

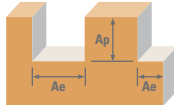
Material	Hardness			Vc (sfm)	DC • in						
		Ae x DC	Ap x DC		1/8	3/16	1/4	5/16	3/8	1/2	
M	STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F	Profile ≤ 0.50 x DC	≤ 0.040 x DC	500	RPM	15280	10187	7640	6112	5093	3820
				(400-600)	Fz	0.0046	0.0071	0.0098	0.0125	0.0154	0.0210
				Feed (ipm)	281	289	449	458	471	481	
		Slot 1 x DC	≤ 0.030 x DC	350	RPM	10696	7131	5348	4278	3565	2674
				(280-420)	Fz	0.0034	0.0044	0.0055	0.0072	0.0090	0.0120
				Feed (ipm)	145	125	176	185	193	193	
		1° Ramp 1 x DC	≤ 0.040 x DC	500	RPM	15280	10187	7640	6112	5093	3820
				(400-600)	Fz	0.0046	0.0071	0.0098	0.0125	0.0154	0.0210
				Feed (ipm)	281	289	449	458	471	481	
	STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L	Profile ≤ 0.50 x DC	≤ 0.040 x DC	400	RPM	12224	8149	6112	4890	4075	3056
				(320-480)	Fz	0.0044	0.0068	0.0093	0.0119	0.0146	0.0200
				Feed (ipm)	215	222	341	349	357	367	
		Slot 1 x DC	≤ 0.030 x DC	300	RPM	9168	6112	4584	3667	3056	2292
				(240-360)	Fz	0.0025	0.0040	0.0054	0.0068	0.0082	0.0110
				Feed (ipm)	92	98	149	150	150	151	
		1° Ramp 1 x DC	≤ 0.040 x DC	400	RPM	12224	8149	6112	4890	4075	3056
				(320-480)	Fz	0.0044	0.0068	0.0093	0.0119	0.0146	0.0200
				Feed (ipm)	215	222	341	349	357	367	
	STAINLESS STEELS (PH) 13-8 PH, 15-5 PH, 17-4 PH, Custom 450	Profile ≤ 0.45	≤ 0.042 x DC	420	RPM	12835	8557	6418	5134	4278	3209
				(336-504)	Fz	0.0038	0.0058	0.0080	0.0103	0.0128	0.0175
				Feed (ipm)	195	199	308	317	329	337	
		Slot 1 x DC	≤ 0.030 x DC	370	RPM	11307	7538	5654	4523	3769	2827
				(296-444)	Fz	0.0023	0.0035	0.0046	0.0058	0.0069	0.0092
				Feed (ipm)	104	106	156	157	156	156	
		1° Ramp 1 x DC	≤ 0.042 x DC	420	RPM	12835	8557	6418	5134	4278	3209
				(336-504)	Fz	0.0038	0.0058	0.0080	0.0103	0.0128	0.0175
				Feed (ipm)	195	199	308	317	329	337	
S	HIGH TEMP ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400	Profile ≤ 0.35 x DC	≤ 0.032 x DC	150	RPM	4584	3056	2292	1834	1528	1146
				(120-180)	Fz	0.0036	0.0054	0.0070	0.0090	0.0110	0.0145
				Feed (ipm)	66	66	96	99	101	100	
		Slot 1 x DC	≤ 0.030 x DC	130	RPM	3973	2649	1986	1589	1324	993
				(104-156)	Fz	0.0023	0.0035	0.0040	0.0050	0.0060	0.0082
				Feed (ipm)	37	37	48	48	48	49	
		1° Ramp 1 x DC	≤ 0.032 x DC	150	RPM	4584	3056	2292	1834	1528	1146
				(120-180)	Fz	0.0036	0.0054	0.0070	0.0090	0.0110	0.0145
				Feed (ipm)	66	66	96	99	101	100	
	HIGH TEMP ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 718, X-750, Incoloy, Waspaloy, Hastelloy, Rene	Profile ≤ 0.35 x DC	≤ 0.032 x DC	130	RPM	3973	2649	1986	1589	1324	993
				(104-156)	Fz	0.0025	0.0040	0.0055	0.0072	0.0090	0.0125
				Feed (ipm)	40	42	66	69	72	74	
		Slot 1 x DC	≤ 0.030 x DC	115	RPM	3514	2343	1757	1406	1171	879
				(92-138)	Fz	0.0017	0.0028	0.0035	0.0045	0.0055	0.0075
				Feed (ipm)	24	26	37	38	39	40	
		1° Ramp 1 x DC	≤ 0.032 x DC	130	RPM	3973	2649	1986	1589	1324	993
				(104-156)	Fz	0.0025	0.0040	0.0055	0.0072	0.0090	0.0125
				Feed (ipm)	40	42	66	69	72	74	
	TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si	Profile ≤ 0.40 x DC	≤ 0.035 x DC	300	RPM	9168	6112	4584	3667	3056	2292
				(240-360)	Fz	0.0031	0.0049	0.0068	0.0088	0.0109	0.0150
				Feed (ipm)	114	120	187	194	200	206	
		Slot 1 x DC	≤ 0.030 x DC	180	RPM	5501	3667	2750	2200	1834	1375
				(144-216)	Fz	0.0022	0.0034	0.0048	0.0062	0.0076	0.0105
				Feed (ipm)	48	50	79	82	84	87	
		1° Ramp 1 x DC	≤ 0.035 x DC	300	RPM	9168	6112	4584	3667	3056	2292
				(240-360)	Fz	0.0031	0.0049	0.0068	0.0088	0.0109	0.0150
				Feed (ipm)	114	120	187	194	200	206	
	TITANIUM ALLOYS (DIFFICULT) Ti10V2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al	Profile ≤ 0.40 x DC	≤ 0.035 x DC	180	RPM	5501	3667	2750	2200	1834	1375
				(144-216)	Fz	0.0011	0.0029	0.0048	0.0068	0.0089	0.0130
				Feed (ipm)	24	43	79	90	98	107	
		Slot 1 x DC	≤ 0.030 x DC	130	RPM	3973	2649	1986	1589	1324	993
				(104-156)	Fz	0.0010	0.0025	0.0035	0.0045	0.0058	0.0080
				Feed (ipm)	16	26	42	43	46	48	
		1° Ramp 1 x DC	≤ 0.035 x DC	180	RPM	5501	3667	2750	2200	1834	1375
				(144-216)	Fz	0.0011	0.0029	0.0048	0.0068	0.0089	0.0130
				Feed (ipm)	24	43	79	90	98	107	

Bhn (Brinell) HRC (Rockwell C)
 rpm = sfm x 3.82 / DC
 ipm = Fz x Flute Count x rpm
 reduce speed and feed for materials harder than listed

Minimum Helical Radius = 20% of DC
 Maximum Helical Radius = 37% of DC
 Rates shown are based off 4xD reach tools,
 reduce IPT by 20% for 6xD reach tools



Refer to the SGS APEX: Application Expert for complete technical information
www.kyocera-sgstool.com/apex



						DC • mm								
Material	Hardness	Ae x DC	Ap x DC	Vc (m/min)		2	3	4	5	6	8	10	12	
M	STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F	Profile ≤ 0.50 x DC	Slot 1 x DC	1° Ramp 1 x DC	152 (122-183)	RPM	24266	16178	12133	9707	8089	6067	4853	4044
						Fz	0.0700	0.1080	0.1480	0.1900	0.2340	0.3200	0.4100	0.5040
						Feed (mm/min)	6795	6989	7183	7377	11357	11648	11939	12230
		Profile ≤ 0.50 x DC	Slot 1 x DC	1° Ramp 1 x DC	107 (85-128)	RPM	16986	11324	8493	6795	5662	4247	3397	2831
						Fz	0.0500	0.0760	0.1050	0.1160	0.1300	0.1900	0.2400	0.2900
						Feed (mm/min)	3397	3443	3567	3153	4416	4841	4892	4926
		Profile ≤ 0.50 x DC	Slot 1 x DC	1° Ramp 1 x DC	152 (122-183)	RPM	24266	16178	12133	9707	8089	6067	4853	4044
						Fz	0.0700	0.1080	0.1480	0.1900	0.2340	0.3200	0.4100	0.5040
						Feed (mm/min)	6795	6989	7183	7377	11357	11648	11939	12230
	STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L	Profile ≤ 0.50 x DC	Slot 1 x DC	1° Ramp 1 x DC	122 (98-146)	RPM	19413	12942	9707	7765	6471	4853	3883	3236
						Fz	0.0635	0.0991	0.1372	0.1778	0.2210	0.3048	0.3900	0.4800
						Feed (mm/min)	4931	5130	5327	5523	8581	8876	9085	9318
		Profile ≤ 0.50 x DC	Slot 1 x DC	1° Ramp 1 x DC	91 (73-110)	RPM	14560	9707	7280	5824	4853	3640	2912	2427
						Fz	0.0350	0.0500	0.0800	0.1100	0.1200	0.1700	0.2200	0.2700
						Feed (mm/min)	2038	1941	2330	2563	3494	3713	3844	3931
		Profile ≤ 0.50 x DC	Slot 1 x DC	1° Ramp 1 x DC	122 (98-146)	RPM	19413	12942	9707	7765	6471	4853	3883	3236
						Fz	0.0635	0.0991	0.1372	0.1778	0.2210	0.3048	0.3900	0.4800
						Feed (mm/min)	4931	5130	5327	5523	8581	8876	9085	9318
	STAINLESS STEELS (PH) 13-8 PH, 15-5 PH, 17-4 PH, Custom 450	Profile ≤ 0.45	Slot 1 x DC	1° Ramp 1 x DC	128 (102-154)	RPM	20384	13589	10192	8153	6795	5096	4077	3397
						Fz	0.0560	0.0870	0.1200	0.1550	0.1920	0.2640	0.3400	0.4200
						Feed (mm/min)	4566	4729	4892	5055	7827	8072	8317	8561
		Profile ≤ 0.45	Slot 1 x DC	1° Ramp 1 x DC	113 (90-135)	RPM	17957	11971	8979	7183	5986	4489	3591	2993
						Fz	0.0400	0.0550	0.0750	0.0950	0.1100	0.1500	0.1900	0.2200
						Feed (mm/min)	2873	2634	2694	2729	3951	4040	4094	3951
		Profile ≤ 0.45	Slot 1 x DC	1° Ramp 1 x DC	128 (102-154)	RPM	20384	13589	10192	8153	6795	5096	4077	3397
						Fz	0.0560	0.0870	0.1200	0.1550	0.1920	0.2640	0.3400	0.4200
						Feed (mm/min)	4566	4729	4892	5055	7827	8072	8317	8561
S	HIGH TEMP ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400	Profile ≤ 0.35 x DC	Slot 1 x DC	1° Ramp 1 x DC	46 (37-55)	RPM	7280	4853	3640	2912	2427	1820	1456	1213
						Fz	0.0600	0.0880	0.1150	0.1470	0.1650	0.2400	0.2900	0.3500
						Feed (mm/min)	1747	1708	1674	1712	2402	2621	2533	2548
		Profile ≤ 0.35 x DC	Slot 1 x DC	1° Ramp 1 x DC	40 (32-48)	RPM	6309	4206	3155	2524	2103	1577	1262	1052
						Fz	0.0350	0.0530	0.0760	0.0910	0.0960	0.1320	0.1600	0.1980
						Feed (mm/min)	883	892	959	919	1211	1249	1211	1249
		Profile ≤ 0.35 x DC	Slot 1 x DC	1° Ramp 1 x DC	46 (37-55)	RPM	7280	4853	3640	2912	2427	1820	1456	1213
						Fz	0.0600	0.0880	0.1150	0.1470	0.1650	0.2400	0.2900	0.3500
						Feed (mm/min)	1747	1708	1674	1712	2402	2621	2533	2548
	HIGH TEMP ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 718, X-750, Incoloy, Waspaloy, Hastelloy, Rene	Profile ≤ 0.35 x DC	Slot 1 x DC	1° Ramp 1 x DC	40 (32-48)	RPM	6309	4206	3155	2524	2103	1577	1262	1052
						Fz	0.0360	0.0570	0.0800	0.1050	0.1320	0.1850	0.2400	0.3000
						Feed (mm/min)	909	959	1009	1060	1666	1751	1817	1893
		Profile ≤ 0.35 x DC	Slot 1 x DC	1° Ramp 1 x DC	35 (28-42)	RPM	5581	3721	2791	2233	1860	1395	1116	930
						Fz	0.0260	0.0399	0.0560	0.0740	0.0860	0.1170	0.1450	0.1800
						Feed (mm/min)	580	594	625	661	960	980	971	1005
		Profile ≤ 0.35 x DC	Slot 1 x DC	1° Ramp 1 x DC	40 (32-48)	RPM	6309	4206	3155	2524	2103	1577	1262	1052
						Fz	0.0360	0.0570	0.0800	0.1050	0.1320	0.1840	0.2400	0.3000
						Feed (mm/min)	909	959	1009	1060	1666	1741	1817	1893
	TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si	Profile ≤ 0.40 x DC	Slot 1 x DC	1° Ramp 1 x DC	91 (73-110)	RPM	14560	9707	7280	5824	4853	3640	2912	2427
						Fz	0.0460	0.0720	0.1000	0.1300	0.1620	0.2260	0.2900	0.3600
						Feed (mm/min)	2679	2795	2912	3028	4717	4936	5067	5242
		Profile ≤ 0.40 x DC	Slot 1 x DC	1° Ramp 1 x DC	55 (44-66)	RPM	8736	5824	4368	3494	2912	2184	1747	1456
						Fz	0.0322	0.0504	0.0700	0.0910	0.1140	0.1600	0.2030	0.2520
						Feed (mm/min)	1125	1174	1223	1272	1992	2097	2128	2201
		Profile ≤ 0.40 x DC	Slot 1 x DC	1° Ramp 1 x DC	91 (73-110)	RPM	14560	9707	7280	5824	4853	3640	2912	2427
						Fz	0.0460	0.0720	0.1000	0.1300	0.1620	0.2260	0.2900	0.3600
						Feed (mm/min)	2679	2795	2912	3028	4717	4936	5067	5242
	TITANIUM ALLOYS (DIFFICULT) Ti10V2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al	Profile ≤ 0.40 x DC	Slot 1 x DC	1° Ramp 1 x DC	55 (44-66)	RPM	8736	5824	4368	3494	2912	2184	1747	1456
						Fz	0.0200	0.0254	0.0560	0.0800	0.1120	0.1500	0.2030	0.3050
						Feed (mm/min)	699	592	978	1118	1957	1966	2128	2664
		Profile ≤ 0.40 x DC	Slot 1 x DC	1° Ramp 1 x DC	40 (32-48)	RPM	6309	4206	3155	2524	2103	1577	1262	1052
						Fz	0.0170	0.0275	0.0510	0.0690	0.0840	0.1160	0.1580	0.1905
						Feed (mm/min)	429	463	644	697	1060	1098	1196	1202
		Profile ≤ 0.40 x DC	Slot 1 x DC	1° Ramp 1 x DC	55 (44-66)	RPM	8736	5824	4368	3494	2912	2184	1747	1456
						Fz	0.0200	0.0254	0.0560	0.0800	0.1120	0.1500	0.2030	0.3050
						Feed (mm/min)	699	592	978	1118	1957	1966	2128	2664

Bhn (Brinell) HRC (Rockwell C)

rpm = (Vc x 1000) / (DC x 3.14)

mm/min = Fz x Flute Count x rpm

reduce speed and feed for materials harder than listed

Minimum Helical Radius = 20% of DC

Maximum Helical Radius = 37% of DC

Rates shown are based off 4xD reach tools,

reduce IPT by 20% for 6xD reach tools

Refer to the SGS APEX: Application Expert for complete technical information
www.kyocera-sgstool.com/apex