MILLING RECOMMENDATIONS - GENERAL PURPOSE ENDMILLS

PROFILING

Surface Feet Per Minute (SFM)
Radial Depth of Cut (RDOC)
Inches Per Tooth (IPT)

Workpiece Material Group			Hardness	SFM based on RDOC: Cutting Diameter Engaged 5%	10%	20%	30%	50%	IPT* (BASELINE): Cutting Diameter 5/16	3/8	1/2	5/8	3/4	1
Steels	Free Machining & Low Carbon: 10XX, 11XX, 12XX 12LXX, ASTM A27 ASTM A36	P	≤ 28 Rc	1050	700	385	375	350	0.0027	0.0032	0.0045	0.0054	0.0063	0.0090
	Medium Carbon, High Carbon Steels, Alloy Steels & Easy to Machine Tool: 13XX, 41XX, 43XX 51XX, 86XX, 93XX	P	28 - 38 Rc	630	420	320	250	210						
Tool & Die Steels	A2, H13, L6, P20, S7	P	28 - 44 Rc	525	350	300	275	250	0.0027	0.0032	0.0045	0.0054	0.0063	0.0090
Stainless Steel	Easy to Machine, 430F, 301, 303, 410, 416 Annealed, 420F, 430, 430F	M	≤ 28 Rc	650	600	550	500	450	0.0027	0.0032	0.0045	0.0054	0.0063	0.0090
	Moderately Difficult to Machine, Nitronic 50, Nitronic 60 , 301, 303 304, 304L Incoloy 27-7MO, 316 316L, 321, 347	M	≤ 28 Rc	525	400	350	300	250						
	Difficult to Machine, 302B, 304B, 309, 310, 316, 316B, 316L, 316Ti, 317, 317L, 321, PH13-8Mo, Nitronics	M	> 28 Rc	525	400	350	300	250						
Super Alloys	High Temp, Nimonics, Inconel, Monel, Hastelloy	S	≤ 42 Rc	265	200	175	150	100	0.0014	0.0016	0.0023	0.0027	0.0032	0.0045
	Titanium: Ti 3Al-2.5V, Ti 6Al-4V Ti 10V-2Fe-3Al	S	≤ 42 Rc	230	200	175	150	125						
Hardened Materials		H	45-55 Rc	250	240	230	210	200	0.0018	0.0021	0.0030	0.0036	0.0042	0.0060
			55-65 Rc	200	180	160	150	100	0.0013	0.0014	0.0021	0.0024	0.0029	0.0041
Cast-Iron	Gray: SAE J431, ASTM A48	K	≤ 240 HB	425	400	375	350	300	0.0027	0.0032	0.0045	0.0054	0.0063	0.0090
	Ductile & Malleable: ASTM A536, ASTM 897, ASTM A47, ASTM A220 ASTM A602	K	> 240 HB	320	300	250	225	200						
Non-Ferrous	Aluminum, Brass, Bronze, Copper, Plastics, Graphite	N		1000	960	920	880	840	0.0027	0.0032	0.0045	0.0054	0.0063	0.0090

*CHIP THINNING Adjustments

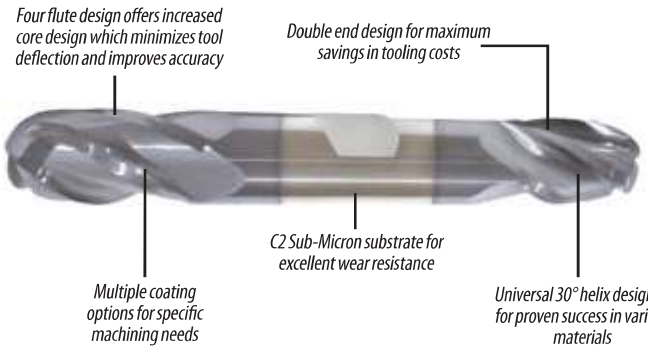
RDOC	Increase IPT
50%	None
30%	1.1 x
25%	1.2 x
20%	1.3 x
15%	1.4 x
10%	1.8 x
7%	2.0 x
5%	2.3 x
3%	3.0 x
2%	3.5 x
1%	5.0 x

SLOTTING

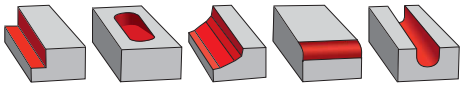
Surface Feet Per Minute (SFM)
Radial Depth of Cut (RDOC)
Inches Per Tooth (IPT)

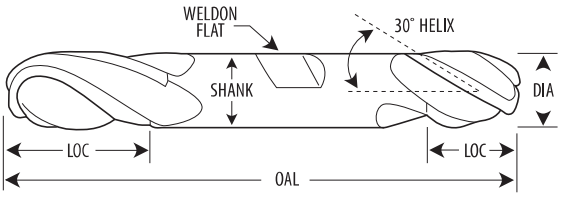
Workpiece Material Group			Hardness	SFM: Cutting Diameter Engaged 25%	50%	100%	IPT* (BASELINE): Cutting Diameter 5/16	3/8	1/2	5/8	3/4	1
Steels	Free Machining & Low Carbon: 10XX, 11XX, 12XX 12LXX, ASTM A27 ASTM A36	P	≤ 28 Rc	385	370	350	0.0016	0.0019	0.0025	0.0031	0.0038	0.0050
	Medium Carbon, High Carbon Steels, Alloy Steels & Easy to Machine Tool: 13XX, 41XX, 43XX 51XX, 86XX, 93XX	P	28 - 38 Rc	245	230	2210						
Tool & Die Steels	A2, H13, L6, P20, S7	P	28 - 44 Rc	210	195	175	0.0016	0.0019	0.0025	0.0031	0.0038	0.0050
Stainless Steel	Easy to Machine, 430F, 301, 303, 410, 416 Annealed, 420F, 430, 430F	M	≤ 28 Rc	385	370	350	0.0016	0.0019	0.0025	0.0031	0.0038	0.0050
	Moderately Difficult to Machine, Nitronic 50, Nitronic 60 , 301, 303 304, 304L Incoloy 27-7MO, 316 316L, 321, 347	M	≤ 28 Rc	245	210	175						
	Difficult to Machine, 302B, 304B, 309, 310, 316, 316B, 316L, 316Ti, 317, 317L, 321, PH13-8Mo, Nitronics	M	> 28 Rc	210	195	175						
Super Alloys	High Temp, Nimonics, Inconel, Monel, Hastelloy	S	≤ 42 Rc	125	105	90	0.0008	0.0010	0.0013	0.0016	0.0017	0.0026
	Titanium: Ti 3Al-2.5V, Ti 6Al-4V Ti 10V-2Fe-3Al	S	≤ 42 Rc	100	90	80						
Hardened Materials		H	34-45 Rc	245	230	210	0.0016	0.0019	0.0025	0.0031	0.0038	0.0050
			45-55 Rc	175	160	140	0.0008	0.0010	0.0013	0.0016	0.0020	0.0025
			55-65 Rc	150	125	100	0.0004	0.0005	0.0008	0.0008	0.0010	0.0012
Cast-Iron	Gray: SAE J431, ASTM A48	K	≤ 240 HB	450	400	350	0.0016	0.0019	0.0025	0.0031	0.0038	0.0050
	Ductile & Malleable: ASTM A536, ASTM 897, ASTM A47, ASTM A220 ASTM A602	K	> 240 HB	300	250	225						
Non-Ferrous	Aluminum, Brass, Bronze, Copper, Plastics, Graphite	N		750	600	450	0.0016	0.0019	0.0025	0.0031	0.0038	0.0050

4 FLUTE - DOUBLE END BALLNOSE



p. 68





DIAMETER TOLERANCE: +0.000 / -0.002" SHANK TOLERANCE: +0.0000 / -0.0005"

DIA	Dec In	LOC	Shank	OAL	Flat	Length	Bright	TiN	TiCN	AlTiN
1/32	0.0313	1/16	1/8	1-1/2	No	Stub	242-001001	242-001011	242-021001	242-031011
3/64	0.0469	3/32	1/8	1-1/2	No	Stub	242-001010	242-001012	242-021010	242-031012
1/16	0.0625	1/8	1/8	1-1/2	No	Stub	242-001010A	242-001021	242-001022	242-031026
5/64	0.0781	1/8	1/8	1-1/2	No	Stub	242-001019	242-001026	242-001027	242-031021
3/32	0.0938	3/16	1/8	1-1/2	No	Stub	242-001030	242-001031	242-001032	242-031031
7/64	0.1094	3/16	1/8	1-1/2	No	Stub	242-001035	242-001036	242-001037	242-031036
1/8	0.1250	1/4	1/8	1-1/2	No	Stub	242-001040	242-001041	242-001042	242-001043
		3/8	3/8	3	Yes	Regular	245-001001	245-001002	—	245-001003
9/64	0.1406	5/16	3/16	2	No	Stub	242-001044	242-001045	242-001046	242-031044
5/32	0.1563	5/16	3/16	2	No	Stub	242-001050	242-001051	242-001052	242-001053
		7/16	3/8	3	Yes	Regular	245-001010	—	—	245-001013
11/64	0.1719	5/16	3/16	2	No	Stub	242-001055	242-001056	242-001057	242-031055
3/16	0.1875	3/8	3/16	2	No	Stub	242-001060	242-001061	242-001062	242-001063
		1/2	3/8	3	Yes	Regular	245-001020	—	—	245-001023
13/64	0.2031	1/2	1/4	2-1/2	No	Stub	242-001065	242-001066	242-001067	242-031065
7/32	0.2188	1/2	1/4	2-1/2	No	Stub	242-001070	242-001071	242-001072	242-031070
		9/16	3/8	3-1/2	Yes	Regular	245-001030	—	—	245-001033
15/64	0.2344	1/2	1/4	2-1/2	No	Stub	242-001075	242-001076	242-001077	242-031075
1/4	0.2500	1/2	1/4	2-1/2	No	Stub	242-001080	242-001081	242-001082	242-001083
		5/8	3/8	3-1/2	Yes	Regular	245-001040	245-001041	—	245-001043
9/32	0.2813	1/2	5/16	2-1/2	No	Stub	242-001085	242-001087	242-001088	242-031085
		11/16	3/8	3-1/2	Yes	Regular	245-001050	—	—	245-001053
5/16	0.3125	1/2	5/16	2-1/2	No	Stub	242-001090	242-001091	242-001093	242-001094
		3/4	3/8	3-1/2	Yes	Regular	245-001060	—	—	245-001063
11/32	0.3438	9/16	3/8	2-1/2	No	Stub	242-001092	242-001095	242-001096	242-031092
		3/4	3/8	3-1/2	Yes	Regular	245-001070	—	—	245-001073
3/8	0.3750	9/16	3/8	2-1/2	No	Stub	242-001100	242-001101	242-001102	242-001104
		3/4	3/8	3-1/2	Yes	Regular	245-001080	—	—	245-001083
7/16	0.4375	9/16	7/16	2-3/4	No	Stub	242-001110	242-001111	242-001112	242-001114
		7/8	1/2	4	Yes	Regular	245-001090	—	—	245-001093
1/2	0.5000	5/8	1/2	3	No	Stub	242-001120	242-001121	242-001122	242-001124
		1	1/2	4	Yes	Regular	245-001100	—	—	245-001103