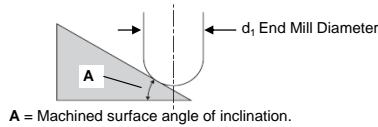
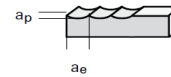


FEEDS & SPEEDS FOR ALL HSC GF500 B & GF300 B Ball



a_e = Width of cut
 a_p = Depth of cut



$RPM = Vc \times 1000 / (3.14 \times d_1)$

$mm/min = fz \times z \times RPM$

- 1 - Roughing = surface milling, machined surface angle A less than 15°.
- 2 - Finishing = contour milling, machined surface angle A between 15° and 90°.
- 3 - Reduce feeds and speeds 20% for tool projection greater than 5xD.
- 4 - Use d_1 to calculate RPM (do not use effective diameter).
- 5 - ALL VALUES IN METRIC.

		d_1 End Mill Diameter							
		2	3	4	6	8	10	12	16
Roughing A < 15°	a_p	0.14	0.21	0.28	0.60	0.80	1.00	1.20	1.60
	a_e	0.60	0.90	1.20	1.80	2.40	3.00	3.60	4.80
Finishing A > 15°	a_p	0.10	0.15	0.20	0.30	0.40	0.50	0.60	0.80
	a_e	0.04	0.06	0.08	0.12	0.16	0.20	0.24	0.32

Material	Color Code	Hardness	HSC	Type of Cut	Cutting Speed m/min (Vc)	Feed / tooth fz (mm/z)							
						2	3	4	6	8	10	12	16
						Free Machining & Low Carbon Steels 1006, 1008, 1015, 1018, 1020, 1022, 1025, 1117, 1140, 1141, 11L08, 11L14, 1213, 12L13, 12L14, 1215, 1330	GREEN	up to 28 HRc	GF 500	Roughing	300	0.03	0.05
			GF 500	Finishing	275	0.06	0.07	0.09	0.11	0.12	0.13	0.14	0.14
Medium Carbon & High Carbon Steels, Alloy Steels & Easy to Machine Tool Steels 1030, 1035, 1040, 1045, 1050, 1052, 1055, 1060, 1085, 1095, 1541, 1551, 9255, 2515, 3135, 3415, 4130, 4137, 4140, 4150, 4320, 4340, 4520, 5015, 5115, 5120, 5132, 5140, 5155, 6150, 8620, 9262, 9840, 52100, O1, O2, O6, S2, W1 to W310	GREEN RED	28 to 38 HRc	GF 500	Roughing	300	0.03	0.05	0.06	0.09	0.13	0.16	0.17	0.21
			GF 500	Finishing	275	0.06	0.07	0.09	0.11	0.12	0.13	0.14	0.14
Tool Steels & Die Steels O7, M1, M2, M3, M4, M7, T1, T2, T4, T5, T8, T15, A2, A3, A6, A7, H10, H11, H12, H13, H19, H21, L3, L6, L7, P2, P20, S1, S5, S7, 52100, A 128, D2, D3, D4, D5, D7	RED	28 to 44 HRc	GF 500	Roughing	275	0.03	0.05	0.06	0.09	0.13	0.16	0.17	0.21
			GF 500	Finishing	250	0.06	0.07	0.09	0.11	0.12	0.13	0.14	0.14
Hardened Steels Carbon and Alloy Steels, Tool & Die Steels	H	up to 54 HRc	GF 500	Roughing	225	0.03	0.04	0.06	0.09	0.12	0.14	0.15	0.18
			GF 500	Finishing	215	0.05	0.06	0.08	0.11	0.12	0.13	0.13	0.14
	H	54 to 60 HRc	GF 300	Roughing	170	0.02	0.04	0.05	0.08	0.10	0.13	0.14	0.16
			GF 300	Finishing	185	0.05	0.06	0.08	0.10	0.11	0.12	0.13	0.13
Stainless Steel - Easy to Machine 430F, 301, 303, 410, 416 Annealed, 420F, 430, 430F	BLUE	up to 28 HRc	GF 500	Roughing	275	0.03	0.05	0.07	0.11	0.15	0.18	0.19	0.24
			GF 500	Finishing	225	0.06	0.07	0.09	0.11	0.12	0.13	0.14	0.14
Stainless Steel - Moderately Difficult 301, 302, 303 High Tensile, 304, 304L, 305, 420, 15-5PH, 17-4PH, 17-7PH	BLUE	up to 28 HRc	GF 500	Roughing	225	0.03	0.05	0.07	0.11	0.15	0.18	0.19	0.24
			GF 500	Finishing	200	0.06	0.07	0.09	0.11	0.12	0.13	0.14	0.14
Stainless Steel - Difficult to Machine 302B, 304B, 309, 310, 316, 316B, 316L, 316Ti, 317, 317L, 321, PH13-8MO, Nitronic	BLUE	over 28 HRc	GF 500	Roughing	225	0.03	0.05	0.06	0.09	0.13	0.16	0.17	0.21
			GF 500	Finishing	175	0.06	0.07	0.09	0.11	0.12	0.13	0.14	0.14
High-Temperature Alloys Nimonic, Inconel, Monel, Hastelloy	GRAY	up to 42 HRc	GF 500	Roughing	100	0.03	0.05	0.06	0.09	0.13	0.16	0.17	0.21
			GF 500	Finishing	50	0.06	0.07	0.09	0.11	0.12	0.13	0.14	0.14
Titanium Alloys 6Al-4V, 5Al-2.5 Sn, 6Al-2Sn-4Zr-6Mo, 3Al-8V-6Cr4Mo-4Zr, 10V-2Fe-3Al, 13V-11Cr-3Al	GRAY	up to 42 HRc	GF 500	Roughing	150	0.03	0.05	0.06	0.09	0.13	0.16	0.17	0.21
			GF 500	Finishing	75	0.06	0.07	0.09	0.11	0.12	0.13	0.14	0.14
Cast Iron - Gray CG ASTM A48, CLASS 20, 25, 30, 35, SAE J431C, GRADES G1800, G3000, G3500, GG 10, 15, 20, 25, 30, 35, 40	WHITE	up to 240 HB 30	GF 500	Roughing	275	0.03	0.05	0.07	0.11	0.15	0.18	0.19	0.24
			GF 500	Finishing	200	0.06	0.07	0.09	0.11	0.12	0.13	0.14	0.14
Cast Iron - Ductile & Malleable CGI 60-40-18, 65-45-12, D4018, D4512, D5506, 32510, 35108, M3210, M4504, M5503, 250, 300, 350, 400, 450	WHITE	over 240 HB 30	GF 500	Roughing	275	0.03	0.05	0.07	0.11	0.15	0.18	0.19	0.24
			GF 500	Finishing	200	0.06	0.07	0.09	0.11	0.12	0.13	0.14	0.14
Aluminum, Al-wrought alloys, Al-alloys 2024, 6061, 7075, 1050, 6351, 5005, 2017, 7075	BLACK	up to 3% Si											
Aluminum-cast alloys High Silicon - A380, A390, Castings, 3.2131 G-AISI5Cu1, 3.2153 G-AISI7Cu3, 3.2573 G-AISI9, 3.2581 G-AISI12, 3.2583 G-AISI12Cu, - G-AISI12CuNiMg	BLACK	over 3% Si											
Magnesium Alloys	PURPLE	-											
Non-ferrous Copper Alloys, Brass, Bronze	BROWN	up to 28 HRc											