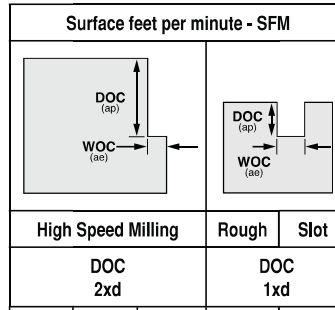


For finishing use WOC (ae) .01 up to .1xd, use SFM from .25xd column, do not increase IPT from table values



$$RPM = \frac{SFM}{d_1} \times 3.82$$

$$IPM = \text{No. of teeth} \times IPT \times RPM$$

Material	Hardness	TYPE	Surface feet per minute - SFM					Feed Rate Inch per Tooth - IPT								
			High Speed Milling			Rough		d1 End Mill Diameter								
			DOC 2xd	DOC 1xd	DOC .25xd	DOC .4 to .9xd	DOC 1xd	1/8 3.17mm	1/4 6.35mm	5/16 7.94mm	3/8 9.52mm	1/2 12.70mm	5/8 15.87mm	3/4 19.05mm	1 25.40mm	
			WOC .05xd	WOC .1xd	WOC .25xd	WOC .4 to .9xd	WOC 1xd	Multiply IPT x this factor based on WOC								
Structural + free-cutting steels, unalloyed heat-treatable + case hardened steels A283, 1151, 1215, L10, 10Lxx, 11Lxx, 12Lxx, 41Lxx, 51Lxx, 86Lxx, 86Lxx, 10xx	up to 28 HRc	2, 3, 4 Flute	840	760	640	460	400	.0005	.0010	.0013	.0016	.0021	.0027	.0030	.0044	
Free-cutting steels, unalloyed case hardened steels, nitriding steels 1151, 1215, L10, 10Lxx, 11Lxx, 12Lxx, 41Lxx, 51Lxx, 86Lxx, 86Lxx, 10xx, 11xx	28 to 38 HRc	2, 3, 4 Flute	760	680	580	425	360	.0005	.0010	.0013	.0016	.0021	.0027	.0030	.0044	
Alloyed heat-treatable, tool and high speed steels 13xx, 2340, 31xx, 32xx, 33xx, 34xx, 40xx, 41xx, 43xx, 4640, 50xx, 51xx, 61xx, 71xx, 86xx, 87xx, 92xx, 98xx, 98xx, Ax, Ox, Dx, Hxx, Lx, Wx, Mx, Tx	28 to 44 HRc	2, 3, 4 Flute	630	570	480	360	300	.0005	.0009	.0011	.0015	.0020	.0023	.0030	.0040	
Hardened Steels Carbon and Alloy Steels, Tool & Die Steels	Up to 54 HRc	2, 3, 4 Flute	230	200	160	160	115	.0003	.0005	.0007	.0009	.0012	.0016	.0019	.0024	
Stainless steel 303, 410, 420F, 430, 430F, 416	Up to 28 HRc	2, 3, 4 Flute	550	500	325	325	260	.0003	.0007	.0009	.0011	.0015	.0020	.0023	.0032	
Stainless steel 304, 304L, 420, 17-4PH, 17-7PH, 15-5PH, 13-8PH	up to 28 HRc	2, 3, 4 Flute	380	340	230	230	180	.0003	.0006	.0007	.0010	.0013	.0016	.0019	.0028	
Stainless steel 310, 316, 316B, 316L, 317, Duplex	over 28 HRc	2, 3, 4 Flute	320	290	230	230	150	.0003	.0005	.0007	.0009	.0012	.0016	.0019	.0024	
Titanium Alloys 6Al-4V, 5Al-2.5 Sn, 6Al-2Sn-4Zr-6Mo, 3Al-8V-6Cr4Mo-4Zr, 10V-2Fe-3Al, 13V-11Cr-3Al	up to 42 HRc	2, 3, 4 Flute	270	250	165	165	130	.0002	.0004	.0005	.0007	.0009	.0012	.0015	.0020	
High-Temperature Alloys Inconel, Nimonic, Monel, Hastelloy, Waspalloy, A286, Rene 41, Udimet, Stellite	up to 42 HRc	2, 3, 4 Flute	170	150	130	130	80	.0003	.0007	.0009	.0011	.0015	.0020	.0023	.0032	
Cast iron, grey cast iron, spheroidal graphite and malleable cast iron 0.6010 EN-GL100 (GG10), 0.6020 EN-GJL-200 (GG20), 0.7050 EN-GJS-500-7 (GGG50), 0.8535 EN-GJMW-350-4 (GTW35)	up to 240 HB 30	2, 3, 4 Flute	760	680	580	425	360	.0005	.0009	.0012	.0015	.0020	.0023	.0030	.0040	
Cast iron, grey cast iron, spheroidal graphite and malleable cast iron 0.6025 EN-GL250 (GG25), 0.6035 EN-GJL-350 (GG35), 0.7070 EN-GJS-700-2 (GGG70), 0.8170 EN-GJMB-700-2 (GTS70)	over 240 HB 30	2, 3, 4 Flute	650	590	500	360	310	.0004	.0008	.0010	.0012	.0017	.0020	.0026	.0032	
Aluminum, Al-wrought alloys, Al-alloys 2024, 6061, 7075, 1050, 6351, 5005, 2017, 7075	up to 3% Si	2, 3, 4 Flute	2060	1860	1570	1150	980	.0008	.0015	.0020	.0024	.0033	.0039	.0049	.0064	
Aluminium-cast alloys 3.2131 G-AISI5Cu1, 3.2153 G-AISI7Cu3, 3.2573 G-AISI9, 3.2581 G-AISI12, 3.2583 G-AISI12Cu, - G-AISI12CuNiMg	over 3% Si	2, 3, 4 Flute	1100	1000	840	625	525	.0007	.0013	.0016	.0021	.0028	.0035	.0041	.0056	
Magnesium-alloys MgMn2, G-MgAl8Zn1, G-MgAl6Zn3	—	2, 3, 4 Flute	860	780	660	690	410	.0007	.0013	.0016	.0021	.0028	.0035	.0041	.0056	
Non-ferrous metals (copper, short- or long-chipping brass or bronze)	up to 28 HRc	2, 3, 4 Flute	1210	1090	920	950	575	.0005	.0010	.0013	.0017	.0023	.0027	.0034	.0048	

UNI-PRO "R" End Mills (4-Flute) - Inch - Standard Length

F

center cutting with corner radius



Standard



No. Flutes



Helix angle



Radius



Rake Angle



Slotting



Roughing



Ramping



Helix



Finishing

Tool material

Surface finish



Solid Carbide

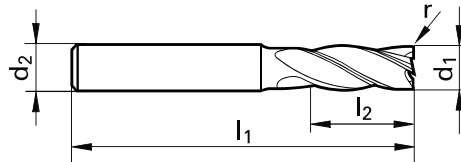
FIREX®

Series

3089

Application group	Material examples	Ideal for
P	Steel	●
M	Stainless steel	●
K	Cast iron	●
N	Aluminum	○
S	Ni / Ti alloys	○
H	Hardened steel	--
●=Optimal ○=Secondary		

Speed and Feed data found on page 297



d1 h10	d2 h6	l1	l2	r	No. of Flutes	Code no.	EDP Number
inch	inch	inch	inch				
1/8	1/8	1 1/2	3/8	0.015	4	3.172	9030890031720
1/8	1/8	1 1/2	3/8	0.031	4	3.174	9030890031740
3/16	3/16	2	5/8	0.015	4	4.762	9030890047620
3/16	3/16	2	5/8	0.031	4	4.764	9030890047640
3/16	3/16	2	5/8	0.062	4	4.766	9030890047660
1/4	1/4	2 1/2	3/4	0.015	4	6.352	9030890063520
1/4	1/4	2 1/2	3/4	0.031	4	6.354	9030890063540
1/4	1/4	2 1/2	3/4	0.062	4	6.356	9030890063560
5/16	5/16	2 1/2	13/16	0.015	4	7.942	9030890079420
5/16	5/16	2 1/2	13/16	0.031	4	7.944	9030890079440
5/16	5/16	2 1/2	13/16	0.062	4	7.946	9030890079460
3/8	3/8	2 1/2	1	0.015	4	9.522	9030890095220
3/8	3/8	2 1/2	1	0.031	4	9.524	9030890095240
3/8	3/8	2 1/2	1	0.062	4	9.526	9030890095260
1/2	1/2	3	1	0.015	4	12.702	9030890127020
1/2	1/2	3	1	0.031	4	12.704	9030890127040
1/2	1/2	3	1	0.062	4	12.706	9030890127060