**
0.026	0.078	1 1/2	1/8	4	**02630**
0.027	0.081	1 1/2	1/8	4	**02730**
0.028	0.084	1 1/2	1/8	4	**02830**
0.029	0.087	1 1/2	1/8	4	**02930**
0.030	0.090	1 1/2	1/8	4	**03030**
0.031	0.093	1 1/2	1/8	4	**03130**
0.032	0.096	1 1/2	1/8	4	**03230**
0.033	0.099	1 1/2	1/8	4	**03330**
0.034	0.102	1 1/2	1/8	4	**03430**
0.035	0.105	1 1/2	1/8	4	**03530**
0.036	0.108	1 1/2	1/8	4	**03630**
0.037	0.111	1 1/2	1/8	4	**03730**
0.038	0.114	1 1/2	1/8	4	**03830**
0.039	0.117	1 1/2	1/8	4	**03930**
0.040	0.120	1 1/2	1/8	4	**04030**
0.041	0.123	1 1/2	1/8	4	**04130**
0.042	0.126	1 1/2	1/8	4	**04230**
0.043	0.129	1 1/2	1/8	4	**04330**
0.044	0.132	1 1/2	1/8	4	**04430**
0.045	0.135	1 1/2	1/8	4	**04530**

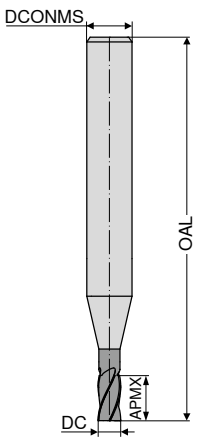
P	●
M	●
K	●
N	●
S	●
H	
O	

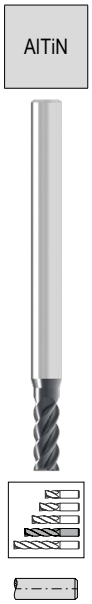
→ v_c/f_z Page 138+139

Continued on next page

Micro end milling cutter







59 007 ...

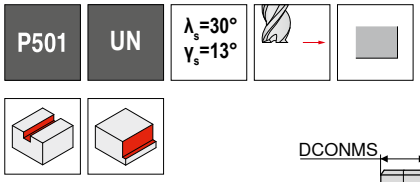
DC +/-0.0005 inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	
0.046	0.138	1 1/2	1/8	4	**04630**
0.047	0.141	1 1/2	1/8	4	**04730**
0.048	0.144	1 1/2	1/8	4	**04830**
0.049	0.147	1 1/2	1/8	4	**04930**
0.050	0.150	1 1/2	1/8	4	**05030**
0.051	0.153	1 1/2	1/8	4	**05130**
0.052	0.156	1 1/2	1/8	4	**05230**
0.053	0.159	1 1/2	1/8	4	**05330**
0.054	0.162	1 1/2	1/8	4	**05430**
0.055	0.165	1 1/2	1/8	4	**05530**
0.056	0.168	1 1/2	1/8	4	**05630**
0.057	0.171	1 1/2	1/8	4	**05730**
0.058	0.174	1 1/2	1/8	4	**05830**
0.059	0.177	1 1/2	1/8	4	**05930**
0.060	0.180	1 1/2	1/8	4	**06030**
0.061	0.183	1 1/2	1/8	4	**06130**
0.062	0.186	1 1/2	1/8	4	**06230**
0.063	0.189	1 1/2	1/8	4	**06330**
0.064	0.192	1 1/2	1/8	4	**06430**
0.065	0.195	1 1/2	1/8	4	**06530**
0.066	0.198	1 1/2	1/8	4	**06630**
0.067	0.201	1 1/2	1/8	4	**06730**
0.068	0.204	1 1/2	1/8	4	**06830**
0.069	0.207	1 1/2	1/8	4	**06930**
0.070	0.210	1 1/2	1/8	4	**07030**
0.071	0.213	1 1/2	1/8	4	**07130**
0.072	0.216	1 1/2	1/8	4	**07230**
0.073	0.219	1 1/2	1/8	4	**07330**
0.074	0.222	1 1/2	1/8	4	**07430**
0.075	0.225	1 1/2	1/8	4	**07530**
0.076	0.228	1 1/2	1/8	4	**07630**
0.077	0.231	1 1/2	1/8	4	**07730**
0.078	0.234	1 1/2	1/8	4	**07830**
0.079	0.237	1 1/2	1/8	4	**07930**
0.080	0.240	1 1/2	1/8	4	**08030**
0.081	0.243	1 1/2	1/8	4	**08130**
0.082	0.246	1 1/2	1/8	4	**08230**
0.083	0.249	1 1/2	1/8	4	**08330**
0.084	0.252	1 1/2	1/8	4	**08430**
0.085	0.255	1 1/2	1/8	4	**08530**
0.086	0.258	1 1/2	1/8	4	**08630**

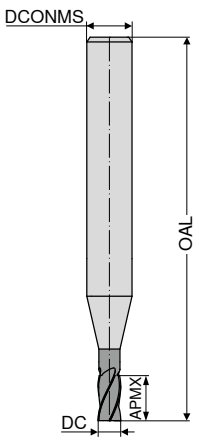
P	●
M	●
K	●
N	●
S	●
H	
O	

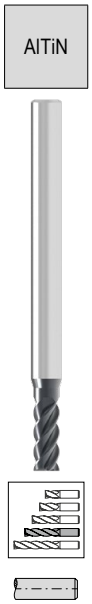
→ v_c/f_z Page 138+139

Continued on next page

Micro end milling cutter







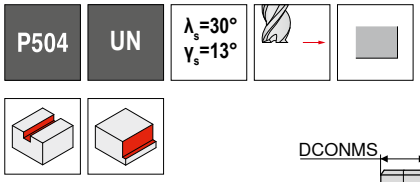
59 007 ...

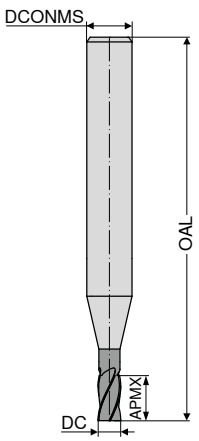
DC +/-0.0005 inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	
0.087	0.261	1 1/2	1/8	4	**08730**
0.088	0.264	1 1/2	1/8	4	**08830**
0.089	0.267	1 1/2	1/8	4	**08930**
0.090	0.270	1 1/2	1/8	4	**09030**
0.091	0.273	1 1/2	1/8	4	**09130**
0.092	0.276	1 1/2	1/8	4	**09230**
0.093	0.279	1 1/2	1/8	4	**09330**
0.094	0.282	1 1/2	1/8	4	**09430**
0.095	0.285	1 1/2	1/8	4	**09530**
0.096	0.288	1 1/2	1/8	4	**09630**
0.097	0.291	1 1/2	1/8	4	**09730**
0.098	0.294	1 1/2	1/8	4	**09830**
0.099	0.297	1 1/2	1/8	4	**09930**
0.100	0.300	1 1/2	1/8	4	**10030**
0.101	0.303	1 1/2	1/8	4	**10130**
0.102	0.306	1 1/2	1/8	4	**10230**
0.103	0.309	1 1/2	1/8	4	**10330**
0.104	0.312	1 1/2	1/8	4	**10430**
0.105	0.315	1 1/2	1/8	4	**10530**
0.106	0.318	1 1/2	1/8	4	**10630**
0.107	0.321	1 1/2	1/8	4	**10730**
0.108	0.324	1 1/2	1/8	4	**10830**
0.109	0.327	1 1/2	1/8	4	**10930**
0.110	0.330	1 1/2	1/8	4	**11030**
0.111	0.333	1 1/2	1/8	4	**11130**
0.112	0.336	1 1/2	1/8	4	**11230**
0.113	0.339	1 1/2	1/8	4	**11330**
0.114	0.341	1 1/2	1/8	4	**11430**
0.115	0.345	1 1/2	1/8	4	**11530**
0.116	0.348	1 1/2	1/8	4	**11630**
0.117	0.351	1 1/2	1/8	4	**11730**
0.118	0.354	1 1/2	1/8	4	**11830**
0.119	0.357	1 1/2	1/8	4	**11930**
0.120	0.360	1 1/2	1/8	4	**12030**

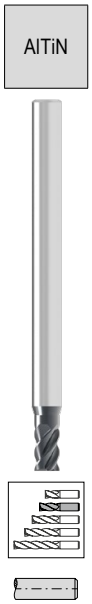
P	●
M	●
K	●
N	●
S	●
H	
O	

→ v_c/f_z Page 138+139

Micro end milling cutter







59 009 ...

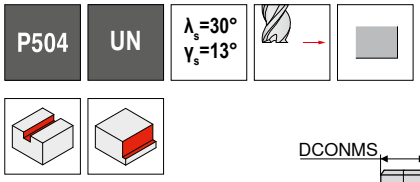
DC +/-0.0005 inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	
0.005	0.008	1 1/2	1/8	4	**00516**
0.006	0.009	1 1/2	1/8	4	**00615**
0.007	0.011	1 1/2	1/8	4	**00716**
0.008	0.012	1 1/2	1/8	4	**00815**
0.009	0.014	1 1/2	1/8	4	**00916**
0.010	0.015	1 1/2	1/8	4	**01015**
0.011	0.017	1 1/2	1/8	4	**01115**
0.012	0.018	1 1/2	1/8	4	**01215**
0.013	0.020	1 1/2	1/8	4	**01315**
0.014	0.021	1 1/2	1/8	4	**01415**
0.015	0.023	1 1/2	1/8	4	**01515**
0.016	0.024	1 1/2	1/8	4	**01615**
0.017	0.026	1 1/2	1/8	4	**01715**
0.018	0.027	1 1/2	1/8	4	**01815**
0.019	0.029	1 1/2	1/8	4	**01915**
0.020	0.030	1 1/2	1/8	4	**02015**
0.021	0.032	1 1/2	1/8	4	**02115**
0.022	0.033	1 1/2	1/8	4	**02215**
0.023	0.035	1 1/2	1/8	4	**02315**
0.024	0.036	1 1/2	1/8	4	**02415**
0.025	0.038	1 1/2	1/8	4	**02515**
0.026	0.039	1 1/2	1/8	4	**02615**
0.027	0.041	1 1/2	1/8	4	**02715**
0.028	0.042	1 1/2	1/8	4	**02815**
0.029	0.044	1 1/2	1/8	4	**02915**
0.030	0.045	1 1/2	1/8	4	**03015**
0.031	0.047	1 1/2	1/8	4	**03115**
0.032	0.048	1 1/2	1/8	4	**03215**
0.033	0.050	1 1/2	1/8	4	**03315**
0.034	0.051	1 1/2	1/8	4	**03415**
0.035	0.053	1 1/2	1/8	4	**03515**
0.036	0.054	1 1/2	1/8	4	**03615**
0.037	0.056	1 1/2	1/8	4	**03715**
0.038	0.057	1 1/2	1/8	4	**03815**
0.039	0.059	1 1/2	1/8	4	**03915**
0.040	0.060	1 1/2	1/8	4	**04015**
0.041	0.062	1 1/2	1/8	4	**04115**
0.042	0.063	1 1/2	1/8	4	**04215**
0.043	0.065	1 1/2	1/8	4	**04315**
0.044	0.066	1 1/2	1/8	4	**04415**
0.045	0.068	1 1/2	1/8	4	**04515**

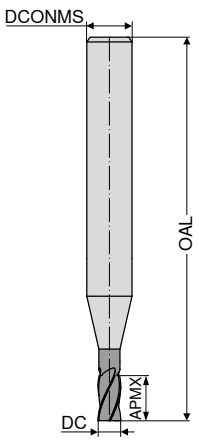
P	●
M	●
K	●
N	●
S	●
H	
O	

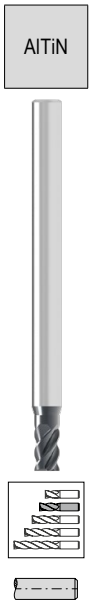
→ v_c/f_z Page 140

Continued on next page

Micro end milling cutter







59 009 ...

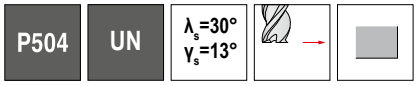
DC +/-0.0005 inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	
0.046	0.069	1 1/2	1/8	4	**04615**
0.047	0.071	1 1/2	1/8	4	**04715**
0.048	0.072	1 1/2	1/8	4	**04815**
0.049	0.074	1 1/2	1/8	4	**04915**
0.050	0.075	1 1/2	1/8	4	**05015**
0.051	0.077	1 1/2	1/8	4	**05115**
0.052	0.078	1 1/2	1/8	4	**05215**
0.053	0.080	1 1/2	1/8	4	**05315**
0.054	0.081	1 1/2	1/8	4	**05415**
0.055	0.083	1 1/2	1/8	4	**05515**
0.056	0.084	1 1/2	1/8	4	**05615**
0.057	0.086	1 1/2	1/8	4	**05715**
0.058	0.087	1 1/2	1/8	4	**05815**
0.059	0.089	1 1/2	1/8	4	**05915**
0.060	0.090	1 1/2	1/8	4	**06015**
0.061	0.092	1 1/2	1/8	4	**06115**
0.062	0.093	1 1/2	1/8	4	**06215**
0.063	0.095	1 1/2	1/8	4	**06315**
0.064	0.096	1 1/2	1/8	4	**06415**
0.065	0.098	1 1/2	1/8	4	**06515**
0.066	0.099	1 1/2	1/8	4	**06615**
0.067	0.101	1 1/2	1/8	4	**06715**
0.068	0.102	1 1/2	1/8	4	**06815**
0.069	0.104	1 1/2	1/8	4	**06915**
0.070	0.105	1 1/2	1/8	4	**07015**
0.071	0.107	1 1/2	1/8	4	**07115**
0.072	0.108	1 1/2	1/8	4	**07215**
0.073	0.110	1 1/2	1/8	4	**07315**
0.074	0.111	1 1/2	1/8	4	**07415**
0.075	0.113	1 1/2	1/8	4	**07515**
0.076	0.114	1 1/2	1/8	4	**07615**
0.077	0.116	1 1/2	1/8	4	**07715**
0.078	0.117	1 1/2	1/8	4	**07815**
0.079	0.119	1 1/2	1/8	4	**07915**
0.080	0.120	1 1/2	1/8	4	**08015**
0.081	0.122	1 1/2	1/8	4	**08115**
0.082	0.123	1 1/2	1/8	4	**08215**
0.083	0.125	1 1/2	1/8	4	**08315**
0.084	0.126	1 1/2	1/8	4	**08415**
0.085	0.128	1 1/2	1/8	4	**08515**
0.086	0.129	1 1/2	1/8	4	**08615**

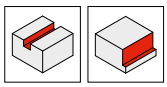
P	●
M	●
K	●
N	●
S	●
H	
O	

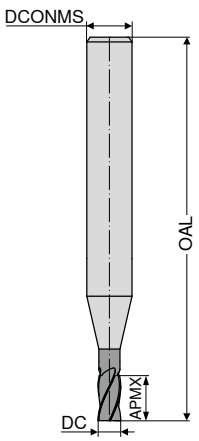
→ v_c/f_z Page 140

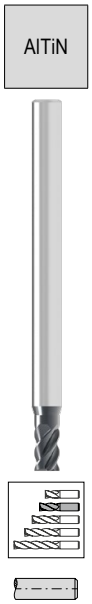
Continued on next page

Micro end milling cutter









59 009 ...

DC +/-0.0005 inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	
0.087	0.131	1 1/2	1/8	4	**08715**
0.088	0.132	1 1/2	1/8	4	**08815**
0.089	0.134	1 1/2	1/8	4	**08915**
0.090	0.135	1 1/2	1/8	4	**09015**
0.091	0.137	1 1/2	1/8	4	**09115**
0.092	0.138	1 1/2	1/8	4	**09215**
0.093	0.140	1 1/2	1/8	4	**09315**
0.094	0.141	1 1/2	1/8	4	**09415**
0.095	0.143	1 1/2	1/8	4	**09515**
0.096	0.144	1 1/2	1/8	4	**09615**
0.097	0.146	1 1/2	1/8	4	**09715**
0.098	0.147	1 1/2	1/8	4	**09815**
0.099	0.149	1 1/2	1/8	4	**09915**
0.100	0.150	1 1/2	1/8	4	**10015**
0.101	0.152	1 1/2	1/8	4	**10115**
0.102	0.153	1 1/2	1/8	4	**10215**
0.103	0.155	1 1/2	1/8	4	**10315**
0.104	0.156	1 1/2	1/8	4	**10415**
0.105	0.158	1 1/2	1/8	4	**10515**
0.106	0.159	1 1/2	1/8	4	**10615**
0.107	0.161	1 1/2	1/8	4	**10715**
0.108	0.162	1 1/2	1/8	4	**10815**
0.109	0.164	1 1/2	1/8	4	**10915**
0.110	0.165	1 1/2	1/8	4	**11015**
0.111	0.167	1 1/2	1/8	4	**11115**
0.112	0.168	1 1/2	1/8	4	**11215**
0.113	0.170	1 1/2	1/8	4	**11315**
0.114	0.171	1 1/2	1/8	4	**11415**
0.115	0.173	1 1/2	1/8	4	**11515**
0.116	0.174	1 1/2	1/8	4	**11615**
0.117	0.176	1 1/2	1/8	4	**11715**
0.118	0.177	1 1/2	1/8	4	**11815**
0.119	0.179	1 1/2	1/8	4	**11915**
0.120	0.180	1 1/2	1/8	4	**12015**

P	●
M	●
K	●
N	●
S	●
H	
O	

→ v_c/f_z Page 140

Micro ball nosed cutter

▲ Radius accuracy: +/- 0.001 for Ø ≤ 0.060
+/- 0.0015 for Ø > 0.060

P503 | UN | λ_s=30° γ_s=13°

AlTiN

59 008 ...

DC +/-0.0005 inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	
0.005	0.015	1 1/2	1/8	4	**00530**
0.006	0.018	1 1/2	1/8	4	**00630**
0.007	0.021	1 1/2	1/8	4	**00730**
0.008	0.024	1 1/2	1/8	4	**00830**
0.009	0.027	1 1/2	1/8	4	**00930**
0.010	0.030	1 1/2	1/8	4	**01030**
0.011	0.033	1 1/2	1/8	4	**01130**
0.012	0.036	1 1/2	1/8	4	**01230**
0.013	0.039	1 1/2	1/8	4	**01330**
0.014	0.042	1 1/2	1/8	4	**01430**
0.015	0.045	1 1/2	1/8	4	**01530**
0.016	0.048	1 1/2	1/8	4	**01630**
0.017	0.051	1 1/2	1/8	4	**01730**
0.018	0.054	1 1/2	1/8	4	**01830**
0.019	0.057	1 1/2	1/8	4	**01930**
0.020	0.060	1 1/2	1/8	4	**02030**
0.021	0.063	1 1/2	1/8	4	**02130**
0.022	0.066	1 1/2	1/8	4	**02230**
0.023	0.069	1 1/2	1/8	4	**02330**
0.024	0.072	1 1/2	1/8	4	**02430**
0.025	0.075	1 1/2	1/8	4	**02530**
0.026	0.078	1 1/2	1/8	4	**02630**
0.027	0.081	1 1/2	1/8	4	**02730**
0.028	0.084	1 1/2	1/8	4	**02830**
0.029	0.087	1 1/2	1/8	4	**02930**
0.030	0.090	1 1/2	1/8	4	**03030**
0.031	0.093	1 1/2	1/8	4	**03130**
0.032	0.096	1 1/2	1/8	4	**03230**
0.033	0.099	1 1/2	1/8	4	**03330**
0.034	0.102	1 1/2	1/8	4	**03430**
0.035	0.105	1 1/2	1/8	4	**03530**
0.036	0.108	1 1/2	1/8	4	**03630**
0.037	0.111	1 1/2	1/8	4	**03730**
0.038	0.114	1 1/2	1/8	4	**03830**
0.039	0.117	1 1/2	1/8	4	**03930**
0.040	0.120	1 1/2	1/8	4	**04030**
0.041	0.123	1 1/2	1/8	4	**04130**
0.042	0.126	1 1/2	1/8	4	**04230**
0.043	0.129	1 1/2	1/8	4	**04330**
0.044	0.132	1 1/2	1/8	4	**04430**
0.045	0.135	1 1/2	1/8	4	**04530**
0.046	0.138	1 1/2	1/8	4	**04630**
0.047	0.141	1 1/2	1/8	4	**04730**

P	●
M	●
K	●
N	●
S	●
H	
O	

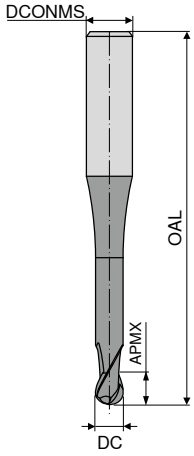
→ v_c/f_z Page 138

Continued on next page

Micro ball nosed cutter

▲ Radius accuracy: +/- 0.001 for Ø ≤ 0.060
+/- 0.0015 for Ø > 0.060

P503 | UN | λ_s=30° γ_s=13°



AlTiN

59 008 ...

DC +/-0.0005 inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	
0.048	0.144	1 1/2	1/8	4	**04830**
0.049	0.147	1 1/2	1/8	4	**04930**
0.050	0.150	1 1/2	1/8	4	**05030**
0.051	0.153	1 1/2	1/8	4	**05130**
0.052	0.156	1 1/2	1/8	4	**05230**
0.053	0.159	1 1/2	1/8	4	**05330**
0.054	0.162	1 1/2	1/8	4	**05430**
0.055	0.165	1 1/2	1/8	4	**05530**
0.056	0.168	1 1/2	1/8	4	**05630**
0.057	0.171	1 1/2	1/8	4	**05730**
0.058	0.174	1 1/2	1/8	4	**05830**
0.059	0.177	1 1/2	1/8	4	**05930**
0.060	0.180	1 1/2	1/8	4	**06030**
0.061	0.183	1 1/2	1/8	4	**06130**
0.062	0.186	1 1/2	1/8	4	**06230**
0.063	0.189	1 1/2	1/8	4	**06330**
0.064	0.192	1 1/2	1/8	4	**06430**
0.065	0.195	1 1/2	1/8	4	**06530**
0.066	0.198	1 1/2	1/8	4	**06630**
0.067	0.201	1 1/2	1/8	4	**06730**
0.068	0.204	1 1/2	1/8	4	**06830**
0.069	0.207	1 1/2	1/8	4	**06930**
0.070	0.210	1 1/2	1/8	4	**07030**
0.071	0.213	1 1/2	1/8	4	**07130**
0.072	0.216	1 1/2	1/8	4	**07230**
0.073	0.219	1 1/2	1/8	4	**07330**
0.074	0.222	1 1/2	1/8	4	**07430**
0.075	0.225	1 1/2	1/8	4	**07530**
0.076	0.228	1 1/2	1/8	4	**07630**
0.077	0.231	1 1/2	1/8	4	**07730**
0.078	0.234	1 1/2	1/8	4	**07830**
0.079	0.237	1 1/2	1/8	4	**07930**
0.080	0.240	1 1/2	1/8	4	**08030**
0.081	0.243	1 1/2	1/8	4	**08130**
0.082	0.246	1 1/2	1/8	4	**08230**
0.083	0.249	1 1/2	1/8	4	**08330**
0.084	0.252	1 1/2	1/8	4	**08430**
0.085	0.255	1 1/2	1/8	4	**08530**
0.086	0.258	1 1/2	1/8	4	**08630**
0.087	0.261	1 1/2	1/8	4	**08730**
0.088	0.264	1 1/2	1/8	4	**08830**
0.089	0.267	1 1/2	1/8	4	**08930**
0.090	0.270	1 1/2	1/8	4	**09030**

P	●
M	●
K	●
N	●
S	●
H	
O	

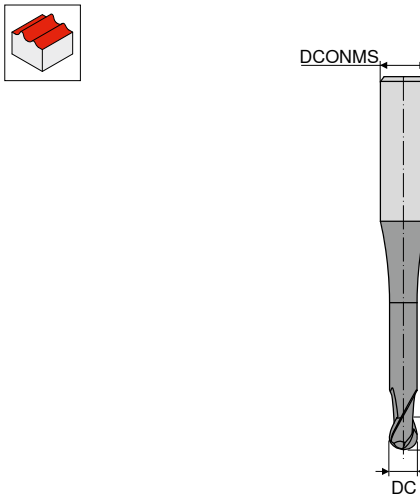
→ v_c/f_z Page 138

Continued on next page

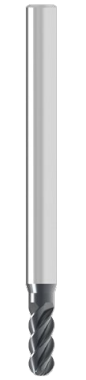
Micro ball nosed cutter

▲ Radius accuracy: +/- 0.001 for Ø ≤ 0.060
+/- 0.0015 for Ø > 0.060

P503 | UN | λ_s=30° γ_s=13°



AlTiN



59 008 ...

DC +/-0.0005 inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	
0.091	0.273	1 1/2	1/8	4	**09130**
0.092	0.276	1 1/2	1/8	4	**09230**
0.093	0.279	1 1/2	1/8	4	**09330**
0.094	0.282	1 1/2	1/8	4	**09430**
0.095	0.285	1 1/2	1/8	4	**09530**
0.096	0.288	1 1/2	1/8	4	**09630**
0.097	0.291	1 1/2	1/8	4	**09730**
0.098	0.294	1 1/2	1/8	4	**09830**
0.099	0.297	1 1/2	1/8	4	**09930**
0.100	0.300	1 1/2	1/8	4	**10030**
0.101	0.303	1 1/2	1/8	4	**10130**
0.102	0.306	1 1/2	1/8	4	**10230**
0.103	0.309	1 1/2	1/8	4	**10330**
0.104	0.312	1 1/2	1/8	4	**10430**
0.105	0.315	1 1/2	1/8	4	**10530**
0.106	0.318	1 1/2	1/8	4	**10630**
0.107	0.321	1 1/2	1/8	4	**10730**
0.108	0.324	1 1/2	1/8	4	**10830**
0.109	0.327	1 1/2	1/8	4	**10930**
0.110	0.330	1 1/2	1/8	4	**11030**
0.111	0.333	1 1/2	1/8	4	**11130**
0.112	0.336	1 1/2	1/8	4	**11230**
0.113	0.339	1 1/2	1/8	4	**11330**
0.114	0.341	1 1/2	1/8	4	**11430**
0.115	0.345	1 1/2	1/8	4	**11530**
0.116	0.348	1 1/2	1/8	4	**11630**
0.117	0.351	1 1/2	1/8	4	**11730**
0.118	0.354	1 1/2	1/8	4	**11830**
0.119	0.357	1 1/2	1/8	4	**11930**
0.120	0.360	1 1/2	1/8	4	**12030**

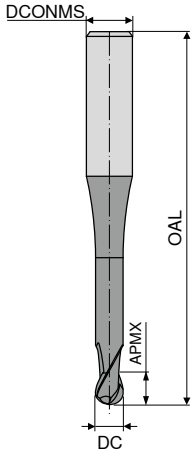
P	●
M	●
K	●
N	●
S	●
H	
O	

→ v_c/f_z Page 138

Micro ball nosed cutter

▲ Radius accuracy: +/- 0.001 for Ø ≤ 0.060
+/- 0.0015 for Ø > 0.060

P506 | UN | λ_s=30° γ_s=13°



AlTiN

59 010 ...

DC +/-0.0005 inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	
0.005	0.008	1 1/2	1/8	4	**00516**
0.006	0.009	1 1/2	1/8	4	**00615**
0.007	0.011	1 1/2	1/8	4	**00716**
0.008	0.012	1 1/2	1/8	4	**00815**
0.009	0.014	1 1/2	1/8	4	**00916**
0.010	0.015	1 1/2	1/8	4	**01015**
0.011	0.017	1 1/2	1/8	4	**01115**
0.012	0.018	1 1/2	1/8	4	**01215**
0.013	0.020	1 1/2	1/8	4	**01315**
0.014	0.021	1 1/2	1/8	4	**01415**
0.015	0.023	1 1/2	1/8	4	**01515**
0.016	0.024	1 1/2	1/8	4	**01615**
0.017	0.026	1 1/2	1/8	4	**01715**
0.018	0.027	1 1/2	1/8	4	**01815**
0.019	0.029	1 1/2	1/8	4	**01915**
0.020	0.030	1 1/2	1/8	4	**02015**
0.021	0.032	1 1/2	1/8	4	**02115**
0.022	0.033	1 1/2	1/8	4	**02215**
0.023	0.035	1 1/2	1/8	4	**02315**
0.024	0.036	1 1/2	1/8	4	**02415**
0.025	0.038	1 1/2	1/8	4	**02515**
0.026	0.039	1 1/2	1/8	4	**02615**
0.027	0.041	1 1/2	1/8	4	**02715**
0.028	0.042	1 1/2	1/8	4	**02815**
0.029	0.044	1 1/2	1/8	4	**02915**
0.030	0.045	1 1/2	1/8	4	**03015**
0.031	0.047	1 1/2	1/8	4	**03115**
0.032	0.048	1 1/2	1/8	4	**03215**
0.033	0.050	1 1/2	1/8	4	**03315**
0.034	0.051	1 1/2	1/8	4	**03415**
0.035	0.053	1 1/2	1/8	4	**03515**
0.036	0.054	1 1/2	1/8	4	**03615**
0.037	0.056	1 1/2	1/8	4	**03715**
0.038	0.057	1 1/2	1/8	4	**03815**
0.039	0.059	1 1/2	1/8	4	**03915**
0.040	0.060	1 1/2	1/8	4	**04015**
0.041	0.062	1 1/2	1/8	4	**04115**
0.042	0.063	1 1/2	1/8	4	**04215**
0.043	0.065	1 1/2	1/8	4	**04315**
0.044	0.066	1 1/2	1/8	4	**04415**
0.045	0.068	1 1/2	1/8	4	**04515**
0.046	0.069	1 1/2	1/8	4	**04615**
0.047	0.071	1 1/2	1/8	4	**04715**

P	●
M	●
K	●
N	●
S	●
H	
O	

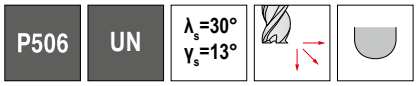
→ v_c/f_z Page 140

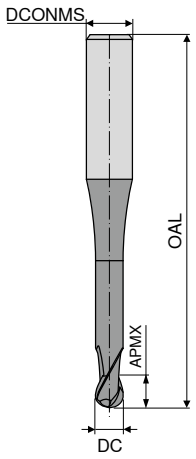
Continued on next page

Micro ball nosed cutter

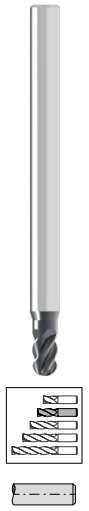
▲ Radius accuracy: +/- 0.001 for Ø ≤ 0.060
+/- 0.0015 for Ø > 0.060

P506 | UN | λ_s=30° γ_s=13°





AlTiN



59 010 ...

DC +/-0.0005 inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	
0.048	0.072	1 1/2	1/8	4	**04815**
0.049	0.074	1 1/2	1/8	4	**04915**
0.050	0.075	1 1/2	1/8	4	**05015**
0.051	0.077	1 1/2	1/8	4	**05115**
0.052	0.078	1 1/2	1/8	4	**05215**
0.053	0.080	1 1/2	1/8	4	**05315**
0.054	0.081	1 1/2	1/8	4	**05415**
0.055	0.083	1 1/2	1/8	4	**05515**
0.056	0.084	1 1/2	1/8	4	**05615**
0.057	0.086	1 1/2	1/8	4	**05715**
0.058	0.087	1 1/2	1/8	4	**05815**
0.059	0.089	1 1/2	1/8	4	**05915**
0.060	0.090	1 1/2	1/8	4	**06015**
0.061	0.092	1 1/2	1/8	4	**06115**
0.062	0.093	1 1/2	1/8	4	**06215**
0.063	0.095	1 1/2	1/8	4	**06315**
0.064	0.096	1 1/2	1/8	4	**06415**
0.065	0.098	1 1/2	1/8	4	**06515**
0.066	0.099	1 1/2	1/8	4	**06615**
0.067	0.101	1 1/2	1/8	4	**06715**
0.068	0.102	1 1/2	1/8	4	**06815**
0.069	0.104	1 1/2	1/8	4	**06915**
0.070	0.105	1 1/2	1/8	4	**07015**
0.071	0.107	1 1/2	1/8	4	**07115**
0.072	0.108	1 1/2	1/8	4	**07215**
0.073	0.110	1 1/2	1/8	4	**07315**
0.074	0.111	1 1/2	1/8	4	**07415**
0.075	0.113	1 1/2	1/8	4	**07515**
0.076	0.114	1 1/2	1/8	4	**07615**
0.077	0.116	1 1/2	1/8	4	**07715**
0.078	0.117	1 1/2	1/8	4	**07815**
0.079	0.119	1 1/2	1/8	4	**07915**
0.080	0.120	1 1/2	1/8	4	**08015**
0.081	0.122	1 1/2	1/8	4	**08115**
0.082	0.123	1 1/2	1/8	4	**08215**
0.083	0.125	1 1/2	1/8	4	**08315**
0.084	0.126	1 1/2	1/8	4	**08415**
0.085	0.128	1 1/2	1/8	4	**08515**
0.086	0.129	1 1/2	1/8	4	**08615**
0.087	0.131	1 1/2	1/8	4	**08715**
0.088	0.132	1 1/2	1/8	4	**08815**
0.089	0.134	1 1/2	1/8	4	**08915**
0.090	0.135	1 1/2	1/8	4	**09015**

P	●
M	●
K	●
N	●
S	●
H	
O	

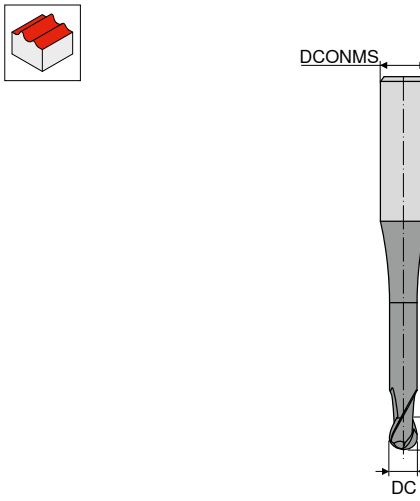
→ v_c/f_z Page 140

Continued on next page

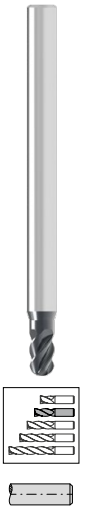
Micro ball nosed cutter

▲ Radius accuracy: +/- 0.001 for Ø ≤ 0.060
+/- 0.0015 for Ø > 0.060

P506 | UN | λ_s=30° γ_s=13°



AlTiN



59 010 ...

DC +/-0.0005 inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	
0.091	0.137	1 1/2	1/8	4	**09115**
0.092	0.138	1 1/2	1/8	4	**09215**
0.093	0.140	1 1/2	1/8	4	**09315**
0.094	0.141	1 1/2	1/8	4	**09415**
0.095	0.143	1 1/2	1/8	4	**09515**
0.096	0.144	1 1/2	1/8	4	**09615**
0.097	0.146	1 1/2	1/8	4	**09715**
0.098	0.147	1 1/2	1/8	4	**09815**
0.099	0.149	1 1/2	1/8	4	**09915**
0.100	0.150	1 1/2	1/8	4	**10015**
0.101	0.152	1 1/2	1/8	4	**10115**
0.102	0.153	1 1/2	1/8	4	**10215**
0.103	0.155	1 1/2	1/8	4	**10315**
0.104	0.156	1 1/2	1/8	4	**10415**
0.105	0.158	1 1/2	1/8	4	**10515**
0.106	0.159	1 1/2	1/8	4	**10615**
0.107	0.161	1 1/2	1/8	4	**10715**
0.108	0.162	1 1/2	1/8	4	**10815**
0.109	0.164	1 1/2	1/8	4	**10915**
0.110	0.165	1 1/2	1/8	4	**11015**
0.111	0.167	1 1/2	1/8	4	**11115**
0.112	0.168	1 1/2	1/8	4	**11215**
0.113	0.170	1 1/2	1/8	4	**11315**
0.114	0.171	1 1/2	1/8	4	**11415**
0.115	0.173	1 1/2	1/8	4	**11515**
0.116	0.174	1 1/2	1/8	4	**11615**
0.117	0.176	1 1/2	1/8	4	**11715**
0.118	0.177	1 1/2	1/8	4	**11815**
0.119	0.179	1 1/2	1/8	4	**11915**
0.120	0.180	1 1/2	1/8	4	**12015**

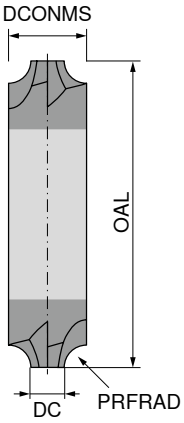
P	●
M	●
K	●
N	●
S	●
H	
O	

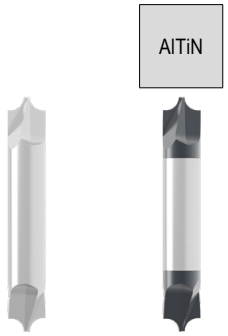
→ v_c/f_z Page 140

Profile end milling cutter

▲ PRFRAD ≤ 1.397 [Inch] Tol. = ± 0.01
▲ PRFRAD > 1.397 [Inch] Tol. = ± 0.015

P137 | UN | λ_s = 0° γ_s=-5°





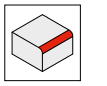
PRFRAD inch	DC +0.000/-0.002 inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 049 ...	59 050 ...
0.010	0.105	1 1/2	1/8	2	12510	12510
0.015	0.095	1 1/2	1/8	2	12515	12515
0.020	0.085	1 1/2	1/8	2	12520	12520
0.025	0.075	1 1/2	1/8	2	12525	12525
0.031	0.063	1 1/2	1/8	2	12531	12531
0.035	0.055	1 1/2	1/8	2	12535	12535
0.040	0.045	1 1/2	1/8	2	12540	12540
0.046	0.095	1 1/2	1/8	2	12546	12546
0.050	0.087	2	3/16	2	18850	18850
0.055	0.077	2	3/16	2	18855	18855
0.062	0.058	2	3/16	2	18862	18862
0.072	0.106	2 1/2	1/4	2	25072	25072
0.078	0.094	2 1/2	1/4	2	25078	25078
0.085	0.080	2 1/2	1/4	2	25085	25085
0.094	0.062	2 1/2	1/4	2	25094	25094
0.100	0.050	2 1/2	1/4	2	25000	25000
0.109	0.094	2 1/2	1/4	2	25009	25009
0.118	0.076	2 1/2	5/16	2	31318	31318
0.125	0.063	2 1/2	5/16	2	31325	31325
0.140	0.095	2 1/2	3/8	2	37540	37540
0.156	0.063	2 1/2	3/8	2	37556	37556
P					●	●
M						
K					●	●
N						
S						
H						
O						

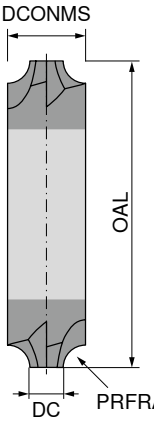
→ v_c/f_z Page 141

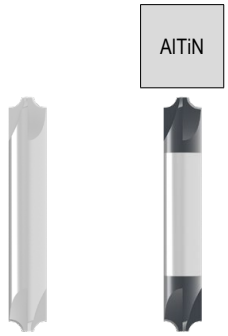
Profile end milling cutter

▲ PRFRAD ≤ 1.397 [Inch] Tol. = ± 0.01
▲ PRFRAD > 1.397 [Inch] Tol. = ± 0.015

P139 | UN | λ_s=0° γ_s=3,5°







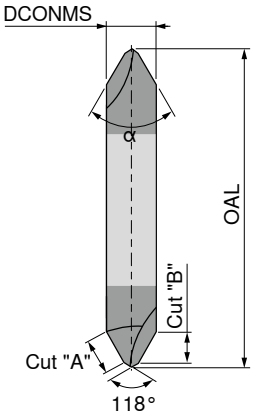
PRFRAD inch	DC +0.000/-0.002 inch	APMX inch	OAL inch	DCONMS -0.0001 / -0.0004 inch	ZEFP	59 051 ...	59 052 ...
0.010	0.162	3/16	2	3/16	4	**18810**	**18810**
0.015	0.152	3/16	2	3/16	4	**18910**	**18910**
0.020	0.142	3/16	2	3/16	4	**19010**	**19010**
0.025	0.132	3/16	2	3/16	4	**19110**	**19110**
0.031	0.120	3/16	2	3/16	4	**19210**	**19210**
0.035	0.112	3/16	2	3/16	4	**19310**	**19310**
0.040	0.165	1/4	2 1/2	1/4	4	**25010**	**25010**
0.046	0.153	1/4	2 1/2	1/4	4	**25110**	**25110**
0.050	0.145	1/4	2 1/2	1/4	4	**25210**	**25210**
0.055	0.135	1/4	2 1/2	1/4	4	**25410**	**25410**
0.062	0.121	1/4	2 1/2	1/4	4	**25310**	**25310**
0.078	0.214	3/8	2 1/2	3/8	4	**37510**	**37510**
0.094	0.182	3/8	2 1/2	3/8	4	**37610**	**37610**
0.100	0.170	3/8	2 1/2	3/8	4	**37710**	**37710**
0.118	0.134	3/8	2 1/2	3/8	4	**37810**	**37810**
0.125	0.120	3/8	2 1/2	3/8	4	**37910**	**37910**
0.156	0.183	1/2	3	1/2	4	**50010**	**50010**
P						●	●
M							
K						●	●
N							
S							
H							
O							

→ v_c/f_z Page 142

14

Chamfer milling cutter 60°

P132 | UN | λ_s=0° γ_s=0°



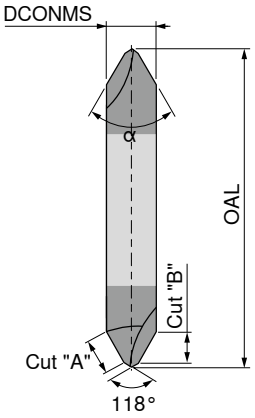
AlTiN

						α = 60°	α = 60°
						59 041 ...	59 042 ...
DC inch	Cut "A" inch	Cut "B" inch	OAL inch	DCONMS inch	ZEFP		
1/8	0.098	0.085	1 1/2	1/8	2	12506	12506
3/16	0.147	0.127	2	3/16	2	18806	18806
1/4	0.200	0.173	2 1/2	1/4	2	25006	25006
3/8	0.313	0.271	2 1/2	3/8	2	37506	37506
1/2	0.430	0.372	3	1/2	2	50006	50006
P						●	●
M							
K						●	●
N							
S							
H							
O							

→ v_c/f_z Page 143

Chamfer milling cutter 60°

P133 | UN | λ_s=0° γ_s=0°



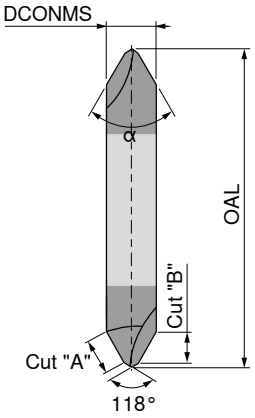
AlTiN

						α = 60°	α = 60°
						59 043 ...	59 044 ...
DC inch	Cut "A" inch	Cut "B" inch	OAL inch	DCONMS inch	ZEFP		
1/4	0.200	0.173	2 1/2	1/4	4	25006	25006
3/8	0.313	0.271	2 1/2	3/8	4	37506	37506
1/2	0.430	0.372	3	1/2	4	50006	50006
P						●	●
M							
K						●	●
N							
S							
H							
O							

→ v_c/f_z Page 145

Chamfer milling cutter 90°

P134 | UN | λ_s=0° γ_s=0°



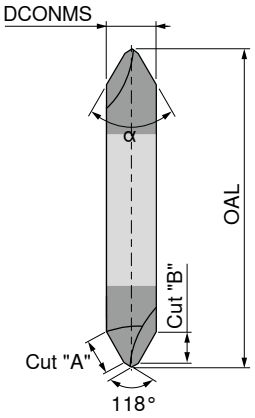
AlTiN

						α = 90°	α = 90°
						59 045 ...	59 046 ...
DC inch	Cut "A" inch	Cut "B" inch	OAL inch	DCONMS inch	ZEFP		
1/8	0.071	0.050	1 1/2	1/8	2	12509	12509
3/16	0.107	0.076	2	3/16	2	18809	18809
1/4	0.141	0.100	2 1/2	1/4	2	25009	25009
3/8	0.221	0.157	2 1/2	3/8	2	37509	37509
1/2	0.304	0.215	3	1/2	2	50009	50009
P						●	●
M							
K						●	●
N							
S							
H							
O							

→ v_c/f_z Page 143

Chamfer milling cutter 90°

P135 | UN | λ_s=0° γ_s=0°



AlTiN

	α = 90°	α = 90°
	59 047 ...	59 048 ...

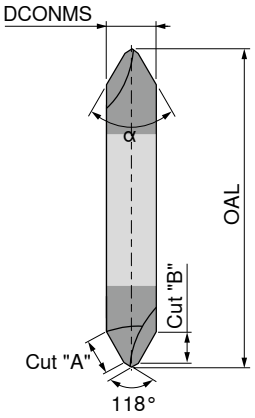
DC inch	Cut "A" inch	Cut "B" inch	OAL inch	DCONMS inch	ZEFP		
1/4	0.141	0.100	2 1/2	1/4	4	**25009**	**25009**
3/8	0.221	0.157	2 1/2	3/8	4	**37509**	**37509**
1/2	0.304	0.215	3	1/2	4	**50009**	**50009**

P	●	●
M		
K	●	●
N		
S		
H		
O		

→ v_c/f_z Page 146

Chamfer milling cutter 120°

P130 | UN | λ_s=0° γ_s=0°



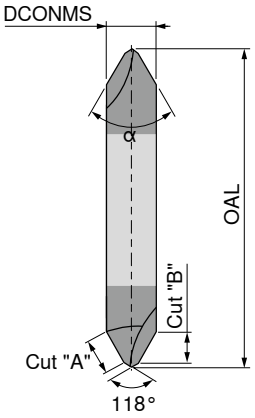
AlTiN

						α = 120°	α = 120°
						59 037 ...	59 038 ...
DC inch	Cut "A" inch	Cut "B" inch	OAL inch	DCONMS inch	ZEFP		
1/4	0.124	0.062	2 1/2	1/4	2	**25012**	**25012**
3/8	0.199	0.100	2 1/2	3/8	2	**37512**	**37512**
1/2	0.266	0.133	3	1/2	2	**50012**	**50012**
P						●	●
M							
K						●	●
N							
S							
H							
O							

→ v_c/f_z Page 144

Chamfer milling cutter 120°

P131 | UN | λ_s=0° γ_s=0°



AlTiN

						α = 120°	α = 120°
						59 039 ...	59 040 ...
DC inch	Cut "A" inch	Cut "B" inch	OAL inch	DCONMS inch	ZEFP		
1/4	0.144	0.072	2 1/2	1/4	4	25012	25012
3/8	0.217	0.108	2 1/2	3/8	4	37512	37512
1/2	0.289	0.144	3	1/2	4	50012	50012
P						●	●
M							
K						●	●
N							
S							
H							
O							

→ v_c/f_z Page 146

Material examples for cutting data tables

	Material sub-group	Index	Composition / Structure / Heat treatment		Tensile strength lbf/in²* / HB / HRC	Material number	Material designation	Material number	Material designation
P	Unalloyed steel	P.1.1	< 0.15 % C	Annealed	60900 lbf/in² / 125 HB	1.0401	1015	1.0301	1010
		P.1.2	< 0.45 % C	Annealed	92800 lbf/in² / 190 HB	1.1191	1045	1.0737	12L14
		P.1.3		Tempered	121800 lbf/in² / 250 HB	1.1191	1045	1.0503	1043
		P.1.4	< 0.75 % C	Annealed	132000 lbf/in² / 270 HB	1.1223	1060	1.0535	1055
		P.1.5		Tempered	146500 lbf/in² / 300 HB	1.1223	1060	1.1274	1095
	Low-alloy steel	P.2.1		Annealed	88500 lbf/in² / 180 HB	1.7131	5115	1.6523	8620
		P.2.2		Tempered	134900 lbf/in² / 275 HB	1.7131	5115	1.6582	4340
		P.2.3		Tempered	146500 lbf/in² / 300 HB	1.7225	4142	1.7131	5115
		P.2.4		Tempered	174000 lbf/in² / 375 HB	1.7225	4142	17223	4140
	High-alloy steel and high-alloy tool steel	P.3.1		Annealed	98600 lbf/in² / 200 HB	1.4021	420	1.2379	D2
		P.3.2		Hardened and tempered	159500 lbf/in² / 300 HB	1.2343	H11	1.3343	M2
		P.3.3		Hardened and tempered	188500 lbf/in² / 400 HB	1.2343	H11	1.2363	A2
	Stainless steel	P.4.1	Ferritic / martensitic	Annealed	98600 lbf/in² / 200 HB	1.4016	430	1.4125	440C
		P.4.2	Martensitic	Tempered	117500 lbf/in² / 250 HB	1.4112	S44003	1.4021	420
M	Stainless steel	M.1.1	Austenitic / austenitic-ferritic	Quenched	88500 lbf/in² / 200 HB	1.4301	304	1.4401	316
		M.2.1	Austenitic	Tempered	300 HB	1.4841	314	1.4568	17-7 PH
		M.3.1	Austenitic / ferritic (Duplex)		113100 lbf/in² / 230 HB	1.4462	S32205	1.4410	S32750
K	Grey cast iron	K.1.1	Pearlitic / ferritic		88500 lbf/in² / 180 HB	0.6010	A48-20B	0.6025	A48-40 B
		K.1.2	Pearlitic (martensitic)		127600 lbf/in² / 260 HB	0.6030	A48-45B	0.6040	A48-60 B
	Spherulitic graphite cast iron	K.2.1	Ferritic		78300 lbf/in² / 160 HB	0.7040	60-40-18	0.7050	65-45-12
		K.2.2	Pearlitic		122600 lbf/in² / 250 HB	0.7070	100-70-03	0.7660	A439 Type D2
	Malleable iron	K.3.1	Ferritic		63800 lbf/in² / 130 HB	0.8035	GTW-35-04		
		K.3.2	Pearlitic		113100 lbf/in² / 230 HB	0.8170	70003		
N	Aluminium wrought alloy	N.1.1	Non-hardenable		60 HB	3.0255	A91060	3.0255	A91060
		N.1.2	Hardenable		49300 lbf/in² / 100 HB	3.1355	2024	3.1355	2024
	Cast aluminium alloy	N.2.1	≤ 12 % Si, non-hardenable		36300 lbf/in² / 75 HB	3.2581	A04130 / A413-0	3.2581	A04130 / A413-0
		N.2.2	≤ 12 % Si, hardenable		43500 lbf/in² / 90 HB	3.2134	G-AlSi5Cu1Mg		
		N.2.3	> 12 % Si, non-hardenable		63800 lbf/in² / 130 HB		G-AlSi17Cu4Mg		
	Copper and copper alloys (bronze/brass)	N.3.1	Free-machining alloys, PB > 1 %		54400 lbf/in² / 110 HB	2.0380	CuZn39Pb2 (Ms58)	2.0380	C37700
		N.3.2	CuZn, CuSnZn		43500 lbf/in² / 90 HB	2.0331	CuZn15	2.0331	C34000
		N.3.3	CuSn, lead-free copper and electrolytic copper		49300 lbf/in² / 100 HB	2.0060	E-Cu57		
	Magnesium alloys	N.4.1	Magnesium and magnesium alloys		70 HB	3.5612	MgAl6Zn		
S	Heat-resistant alloys	S.1.1	Fe - basis	Annealed	98600 lbf/in² / 200 HB	1.4864	X12NiCrSi 36-16	1.4864	330
		S.1.2			137800 lbf/in² / 280 HB	1.4980	X6NiCrTiMoVB25-15-2	1.4980	S66286
		S.2.1	Ni or Co basis	Annealed	121800 lbf/in² / 250 HB	2.4856	Inconel 625	2.4812	Hastelloy C
		S.2.2			171100 lbf/in² / 350 HB	2.4952	Nimonic 80A	2.4668	Inconel 718
		S.2.3		Cast	156600 lbf/in² / 320 HB	2.4674	Nimocast PK24	2.4670	Nimocast 713
	Titanium alloys	S.3.1	Pure titanium		5800 lbf/in²	3.7025	Ti99,8		
		S.3.2	Alpha + beta alloys		152300 lbf/in²	3.7165	TiAl6V4		
		S.3.3	Beta alloys		203100 lbf/in² / 410 HB	Ti555.3	Ti-5Al-5V-5Mo-3Cr		
H	Hardened steel	H.1.1		Hardened and tempered	46-55 HRC				
		H.1.2		Hardened and tempered	56-60 HRC				
		H.1.3		Hardened and tempered	61-65 HRC				
		H.1.4		Hardened and tempered	66-70 HRC				
	Chilled iron	H.2.1		Cast	400 HB				
	Hardened cast iron	H.3.1		Hardened and tempered	55 HRC				
O	Non-metal materials	O.1.1	Plastics, duroplastic		≤ 21800 lbf/in²				
		O.1.2	Plastics, thermoplastic		≤ 14500 lbf/in²				
		O.2.1	Aramid fibre-reinforced		≤ 145000 lbf/in²				
		O.2.2	Glass/carbon-fibre reinforced		≤ 145000 lbf/in²				
		O.3.1	Graphite						

*** Tensile Strength at Rupture (Rm)**

Cutting Data – P220 – End Milling Cutter, short – long

			59 003 ...									
		Ø DC =	1/8"	3/16"	1/4–5/16"	3/8"	1/2"	5/8"	3/4"	● 1st choice		
										○ suitable		
			a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	Emulsion	Compressed air	MQL
Index	v_c ft/min	$a_{p\,max.}$ x DC	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch			
P.1.1												
P.1.2												
P.1.3												
P.1.4												
P.1.5												
P.2.1												
P.2.2												
P.2.3												
P.2.4												
P.3.1												
P.3.2												
P.3.3												
P.4.1												
P.4.2												
M.1.1												
M.2.1												
M.3.1												
K.1.1												
K.1.2												
K.2.1												
K.2.2												
K.3.1												
K.3.2												
N.1.1	1970	1.0	0.0015	0.0019	0.0029	0.0036	0.0050	0.0053	0.0060	●	○	○
N.1.2	1970	1.0	0.0015	0.0019	0.0029	0.0036	0.0050	0.0053	0.0060	●	○	○
N.2.1	1180	1.0	0.0012	0.0015	0.0025	0.0031	0.0044	0.0047	0.0054	●	○	○
N.2.2	1180	1.0	0.0012	0.0015	0.0025	0.0031	0.0044	0.0047	0.0054	●	○	○
N.2.3	790	1.0	0.0012	0.0015	0.0025	0.0031	0.0044	0.0047	0.0054	●	○	○
N.3.1	790	1.0	0.0010	0.0013	0.0020	0.0026	0.0036	0.0039	0.0044	●	○	○
N.3.2	790	1.0	0.0010	0.0013	0.0020	0.0026	0.0036	0.0039	0.0044	●	○	○
N.3.3	560	1.0	0.0010	0.0013	0.0020	0.0026	0.0036	0.0039	0.0044	●	○	○
N.4.1	720	1.0	0.0012	0.0015	0.0025	0.0031	0.0044	0.0047	0.0054	●	○	○
S.1.1												
S.1.2												
S.2.1												
S.2.2												
S.2.3												
S.3.1												
S.3.2												
S.3.3												
H.1.1												
H.1.2												
H.1.3												
H.1.4												
H.2.1												
H.3.1												
O.1.1												
O.1.2												
O.2.1												
O.2.2												
O.3.1												

Cutting Data – S142 – End Milling Cutter, short – extra long

			59 053 ... / 59 054 ...										
		Ø DC =	5/32"	3/16"	1/4–5/16"	11/32–3/8"	1/2"	5/8"	3/4"	1"	● 1st choice		
											○ suitable		
			a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC			
Index	v_c ft/min	$a_{p\,max.}$ x DC	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	Emulsion	Compressed air	MQL
P.1.1													
P.1.2													
P.1.3													
P.1.4													
P.1.5													
P.2.1													
P.2.2													
P.2.3													
P.2.4													
P.3.1													
P.3.2													
P.3.3													
P.4.1													
P.4.2													
M.1.1													
M.2.1													
M.3.1													
K.1.1													
K.1.2													
K.2.1													
K.2.2													
K.3.1													
K.3.2													
N.1.1	980	1.0	0.0015	0.0019	0.0029	0.0036	0.0050	0.0053	0.0060	0.0069	●	○	○
N.1.2	980	1.0	0.0015	0.0019	0.0029	0.0036	0.0050	0.0053	0.0060	0.0069	●	○	○
N.2.1	590	1.0	0.0012	0.0015	0.0025	0.0031	0.0044	0.0047	0.0054	0.0062	●	○	○
N.2.2	590	1.0	0.0012	0.0015	0.0025	0.0031	0.0044	0.0047	0.0054	0.0062	●	○	○
N.2.3	390	1.0	0.0012	0.0015	0.0025	0.0031	0.0044	0.0047	0.0054	0.0062	●	○	○
N.3.1	390	1.0	0.0010	0.0013	0.0020	0.0026	0.0036	0.0039	0.0044	0.0050	●	○	○
N.3.2	390	1.0	0.0010	0.0013	0.0020	0.0026	0.0036	0.0039	0.0044	0.0050	●	○	○
N.3.3	280	1.0	0.0010	0.0013	0.0020	0.0026	0.0036	0.0039	0.0044	0.0050	●	○	○
N.4.1	360	1.0	0.0012	0.0015	0.0025	0.0031	0.0044	0.0047	0.0054	0.0062	●	○	○
S.1.1													
S.1.2													
S.2.1													
S.2.2													
S.2.3													
S.3.1													
S.3.2													
S.3.3													
H.1.1													
H.1.2													
H.1.3													
H.1.4													
H.2.1													
H.3.1													
O.1.1													
O.1.2													
O.2.1													
O.2.2													
O.3.1													

Cutting Data – P109 – End Milling Cutter, extra short – extra long

			59 027 ...												
		Ø DC =	1/8–5/32"	3/16"	7/32"	1/4–9/32–5/16"	3/8"	7/16"	1/2"	9/16–5/8"	3/4"	1"	● 1st choice		
													○ suitable		
			a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	Emulsion	Compressed air	MQL
Index	v_c ft/min	$a_{p\,max.}$ x DC	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch			
P.1.1															
P.1.2															
P.1.3															
P.1.4															
P.1.5															
P.2.1															
P.2.2															
P.2.3															
P.2.4															
P.3.1															
P.3.2															
P.3.3															
P.4.1															
P.4.2															
M.1.1															
M.2.1															
M.3.1															
K.1.1															
K.1.2															
K.2.1															
K.2.2															
K.3.1															
K.3.2															
N.1.1	1380	1.0	0.0012	0.0015	0.0019	0.0025	0.0031	0.0038	0.0044	0.0047	0.0054	0.0062	●	○	○
N.1.2	1380	1.0	0.0012	0.0015	0.0019	0.0025	0.0031	0.0038	0.0044	0.0047	0.0054	0.0062	●	○	○
N.2.1	830	1.0	0.0011	0.0014	0.0017	0.0023	0.0029	0.0035	0.0040	0.0043	0.0049	0.0056	●	○	○
N.2.2	830	1.0	0.0011	0.0014	0.0017	0.0023	0.0029	0.0035	0.0040	0.0043	0.0049	0.0056	●	○	○
N.2.3	550	1.0	0.0011	0.0014	0.0017	0.0023	0.0029	0.0035	0.0040	0.0043	0.0049	0.0056	●	○	○
N.3.1	550	1.0	0.0008	0.0011	0.0013	0.0017	0.0022	0.0026	0.0031	0.0033	0.0037	0.0043	●	○	○
N.3.2	550	1.0	0.0008	0.0011	0.0013	0.0017	0.0022	0.0026	0.0031	0.0033	0.0037	0.0043	●	○	○
N.3.3	390	1.0	0.0008	0.0011	0.0013	0.0017	0.0022	0.0026	0.0031	0.0033	0.0037	0.0043	●	○	○
N.4.1	510	1.0	0.0011	0.0014	0.0017	0.0023	0.0029	0.0035	0.0040	0.0043	0.0049	0.0056	●	○	○
S.1.1															
S.1.2															
S.2.1															
S.2.2															
S.2.3															
S.3.1															
S.3.2															
S.3.3															
H.1.1															
H.1.2															
H.1.3															
H.1.4															
H.2.1															
H.3.1															
O.1.1															
O.1.2															
O.2.1															
O.2.2															
O.3.1															

Cutting Data – P362 – End Milling Cutter, short – extra long

			59 004 ...									
		Ø DC =	3/16"	1/4"	3/8"	1/2"	5/8"	3/4"	1"	● 1st choice		
										○ suitable		
			a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	Emulsion	Compressed air	MQL
Index	v_c ft/min	$a_{p\,max.}$ x DC	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch			
P.1.1												
P.1.2												
P.1.3												
P.1.4												
P.1.5												
P.2.1												
P.2.2												
P.2.3												
P.2.4												
P.3.1												
P.3.2												
P.3.3												
P.4.1												
P.4.2												
M.1.1												
M.2.1												
M.3.1												
K.1.1												
K.1.2												
K.2.1												
K.2.2												
K.3.1												
K.3.2												
N.1.1	1970	1.0	0.0015	0.0025	0.0031	0.0044	0.0047	0.0054	0.0062	●	○	○
N.1.2	1970	1.0	0.0015	0.0025	0.0031	0.0044	0.0047	0.0054	0.0062	●	○	○
N.2.1	1180	1.0	0.0014	0.0023	0.0029	0.0040	0.0043	0.0049	0.0056	●	○	○
N.2.2	1180	1.0	0.0014	0.0023	0.0029	0.0040	0.0043	0.0049	0.0056	●	○	○
N.2.3	790	1.0	0.0014	0.0023	0.0029	0.0040	0.0043	0.0049	0.0056	●	○	○
N.3.1	790	1.0	0.0011	0.0017	0.0022	0.0031	0.0033	0.0037	0.0043	●	○	○
N.3.2	790	1.0	0.0011	0.0017	0.0022	0.0031	0.0033	0.0037	0.0043	●	○	○
N.3.3	560	1.0	0.0011	0.0017	0.0022	0.0031	0.0033	0.0037	0.0043	●	○	○
N.4.1	720	1.0	0.0014	0.0023	0.0029	0.0040	0.0043	0.0049	0.0056	●	○	○
S.1.1												
S.1.2												
S.2.1												
S.2.2												
S.2.3												
S.3.1												
S.3.2												
S.3.3												
H.1.1												
H.1.2												
H.1.3												
H.1.4												
H.2.1												
H.3.1												
O.1.1												
O.1.2												
O.2.1												
O.2.2												
O.3.1												

Cutting Data – P376 – End Milling Cutter, short – extra long

			59 005 ...								
		Ø DC =	1/4–5/16"	3/8"	1/2"	5/8"	3/4"	1"	● 1st choice		
									○ suitable		
			a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	Emulsion	Compressed air	MQL
Index	v_c ft/min	$a_{p\,max.}$ x DC	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch			
P.1.1											
P.1.2											
P.1.3											
P.1.4											
P.1.5											
P.2.1											
P.2.2											
P.2.3											
P.2.4											
P.3.1											
P.3.2											
P.3.3											
P.4.1											
P.4.2											
M.1.1											
M.2.1											
M.3.1											
K.1.1											
K.1.2											
K.2.1											
K.2.2											
K.3.1											
K.3.2											
N.1.1	1640	1.0	0.0012	0.0015	0.0020	0.0022	0.0024	0.0028	●	○	○
N.1.2	1640	1.0	0.0012	0.0015	0.0020	0.0022	0.0024	0.0028	●	○	○
N.2.1	980	1.0	0.0009	0.0012	0.0017	0.0018	0.0020	0.0023	●	○	○
N.2.2	980	1.0	0.0009	0.0012	0.0017	0.0018	0.0020	0.0023	●	○	○
N.2.3	690	1.0	0.0009	0.0012	0.0017	0.0018	0.0020	0.0023	●	○	○
N.3.1	690	1.0	0.0009	0.0012	0.0017	0.0018	0.0020	0.0023	●	○	○
N.3.2	690	1.0	0.0009	0.0012	0.0017	0.0018	0.0020	0.0023	●	○	○
N.3.3	490	1.0	0.0009	0.0012	0.0017	0.0018	0.0020	0.0023	●	○	○
N.4.1	660	1.0	0.0009	0.0012	0.0017	0.0018	0.0020	0.0023	●	○	○
S.1.1											
S.1.2											
S.2.1											
S.2.2											
S.2.3											
S.3.1											
S.3.2											
S.3.3											
H.1.1											
H.1.2											
H.1.3											
H.1.4											
H.2.1											
H.3.1											
O.1.1											
O.1.2											
O.2.1											
O.2.2											
O.3.1											

Cutting Data – S642 – End Milling Cutter, extra short – extra long

			59 068... / 59 069 ...											● 1st choice		
		Ø DC =	1/16"	3/32"	1/8–5/32"	3/16"	7/32"	1/4–9/32–5/16"	3/8"	1/2"	5/8"	3/4"	1"	○ suitable		
			a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	Emulsion	Compressed air	MQL
Index	v_c ft/min	$a_{p\,max.}$ x DC	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch			
P.1.1	220	1.0	0.0006	0.0007	0.0008	0.0010	0.0011	0.0014	0.0017	0.0023	0.0024	0.0027	0.0031	●	○	○
P.1.2	180	1.0	0.0004	0.0005	0.0007	0.0008	0.0009	0.0012	0.0015	0.0020	0.0022	0.0024	0.0028	●	○	○
P.1.3	180	1.0	0.0004	0.0005	0.0007	0.0008	0.0009	0.0012	0.0015	0.0020	0.0022	0.0024	0.0028	●	○	○
P.1.4	160	1.0	0.0004	0.0005	0.0007	0.0008	0.0009	0.0012	0.0015	0.0020	0.0022	0.0024	0.0028	●	○	○
P.1.5	160	1.0	0.0004	0.0005	0.0007	0.0008	0.0009	0.0012	0.0015	0.0020	0.0022	0.0024	0.0028	●	○	○
P.2.1	180	1.0	0.0004	0.0005	0.0007	0.0008	0.0009	0.0012	0.0015	0.0020	0.0022	0.0024	0.0028	●	○	○
P.2.2	140	1.0	0.0004	0.0005	0.0007	0.0008	0.0009	0.0012	0.0015	0.0020	0.0022	0.0024	0.0028	●	○	○
P.2.3	140	1.0	0.0004	0.0005	0.0007	0.0008	0.0009	0.0012	0.0015	0.0020	0.0022	0.0024	0.0028	●	○	○
P.2.4	110	1.0	0.0004	0.0005	0.0007	0.0008	0.0009	0.0012	0.0015	0.0020	0.0022	0.0024	0.0028	●	○	○
P.3.1																
P.3.2																
P.3.3																
P.4.1	98	1.0	0.0003	0.0004	0.0006	0.0007	0.0008	0.0011	0.0013	0.0018	0.0019	0.0022	0.0025	●		
P.4.2	79	1.0	0.0003	0.0004	0.0006	0.0007	0.0008	0.0011	0.0013	0.0018	0.0019	0.0022	0.0025	●		
M.1.1	79	1.0	0.0003	0.0004	0.0006	0.0007	0.0008	0.0011	0.0013	0.0018	0.0019	0.0022	0.0025	●		
M.2.1	98	1.0	0.0003	0.0004	0.0006	0.0007	0.0008	0.0011	0.0013	0.0018	0.0019	0.0022	0.0025	●		
M.3.1	98	1.0	0.0003	0.0004	0.0006	0.0007	0.0008	0.0011	0.0013	0.0018	0.0019	0.0022	0.0025	●		
K.1.1	260	1.0	0.0009	0.0011	0.0013	0.0016	0.0018	0.0023	0.0028	0.0037	0.0039	0.0044	0.0050	●	○	○
K.1.2	240	1.0	0.0009	0.0011	0.0013	0.0016	0.0018	0.0023	0.0028	0.0037	0.0039	0.0044	0.0050	●	○	○
K.2.1	260	1.0	0.0006	0.0008	0.0009	0.0011	0.0013	0.0016	0.0019	0.0025	0.0026	0.0030	0.0033	●	○	○
K.2.2	240	1.0	0.0006	0.0008	0.0009	0.0011	0.0013	0.0016	0.0019	0.0025	0.0026	0.0030	0.0033	●	○	○
K.3.1	260	1.0	0.0009	0.0011	0.0013	0.0016	0.0018	0.0023	0.0028	0.0037	0.0039	0.0044	0.0050	●	○	○
K.3.2	240	1.0	0.0009	0.0011	0.0013	0.0016	0.0018	0.0023	0.0028	0.0037	0.0039	0.0044	0.0050	●	○	○
N.1.1																
N.1.2																
N.2.1																
N.2.2																
N.2.3																
N.3.1	390	1.0	0.0006	0.0008	0.0010	0.0012	0.0014	0.0018	0.0022	0.0030	0.0031	0.0035	0.0040	●	○	○
N.3.2	390	1.0	0.0006	0.0008	0.0010	0.0012	0.0014	0.0018	0.0022	0.0030	0.0031	0.0035	0.0040	●	○	○
N.3.3	280	1.0	0.0006	0.0008	0.0010	0.0012	0.0014	0.0018	0.0022	0.0030	0.0031	0.0035	0.0040	●	○	○
N.4.1																
S.1.1	59	1.0	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
S.1.2	59	1.0	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
S.2.1	59	1.0	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
S.2.2	59	1.0	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
S.2.3	59	1.0	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
S.3.1	98	1.0	0.0003	0.0004	0.0006	0.0007	0.0008	0.0011	0.0013	0.0018	0.0019	0.0022	0.0025	●		
S.3.2	39	1.0	0.0003	0.0004	0.0006	0.0007	0.0008	0.0011	0.0013	0.0018	0.0019	0.0022	0.0025	●		
S.3.3																
H.1.1																
H.1.2																
H.1.3																
H.1.4																
H.2.1																
H.3.1																
O.1.1																
O.1.2																
O.2.1																
O.2.2																
O.3.1																

Cutting Data – S643 – End-Milling-Cutter, extra short – extra long

			59 070... / 59 071 ...													
		Ø DC =	1/16–5/64"	3/32"	1/8–5/32"	3/16"	7/32"	1/4–9/32–5/16"	3/8"	1/2"	5/8"	3/4"	1"	● 1st choice		
														○ suitable		
			a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC			
Index	v_c ft/min	$a_{p\,max.}$ x DC	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	Emulsion	Compressed air	MQL
P.1.1	220	1.0	0.0004	0.0005	0.0007	0.0008	0.0009	0.0012	0.0015	0.0020	0.0022	0.0024	0.0028	●	○	○
P.1.2	180	1.0	0.0003	0.0004	0.0006	0.0007	0.0008	0.0011	0.0013	0.0018	0.0019	0.0022	0.0025	●	○	○
P.1.3	180	1.0	0.0003	0.0004	0.0006	0.0007	0.0008	0.0011	0.0013	0.0018	0.0019	0.0022	0.0025	●	○	○
P.1.4	160	1.0	0.0003	0.0004	0.0006	0.0007	0.0008	0.0011	0.0013	0.0018	0.0019	0.0022	0.0025	●	○	○
P.1.5	160	1.0	0.0003	0.0004	0.0006	0.0007	0.0008	0.0011	0.0013	0.0018	0.0019	0.0022	0.0025	●	○	○
P.2.1	180	1.0	0.0003	0.0004	0.0006	0.0007	0.0008	0.0011	0.0013	0.0018	0.0019	0.0022	0.0025	●	○	○
P.2.2	140	1.0	0.0003	0.0004	0.0006	0.0007	0.0008	0.0011	0.0013	0.0018	0.0019	0.0022	0.0025	●	○	○
P.2.3	140	1.0	0.0003	0.0004	0.0006	0.0007	0.0008	0.0011	0.0013	0.0018	0.0019	0.0022	0.0025	●	○	○
P.2.4	110	1.0	0.0003	0.0004	0.0006	0.0007	0.0008	0.0011	0.0013	0.0018	0.0019	0.0022	0.0025	●	○	○
P.3.1																
P.3.2																
P.3.3																
P.4.1	100	1.0	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
P.4.2	80	1.0	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
M.1.1	79	1.0	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
M.2.1	98	1.0	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
M.3.1	98	1.0	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
K.1.1	260	1.0	0.0007	0.0009	0.0011	0.0013	0.0015	0.0020	0.0024	0.0033	0.0035	0.0039	0.0045	●	○	○
K.1.2	240	1.0	0.0007	0.0009	0.0011	0.0013	0.0015	0.0020	0.0024	0.0033	0.0035	0.0039	0.0045	●	○	○
K.2.1	260	1.0	0.0006	0.0007	0.0008	0.0010	0.0011	0.0014	0.0017	0.0023	0.0024	0.0027	0.0031	●	○	○
K.2.2	240	1.0	0.0006	0.0007	0.0008	0.0010	0.0011	0.0014	0.0017	0.0023	0.0024	0.0027	0.0031	●	○	○
K.3.1	260	1.0	0.0007	0.0009	0.0011	0.0013	0.0015	0.0020	0.0024	0.0033	0.0035	0.0039	0.0045	●	○	○
K.3.2	240	1.0	0.0007	0.0009	0.0011	0.0013	0.0015	0.0020	0.0024	0.0033	0.0035	0.0039	0.0045	●	○	○
N.1.1																
N.1.2																
N.2.1																
N.2.2																
N.2.3																
N.3.1	390	1.0	0.0004	0.0006	0.0007	0.0010	0.0012	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039	●	○	○
N.3.2	390	1.0	0.0004	0.0006	0.0007	0.0010	0.0012	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039	●	○	○
N.3.3	280	1.0	0.0004	0.0006	0.0007	0.0010	0.0012	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039	●	○	○
N.4.1																
S.1.1	59	1.0	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
S.1.2	59	1.0	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
S.2.1	59	1.0	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
S.2.2	59	1.0	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
S.2.3	59	1.0	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
S.3.1	98	1.0	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
S.3.2	39	1.0	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
S.3.3																
H.1.1																
H.1.2																
H.1.3																
H.1.4																
H.2.1																
H.3.1																
O.1.1																
O.1.2																
O.2.1																
O.2.2																
O.3.1																

Cutting Data – S644 – End Milling Cutter, extra short – extra long

			59 043... / 59 044 ... / 59 072... / 59 073 ...													● 1st choice		
		Ø DC =	1/32"	3/64"	1/16–5/64"	3/32–7/64"	1/8–5/32"	3/16"	7/32"	1/4–9/32–5/16"	3/8"	1/2"	5/8"	3/4"	1"	○ suitable		
			a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	Emulsion	Compressed air	MQL
Index	v_c ft/min	$a_{p\,max.}$ x DC	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch			
P.1.1	450	1.0	0.0003	0.0003	0.0005	0.0007	0.0009	0.0012	0.0014	0.0019	0.0023	0.0032	0.0034	0.0039	0.0044	●	○	○
P.1.2	430	1.0	0.0003	0.0003	0.0005	0.0007	0.0009	0.0012	0.0014	0.0019	0.0023	0.0032	0.0034	0.0039	0.0044	●	○	○
P.1.3	430	1.0	0.0003	0.0003	0.0005	0.0007	0.0009	0.0012	0.0014	0.0019	0.0023	0.0032	0.0034	0.0039	0.0044	●	○	○
P.1.4	410	1.0	0.0003	0.0003	0.0005	0.0007	0.0009	0.0012	0.0014	0.0019	0.0023	0.0032	0.0034	0.0039	0.0044	●	○	○
P.1.5	410	1.0	0.0003	0.0003	0.0005	0.0007	0.0009	0.0012	0.0014	0.0019	0.0023	0.0032	0.0034	0.0039	0.0044	●	○	○
P.2.1	430	1.0	0.0003	0.0003	0.0005	0.0007	0.0009	0.0012	0.0014	0.0019	0.0023	0.0032	0.0034	0.0039	0.0044	●	○	○
P.2.2	410	1.0	0.0002	0.0002	0.0004	0.0006	0.0007	0.0010	0.0012	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039	●	○	○
P.2.3	390	1.0	0.0003	0.0003	0.0005	0.0007	0.0009	0.0012	0.0014	0.0019	0.0023	0.0032	0.0034	0.0039	0.0044	●	○	○
P.2.4	370	1.0	0.0002	0.0002	0.0004	0.0006	0.0007	0.0010	0.0012	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039	●	○	○
P.3.1	390	1.0	0.0003	0.0003	0.0005	0.0007	0.0009	0.0012	0.0014	0.0019	0.0023	0.0032	0.0034	0.0039	0.0044	●	○	○
P.3.2	370	1.0	0.0003	0.0003	0.0005	0.0007	0.0009	0.0012	0.0014	0.0019	0.0023	0.0032	0.0034	0.0039	0.0044	●	○	○
P.3.3	310	1.0	0.0003	0.0003	0.0005	0.0007	0.0009	0.0012	0.0014	0.0019	0.0023	0.0032	0.0034	0.0039	0.0044	●	○	○
P.4.1	220	1.0	0.0000	0.0000	0.0002	0.0003	0.0005	0.0006	0.0007	0.0010	0.0013	0.0019	0.0020	0.0023	0.0026	●		
P.4.2	180	1.0	0.0000	0.0000	0.0002	0.0003	0.0005	0.0006	0.0007	0.0010	0.0013	0.0019	0.0020	0.0023	0.0026	●		
M.1.1	220	1.0	0.0000	0.0000	0.0002	0.0003	0.0005	0.0006	0.0007	0.0010	0.0013	0.0019	0.0020	0.0023	0.0026	●		
M.2.1	220	1.0	0.0000	0.0000	0.0002	0.0003	0.0005	0.0006	0.0007	0.0010	0.0013	0.0019	0.0020	0.0023	0.0026	●		
M.3.1	220	1.0	0.0000	0.0000	0.0002	0.0003	0.0005	0.0006	0.0007	0.0010	0.0013	0.0019	0.0020	0.0023	0.0026	●		
K.1.1	430	1.0	0.0003	0.0003	0.0006	0.0009	0.0012	0.0015	0.0019	0.0025	0.0031	0.0044	0.0047	0.0054	0.0062	●	○	○
K.1.2	390	1.0	0.0003	0.0003	0.0006	0.0009	0.0012	0.0015	0.0019	0.0025	0.0031	0.0044	0.0047	0.0054	0.0062	●	○	○
K.2.1	410	1.0	0.0003	0.0003	0.0005	0.0007	0.0009	0.0012	0.0014	0.0019	0.0023	0.0032	0.0034	0.0039	0.0044	●	○	○
K.2.2	370	1.0	0.0003	0.0003	0.0005	0.0007	0.0009	0.0012	0.0014	0.0019	0.0023	0.0032	0.0034	0.0039	0.0044	●	○	○
K.3.1	390	1.0	0.0003	0.0003	0.0005	0.0007	0.0009	0.0012	0.0014	0.0019	0.0023	0.0032	0.0034	0.0039	0.0044	●	○	○
K.3.2	350	1.0	0.0003	0.0003	0.0005	0.0007	0.0009	0.0012	0.0014	0.0019	0.0023	0.0032	0.0034	0.0039	0.0044	●	○	○
N.1.1																		
N.1.2																		
N.2.1																		
N.2.2																		
N.2.3																		
N.3.1	690	1.0	0.0003	0.0003	0.0006	0.0009	0.0012	0.0015	0.0019	0.0025	0.0031	0.0044	0.0047	0.0054	0.0062	●	○	○
N.3.2	690	1.0	0.0003	0.0003	0.0006	0.0009	0.0012	0.0015	0.0019	0.0025	0.0031	0.0044	0.0047	0.0054	0.0062	●	○	○
N.3.3	550	1.0	0.0003	0.0003	0.0006	0.0009	0.0012	0.0015	0.0019	0.0025	0.0031	0.0044	0.0047	0.0054	0.0062	●	○	○
N.4.1																		
S.1.1	59	1.0	0.0001	0.0001	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
S.1.2	59	1.0	0.0001	0.0001	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
S.2.1	59	1.0	0.0001	0.0001	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
S.2.2	59	1.0	0.0001	0.0001	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
S.2.3	59	1.0	0.0001	0.0001	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
S.3.1	180	1.0	0.0002	0.0002	0.0004	0.0006	0.0007	0.0010	0.0012	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039	●		
S.3.2																		
S.3.3																		
H.1.1																		
H.1.2																		
H.1.3																		
H.1.4																		
H.2.1																		
H.3.1																		
O.1.1																		
O.1.2																		
O.2.1																		
O.2.2																		
O.3.1																		

Cutting Data – P645 – End Milling Cutter, short – extra long

			59 074 ... / 59 075 ...											
		Ø DC =	1/8–5/32"	3/16"	7/32"	1/4–5/16"	3/8"	1/2"	5/8"	3/4"	1"	● 1st choice		
												○ suitable		
			a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC			
Index	v_c ft/min	$a_{p\,max.}$ x DC	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	Emulsion	Compressed air	MQL
P.1.1	410	1.0	0.0007	0.0010	0.0012	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039	●	○	○
P.1.2	390	1.0	0.0007	0.0010	0.0012	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039	●	○	○
P.1.3	390	1.0	0.0007	0.0010	0.0012	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039	●	○	○
P.1.4	370	1.0	0.0007	0.0010	0.0012	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039	●	○	○
P.1.5	370	1.0	0.0007	0.0010	0.0012	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039	●	○	○
P.2.1	390	1.0	0.0007	0.0010	0.0012	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039	●	○	○
P.2.2	370	1.0	0.0006	0.0007	0.0009	0.0012	0.0015	0.0022	0.0023	0.0026	0.0030	●	○	○
P.2.3	350	1.0	0.0007	0.0010	0.0012	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039	●	○	○
P.2.4	330	1.0	0.0006	0.0007	0.0009	0.0012	0.0015	0.0022	0.0023	0.0026	0.0030	●	○	○
P.3.1	350	1.0	0.0007	0.0010	0.0012	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039	●	○	○
P.3.2	330	1.0	0.0007	0.0010	0.0012	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039	●	○	○
P.3.3	280	1.0	0.0007	0.0010	0.0012	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039	●	○	○
P.4.1	200	1.0	0.0005	0.0006	0.0007	0.0010	0.0013	0.0019	0.0020	0.0023	0.0026	●		
P.4.2	160	1.0	0.0005	0.0006	0.0007	0.0010	0.0013	0.0019	0.0020	0.0023	0.0026	●		
M.1.1	200	1.0	0.0005	0.0006	0.0007	0.0010	0.0013	0.0019	0.0020	0.0023	0.0026	●		
M.2.1	200	1.0	0.0005	0.0006	0.0007	0.0010	0.0013	0.0019	0.0020	0.0023	0.0026	●		
M.3.1	200	1.0	0.0005	0.0006	0.0007	0.0010	0.0013	0.0019	0.0020	0.0023	0.0026	●		
K.1.1	390	1.0	0.0009	0.0012	0.0014	0.0019	0.0023	0.0032	0.0034	0.0039	0.0044	●	○	○
K.1.2	350	1.0	0.0009	0.0012	0.0014	0.0019	0.0023	0.0032	0.0034	0.0039	0.0044	●	○	○
K.2.1	370	1.0	0.0007	0.0010	0.0012	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039	●	○	○
K.2.2	330	1.0	0.0007	0.0010	0.0012	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039	●	○	○
K.3.1	350	1.0	0.0007	0.0010	0.0012	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039	●	○	○
K.3.2	310	1.0	0.0007	0.0010	0.0012	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039	●	○	○
N.1.1														
N.1.2														
N.2.1														
N.2.2														
N.2.3														
N.3.1														
N.3.2														
N.3.3														
N.4.1														
S.1.1														
S.1.2														
S.2.1														
S.2.2														
S.2.3														
S.3.1														
S.3.2														
S.3.3														
H.1.1														
H.1.2														
H.1.3														
H.1.4														
H.2.1														
H.3.1														
O.1.1														
O.1.2														
O.2.1														
O.2.2														
O.3.1														

Cutting Data – P007 – High Performance End Milling Cutter, short – extra long

			59 002 ...										
		Ø DC =	1/8"	3/16"	1/4–5/16"	3/8"	1/2"	5/8"	3/4"	1"	● 1st choice		
											○ suitable		
			a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	Emulsion	Compressed air	MQL
Index	v_c ft/min	$a_{p\,max.}$ x DC	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch			
P.1.1	750	1.0	0.0009	0.0012	0.0019	0.0023	0.0032	0.0034	0.0039	0.0044	●	○	○
P.1.2	720	1.0	0.0009	0.0012	0.0019	0.0023	0.0032	0.0034	0.0039	0.0044	●	○	○
P.1.3	720	1.0	0.0009	0.0012	0.0019	0.0023	0.0032	0.0034	0.0039	0.0044	●	○	○
P.1.4	690	1.0	0.0009	0.0012	0.0019	0.0023	0.0032	0.0034	0.0039	0.0044	●	○	○
P.1.5	690	1.0	0.0009	0.0012	0.0019	0.0023	0.0032	0.0034	0.0039	0.0044	●	○	○
P.2.1	720	1.0	0.0009	0.0012	0.0019	0.0023	0.0032	0.0034	0.0039	0.0044	●	○	○
P.2.2	690	1.0	0.0007	0.0010	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039	●	○	○
P.2.3	660	1.0	0.0009	0.0012	0.0019	0.0023	0.0032	0.0034	0.0039	0.0044	●	○	○
P.2.4	620	1.0	0.0007	0.0010	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039	●	○	○
P.3.1	660	1.0	0.0009	0.0012	0.0019	0.0023	0.0032	0.0034	0.0039	0.0044	●	○	○
P.3.2	620	1.0	0.0009	0.0012	0.0019	0.0023	0.0032	0.0034	0.0039	0.0044	●	○	○
P.3.3	520	1.0	0.0009	0.0012	0.0019	0.0023	0.0032	0.0034	0.0039	0.0044	●	○	○
P.4.1	360	1.0	0.0005	0.0006	0.0010	0.0013	0.0019	0.0020	0.0023	0.0026	●		
P.4.2	300	1.0	0.0005	0.0006	0.0010	0.0013	0.0019	0.0020	0.0023	0.0026	●		
M.1.1	360	1.0	0.0005	0.0006	0.0010	0.0013	0.0019	0.0020	0.0023	0.0026	●		
M.2.1	360	1.0	0.0005	0.0006	0.0010	0.0013	0.0019	0.0020	0.0023	0.0026	●		
M.3.1	360	1.0	0.0005	0.0006	0.0010	0.0013	0.0019	0.0020	0.0023	0.0026	●		
K.1.1	720	1.0	0.0012	0.0015	0.0025	0.0031	0.0044	0.0047	0.0054	0.0062	●	○	○
K.1.2	660	1.0	0.0012	0.0015	0.0025	0.0031	0.0044	0.0047	0.0054	0.0062	●	○	○
K.2.1	690	1.0	0.0009	0.0012	0.0019	0.0023	0.0032	0.0034	0.0039	0.0044	●	○	○
K.2.2	620	1.0	0.0009	0.0012	0.0019	0.0023	0.0032	0.0034	0.0039	0.0044	●	○	○
K.3.1	660	1.0	0.0009	0.0012	0.0019	0.0023	0.0032	0.0034	0.0039	0.0044	●	○	○
K.3.2	590	1.0	0.0009	0.0012	0.0019	0.0023	0.0032	0.0034	0.0039	0.0044	●	○	○
N.1.1													
N.1.2													
N.2.1													
N.2.2													
N.2.3													
N.3.1	1150	1.0	0.0012	0.0015	0.0025	0.0031	0.0044	0.0047	0.0054	0.0062	●	○	○
N.3.2	1150	1.0	0.0012	0.0015	0.0025	0.0031	0.0044	0.0047	0.0054	0.0062	●	○	○
N.3.3	920	1.0	0.0012	0.0015	0.0025	0.0031	0.0044	0.0047	0.0054	0.0062	●	○	○
N.4.1													
S.1.1	98	1.0	0.0004	0.0005	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
S.1.2	98	1.0	0.0004	0.0005	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
S.2.1	98	1.0	0.0004	0.0005	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
S.2.2	98	1.0	0.0004	0.0005	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
S.2.3	98	1.0	0.0004	0.0005	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
S.3.1	300	1.0	0.0007	0.0010	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039	●		
S.3.2													
S.3.3													
H.1.1													
H.1.2													
H.1.3													
H.1.4													
H.2.1													
H.3.1													
O.1.1													
O.1.2													
O.2.1													
O.2.2													
O.3.1													

Cutting Data – P556 – High Performance End milling cutter, short – extra long

			59 006 ...								
		Ø DC =	1/4"	3/8"	1/2"	5/8"	3/4"	1"	● 1st choice		
									○ suitable		
			a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC			
Index	v_c ft/min	$a_{p\,max.}$ x DC	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	Emulsion	Compressed air	MQL
P.1.1	690	1.0	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039	●	○	○
P.1.2	660	1.0	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039	●	○	○
P.1.3	660	1.0	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039	●	○	○
P.1.4	620	1.0	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039	●	○	○
P.1.5	620	1.0	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039	●	○	○
P.2.1	660	1.0	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039	●	○	○
P.2.2	620	1.0	0.0012	0.0015	0.0022	0.0023	0.0026	0.0030	●	○	○
P.2.3	590	1.0	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039	●	○	○
P.2.4	560	1.0	0.0012	0.0015	0.0022	0.0023	0.0026	0.0030	●	○	○
P.3.1	590	1.0	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039	●	○	○
P.3.2	560	1.0	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039	●	○	○
P.3.3	460	1.0	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039	●	○	○
P.4.1	330	1.0	0.0010	0.0013	0.0019	0.0020	0.0023	0.0026	●		
P.4.2	260	1.0	0.0010	0.0013	0.0019	0.0020	0.0023	0.0026	●		
M.1.1	330	1.0	0.0010	0.0013	0.0019	0.0020	0.0023	0.0026	●		
M.2.1	330	1.0	0.0010	0.0013	0.0019	0.0020	0.0023	0.0026	●		
M.3.1	330	1.0	0.0010	0.0013	0.0019	0.0020	0.0023	0.0026	●		
K.1.1	660	1.0	0.0019	0.0023	0.0032	0.0034	0.0039	0.0044	●	○	○
K.1.2	590	1.0	0.0019	0.0023	0.0032	0.0034	0.0039	0.0044	●	○	○
K.2.1	620	1.0	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039	●	○	○
K.2.2	560	1.0	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039	●	○	○
K.3.1	590	1.0	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039	●	○	○
K.3.2	520	1.0	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039	●	○	○
N.1.1											
N.1.2											
N.2.1											
N.2.2											
N.2.3											
N.3.1											
N.3.2											
N.3.3											
N.4.1											
S.1.1	180	1.0	0.0012	0.0015	0.0022	0.0023	0.0026	0.0030	●		
S.1.2	180	1.0	0.0012	0.0015	0.0022	0.0023	0.0026	0.0030	●		
S.2.1	180	1.0	0.0012	0.0015	0.0022	0.0023	0.0026	0.0030	●		
S.2.2	180	1.0	0.0012	0.0015	0.0022	0.0023	0.0026	0.0030	●		
S.2.3	180	1.0	0.0012	0.0015	0.0022	0.0023	0.0026	0.0030	●		
S.3.1	390	1.0	0.0019	0.0023	0.0032	0.0034	0.0039	0.0044	●		
S.3.2	260	1.0	0.0012	0.0015	0.0022	0.0023	0.0026	0.0030	●		
S.3.3											
H.1.1											
H.1.2											
H.1.3											
H.1.4											
H.2.1											
H.3.1											
O.1.1											
O.1.2											
O.2.1											
O.2.2											
O.3.1											

Cutting Data – P160 / P161 – Multi-flute milling cutter, short – extra long

			59 041 ... / 59 042 ...								
		Ø DC =	1/4"	3/8"	1/2"	5/8"	3/4"	1"	● 1st choice		
									○ suitable		
			a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC			
Index	v_c ft/min	$a_{p\,max.}$ x DC	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	Emulsion	Compressed air	MQL
P.1.1	850	0.5	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039	●	○	○
P.1.2	820	0.5	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039	●	○	○
P.1.3	820	0.5	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039	●	○	○
P.1.4	750	0.5	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039	●	○	○
P.1.5	750	0.5	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039	●	○	○
P.2.1	820	0.5	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039	●	○	○
P.2.2	750	0.5	0.0012	0.0015	0.0022	0.0023	0.0026	0.0030	●	○	○
P.2.3	720	0.5	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039	●	○	○
P.2.4	690	0.5	0.0012	0.0015	0.0022	0.0023	0.0026	0.0030	●	○	○
P.3.1	720	0.5	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039	●	○	○
P.3.2	690	0.5	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039	●	○	○
P.3.3	570	0.5	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039	●	○	○
P.4.1	390	0.5	0.0010	0.0013	0.0019	0.0020	0.0023	0.0026	●		
P.4.2	330	0.5	0.0010	0.0013	0.0019	0.0020	0.0023	0.0026	●		
M.1.1	390	0.5	0.0010	0.0013	0.0019	0.0020	0.0023	0.0026	●		
M.2.1	390	0.5	0.0010	0.0013	0.0019	0.0020	0.0023	0.0026	●		
M.3.1	390	0.5	0.0010	0.0013	0.0019	0.0020	0.0023	0.0026	●		
K.1.1	820	0.5	0.0019	0.0023	0.0032	0.0034	0.0039	0.0044	●	○	○
K.1.2	720	0.5	0.0019	0.0023	0.0032	0.0034	0.0039	0.0044	●	○	○
K.2.1	750	0.5	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039	●	○	○
K.2.2	690	0.5	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039	●	○	○
K.3.1	720	0.5	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039	●	○	○
K.3.2	660	0.5	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039	●	○	○
N.1.1											
N.1.2											
N.2.1											
N.2.2											
N.2.3											
N.3.1											
N.3.2											
N.3.3											
N.4.1											
S.1.1	130	1.0	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
S.1.2	130	1.0	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
S.2.1	130	1.0	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
S.2.2	130	1.0	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
S.2.3	130	1.0	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
S.3.1	660	1.0	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039	●		
S.3.2	410	1.0	0.0010	0.0013	0.0019	0.0020	0.0023	0.0026	●		
S.3.3											
H.1.1											
H.1.2											
H.1.3											
H.1.4											
H.2.1											
H.3.1											
O.1.1											
O.1.2											
O.2.1											
O.2.2											
O.3.1											

Cutting Data – P119 – Chamfer milling cutter

			59 029 ... / 59 030 ...												
		Ø DC =	1/8–5/32"	3/16"	7/32"	1/4–3/32 –5/16"	3/8"	7/16"	1/2"	3/16–5/8"	3/4"	1"	● 1st choice		
													○ suitable		
			a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	Emulsion	Compressed air	MQL
Index	v_c ft/min	$a_{p\,max.}$ x DC	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch			
P.1.1															
P.1.2															
P.1.3															
P.1.4															
P.1.5															
P.2.1															
P.2.2															
P.2.3															
P.2.4															
P.3.1															
P.3.2															
P.3.3															
P.4.1															
P.4.2															
M.1.1															
M.2.1															
M.3.1															
K.1.1															
K.1.2															
K.2.1															
K.2.2															
K.3.1															
K.3.2															
N.1.1	1970	1.0	0.0012	0.0015	0.0019	0.0025	0.0031	0.0038	0.0044	0.0047	0.0054	0.0062	●	○	○
N.1.2	1970	1.0	0.0012	0.0015	0.0019	0.0025	0.0031	0.0038	0.0044	0.0047	0.0054	0.0062	●	○	○
N.2.1	1180	1.0	0.0011	0.0014	0.0017	0.0023	0.0029	0.0035	0.0040	0.0043	0.0049	0.0056	●	○	○
N.2.2	1180	1.0	0.0011	0.0014	0.0017	0.0023	0.0029	0.0035	0.0040	0.0043	0.0049	0.0056	●	○	○
N.2.3	790	1.0	0.0011	0.0014	0.0017	0.0023	0.0029	0.0035	0.0040	0.0043	0.0049	0.0056	●	○	○
N.3.1	790	1.0	0.0008	0.0011	0.0013	0.0017	0.0022	0.0026	0.0031	0.0033	0.0037	0.0043	●	○	○
N.3.2	790	1.0	0.0008	0.0011	0.0013	0.0017	0.0022	0.0026	0.0031	0.0033	0.0037	0.0043	●	○	○
N.3.3	560	1.0	0.0008	0.0011	0.0013	0.0017	0.0022	0.0026	0.0031	0.0033	0.0037	0.0043	●	○	○
N.4.1	720	1.0	0.0011	0.0014	0.0017	0.0023	0.0029	0.0035	0.0040	0.0043	0.0049	0.0056	●	○	○
S.1.1															
S.1.2															
S.2.1															
S.2.2															
S.2.3															
S.3.1															
S.3.2															
S.3.3															
H.1.1															
H.1.2															
H.1.3															
H.1.4															
H.2.1															
H.3.1															
O.1.1															
O.1.2															
O.2.1															
O.2.2															
O.3.1															

Cutting Data – P117 – Rough-Finishing Cutter with corner radius, short – long

			59 028 ...										
		Ø DC =	1/8"	3/16"	1/4–5/16"	3/8"	7/16"	1/2"	5/8"	3/4"	● 1st choice		
											○ suitable		
			a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	Emulsion	Compressed air	MQL
Index	v_c ft/min	$a_{p\,max.}$ x DC	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch			
P.1.1	360	1.0	0.0007	0.0008	0.0012	0.0015	0.0018	0.0020	0.0022	0.0024	●	○	○
P.1.2	300	1.0	0.0006	0.0007	0.0011	0.0013	0.0016	0.0018	0.0019	0.0022	●	○	○
P.1.3	300	1.0	0.0006	0.0007	0.0011	0.0013	0.0016	0.0018	0.0019	0.0022	●	○	○
P.1.4	260	1.0	0.0006	0.0007	0.0011	0.0013	0.0016	0.0018	0.0019	0.0022	●	○	○
P.1.5	260	1.0	0.0006	0.0007	0.0011	0.0013	0.0016	0.0018	0.0019	0.0022	●	○	○
P.2.1	300	1.0	0.0006	0.0007	0.0011	0.0013	0.0016	0.0018	0.0019	0.0022	●	○	○
P.2.2	230	1.0	0.0006	0.0007	0.0011	0.0013	0.0016	0.0018	0.0019	0.0022	●	○	○
P.2.3	230	1.0	0.0006	0.0007	0.0011	0.0013	0.0016	0.0018	0.0019	0.0022	●	○	○
P.2.4	180	1.0	0.0006	0.0007	0.0011	0.0013	0.0016	0.0018	0.0019	0.0022	●	○	○
P.3.1													
P.3.2													
P.3.3													
P.4.1	160	1.0	0.0004	0.0005	0.0008	0.0010	0.0012	0.0014	0.0015	0.0017	●		
P.4.2	130	1.0	0.0004	0.0005	0.0008	0.0010	0.0012	0.0014	0.0015	0.0017	●		
M.1.1	130	1.0	0.0004	0.0005	0.0008	0.0010	0.0012	0.0014	0.0015	0.0017	●		
M.2.1	160	1.0	0.0004	0.0005	0.0008	0.0010	0.0012	0.0014	0.0015	0.0017	●		
M.3.1	160	1.0	0.0004	0.0005	0.0008	0.0010	0.0012	0.0014	0.0015	0.0017	●		
K.1.1	430	1.0	0.0011	0.0013	0.0020	0.0024	0.0028	0.0033	0.0035	0.0039	●	○	○
K.1.2	400	1.0	0.0011	0.0013	0.0020	0.0024	0.0028	0.0033	0.0035	0.0039	●	○	○
K.2.1	420	1.0	0.0008	0.0010	0.0014	0.0017	0.0020	0.0023	0.0024	0.0027	●	○	○
K.2.2	400	1.0	0.0008	0.0010	0.0014	0.0017	0.0020	0.0023	0.0024	0.0027	●	○	○
K.3.1	430	1.0	0.0011	0.0013	0.0020	0.0024	0.0028	0.0033	0.0035	0.0039	●	○	○
K.3.2	400	1.0	0.0011	0.0013	0.0020	0.0024	0.0028	0.0033	0.0035	0.0039	●	○	○
N.1.1													
N.1.2													
N.2.1													
N.2.2													
N.2.3													
N.3.1	660	1.0	0.0007	0.0010	0.0016	0.0020	0.0024	0.0028	0.0030	0.0033	●	○	○
N.3.2	660	1.0	0.0007	0.0010	0.0016	0.0020	0.0024	0.0028	0.0030	0.0033	●	○	○
N.3.3	460	1.0	0.0007	0.0010	0.0016	0.0020	0.0024	0.0028	0.0030	0.0033	●	○	○
N.4.1													
S.1.1	98	1.0	0.0004	0.0005	0.0008	0.0010	0.0012	0.0014	0.0015	0.0017	●		
S.1.2	98	1.0	0.0004	0.0005	0.0008	0.0010	0.0012	0.0014	0.0015	0.0017	●		
S.2.1	98	1.0	0.0004	0.0005	0.0008	0.0010	0.0012	0.0014	0.0015	0.0017	●		
S.2.2	98	1.0	0.0004	0.0005	0.0008	0.0010	0.0012	0.0014	0.0015	0.0017	●		
S.2.3	98	1.0	0.0004	0.0005	0.0008	0.0010	0.0012	0.0014	0.0015	0.0017	●		
S.3.1	160	1.0	0.0004	0.0005	0.0008	0.0010	0.0012	0.0014	0.0015	0.0017	●		
S.3.2	66	1.0	0.0004	0.0005	0.0008	0.0010	0.0012	0.0014	0.0015	0.0017	●		
S.3.3													
H.1.1													
H.1.2													
H.1.3													
H.1.4													
H.2.1													
H.3.1													
O.1.1													
O.1.2													
O.2.1													
O.2.2													
O.3.1													

Cutting Data – P120 – Roughing-Finishing cutter with corner radius, extra short – extra long

			59 031 ... / 59 032 ...												
		Ø DC =	1/8–5/32"	3/16"	7/32"	1/4–9/32", 5/16"	11/32–3/8"	7/16"	1/2"	9/16–5/8"	3/4"	1"	● 1st choice		
													○ suitable		
			a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	Emulsion	Compressed air	MQL
Index	v_c ft/min	$a_{p\,max.}$ x DC	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch			
P.1.1	310	1.0	0.0007	0.0008	0.0009	0.0012	0.0015	0.0018	0.0020	0.0022	0.0024	0.0028	●	○	○
P.1.2	260	1.0	0.0006	0.0007	0.0008	0.0011	0.0013	0.0016	0.0018	0.0019	0.0022	0.0025	●	○	○
P.1.3	260	1.0	0.0006	0.0007	0.0008	0.0011	0.0013	0.0016	0.0018	0.0019	0.0022	0.0025	●	○	○
P.1.4	230	1.0	0.0006	0.0007	0.0008	0.0011	0.0013	0.0016	0.0018	0.0019	0.0022	0.0025	●	○	○
P.1.5	230	1.0	0.0006	0.0007	0.0008	0.0011	0.0013	0.0016	0.0018	0.0019	0.0022	0.0025	●	○	○
P.2.1	250	1.0	0.0006	0.0007	0.0008	0.0011	0.0013	0.0016	0.0018	0.0019	0.0022	0.0025	●	○	○
P.2.2	200	1.0	0.0006	0.0007	0.0008	0.0011	0.0013	0.0016	0.0018	0.0019	0.0022	0.0025	●	○	○
P.2.3	200	1.0	0.0006	0.0007	0.0008	0.0011	0.0013	0.0016	0.0018	0.0019	0.0022	0.0025	●	○	○
P.2.4	180	1.0	0.0006	0.0007	0.0008	0.0011	0.0013	0.0016	0.0018	0.0019	0.0022	0.0025	●	○	○
P.3.1															
P.3.2															
P.3.3															
P.4.1															
P.4.2															
M.1.1															
M.2.1															
M.3.1															
K.1.1	390	1.0	0.0011	0.0013	0.0015	0.0020	0.0024	0.0028	0.0033	0.0035	0.0039	0.0045	●	○	○
K.1.2	330	1.0	0.0011	0.0013	0.0015	0.0020	0.0024	0.0028	0.0033	0.0035	0.0039	0.0045	●	○	○
K.2.1	390	1.0	0.0008	0.0010	0.0011	0.0014	0.0017	0.0020	0.0023	0.0024	0.0027	0.0031	●	○	○
K.2.2	330	1.0	0.0008	0.0010	0.0011	0.0014	0.0017	0.0020	0.0023	0.0024	0.0027	0.0031	●	○	○
K.3.1	390	1.0	0.0011	0.0013	0.0015	0.0020	0.0024	0.0028	0.0033	0.0035	0.0039	0.0045	●	○	○
K.3.2	330	1.0	0.0011	0.0013	0.0015	0.0020	0.0024	0.0028	0.0033	0.0035	0.0039	0.0045	●	○	○
N.1.1															
N.1.2															
N.2.1															
N.2.2															
N.2.3															
N.3.1															
N.3.2															
N.3.3															
N.4.1															
S.1.1															
S.1.2															
S.2.1															
S.2.2															
S.2.3															
S.3.1															
S.3.2															
S.3.3															
H.1.1															
H.1.2															
H.1.3															
H.1.4															
H.2.1															
H.3.1															
O.1.1															
O.1.2															
O.2.1															
O.2.2															
O.3.1															

Cutting Data – P121 – Roughing-Finishing cutter with corner radius, short – extra long

			59 035 ...				
		Ø DC =	3/4"	1"	● 1st choice		
					○ suitable		
			a_e 1 x DC	a_e 1 x DC			
Index	v_c ft/min	$a_{p\,max.}$ x DC	f_z inch	f_z inch	Emulsion	Compressed air	MQL
P.1.1	480	1.0	0.0033	0.0039	●	○	○
P.1.2	460	1.0	0.0033	0.0039	●	○	○
P.1.3	460	1.0	0.0033	0.0039	●	○	○
P.1.4	440	1.0	0.0033	0.0039	●	○	○
P.1.5	440	1.0	0.0033	0.0039	●	○	○
P.2.1	460	1.0	0.0033	0.0039	●	○	○
P.2.2	440	1.0	0.0026	0.0030	●	○	○
P.2.3	410	1.0	0.0033	0.0039	●	○	○
P.2.4	390	1.0	0.0026	0.0030	●	○	○
P.3.1	410	1.0	0.0033	0.0039	●	○	○
P.3.2	390	1.0	0.0033	0.0039	●	○	○
P.3.3	320	1.0	0.0033	0.0039	●	○	○
P.4.1	230	1.0	0.0023	0.0026	●		
P.4.2	180	1.0	0.0023	0.0026	●		
M.1.1	230	1.0	0.0023	0.0026	●		
M.2.1	230	1.0	0.0023	0.0026	●		
M.3.1	230	1.0	0.0023	0.0026	●		
K.1.1	460	1.0	0.0039	0.0044	●	○	○
K.1.2	410	1.0	0.0039	0.0044	●	○	○
K.2.1	440	1.0	0.0033	0.0039	●	○	○
K.2.2	390	1.0	0.0033	0.0039	●	○	○
K.3.1	410	1.0	0.0033	0.0039	●	○	○
K.3.2	370	1.0	0.0033	0.0039	●	○	○
N.1.1							
N.1.2							
N.2.1							
N.2.2							
N.2.3							
N.3.1							
N.3.2							
N.3.3							
N.4.1							
S.1.1	130	1.0	0.0026	0.0030	●		
S.1.2	130	1.0	0.0026	0.0030	●		
S.2.1	130	1.0	0.0026	0.0030	●		
S.2.2	130	1.0	0.0026	0.0030	●		
S.2.3	130	1.0	0.0026	0.0030	●		
S.3.1	280	1.0	0.0039	0.0044	●		
S.3.2	180	1.0	0.0026	0.0030	●		
S.3.3							
H.1.1							
H.1.2							
H.1.3							
H.1.4							
H.2.1							
H.3.1							
O.1.1							
O.1.2							
O.2.1							
O.2.2							
O.3.1							

Cutting Data – P102 –Rough milling cutter with corner radius, short – extra long

			59 023 ... / 59 024 ... / 59 025 ... / 59 026 ...										
		Ø DC =	3/16"	1/4–5/16"	3/8"	7/16"	1/2"	3/16–5/8"	3/4"	1"	● 1st choice		
											○ suitable		
			a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	Emulsion	Compressed air	MQL
Index	v_c ft/min	$a_{p\,max.}$ x DC	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch			
P.1.1													
P.1.2													
P.1.3													
P.1.4													
P.1.5													
P.2.1													
P.2.2													
P.2.3													
P.2.4													
P.3.1													
P.3.2													
P.3.3													
P.4.1													
P.4.2													
M.1.1													
M.2.1													
M.3.1													
K.1.1													
K.1.2													
K.2.1													
K.2.2													
K.3.1													
K.3.2													
N.1.1	1970	1.0	0.0015	0.0025	0.0031	0.0038	0.0044	0.0047	0.0054	0.0062	●	○	○
N.1.2	1970	1.0	0.0015	0.0025	0.0031	0.0038	0.0044	0.0047	0.0054	0.0062	●	○	○
N.2.1	1180	1.0	0.0014	0.0023	0.0029	0.0035	0.0040	0.0043	0.0049	0.0056	●	○	○
N.2.2	1180	1.0	0.0014	0.0023	0.0029	0.0035	0.0040	0.0043	0.0049	0.0056	●	○	○
N.2.3	790	1.0	0.0014	0.0023	0.0029	0.0035	0.0040	0.0043	0.0049	0.0056	●	○	○
N.3.1	790	1.0	0.0011	0.0017	0.0022	0.0026	0.0031	0.0033	0.0037	0.0043	●	○	○
N.3.2	790	1.0	0.0011	0.0017	0.0022	0.0026	0.0031	0.0033	0.0037	0.0043	●	○	○
N.3.3	560	1.0	0.0011	0.0017	0.0022	0.0026	0.0031	0.0033	0.0037	0.0043	●	○	○
N.4.1	720	1.0	0.0014	0.0023	0.0029	0.0035	0.0040	0.0043	0.0049	0.0056	●	○	○
S.1.1													
S.1.2													
S.2.1													
S.2.2													
S.2.3													
S.3.1													
S.3.2													
S.3.3													
H.1.1													
H.1.2													
H.1.3													
H.1.4													
H.2.1													
H.3.1													
O.1.1													
O.1.2													
O.2.1													
O.2.2													
O.3.1													

Cutting Data – P190 / P191 – Rough milling cutter, short – extra long

			59 059 ... / 59 061 ...									
		Ø DC =	3/16“	1/4–5/16"	3/8"	1/2"	5/8"	3/4"	1"	● 1st choice		
										○ suitable		
			a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC			
Index	v_c ft/min	$a_{p\,max.}$ x DC	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	Emulsion	Compressed air	MQL
P.1.1	310	1.0	0.0007	0.0012	0.0015	0.0020	0.0022	0.0024	0.0028	●	○	○
P.1.2	260	1.0	0.0006	0.0011	0.0013	0.0018	0.0019	0.0022	0.0025	●	○	○
P.1.3	260	1.0	0.0006	0.0011	0.0013	0.0018	0.0019	0.0022	0.0025	●	○	○
P.1.4	230	1.0	0.0006	0.0011	0.0013	0.0018	0.0019	0.0022	0.0025	●	○	○
P.1.5	230	1.0	0.0006	0.0011	0.0013	0.0018	0.0019	0.0022	0.0025	●	○	○
P.2.1	250	1.0	0.0006	0.0011	0.0013	0.0018	0.0019	0.0022	0.0025	●	○	○
P.2.2	200	1.0	0.0006	0.0011	0.0013	0.0018	0.0019	0.0022	0.0025	●	○	○
P.2.3	200	1.0	0.0006	0.0011	0.0013	0.0018	0.0019	0.0022	0.0025	●	○	○
P.2.4	180	1.0	0.0006	0.0011	0.0013	0.0018	0.0019	0.0022	0.0025	●	○	○
P.3.1												
P.3.2												
P.3.3												
P.4.1												
P.4.2												
M.1.1												
M.2.1												
M.3.1												
K.1.1	390	1.0	0.0011	0.0020	0.0024	0.0033	0.0035	0.0039	0.0045	●	○	○
K.1.2	330	1.0	0.0011	0.0020	0.0024	0.0033	0.0035	0.0039	0.0045	●	○	○
K.2.1	390	1.0	0.0008	0.0014	0.0017	0.0023	0.0024	0.0027	0.0031	●	○	○
K.2.2	330	1.0	0.0008	0.0014	0.0017	0.0023	0.0024	0.0027	0.0031	●	○	○
K.3.1	390	1.0	0.0011	0.0020	0.0024	0.0033	0.0035	0.0039	0.0045	●	○	○
K.3.2	330	1.0	0.0011	0.0020	0.0024	0.0033	0.0035	0.0039	0.0045	●	○	○
N.1.1												
N.1.2												
N.2.1												
N.2.2												
N.2.3												
N.3.1												
N.3.2												
N.3.3												
N.4.1												
S.1.1												
S.1.2												
S.2.1												
S.2.2												
S.2.3												
S.3.1												
S.3.2												
S.3.3												
H.1.1												
H.1.2												
H.1.3												
H.1.4												
H.2.1												
H.3.1												
O.1.1												
O.1.2												
O.2.1												
O.2.2												
O.3.1												

Cutting Data – P100 – Rough milling cutter with corner radius, short – extra long

			59 011 ... / 59 012 ... / 59 013 ... / 59 014 ...										
		Ø DC =	3/16"	1/4–5/16"	3/8"	7/16"	1/2"	9/16–5/8"	3/4"	1"	● 1st choice		
											○ suitable		
			a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	Emulsion	Compressed air	MQL
Index	v_c ft/min	$a_{p\,max.}$ x DC	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch			
P.1.1	312	1.0	0.0008	0.0012	0.0015	0.0018	0.0020	0.0022	0.0024	0.0028	●	○	○
P.1.2	262	1.0	0.0007	0.0011	0.0013	0.0016	0.0018	0.0019	0.0022	0.0025	●	○	○
P.1.3	262	1.0	0.0007	0.0011	0.0013	0.0016	0.0018	0.0019	0.0022	0.0025	●	○	○
P.1.4	230	1.0	0.0007	0.0011	0.0013	0.0016	0.0018	0.0019	0.0022	0.0025	●	○	○
P.1.5	230	1.0	0.0007	0.0011	0.0013	0.0016	0.0018	0.0019	0.0022	0.0025	●	○	○
P.2.1	246	1.0	0.0007	0.0011	0.0013	0.0016	0.0018	0.0019	0.0022	0.0025	●	○	○
P.2.2	197	1.0	0.0007	0.0011	0.0013	0.0016	0.0018	0.0019	0.0022	0.0025	●	○	○
P.2.3	197	1.0	0.0007	0.0011	0.0013	0.0016	0.0018	0.0019	0.0022	0.0025	●	○	○
P.2.4	180	1.0	0.0007	0.0011	0.0013	0.0016	0.0018	0.0019	0.0022	0.0025	●	○	○
P.3.1													
P.3.2													
P.3.3													
P.4.1													
P.4.2													
M.1.1													
M.2.1													
M.3.1													
K.1.1	390	1.0	0.0013	0.0020	0.0024	0.0028	0.0033	0.0035	0.0039	0.0045	●	○	○
K.1.2	330	1.0	0.0013	0.0020	0.0024	0.0028	0.0033	0.0035	0.0039	0.0045	●	○	○
K.2.1	390	1.0	0.0010	0.0014	0.0017	0.0020	0.0023	0.0024	0.0027	0.0031	●	○	○
K.2.2	330	1.0	0.0010	0.0014	0.0017	0.0020	0.0023	0.0024	0.0027	0.0031	●	○	○
K.3.1	390	1.0	0.0013	0.0020	0.0024	0.0028	0.0033	0.0035	0.0039	0.0045	●	○	○
K.3.2	330	1.0	0.0013	0.0020	0.0024	0.0028	0.0033	0.0035	0.0039	0.0045	●	○	○
N.1.1													
N.1.2													
N.2.1													
N.2.2													
N.2.3													
N.3.1													
N.3.2													
N.3.3													
N.4.1													
S.1.1													
S.1.2													
S.2.1													
S.2.2													
S.2.3													
S.3.1													
S.3.2													
S.3.3													
H.1.1													
H.1.2													
H.1.3													
H.1.4													
H.2.1													
H.3.1													
O.1.1													
O.1.2													
O.2.1													
O.2.2													
O.3.1													

Cutting Data – P101 – Rough milling cutter with corner radius, short – extra long

			59 015 ... / 59 016 ... / 59 017 ... / 59 022 ...										
		Ø DC =	3/16"	1/4–5/16"	3/8"	7/16"	1/2"	9/16–5/8"	3/4"	1"	● 1st choice		
											○ suitable		
			a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	Emulsion	Compressed air	MQL
Index	v_c ft/min	$a_{p\,max.}$ x DC	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch			
P.1.1	310	1.0	0.0008	0.0012	0.0015	0.0018	0.0020	0.0022	0.0024	0.0028	●	○	○
P.1.2	260	1.0	0.0007	0.0011	0.0013	0.0016	0.0018	0.0019	0.0022	0.0025	●	○	○
P.1.3	260	1.0	0.0007	0.0011	0.0013	0.0016	0.0018	0.0019	0.0022	0.0025	●	○	○
P.1.4	230	1.0	0.0007	0.0011	0.0013	0.0016	0.0018	0.0019	0.0022	0.0025	●	○	○
P.1.5	230	1.0	0.0007	0.0011	0.0013	0.0016	0.0018	0.0019	0.0022	0.0025	●	○	○
P.2.1	250	1.0	0.0007	0.0011	0.0013	0.0016	0.0018	0.0019	0.0022	0.0025	●	○	○
P.2.2	200	1.0	0.0007	0.0011	0.0013	0.0016	0.0018	0.0019	0.0022	0.0025	●	○	○
P.2.3	200	1.0	0.0007	0.0011	0.0013	0.0016	0.0018	0.0019	0.0022	0.0025	●	○	○
P.2.4	180	1.0	0.0007	0.0011	0.0013	0.0016	0.0018	0.0019	0.0022	0.0025	●	○	○
P.3.1													
P.3.2													
P.3.3													
P.4.1													
P.4.2													
M.1.1													
M.2.1													
M.3.1													
K.1.1	390	1.0	0.0013	0.0020	0.0024	0.0028	0.0033	0.0035	0.0039	0.0045	●	○	○
K.1.2	330	1.0	0.0013	0.0020	0.0024	0.0028	0.0033	0.0035	0.0039	0.0045	●	○	○
K.2.1	390	1.0	0.0010	0.0014	0.0017	0.0020	0.0023	0.0024	0.0027	0.0031	●	○	○
K.2.2	330	1.0	0.0010	0.0014	0.0017	0.0020	0.0023	0.0024	0.0027	0.0031	●	○	○
K.3.1	390	1.0	0.0013	0.0020	0.0024	0.0028	0.0033	0.0035	0.0039	0.0045	●	○	○
K.3.2	330	1.0	0.0013	0.0020	0.0024	0.0028	0.0033	0.0035	0.0039	0.0045	●	○	○
N.1.1													
N.1.2													
N.2.1													
N.2.2													
N.2.3													
N.3.1													
N.3.2													
N.3.3													
N.4.1													
S.1.1													
S.1.2													
S.2.1													
S.2.2													
S.2.3													
S.3.1													
S.3.2													
S.3.3													
H.1.1													
H.1.2													
H.1.3													
H.1.4													
H.2.1													
H.3.1													
O.1.1													
O.1.2													
O.2.1													
O.2.2													
O.3.1													

Cutting Data – P662 – Ball nosed Cutter, extra short – extra long

			59 074 ... / 59 075 ...											
		Ø DC =	1/16"	1/8"	3/16"	1/4–5/16"	3/8"	1/2"	5/8"	3/4"	1"	● 1st choice		
												○ suitable		
			a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC			
Index	v_c ft/min	$a_{p\,max.}$ x DC	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	Emulsion	Compressed air	MQL
P.1.1	350	1.0	0.0003	0.0006	0.0007	0.0011	0.0013	0.0018	0.0019	0.0022	0.0025	●	○	○
P.1.2	310	1.0	0.0003	0.0006	0.0007	0.0011	0.0013	0.0018	0.0019	0.0022	0.0025	●	○	○
P.1.3	310	1.0	0.0003	0.0006	0.0007	0.0011	0.0013	0.0018	0.0019	0.0022	0.0025	●	○	○
P.1.4	300	1.0	0.0003	0.0006	0.0007	0.0011	0.0013	0.0018	0.0019	0.0022	0.0025	●	○	○
P.1.5	300	1.0	0.0003	0.0006	0.0007	0.0011	0.0013	0.0018	0.0019	0.0022	0.0025	●	○	○
P.2.1	330	1.0	0.0003	0.0006	0.0007	0.0011	0.0013	0.0018	0.0019	0.0022	0.0025	●	○	○
P.2.2	280	1.0	0.0003	0.0006	0.0007	0.0011	0.0013	0.0018	0.0019	0.0022	0.0025	●	○	○
P.2.3	280	1.0	0.0003	0.0006	0.0007	0.0011	0.0013	0.0018	0.0019	0.0022	0.0025	●	○	○
P.2.4	260	1.0	0.0003	0.0006	0.0007	0.0011	0.0013	0.0018	0.0019	0.0022	0.0025	●	○	○
P.3.1														
P.3.2														
P.3.3														
P.4.1	200	1.0	0.0002	0.0004	0.0005	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
P.4.2	80	1.0	0.0002	0.0004	0.0005	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
M.1.1	98	1.0	0.0002	0.0004	0.0005	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
M.2.1	98	1.0	0.0002	0.0004	0.0005	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
M.3.1	98	1.0	0.0002	0.0004	0.0005	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
K.1.1	240	1.0	0.0007	0.0011	0.0013	0.0020	0.0024	0.0033	0.0035	0.0039	0.0045	●	○	○
K.1.2	160	1.0	0.0007	0.0011	0.0013	0.0020	0.0024	0.0033	0.0035	0.0039	0.0045	●	○	○
K.2.1	240	1.0	0.0006	0.0008	0.0010	0.0014	0.0017	0.0023	0.0024	0.0027	0.0031	●	○	○
K.2.2	390	1.0	0.0006	0.0008	0.0010	0.0014	0.0017	0.0023	0.0024	0.0027	0.0031	●	○	○
K.3.1	240	1.0	0.0007	0.0011	0.0013	0.0020	0.0024	0.0033	0.0035	0.0039	0.0045	●	○	○
K.3.2	200	1.0	0.0007	0.0011	0.0013	0.0020	0.0024	0.0033	0.0035	0.0039	0.0045	●	○	○
N.1.1														
N.1.2														
N.2.1														
N.2.2														
N.2.3														
N.3.1	390	1.0	0.0004	0.0008	0.0011	0.0017	0.0022	0.0031	0.0033	0.0037	0.0043	●	○	○
N.3.2	390	1.0	0.0004	0.0008	0.0011	0.0017	0.0022	0.0031	0.0033	0.0037	0.0043	●	○	○
N.3.3	280	1.0	0.0004	0.0008	0.0011	0.0017	0.0022	0.0031	0.0033	0.0037	0.0043	●	○	○
N.4.1														
S.1.1	59	1.0	0.0002	0.0004	0.0005	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
S.1.2	59	1.0	0.0002	0.0004	0.0005	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
S.2.1	59	1.0	0.0002	0.0004	0.0005	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
S.2.2	59	1.0	0.0002	0.0004	0.0005	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
S.2.3	59	1.0	0.0002	0.0004	0.0005	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
S.3.1	98	1.0	0.0002	0.0004	0.0005	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
S.3.2	39	1.0	0.0002	0.0004	0.0005	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
S.3.3														
H.1.1														
H.1.2														
H.1.3														
H.1.4														
H.2.1														
H.3.1														
O.1.1														
O.1.2														
O.2.1														
O.2.2														
O.3.1														

Cutting Data – S663 – Ball nosed Cutter, extra short – extra long

			59 078 ... / 59 079 ...										
		Ø DC =	1/8"	3/16"	1/4–5/16"	3/8"	1/2"	5/8"	3/4"	1"	● 1st choice		
											○ suitable		
			a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	Emulsion	Compressed air	MQL
Index	v_c ft/min	$a_{p\,max.}$ x DC	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch			
P.1.1	590	1.0	0.0006	0.0007	0.0011	0.0013	0.0018	0.0019	0.0022	0.0025	●	○	○
P.1.2	520	1.0	0.0006	0.0007	0.0011	0.0013	0.0018	0.0019	0.0022	0.0025	●	○	○
P.1.3	520	1.0	0.0006	0.0007	0.0011	0.0013	0.0018	0.0019	0.0022	0.0025	●	○	○
P.1.4	490	1.0	0.0006	0.0007	0.0011	0.0013	0.0018	0.0019	0.0022	0.0025	●	○	○
P.1.5	490	1.0	0.0006	0.0007	0.0011	0.0013	0.0018	0.0019	0.0022	0.0025	●	○	○
P.2.1	560	1.0	0.0006	0.0007	0.0011	0.0013	0.0018	0.0019	0.0022	0.0025	●	○	○
P.2.2	460	1.0	0.0006	0.0007	0.0011	0.0013	0.0018	0.0019	0.0022	0.0025	●	○	○
P.2.3	460	1.0	0.0006	0.0007	0.0011	0.0013	0.0018	0.0019	0.0022	0.0025	●	○	○
P.2.4	430	1.0	0.0006	0.0007	0.0011	0.0013	0.0018	0.0019	0.0022	0.0025	●	○	○
P.3.1													
P.3.2													
P.3.3													
P.4.1	330	1.0	0.0004	0.0005	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
P.4.2	130	1.0	0.0004	0.0005	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
M.1.1	160	1.0	0.0004	0.0005	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
M.2.1	160	1.0	0.0004	0.0005	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
M.3.1	160	1.0	0.0004	0.0005	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
K.1.1	390	1.0	0.0011	0.0013	0.0020	0.0024	0.0033	0.0035	0.0039	0.0045	●	○	○
K.1.2	260	1.0	0.0011	0.0013	0.0020	0.0024	0.0033	0.0035	0.0039	0.0045	●	○	○
K.2.1	390	1.0	0.0008	0.0010	0.0014	0.0017	0.0023	0.0024	0.0027	0.0031	●	○	○
K.2.2	660	1.0	0.0008	0.0010	0.0014	0.0017	0.0023	0.0024	0.0027	0.0031	●	○	○
K.3.1	390	1.0	0.0011	0.0013	0.0020	0.0024	0.0033	0.0035	0.0039	0.0045	●	○	○
K.3.2	330	1.0	0.0011	0.0013	0.0020	0.0024	0.0033	0.0035	0.0039	0.0045	●	○	○
N.1.1													
N.1.2													
N.2.1													
N.2.2													
N.2.3													
N.3.1	660	1.0	0.0008	0.0011	0.0017	0.0022	0.0031	0.0033	0.0037	0.0043	●	○	○
N.3.2	660	1.0	0.0008	0.0011	0.0017	0.0022	0.0031	0.0033	0.0037	0.0043	●	○	○
N.3.3	460	1.0	0.0008	0.0011	0.0017	0.0022	0.0031	0.0033	0.0037	0.0043	●	○	○
N.4.1													
S.1.1	98	1.0	0.0004	0.0005	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
S.1.2	98	1.0	0.0004	0.0005	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
S.2.1	98	1.0	0.0004	0.0005	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
S.2.2	98	1.0	0.0004	0.0005	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
S.2.3	98	1.0	0.0004	0.0005	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
S.3.1	160	1.0	0.0004	0.0005	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
S.3.2	66	1.0	0.0004	0.0005	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
S.3.3													
H.1.1													
H.1.2													
H.1.3													
H.1.4													
H.2.1													
H.3.1													
O.1.1													
O.1.2													
O.2.1													
O.2.2													
O.3.1													

Cutting Data – P157 – Ball nosed cutter, short – extra long

			59 055 ...											
		Ø DC =	1/8–5/32"	3/16"	7/32"	1/4–5/16"	3/8"	1/2"	9/16"	3/4"	1"	● 1st choice		
												○ suitable		
			a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC			
Index	v_c ft/min	$a_{p\,max.}$ x DC	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	Emulsion	Compressed air	MQL
P.1.1	430	1.0	0.0007	0.0008	0.0009	0.0012	0.0015	0.0020	0.0022	0.0024	0.0028	●	○	○
P.1.2	360	1.0	0.0006	0.0007	0.0008	0.0011	0.0013	0.0018	0.0019	0.0022	0.0025	●	○	○
P.1.3	360	1.0	0.0006	0.0007	0.0008	0.0011	0.0013	0.0018	0.0019	0.0022	0.0025	●	○	○
P.1.4	310	1.0	0.0006	0.0007	0.0008	0.0011	0.0013	0.0018	0.0019	0.0022	0.0025	●	○	○
P.1.5	310	1.0	0.0006	0.0007	0.0008	0.0011	0.0013	0.0018	0.0019	0.0022	0.0025	●	○	○
P.2.1	360	1.0	0.0006	0.0007	0.0008	0.0011	0.0013	0.0018	0.0019	0.0022	0.0025	●	○	○
P.2.2	280	1.0	0.0006	0.0007	0.0008	0.0011	0.0013	0.0018	0.0019	0.0022	0.0025	●	○	○
P.2.3	280	1.0	0.0006	0.0007	0.0008	0.0011	0.0013	0.0018	0.0019	0.0022	0.0025	●	○	○
P.2.4	210	1.0	0.0006	0.0007	0.0008	0.0011	0.0013	0.0018	0.0019	0.0022	0.0025	●	○	○
P.3.1														
P.3.2														
P.3.3														
P.4.1	200	1.0	0.0004	0.0005	0.0006	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
P.4.2	160	1.0	0.0004	0.0005	0.0006	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
M.1.1	160	1.0	0.0004	0.0005	0.0006	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
M.2.1	200	1.0	0.0004	0.0005	0.0006	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
M.3.1	200	1.0	0.0004	0.0005	0.0006	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
K.1.1	510	1.0	0.0011	0.0013	0.0015	0.0020	0.0024	0.0033	0.0035	0.0039	0.0045	●	○	○
K.1.2	480	1.0	0.0011	0.0013	0.0015	0.0020	0.0024	0.0033	0.0035	0.0039	0.0045	●	○	○
K.2.1	510	1.0	0.0008	0.0010	0.0011	0.0014	0.0017	0.0023	0.0024	0.0027	0.0031	●	○	○
K.2.2	480	1.0	0.0008	0.0010	0.0011	0.0014	0.0017	0.0023	0.0024	0.0027	0.0031	●	○	○
K.3.1	510	1.0	0.0011	0.0013	0.0015	0.0020	0.0024	0.0033	0.0035	0.0039	0.0045	●	○	○
K.3.2	480	1.0	0.0011	0.0013	0.0015	0.0020	0.0024	0.0033	0.0035	0.0039	0.0045	●	○	○
N.1.1														
N.1.2														
N.2.1														
N.2.2														
N.2.3														
N.3.1	790	1.0	0.0008	0.0011	0.0013	0.0017	0.0022	0.0031	0.0033	0.0037	0.0043	●	○	○
N.3.2	790	1.0	0.0008	0.0011	0.0013	0.0017	0.0022	0.0031	0.0033	0.0037	0.0043	●	○	○
N.3.3	560	1.0	0.0008	0.0011	0.0013	0.0017	0.0022	0.0031	0.0033	0.0037	0.0043	●	○	○
N.4.1														
S.1.1														
S.1.2														
S.2.1														
S.2.2														
S.2.3														
S.3.1														
S.3.2														
S.3.3														
H.1.1														
H.1.2														
H.1.3														
H.1.4														
H.2.1														
H.3.1														
O.1.1														
O.1.2														
O.2.1														
O.2.2														
O.3.1														

Cutting Data – S664 – Ball nosed Cutter, extra short – extra long

			59 080... / 59 081 ...												● 1st choice		
		Ø DC =	1/32"	3/64"	1/16"	3/32"	1/8–5/32"	3/16"	1/4–5/16"	3/8"	1/2"	5/8"	3/4"	1"	○ suitable		
			a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	Emulsion	Compressed air	MQL
Index	v_c ft/min	$a_{p\,max.}$ x DC	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch			
P.1.1	260	1.0	0.0003	0.0003	0.0004	0.0005	0.0007	0.0008	0.0012	0.0015	0.0020	0.0022	0.0024	0.0028	●	○	○
P.1.2	220	1.0	0.0002	0.0002	0.0003	0.0004	0.0006	0.0007	0.0011	0.0013	0.0018	0.0019	0.0022	0.0025	●	○	○
P.1.3	220	1.0	0.0002	0.0002	0.0003	0.0004	0.0006	0.0007	0.0011	0.0013	0.0018	0.0019	0.0022	0.0025	●	○	○
P.1.4	190	1.0	0.0002	0.0002	0.0003	0.0004	0.0006	0.0007	0.0011	0.0013	0.0018	0.0019	0.0022	0.0025	●	○	○
P.1.5	190	1.0	0.0002	0.0002	0.0003	0.0004	0.0006	0.0007	0.0011	0.0013	0.0018	0.0019	0.0022	0.0025	●	○	○
P.2.1	220	1.0	0.0002	0.0002	0.0003	0.0004	0.0006	0.0007	0.0011	0.0013	0.0018	0.0019	0.0022	0.0025	●	○	○
P.2.2	170	1.0	0.0002	0.0002	0.0003	0.0004	0.0006	0.0007	0.0011	0.0013	0.0018	0.0019	0.0022	0.0025	●	○	○
P.2.3	170	1.0	0.0002	0.0002	0.0003	0.0004	0.0006	0.0007	0.0011	0.0013	0.0018	0.0019	0.0022	0.0025	●	○	○
P.2.4	130	1.0	0.0002	0.0002	0.0003	0.0004	0.0006	0.0007	0.0011	0.0013	0.0018	0.0019	0.0022	0.0025	●	○	○
P.3.1																	
P.3.2																	
P.3.3																	
P.4.1	120	1.0	0.0001	0.0001	0.0002	0.0003	0.0004	0.0005	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
P.4.2	100	1.0	0.0001	0.0001	0.0002	0.0003	0.0004	0.0005	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
M.1.1	98	1.0	0.0001	0.0001	0.0002	0.0003	0.0004	0.0005	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
M.2.1	120	1.0	0.0001	0.0001	0.0002	0.0003	0.0004	0.0005	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
M.3.1	120	1.0	0.0001	0.0001	0.0002	0.0003	0.0004	0.0005	0.0008	0.0010	0.0014	0.0015	0.0017	0.0019	●		
K.1.1	310	1.0	0.0004	0.0006	0.0007	0.0009	0.0011	0.0013	0.0020	0.0024	0.0033	0.0035	0.0039	0.0045	●	○	○
K.1.2	290	1.0	0.0004	0.0006	0.0007	0.0009	0.0011	0.0013	0.0020	0.0024	0.0033	0.0035	0.0039	0.0045	●	○	○
K.2.1	310	1.0	0.0004	0.0005	0.0006	0.0007	0.0008	0.0010	0.0014	0.0017	0.0023	0.0024	0.0027	0.0031	●	○	○
K.2.2	290	1.0	0.0004	0.0005	0.0006	0.0007	0.0008	0.0010	0.0014	0.0017	0.0023	0.0024	0.0027	0.0031	●	○	○
K.3.1	310	1.0	0.0004	0.0006	0.0007	0.0009	0.0011	0.0013	0.0020	0.0024	0.0033	0.0035	0.0039	0.0045	●	○	○
K.3.2	290	1.0	0.0004	0.0006	0.0007	0.0009	0.0011	0.0013	0.0020	0.0024	0.0033	0.0035	0.0039	0.0045	●	○	○
N.1.1																	
N.1.2																	
N.2.1																	
N.2.2																	
N.2.3																	
N.3.1	470	1.0	0.0002	0.0003	0.0004	0.0006	0.0008	0.0011	0.0017	0.0022	0.0031	0.0033	0.0037	0.0043	●	○	○
N.3.2	470	1.0	0.0002	0.0003	0.0004	0.0006	0.0008	0.0011	0.0017	0.0022	0.0031	0.0033	0.0037	0.0043	●	○	○
N.3.3	330	1.0	0.0002	0.0003	0.0004	0.0006	0.0008	0.0011	0.0017	0.0022	0.0031	0.0033	0.0037	0.0043	●	○	○
N.4.1																	
S.1.1																	
S.1.2																	
S.2.1																	
S.2.2																	
S.2.3																	
S.3.1																	
S.3.2																	
S.3.3																	
H.1.1																	
H.1.2																	
H.1.3																	
H.1.4																	
H.2.1																	
H.3.1																	
O.1.1																	
O.1.2																	
O.2.1																	
O.2.2																	
O.3.1																	

Cutting Data – P166 – Ball nosed and End milling cutter, short – extra long

			59 082 ... / 59 083 ... / 59 084 ...								
		Ø DC =	1/4"	3/8"	1/2"	5/8"	3/4"	1"	● 1st choice		
									○ suitable		
			a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	Emulsion	Compressed air	MQL
Index	v_c ft/min	$a_{p\,max.}$ x DC	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch			
P.1.1	690	0.5	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039	●	○	○
P.1.2	660	0.5	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039	●	○	○
P.1.3	660	0.5	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039	●	○	○
P.1.4	620	0.5	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039	●	○	○
P.1.5	620	0.5	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039	●	○	○
P.2.1	660	0.5	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039	●	○	○
P.2.2	620	0.5	0.0012	0.0015	0.0022	0.0023	0.0026	0.0030	●	○	○
P.2.3	590	0.5	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039	●	○	○
P.2.4	560	0.5	0.0012	0.0015	0.0022	0.0023	0.0026	0.0030	●	○	○
P.3.1	590	0.5	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039			
P.3.2	560	0.5	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039			
P.3.3	460	0.5	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039			
P.4.1	330	0.5	0.0010	0.0013	0.0019	0.0020	0.0023	0.0026	●		
P.4.2	260	0.5	0.0010	0.0013	0.0019	0.0020	0.0023	0.0026	●		
M.1.1	330	0.5	0.0010	0.0013	0.0019	0.0020	0.0023	0.0026	●		
M.2.1	330	0.5	0.0010	0.0013	0.0019	0.0020	0.0023	0.0026	●		
M.3.1	330	0.5	0.0010	0.0013	0.0019	0.0020	0.0023	0.0026	●		
K.1.1	660	0.5	0.0019	0.0023	0.0032	0.0034	0.0039	0.0044	●	○	○
K.1.2	590	0.5	0.0019	0.0023	0.0032	0.0034	0.0039	0.0044	●	○	○
K.2.1	620	0.5	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039	●	○	○
K.2.2	560	0.5	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039	●	○	○
K.3.1	590	0.5	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039	●	○	○
K.3.2	520	0.5	0.0016	0.0020	0.0028	0.0030	0.0033	0.0039	●	○	○
N.1.1											
N.1.2											
N.2.1											
N.2.2											
N.2.3											
N.3.1											
N.3.2											
N.3.3											
N.4.1											
S.1.1	120	1.0	0.0012	0.0015	0.0022	0.0023	0.0026	0.0030	●		
S.1.2	120	1.0	0.0012	0.0015	0.0022	0.0023	0.0026	0.0030	●		
S.2.1	80	1.0	0.0010	0.0012	0.0018	0.0020	0.0022	0.0024	●		
S.2.2	80	1.0	0.0010	0.0012	0.0018	0.0020	0.0022	0.0024	●		
S.2.3	80	1.0	0.0010	0.0012	0.0018	0.0020	0.0022	0.0024	●		
S.3.1	300	1.0	0.0019	0.0023	0.0032	0.0034	0.0039	0.0044	●		
S.3.2	180	1.0	0.0012	0.0015	0.0022	0.0023	0.0026	0.0030	●		
S.3.3	140	1.0	0.0012	0.0015	0.0022	0.0023	0.0026	0.0030	●		
H.1.1											
H.1.2											
H.1.3											
H.1.4											
H.2.1											
H.3.1											
O.1.1											
O.1.2											
O.2.1											
O.2.2											
O.3.1											

Cutting Data – P250 – Ball Nosed Cutter, medium long – extra long

		59 063 ...									
		Ø DC =	1/8"	3/16"	1/4"	3/8"	1/2"	● 1st choice			
								○ suitable			
			a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC				
Index	v_c ft/min	$a_{p\,max.}$ x DC	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	Emulsion	Compressed air	MQL
P.1.1	350	1.0	0.0006	0.0007	0.0011	0.0013	0.0018	●	○	○
P.1.2	310	1.0	0.0006	0.0007	0.0011	0.0013	0.0018	●	○	○
P.1.3	310	1.0	0.0006	0.0007	0.0011	0.0013	0.0018	●	○	○
P.1.4	300	1.0	0.0006	0.0007	0.0011	0.0013	0.0018	●	○	○
P.1.5	300	1.0	0.0006	0.0007	0.0011	0.0013	0.0018	●	○	○
P.2.1	330	1.0	0.0006	0.0007	0.0011	0.0013	0.0018	●	○	○
P.2.2	280	1.0	0.0006	0.0007	0.0011	0.0013	0.0018	●	○	○
P.2.3	280	1.0	0.0006	0.0007	0.0011	0.0013	0.0018	●	○	○
P.2.4	260	1.0	0.0006	0.0007	0.0011	0.0013	0.0018	●	○	○
P.3.1										
P.3.2										
P.3.3										
P.4.1	200	1.0	0.0004	0.0005	0.0008	0.0010	0.0014	●		
P.4.2	80	1.0	0.0004	0.0005	0.0008	0.0010	0.0014	●		
M.1.1	100	1.0	0.0004	0.0005	0.0008	0.0010	0.0014	●		
M.2.1	100	1.0	0.0004	0.0005	0.0008	0.0010	0.0014	●		
M.3.1	100	1.0	0.0004	0.0005	0.0008	0.0010	0.0014	●		
K.1.1	240	1.0	0.0011	0.0013	0.0020	0.0024	0.0033	●	○	○
K.1.2	160	1.0	0.0011	0.0013	0.0020	0.0024	0.0033	●	○	○
K.2.1	240	1.0	0.0008	0.0010	0.0014	0.0017	0.0023	●	○	○
K.2.2	390	1.0	0.0008	0.0010	0.0014	0.0017	0.0023	●	○	○
K.3.1	240	1.0	0.0011	0.0013	0.0020	0.0024	0.0033	●	○	○
K.3.2	200	1.0	0.0011	0.0013	0.0020	0.0024	0.0033	●	○	○
N.1.1										
N.1.2										
N.2.1										
N.2.2										
N.2.3										
N.3.1	390	1.0	0.0008	0.0011	0.0017	0.0022	0.0031	●	○	○
N.3.2	390	1.0	0.0008	0.0011	0.0017	0.0022	0.0031	●	○	○
N.3.3	280	1.0	0.0008	0.0011	0.0017	0.0022	0.0031	●	○	○
N.4.1										
S.1.1	59	1.0	0.0004	0.0005	0.0008	0.0010	0.0014	●		
S.1.2	59	1.0	0.0004	0.0005	0.0008	0.0010	0.0014	●		
S.2.1	59	1.0	0.0004	0.0005	0.0008	0.0010	0.0014	●		
S.2.2	59	1.0	0.0004	0.0005	0.0008	0.0010	0.0014	●		
S.2.3	59	1.0	0.0004	0.0005	0.0008	0.0010	0.0014	●		
S.3.1	98	1.0	0.0004	0.0005	0.0008	0.0010	0.0014	●		
S.3.2	39	1.0	0.0004	0.0005	0.0008	0.0010	0.0014	●		
S.3.3										
H.1.1										
H.1.2										
H.1.3										
H.1.4										
H.2.1										
H.3.1										
O.1.1										
O.1.2										
O.2.1										
O.2.2										
O.3.1										

Cutting Data – P251, P251, P253, P254 – Ball nosed cutter, extra long

			59 064 ... / 59 065 ... / 59 066 ... / 59 067 ...					● 1st choice		
		Ø DC =	1/32"	.060"	3/32"	1/8"	3/16"	○ suitable		
			a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC			
Index	v_c ft/min	$a_{p\,max.}$ x DC	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	Emulsion	Compressed air	MQL
P.1.1	300	1.0	0.0002	0.0003	0.0004	0.0006	0.0007	●	○	○
P.1.2	260	1.0	0.0002	0.0003	0.0004	0.0006	0.0007	●	○	○
P.1.3	260	1.0	0.0002	0.0003	0.0004	0.0006	0.0007	●	○	○
P.1.4	250	1.0	0.0002	0.0003	0.0004	0.0006	0.0007	●	○	○
P.1.5	250	1.0	0.0002	0.0003	0.0004	0.0006	0.0007	●	○	○
P.2.1	280	1.0	0.0002	0.0003	0.0004	0.0006	0.0007	●	○	○
P.2.2	230	1.0	0.0002	0.0003	0.0004	0.0006	0.0007	●	○	○
P.2.3	230	1.0	0.0002	0.0003	0.0004	0.0006	0.0007	●	○	○
P.2.4	210	1.0	0.0002	0.0003	0.0004	0.0006	0.0007	●	○	○
P.3.1										
P.3.2										
P.3.3										
P.4.1	160	1.0	0.0001	0.0002	0.0003	0.0004	0.0005	●		
P.4.2	70	1.0	0.0001	0.0002	0.0003	0.0004	0.0005	●		
M.1.1	82	1.0	0.0001	0.0002	0.0003	0.0004	0.0005	●		
M.2.1	82	1.0	0.0001	0.0002	0.0003	0.0004	0.0005	●		
M.3.1	82	1.0	0.0001	0.0002	0.0003	0.0004	0.0005	●		
K.1.1	200	1.0	0.0004	0.0007	0.0009	0.0011	0.0013	●	○	○
K.1.2	130	1.0	0.0004	0.0007	0.0009	0.0011	0.0013	●	○	○
K.2.1	200	1.0	0.0004	0.0006	0.0007	0.0008	0.0010	●	○	○
K.2.2	330	1.0	0.0004	0.0006	0.0007	0.0008	0.0010	●	○	○
K.3.1	200	1.0	0.0004	0.0007	0.0009	0.0011	0.0013	●	○	○
K.3.2	160	1.0	0.0004	0.0007	0.0009	0.0011	0.0013	●	○	○
N.1.1										
N.1.2										
N.2.1										
N.2.2										
N.2.3										
N.3.1	330	1.0	0.0002	0.0004	0.0006	0.0008	0.0011	●	○	○
N.3.2	330	1.0	0.0002	0.0004	0.0006	0.0008	0.0011	●	○	○
N.3.3	230	1.0	0.0002	0.0004	0.0006	0.0008	0.0011	●	○	○
N.4.1										
S.1.1	49	1.0	0.0001	0.0002	0.0003	0.0004	0.0005	●		
S.1.2	49	1.0	0.0001	0.0002	0.0003	0.0004	0.0005	●		
S.2.1	49	1.0	0.0001	0.0002	0.0003	0.0004	0.0005	●		
S.2.2	49	1.0	0.0001	0.0002	0.0003	0.0004	0.0005	●		
S.2.3	49	1.0	0.0001	0.0002	0.0003	0.0004	0.0005	●		
S.3.1	82	1.0	0.0001	0.0002	0.0003	0.0004	0.0005	●		
S.3.2	33	1.0	0.0001	0.0002	0.0003	0.0004	0.0005	●		
S.3.3										
H.1.1										
H.1.2										
H.1.3										
H.1.4										
H.2.1										
H.3.1										
O.1.1										
O.1.2										
O.2.1										
O.2.2										
O.3.1										

Cutting Data – P501, P503 – Micro End Milling Cutter, long

			59 007 ... / 59 008 ...									
		Ø DC =	0.005–015"		0.015–031"		0.031–047"		0.047–062"		0.062–078“	
			a_e 0.13 x DC	a_e 0.25 x DC	a_e 0.13 x DC	a_e 0.25 x DC	a_e 0.13 x DC	a_e 0.25 x DC	a_e 0.13 x DC	a_e 0.25 x DC	a_e .13 x DC	a_e 0.25 x DC
Index	v_c ft/min	$a_{p\,max.}$ x DC	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch
P.1.1	600	3.0	0.00005		0.00010		0.00015			0.00170		0.00021
P.1.2	600	3.0	0.00005		0.00010		0.00015			0.00170		0.00021
P.1.3	200	3.0	0.00004		0.00009		0.00013			0.00020		0.00025
P.1.4	200	3.0	0.00004		0.00009		0.00013			0.00020		0.00025
P.1.5	200	3.0	0.00004		0.00009		0.00013			0.00020		0.00025
P.2.1	200	3.0	0.00004		0.00009		0.00013			0.00015		0.00019
P.2.2	200	3.0	0.00004		0.00009		0.00013			0.00015		0.00019
P.2.3	200	3.0	0.00004		0.00009		0.00013			0.00015		0.00019
P.2.4	100	3.0	0.00002		0.00004		0.00007			0.00008		0.00100
P.3.1	150	3.0	0.00003		0.00006		0.00008			0.00010		0.00012
P.3.2	150	3.0	0.00003		0.00006		0.00008			0.00010		0.00012
P.3.3	90	3.0	0.00001		0.00003		0.00004			0.00005		0.00006
P.4.1	450	3.0	0.00005		0.00010		0.00015			0.00017		0.00021
P.4.2	450	3.0	0.00005		0.00010		0.00015			0.00017		0.00021
M.1.1	200	3.0	0.00004		0.00009		0.00013			0.00015		0.00019
M.2.1	200	3.0	0.00002		0.00004		0.00007			0.00008		0.00100
M.3.1	100	3.0	0.00002		0.00004		0.00007			0.00008		0.00100
K.1.1	400	3.0	0.00005		0.00010		0.00015			0.00017		0.00021
K.1.2	400	3.0	0.00005		0.00010		0.00015			0.00017		0.00021
K.2.1	300	3.0	0.00005		0.00010		0.00015			0.00017		0.00021
K.2.2	300	3.0	0.00005		0.00010		0.00015			0.00017		0.00021
K.3.1	250	3.0	0.00005		0.00010		0.00015			0.00017		0.00021
K.3.2	250	3.0	0.00005		0.00010		0.00015			0.00017		0.00021
N.1.1	1000	3.0	0.00015		0.00031		0.00047			0.00055		0.00069
N.1.2	1000	3.0	0.00015		0.00031		0.00047			0.00055		0.00069
N.2.1	750	3.0	0.00015		0.00031		0.00047			0.00055		0.00069
N.2.2	750	3.0	0.00015		0.00031		0.00047			0.00055		0.00069
N.2.3												
N.3.1	500	3.0	0.00012		0.00025		0.00038		0.00044		0.00055	
N.3.2	800	3.0	0.00015		0.00031		0.00048		0.00055		0.00069	
N.3.3	400	3.0	0.00012		0.00025		0.00038		0.00044		0.00055	
N.4.1	1500	3.0	0.00015		0.00031		0.00048		0.00055		0.00069	
S.1.1	70	3.0	0.00003		0.00006		0.00009			0.00010		0.00012
S.1.2	50	3.0	0.00001		0.00003		0.00004			0.00005		0.00006
S.2.1	70	3.0	0.00003		0.00006		0.00009			0.00010		0.00012
S.2.2	50	3.0	0.00003		0.00006		0.00009			0.00010		0.00012
S.2.3	50	3.0	0.00001		0.00003		0.00004			0.00005		0.00006
S.3.1	200	3.0	0.00003		0.00006		0.00008			0.00010		0.00012
S.3.2	150	3.0	0.00003		0.00006		0.00008			0.00010		0.00012
S.3.3	75	3.0	0.00001		0.00003		0.00004			0.00005		0.00006
H.1.1												
H.1.2												
H.1.3												
H.1.4												
H.2.1												
H.3.1												
O.1.1												
O.1.2												
O.2.1												
O.2.2												
O.3.1												

	59 007 ... / 59 008 ...						
	0.078–093"		0.093–0120"		● 1st choice		
					○ suitable		
	a_e 0.13 x DC	a_e 0.25 x DC	a_e 0.13 x DC	a_e 0.25 x DC			
Index	f_z inch	f_z inch	f_z inch	f_z inch	Emulsion	Compressed air	MQL
P.1.1		0.00025		0.00034	●		
P.1.2		0.00025		0.00034	●		
P.1.3		0.00030		0.00040	●		
P.1.4		0.00030		0.00040	●		
P.1.5		0.00030		0.00040	●		
P.2.1		0.00023		0.00031	●		
P.2.2		0.00023		0.00031	●		
P.2.3		0.00023		0.00031	●		
P.2.4		0.00012		0.00016	●		
P.3.1		0.00014		0.00019	●		
P.3.2		0.00014		0.00019	●		
P.3.3		0.00007		0.00010	●		
P.4.1		0.00025		0.00034	●		
P.4.2		0.00025		0.00034	●		
M.1.1		0.00023		0.00031	●		
M.2.1		0.00012		0.00016	●		
M.3.1		0.00012		0.00016	●		
K.1.1		0.00025		0.00034	●		
K.1.2		0.00025		0.00034	●		
K.2.1		0.00025		0.00034	●		
K.2.2		0.00025		0.00034	●		
K.3.1		0.00025		0.00034	●		
K.3.2		0.00025		0.00034	●		
N.1.1		0.00082		0.00110	●		
N.1.2		0.00082		0.00110	●		
N.2.1		0.00082		0.00110	●		
N.2.2		0.00082		0.00110	●		
N.2.3							
N.3.1	0.00065		0.00088		●		
N.3.2	0.00082		0.00110		●		
N.3.3	0.00065		0.00088		●		
N.4.1	0.00082		0.00110		●		
S.1.1		0.00014		0.00019	●		
S.1.2		0.00007		0.00010	●		
S.2.1		0.00014		0.00019	●		
S.2.2		0.00014		0.00019	●		
S.2.3		0.00007		0.00010	●		
S.3.1		0.00014		0.00019	●		
S.3.2		0.00014		0.00019	●		
S.3.3		0.00007		0.00010	●		
H.1.1							
H.1.2							
H.1.3							
H.1.4							
H.2.1							
H.3.1							
O.1.1							
O.1.2							
O.2.1							
O.2.2							
O.3.1							

Cutting Data – P504, P506 – Micro end milling cutter, short

			59 009 ... / 59 010...									
		Ø DC =	0.005–015"	0.015–031"	0.031–047"	0.047–062"	0.062–078"	0.078–093"	0.093–0120"	● 1st choice		
										○ suitable		
			a_e 0.30 x DC	a_e 0.30 x DC	a_e 0.30 x DC	a_e 0.60 x DC	a_e 0.60 x DC	a_e 0.60 x DC	a_e 0.60 x DC			
Index	v_c ft/min	$a_{p\,max.}$ x DC	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch	Emulsion	Compressed air	MQL
P.1.1	600	1.0	0.00007	0.00014	0.00021	0.00024	0.00031	0.00036	0.00049	●		
P.1.2	600	1.0	0.00007	0.00014	0.00021	0.00024	0.00031	0.00036	0.00049	●		
P.1.3	200	1.0	0.00006	0.00013	0.00019	0.00022	0.00028	0.00033	0.00045	●		
P.1.4	200	1.0	0.00006	0.00013	0.00019	0.00022	0.00028	0.00033	0.00045	●		
P.1.5	200	1.0	0.00006	0.00013	0.00019	0.00022	0.00028	0.00033	0.00045	●		
P.2.1	200	1.0	0.00006	0.00013	0.00019	0.00022	0.00028	0.00033	0.00045	●		
P.2.2	200	1.0	0.00006	0.00013	0.00019	0.00022	0.00028	0.00033	0.00045	●		
P.2.3	200	1.0	0.00006	0.00013	0.00019	0.00022	0.00028	0.00033	0.00045	●		
P.2.4	100	1.0	0.00003	0.00006	0.00010	0.00011	0.00014	0.00017	0.00022	●		
P.3.1	150	1.0	0.00004	0.00008	0.00012	0.00014	0.00017	0.00021	0.00028	●		
P.3.2	150	1.0	0.00004	0.00008	0.00012	0.00014	0.00017	0.00021	0.00028	●		
P.3.3	90	1.0	0.00002	0.00004	0.00006	0.00007	0.00009	0.00012	0.00018	●		
P.4.1	450	1.0	0.00007	0.00014	0.00021	0.00024	0.00031	0.00036	0.00049	●		
P.4.2	450	1.0	0.00007	0.00014	0.00021	0.00024	0.00031	0.00036	0.00049	●		
M.1.1	200	1.0	0.00006	0.00013	0.00019	0.00022	0.00028	0.00033	0.00045	●		
M.2.1	200	1.0	0.00003	0.00006	0.00010	0.00011	0.00014	0.00017	0.00022	●		
M.3.1	100	1.0	0.00003	0.00006	0.00010	0.00011	0.00014	0.00017	0.00022	●		
K.1.1	400	1.0	0.00007	0.00014	0.00021	0.00024	0.00031	0.00036	0.00049	●		
K.1.2	400	1.0	0.00007	0.00014	0.00021	0.00024	0.00031	0.00036	0.00049	●		
K.2.1	300	1.0	0.00007	0.00014	0.00021	0.00024	0.00031	0.00036	0.00049	●		
K.2.2	300	1.0	0.00007	0.00014	0.00021	0.00024	0.00031	0.00036	0.00049	●		
K.3.1	250	1.0	0.00007	0.00014	0.00021	0.00024	0.00031	0.00036	0.00049	●		
K.3.2	250	1.0	0.00007	0.00014	0.00021	0.00024	0.00031	0.00036	0.00049	●		
N.1.1	1000	1.0	0.00022	0.00045	0.00068	0.00780	0.00099	0.00118	0.00158	●		
N.1.2	1000	1.0	0.00022	0.00045	0.00068	0.00780	0.00099	0.00118	0.00158	●		
N.2.1	750	1.0	0.00022	0.00045	0.00068	0.00780	0.00099	0.00118	0.00158	●		
N.2.2	750	1.0	0.00022	0.00045	0.00068	0.00780	0.00099	0.00118	0.00158	●		
N.2.3												
N.3.1	500	1.0	0.00017	0.00036	0.00055	0.00063	0.00079	0.00094	0.00127	●		
N.3.2	800	1.0	0.00017	0.00036	0.00055	0.00063	0.00079	0.00094	0.00127	●		
N.3.3	400	1.0	0.00017	0.00036	0.00055	0.00063	0.00079	0.00094	0.00127	●		
N.4.1	1500	1.0	0.00022	0.00045	0.00068	0.00078	0.00099	0.00118	0.00158	●		
S.1.1	70	1.0	0.00004	0.00008	0.00012	0.00014	0.00017	0.00021	0.00028	●		
S.1.2	50	1.0	0.00002	0.00004	0.00006	0.00007	0.00009	0.00012	0.00018	●		
S.2.1	70	1.0	0.00004	0.00008	0.00012	0.00014	0.00017	0.00021	0.00028	●		
S.2.2	50	1.0	0.00002	0.00004	0.00006	0.00007	0.00009	0.00012	0.00018	●		
S.2.3	50	1.0	0.00002	0.00004	0.00006	0.00007	0.00009	0.00012	0.00018	●		
S.3.1	200	1.0	0.00004	0.00008	0.00012	0.00014	0.00017	0.00021	0.00028	●		
S.3.2	150	1.0	0.00004	0.00008	0.00012	0.00014	0.00017	0.00021	0.00028	●		
S.3.3	75	1.0	0.00002	0.00004	0.00006	0.00007	0.00009	0.00012	0.00018	●		
H.1.1												
H.1.2												
H.1.3												
H.1.4												
H.2.1												
H.3.1												
O.1.1												
O.1.2												
O.2.1												
O.2.2												
O.3.1												

Cutting Data – P137 – Profile milling cutter

			59 049 ... / 59 050 ...						
		Ø DC =	1/8"	3/16"	1/4–5/16"	3/8"	● 1st choice		
							○ suitable		
			a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	Emulsion	Compressed air	MQL
Index	v_c ft/min	$a_{p\,max.}$ x DC	f_z inch	f_z inch	f_z inch	f_z inch			
P.1.1	310	1.0	0.0006	0.0007	0.0011	0.0013	●	○	○
P.1.2	260	1.0	0.0006	0.0007	0.0011	0.0013	●	○	○
P.1.3	260	1.0	0.0006	0.0007	0.0011	0.0013	●	○	○
P.1.4	230	1.0	0.0006	0.0007	0.0011	0.0013	●	○	○
P.1.5	230	1.0	0.0006	0.0007	0.0011	0.0013	●	○	○
P.2.1	250	1.0	0.0006	0.0007	0.0011	0.0013	●	○	○
P.2.2	200	1.0	0.0006	0.0007	0.0011	0.0013	●	○	○
P.2.3	200	1.0	0.0006	0.0007	0.0011	0.0013	●	○	○
P.2.4	180	1.0	0.0006	0.0007	0.0011	0.0013	●	○	○
P.3.1									
P.3.2									
P.3.3									
P.4.1									
P.4.2									
M.1.1									
M.2.1									
M.3.1									
K.1.1	390	1.0	0.0011	0.0013	0.0020	0.0024	●	○	○
K.1.2	330	1.0	0.0011	0.0013	0.0020	0.0024	●	○	○
K.2.1	390	1.0	0.0008	0.0010	0.0014	0.0017	●	○	○
K.2.2	330	1.0	0.0008	0.0010	0.0014	0.0017	●	○	○
K.3.1	390	1.0	0.0011	0.0013	0.0020	0.0024	●	○	○
K.3.2	330	1.0	0.0011	0.0013	0.0020	0.0024	●	○	○
N.1.1									
N.1.2									
N.2.1									
N.2.2									
N.2.3									
N.3.1									
N.3.2									
N.3.3									
N.4.1									
S.1.1									
S.1.2									
S.2.1									
S.2.2									
S.2.3									
S.3.1									
S.3.2									
S.3.3									
H.1.1									
H.1.2									
H.1.3									
H.1.4									
H.2.1									
H.3.1									
O.1.1									
O.1.2									
O.2.1									
O.2.2									
O.3.1									

Cutting Data – P139 – Profile milling cutter

			59 051 ... / 59 052 ...						
		Ø DC =	3/16"	1/4"	3/8"	1/2"	● 1st choice		
							○ suitable		
			a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC			
Index	v_c ft/min	$a_{p\,max.}$ x DC	f_z inch	f_z inch	f_z inch	f_z inch	Emulsion	Compressed air	MQL
P.1.1	310	1.0	0.0007	0.0011	0.0013	0.0018	●	○	○
P.1.2	260	1.0	0.0007	0.0011	0.0013	0.0018	●	○	○
P.1.3	260	1.0	0.0007	0.0011	0.0013	0.0018	●	○	○
P.1.4	230	1.0	0.0007	0.0011	0.0013	0.0018	●	○	○
P.1.5	230	1.0	0.0007	0.0011	0.0013	0.0018	●	○	○
P.2.1	250	1.0	0.0007	0.0011	0.0013	0.0018	●	○	○
P.2.2	200	1.0	0.0007	0.0011	0.0013	0.0018	●	○	○
P.2.3	200	1.0	0.0007	0.0011	0.0013	0.0018	●	○	○
P.2.4	180	1.0	0.0007	0.0011	0.0013	0.0018	●	○	○
P.3.1									
P.3.2									
P.3.3									
P.4.1									
P.4.2									
M.1.1									
M.2.1									
M.3.1									
K.1.1	390	1.0	0.0013	0.0020	0.0024	0.0033	●	○	○
K.1.2	330	1.0	0.0013	0.0020	0.0024	0.0033	●	○	○
K.2.1	390	1.0	0.0010	0.0014	0.0017	0.0023	●	○	○
K.2.2	330	1.0	0.0010	0.0014	0.0017	0.0023	●	○	○
K.3.1	390	1.0	0.0013	0.0020	0.0024	0.0033	●	○	○
K.3.2	330	1.0	0.0013	0.0020	0.0024	0.0033	●	○	○
N.1.1									
N.1.2									
N.2.1									
N.2.2									
N.2.3									
N.3.1									
N.3.2									
N.3.3									
N.4.1									
S.1.1									
S.1.2									
S.2.1									
S.2.2									
S.2.3									
S.3.1									
S.3.2									
S.3.3									
H.1.1									
H.1.2									
H.1.3									
H.1.4									
H.2.1									
H.3.1									
O.1.1									
O.1.2									
O.2.1									
O.2.2									
O.3.1									

Cutting Data – P132/P134 – Chamfer milling cutter

			59 041 ... / 59 042 ... / 59 045 ... / 59 046 ...					● 1st choice		
		Ø DC =	1/8"	3/16"	1/4"	3/8"	1/2"	○ suitable		
			a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	a_e 1 x DC	Emulsion	Compressed air	MQL
Index	v_c ft/min	$a_{p\,max.}$ x DC	f_z inch	f_z inch	f_z inch	f_z inch	f_z inch			
P.1.1	310	1.0	0.0006	0.0007	0.0011	0.0013	0.0018	●	○	○
P.1.2	260	1.0	0.0006	0.0007	0.0011	0.0013	0.0018	●	○	○
P.1.3	260	1.0	0.0006	0.0007	0.0011	0.0013	0.0018	●	○	○
P.1.4	230	1.0	0.0006	0.0007	0.0011	0.0013	0.0018	●	○	○
P.1.5	230	1.0	0.0006	0.0007	0.0011	0.0013	0.0018	●	○	○
P.2.1	250	1.0	0.0006	0.0007	0.0011	0.0013	0.0018	●	○	○
P.2.2	200	1.0	0.0006	0.0007	0.0011	0.0013	0.0018	●	○	○
P.2.3	200	1.0	0.0006	0.0007	0.0011	0.0013	0.0018	●	○	○
P.2.4	180	1.0	0.0006	0.0007	0.0011	0.0013	0.0018	●	○	○
P.3.1										
P.3.2										
P.3.3										
P.4.1										
P.4.2										
M.1.1										
M.2.1										
M.3.1										
K.1.1	390	1.0	0.0011	0.0013	0.0020	0.0024	0.0033	●	○	○
K.1.2	330	1.0	0.0011	0.0013	0.0020	0.0024	0.0033	●	○	○
K.2.1	390	1.0	0.0008	0.0010	0.0014	0.0017	0.0023	●	○	○
K.2.2	330	1.0	0.0008	0.0010	0.0014	0.0017	0.0023	●	○	○
K.3.1	390	1.0	0.0011	0.0013	0.0020	0.0024	0.0033	●	○	○
K.3.2	330	1.0	0.0011	0.0013	0.0020	0.0024	0.0033	●	○	○
N.1.1										
N.1.2										
N.2.1										
N.2.2										
N.2.3										
N.3.1										
N.3.2										
N.3.3										
N.4.1										
S.1.1										
S.1.2										
S.2.1										
S.2.2										
S.2.3										
S.3.1										
S.3.2										
S.3.3										
H.1.1										
H.1.2										
H.1.3										
H.1.4										
H.2.1										
H.3.1										
O.1.1										
O.1.2										
O.2.1										
O.2.2										
O.3.1										

Cutting Data – P130 – Chamfer milling cutter

			59 037 ... / 59 038 ...					
		Ø DC =	1/4"	3/8"	1/2"	● 1st choice		
						○ suitable		
			a_e 1 x DC	a_e 1 x DC	a_e 1 x DC			
Index	v_c ft/min	$a_{p\,max.}$ x DC	f_z inch	f_z inch	f_z inch	Emulsion	Compressed air	MQL
P.1.1	310	1.0	0.0011	0.0013	0.0018	●	○	○
P.1.2	260	1.0	0.0011	0.0013	0.0018	●	○	○
P.1.3	260	1.0	0.0011	0.0013	0.0018	●	○	○
P.1.4	230	1.0	0.0011	0.0013	0.0018	●	○	○
P.1.5	230	1.0	0.0011	0.0013	0.0018	●	○	○
P.2.1	250	1.0	0.0011	0.0013	0.0018	●	○	○
P.2.2	200	1.0	0.0011	0.0013	0.0018	●	○	○
P.2.3	200	1.0	0.0011	0.0013	0.0018	●	○	○
P.2.4	180	1.0	0.0011	0.0013	0.0018	●	○	○
P.3.1								
P.3.2								
P.3.3								
P.4.1								
P.4.2								
M.1.1								
M.2.1								
M.3.1								
K.1.1	390	1.0	0.0020	0.0024	0.0033	●	○	○
K.1.2	330	1.0	0.0020	0.0024	0.0033	●	○	○
K.2.1	390	1.0	0.0014	0.0017	0.0023	●	○	○
K.2.2	330	1.0	0.0014	0.0017	0.0023	●	○	○
K.3.1	390	1.0	0.0020	0.0024	0.0033	●	○	○
K.3.2	330	1.0	0.0020	0.0024	0.0033	●	○	○
N.1.1								
N.1.2								
N.2.1								
N.2.2								
N.2.3								
N.3.1								
N.3.2								
N.3.3								
N.4.1								
S.1.1								
S.1.2								
S.2.1								
S.2.2								
S.2.3								
S.3.1								
S.3.2								
S.3.3								
H.1.1								
H.1.2								
H.1.3								
H.1.4								
H.2.1								
H.3.1								
O.1.1								
O.1.2								
O.2.1								
O.2.2								
O.3.1								

Cutting Data – P133 – Chamfer milling cutter

			59 043 ... / 59 044 ...					
		Ø DC =	1/8"	3/16"	1/4"	● 1st choice		
						○ suitable		
			a_e 1 x DC	a_e 1 x DC	a_e 1 x DC			
Index	v_c ft/min	$a_{p\,max.}$ x DC	f_z inch	f_z inch	f_z inch	Emulsion	Compressed air	MQL
P.1.1	310	1.0	0.0011	0.0013	0.0018	●	○	○
P.1.2	260	1.0	0.0011	0.0013	0.0018	●	○	○
P.1.3	260	1.0	0.0011	0.0013	0.0018	●	○	○
P.1.4	230	1.0	0.0011	0.0013	0.0018	●	○	○
P.1.5	230	1.0	0.0011	0.0013	0.0018	●	○	○
P.2.1	250	1.0	0.0011	0.0013	0.0018	●	○	○
P.2.2	200	1.0	0.0011	0.0013	0.0018	●	○	○
P.2.3	200	1.0	0.0011	0.0013	0.0018	●	○	○
P.2.4	180	1.0	0.0011	0.0013	0.0018	●	○	○
P.3.1								
P.3.2								
P.3.3								
P.4.1								
P.4.2								
M.1.1								
M.2.1								
M.3.1								
K.1.1	390	1.0	0.0020	0.0024	0.0033	●	○	○
K.1.2	330	1.0	0.0020	0.0024	0.0033	●	○	○
K.2.1	390	1.0	0.0014	0.0017	0.0023	●	○	○
K.2.2	330	1.0	0.0014	0.0017	0.0023	●	○	○
K.3.1	390	1.0	0.0020	0.0024	0.0033	●	○	○
K.3.2	330	1.0	0.0020	0.0024	0.0033	●	○	○
N.1.1								
N.1.2								
N.2.1								
N.2.2								
N.2.3								
N.3.1								
N.3.2								
N.3.3								
N.4.1								
S.1.1								
S.1.2								
S.2.1								
S.2.2								
S.2.3								
S.3.1								
S.3.2								
S.3.3								
H.1.1								
H.1.2								
H.1.3								
H.1.4								
H.2.1								
H.3.1								
O.1.1								
O.1.2								
O.2.1								
O.2.2								
O.3.1								

Cutting Data – P131/P135 – Chamfer milling cutter

			59 039 ... / 59 040 ... / 59 047 ... / 59 048 ...			● 1st choice		
		Ø DC =	1/4"	3/8"	1/2"	○ suitable		
			a_e 1 x DC	a_e 1 x DC	a_e 1 x DC			
Index	v_c ft/min	$a_{p\,max.}$ x DC	f_z inch	f_z inch	f_z inch	Emulsion	Compressed air	MQL
P.1.1	310	1.0	0.0011	0.0013	0.0018	●	○	○
P.1.2	260	1.0	0.0011	0.0013	0.0018	●	○	○
P.1.3	260	1.0	0.0011	0.0013	0.0018	●	○	○
P.1.4	230	1.0	0.0011	0.0013	0.0018	●	○	○
P.1.5	230	1.0	0.0011	0.0013	0.0018	●	○	○
P.2.1	250	1.0	0.0011	0.0013	0.0018	●	○	○
P.2.2	200	1.0	0.0011	0.0013	0.0018	●	○	○
P.2.3	200	1.0	0.0011	0.0013	0.0018	●	○	○
P.2.4	180	1.0	0.0011	0.0013	0.0018	●	○	○
P.3.1								
P.3.2								
P.3.3								
P.4.1								
P.4.2								
M.1.1								
M.2.1								
M.3.1								
K.1.1	390	1.0	0.0020	0.0024	0.0033	●	○	○
K.1.2	330	1.0	0.0020	0.0024	0.0033	●	○	○
K.2.1	390	1.0	0.0014	0.0017	0.0023	●	○	○
K.2.2	330	1.0	0.0014	0.0017	0.0023	●	○	○
K.3.1	390	1.0	0.0020	0.0024	0.0033	●	○	○
K.3.2	330	1.0	0.0020	0.0024	0.0033	●	○	○
N.1.1								
N.1.2								
N.2.1								
N.2.2								
N.2.3								
N.3.1								
N.3.2								
N.3.3								
N.4.1								
S.1.1								
S.1.2								
S.2.1								
S.2.2								
S.2.3								
S.3.1								
S.3.2								
S.3.3								
H.1.1								
H.1.2								
H.1.3								
H.1.4								
H.2.1								
H.3.1								
O.1.1								
O.1.2								
O.2.1								
O.2.2								
O.3.1								

Technical references

Feedrate Adjustment

If the rpm indicated in the tables cannot be obtained by the machine spindle, the feed rate is to be reduced proportionally to the max rpm.

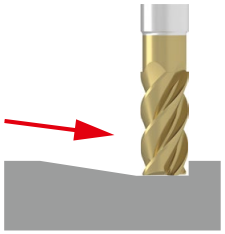
Example:
according to table = n 50000/min. and v_f 40 inch/min.,
maximum machine rpm = 40000/min.

Calculation of feed rate which can be applied:
40000 = 80 % of 50000/min. accordingly 80 % of 40 = 32 inch/min.

Feed rate which can be applied = **32 inch/min.**

Angled ramping with solid carbide cutters

Angled ramping with solid carbide cutters is possible at an angle of 3° to 6° depending on the cutter type.
A protective edge chamfer or corner radius is an advantage.



S.F.M./R.P.M. CONVERSION CHART

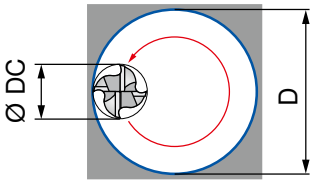
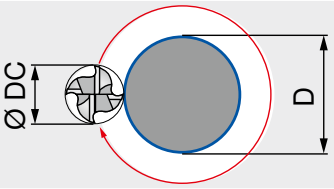
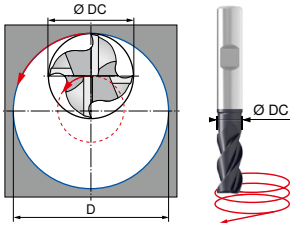
	DIAMETER															
S.F.M.	**1/16**	**3/32**	**1/8**	**5/32**	**3/16**	**7/32**	**1/4**	**5/16**	**3/8**	**7/16**	**1/2**	**5/8**	**3/4**	**7/8**	**1**
50	3.050	2.040	1.530	1.220	1.020	875	765	610	510	440	380	310	250	220	190
75	4.580	3.060	2.290	1.830	1.530	1.310	1.150	920	760	660	570	460	380	330	285
100	6.100	4.080	3.050	2.450	2.040	1.750	1.530	1.220	1.020	870	760	610	510	440	385
125	7.630	5.100	3.820	3.050	2.550	2.180	1.920	1.530	1.270	1.100	950	770	630	550	475
150	9.150	6.120	4.570	3.670	3.060	2.620	2.290	1.83	1.530	1.310	1.140	920	760	660	575
175	10.680	7.140	5.350	4.270	3.570	3.060	2.680	2.140	1.780	1.540	1.330	1.080	880	770	665
200	12.200	8.150	6.100	4.900	4.070	3.500	3.100	2.450	2.00	1.750	1.500	1.200	1.000	875	750
300	18.500	12.200	9.200	7.300	6.100	5.250	4.600	3.700	3.100	2.600	2.300	1.800	1.500	1.300	1.100
400	24.500	16.300	12.200	9.800	8.150	7.000	6.100	4.900	4.100	3.500	3.050	2.450	2.050	1.750	1.525
500	30.500	20.400	15.300	12.200	10.200	8.700	7.600	6.100	5.100	4.400	3.800	3.100	2.500	2.200	1.900
750	45.800	36.700	22.900	18.300	15.300	13.100	11.500	9.200	7.600	6.550	5.700	4.600	3.800	3.700	2.850
1.000	–	40.800	30.600	24.500	20.400	17.500	15.300	12.200	103200	8.750	7.650	6.100	5.100	4.400	3.800
1.500	–	–	45.900	36.700	30.600	26.200	22.900	18.300	15.300	13.150	11.300	9.200	7.600	6.500	5.700
2.000	–	–	–	49.000	40.800	35.000	30.600	24.400	20.400	17.500	15.300	12.200	10.200	8.700	7.600
3.000	–	–	–	–	–	52.500	45.900	36.600	30.600	26.250	22.900	18.300	15.300	13.100	11.400
4.000	–	–	–	–	–	–	–	48.800	40.800	35.000	30.600	24.400	20.400	17.500	15.200
5.000	–	–	–	–	–	–	–	–	–	43.700	38.200	30.600	25.500	21.800	19.000

General formula for calculating the cutting parameters

Designation	Abbreviation	Unit	Formula	Example	
Number of revolutions	**n**	**min^{-1}**	$n = \frac{v_c \times 12}{DC \times \pi}$	v_c = 80 ft/min DC = 0.75 inch	$n = \frac{80 \times 12}{0.75 \times \pi}$ = 408 min^{-1}
Cutting speed	**v_c**	**ft/min**	$v_c = \frac{DC \times \pi \times n}{12}$	n = 400 min^{-1} DC = 0.75 inch	$v_c = \frac{0.75 \times \pi \times 400}{12}$ = 78 ft/min
Feed per tooth	**f_z**	**inch**	$f_z = \frac{v_f}{ZEFP \times n}$	v_f = 12.8 inch/min n = 400 min^{-1} ZEFP = 4	$f_z = \frac{12.8}{4 \times 400}$ = 0.008 inch
Feed per revolution	**f**	**inch/rev**	$f = f_z \times ZEFP$	f_z = 0.008 inch ZEFP = 4	f = 0.008 x 4 = 0.032 inch/rev
Feed rate	**v_f**	**inch/min.**	$v_f = f_z \times ZEFP \times n$	f_z = 0.008 ZEFP = 4 n = 400 min^{-1}	v_f = 0.008 x 4 x 400 = 12.8 inch/min
Average chip thickness	**h_m**	**inch**	$h_m = f_z \times \sqrt{\frac{a_e}{DC}}$	f_z = 0.008 inch a_e = 0.012 inch DC = 0.75	$h_m = 0.008 \times \sqrt{\frac{0.012}{0.75}}$ = 0.001 inch

ZEFP = Number of flutes
a_e = cutting width

Calculation of the feed rate on the midpoint path of the milling cutter (v_{fM})

Designation	Abbreviation	Unit	Formula	Example
Internal contour	**v_{fM}**	**inch/min.**	$V_{fM} = \frac{v_f \times (D - DC)}{D}$	
Outside profile	**v_{fM}**	**inch/min.**	$V_{fM} = \frac{v_f \times (D + DC)}{D}$	
Helical ramping	**v_{fM}**	**inch/min.**	$V_{fM} = \frac{n \times f_z \times ZEFP \times (D - D_C)}{D}$	

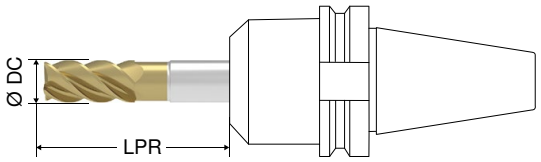
Tips for Tool Selection

Rake and helix angles combined with the coating are decisive factors for the operational area.

Characteristics	Benefits
Helix angle with slow spiral	
▲ For materials with high tensile strength	▲ High edge stability
▲ For high material removal rates	▲ Low tendency to edge chipping
▲ For slot milling, pocket milling, rough milling	
Helix angle with quick spiral	
▲ For soft steels, non ferrous metals, etc.	▲ Soft cut
▲ For low material removal rates	▲ Low cutting forces
▲ Typical for finishing processes	
Small rake angles are applied	
▲ For hard, brittle materials	▲ High edge stability
▲ For high material removal rates	▲ Low tendency to edge chipping
▲ For rough machining	
Large rake angles are applied	
▲ For soft materials	▲ Soft cut
▲ For low material removal rates	▲ Low cutting forces
▲ For finishing	▲ Favorable chip flow
	▲ Low tendency to stick

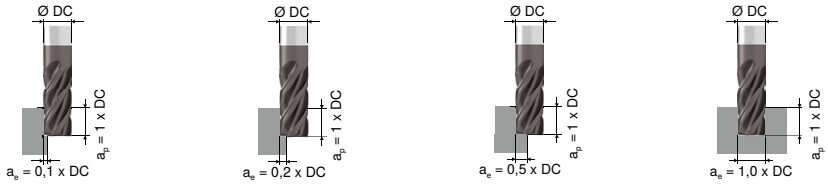
Correction factor for solid carbide milling cutters

Factors for cutting speed (v_c) and feed rate (f_z) in relation to the overhang length (LPR)



Length					
Overhang length (LPR)	1.5 x DC	4 x DC	8 x DC	12 x DC	> 12 x DC
Factor for v_c (Kf v_c)	1.0	1.0	0.9	0.85	0.7
Factor for f_z (Kf f_z)	1.2	1.0	0.8	0.7	0.5

Factors for cutting speed (v_c) and feed rate (f_z) in relation to the cutting depth (a_p) and cutting width (a_e)



Factor for v_c (Kf v_c)	1.3	1.1	1.0	0.85
Factor for f_z (Kf f_z)	1.5	1.3	1.0	0.8

Calculation aid for copy milling

Theoretical surface roughness (R_{th}) and step over (b_r)

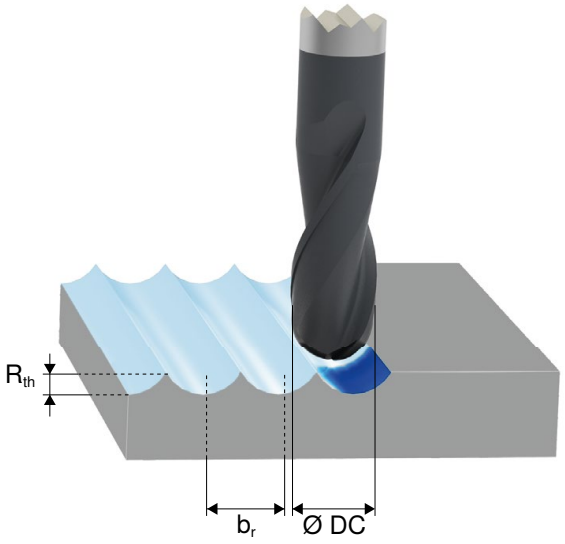
$$R_{th} = r - \sqrt{\frac{(r \times 2)^2 - b_r^2}{4}}$$

$$b_r = 2 \times \sqrt{R_{th} \times (r \times 2 - R_{th})}$$

$$R_{th} \simeq R_a / 0.1$$

$$R_a \simeq 0.1 \times R_{th}$$

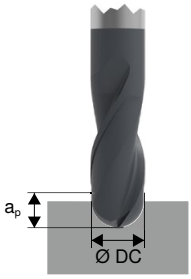
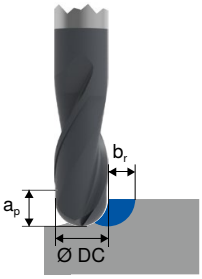
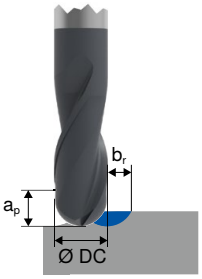
When copy milling, in order to achieve as smooth a surface as possible, the step over b_r should be adapted to the cutter diameter DC. The smaller the cutter diameter DC is, the smaller the step over b_r must be.



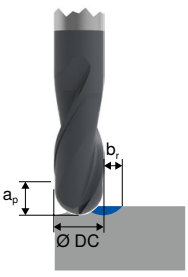
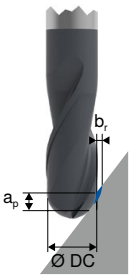
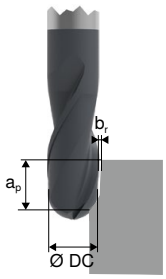
RPM correction factor (Kf n) for copy milling

$$n = \frac{v_c \times 12}{DC \times \pi} \times Kf\ n$$

Rough machining

	Peripheral and ball nose copy milling	Ball nose copy milling	
			
Axial milling depth a_p	0.5 x DC	> 0.5 x DC	0.2 x DC – 0.5 x DC
Step over b_r	1 x DC	0.2 x DC – 0.5 x DC	0.2 x DC – 0.5 x DC
Correction factor (Kf n)	1	1	1.1

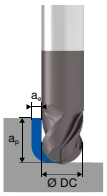
Finish milling

	Ball nose copy milling		
			
Axial milling depth a_p	< 0.2 x DC	0.2 x DC – 0.5 x DC	> 0.5 x DC
Step over b_r	< 0.2 x DC	< 0.2 x DC	< 0.2 x DC
Correction factor (Kf n)	2	1.3	1

Calculation aid for copy milling

For peripheral milling or ball nosed copy milling at cutting depths of $\mathbf{a_p} \geq 0.5 \times DC$ and $\mathbf{a_e}$ = **0.2 to 0.5 x DC** the rpm can be calculated with the following fomula:

$$n = \frac{v_C \times 12}{DC \times \pi}$$



When ball milling the effective milling diameter $\mathbf{d_{eff.}}$ must be determined using the following formula:

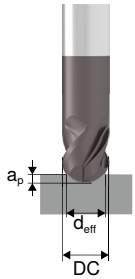
Ball nose milling cutters

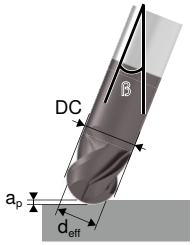
$$d_{eff.} = 2 \times \sqrt{a_p \times (DC - a_p)}$$

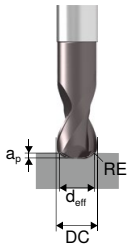
$$d_{eff.} = DC \times \sin\left(\beta \pm \arccos\left(\frac{DC - 2a_p}{DC}\right)\right)$$

Torus end milling cutters

$$d_{eff.} = (DC - 2RE) + 2 \times \sqrt{a_p \times (2RE - a_p)}$$



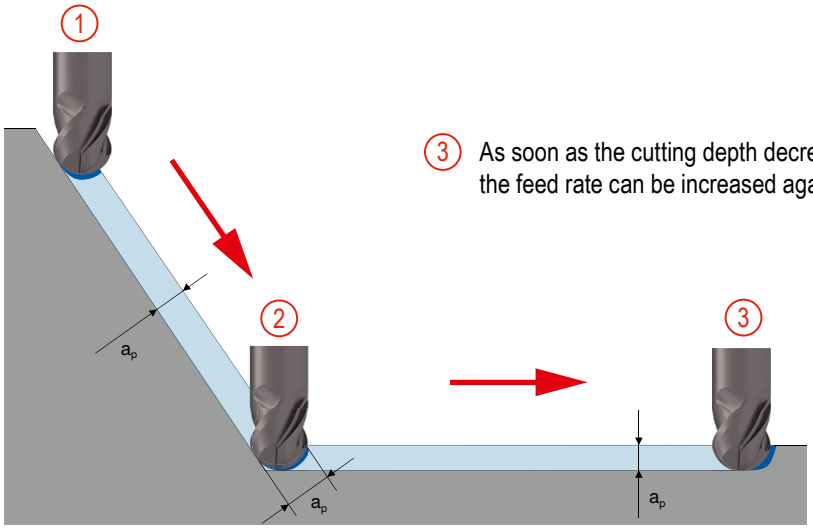




Information concerning plunge and draw milling

1. When machining the profile flanks relatively high feed rates are possible as the cutting depth is relatively low (area highlighted in blue).

2. A large increase in cutting depth occurs when the base of the profile is reached. Here the feed rate must be reduced as othwerwise tool breakage can occur due to vibrations, misalignment or chattering.



3. As soon as the cutting depth decreases during the machining of the profile base, the feed rate can be increased again.

Rule:
The steeper the angle, the lower the feed rate.
The shallower the angle, the larger the feed rate.

When plunge or draw milling dies, the feed rate has to be adapted to the various milling positions. Otherwise the cutting edge can be damaged due to overload (vibrations, misalignment or chattering).

Tool types

AL	Aluminium and Non-Ferrous Material
ST	Steel and Steel Alloys
UN	Universal

Coatings

ALTiN	▲ Monolayer coating ▲ HV0.05 = 3500 ▲ Coefficient of friction (against steel) = 0.30 ▲ Maximum application temperature: 1000°C
ZrN	▲ Monolayer coating ▲ HV0.05 = 2500 ▲ Coefficient of friction (against steel) = 0.30 ▲ Maximum application temperature: 650°C
DPAU72S DRAGONSKIN	▲ Monolayer coating ▲ HV0.05 = 3800 ▲ Coefficient of friction (against steel) = 0.35 ▲ Maximum application temperature: 1100°C
DPXU72S DRAGONSKIN	▲ ALCrN/SiN Nano Composite coating ▲ HV0.05 = 3700 ▲ Coefficient of friction (against steel) = 0.30 ▲ Maximum application temperature: 1100°C