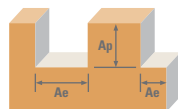
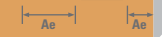


Series Z5, Z5CR, Z5L, Z5LC Fractional							Vc (sfm)	DC • in							
Hardness		Ae x DC		Ap x DC			1/8	1/4	3/8	1/2	5/8	3/4	1		
P	CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 275 Bhn or ≤ 28 HRC	HSM ¹ 	≤ 0.1	≤ APMX	720 (576-864)	RPM	22003	11002	7334	5501	4401	3667	2750	
			Fz	0.00078	0.0021	0.0039	0.0052	0.0057	0.0062	0.0073					
			Feed (ipm)	85.8	115.5	143.0	143.0	125.4	113.7	100.4					
		Fz	0.00046	0.0012	0.0023	0.0031	0.0034	0.0037	0.0043						
		Feed (ipm)	50.6	66.0	84.3	85.3	74.8	67.8	59.1						
		Slot ² 	1	≤ 1	440 (352-528)	RPM	13446	6723	4482	3362	2689	2241	1681		
						Fz	0.00046	0.0012	0.0023	0.0031	0.0034	0.0037	0.0043		
						Feed (ipm)	30.9	40.3	51.5	52.1	45.7	41.5	36.1		
		ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	≤ 375 Bhn or ≤ 40 HRC	HSM ¹ 	≤ 0.1	≤ APMX	410 (328-492)	RPM	12530	6265	4177	3132	2506	2088	1566
	Fz			0.00057	0.0015	0.0029	0.0038	0.0042	0.0046	0.0053					
	Feed (ipm)			35.7	47.0	60.6	59.5	52.6	48.0	41.5					
	Fz		0.00034	0.0009	0.0017	0.0023	0.0026	0.0028	0.0032						
	Feed (ipm)		16.4	21.7	27.3	27.7	25.0	22.5	19.3						
	Slot ² 		1	≤ 1	250 (200-300)	RPM	7640	3820	2547	1910	1528	1273	955		
						Fz	0.00034	0.0009	0.0017	0.0023	0.0026	0.0028	0.0032		
						Feed (ipm)	13.0	17.2	21.6	22.0	19.9	17.8	15.3		
	TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2		≤ 375 Bhn or ≤ 40 HRC	HSM ¹ 	≤ 0.1	≤ APMX	240 (192-288)	RPM	7334	3667	2445	1834	1467	1222	917
		Fz		0.00045	0.0012	0.0023	0.0030	0.0033	0.0036	0.0042					
		Feed (ipm)		16.5	22.0	28.1	27.5	24.2	22.0	19.3					
		Fz	0.00028	0.0007	0.0014	0.0018	0.0020	0.0022	0.0026						
		Feed (ipm)	7.9	9.9	13.2	12.7	11.3	10.4	9.2						
		Slot ² 	1	≤ 1	145 (116-174)	RPM	4431	2216	1477	1108	886	739	554		
						Fz	0.00028	0.0007	0.0014	0.0018	0.0020	0.0022	0.0026		
						Feed (ipm)	6.2	7.8	10.3	10.0	8.9	8.1	7.2		
		M	STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F	≤ 275 Bhn or ≤ 28 HRC	HSM ¹ 	≤ 0.1	≤ APMX	635 (508-762)	RPM	19406	9703	6469	4851	3881	3234
	Fz				0.00057	0.0015	0.0029	0.0038	0.0042	0.0046	0.0053				
	Feed (ipm)				55.3	72.8	93.8	92.2	81.5	74.4	64.3				
Fz	0.00034			0.0009	0.0017	0.0023	0.0026	0.0028	0.0032						
Feed (ipm)	25.5			33.7	42.4	43.1	38.9	34.9	29.9						
Slot ² 	1			≤ 1	390 (312-468)	RPM	11918	5959	3973	2980	2384	1986	1490		
						Fz	0.00034	0.0009	0.0017	0.0023	0.0026	0.0028	0.0032		
						Feed (ipm)	20.3	26.8	33.8	34.3	31.0	27.8	23.8		
STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L	≤ 275 Bhn or ≤ 28 HRC			HSM ¹ 	≤ 0.1	≤ APMX	440 (352-528)	RPM	13446	6723	4482	3362	2689	2241	1681
			Fz	0.00045	0.0012	0.0023	0.0030	0.0033	0.0036	0.0042					
			Feed (ipm)	30.3	40.3	51.5	50.4	44.4	40.3	35.3					
	Fz		0.00027	0.0007	0.0014	0.0018	0.0020	0.0022	0.0025						
	Feed (ipm)		14.0	18.2	24.2	23.4	20.8	19.0	16.2						
	Slot ² 		1	≤ 1	270 (216-324)	RPM	8251	4126	2750	2063	1650	1375	1031		
						Fz	0.00027	0.0007	0.0014	0.0018	0.0020	0.0022	0.0025		
						Feed (ipm)	11.1	14.4	19.3	18.6	16.5	15.1	12.9		
	STAINLESS STEELS (PH) 13-8 PH, 15-5PH, 17-4 PH, CUSTOM 450		≤ 325 Bhn or ≤ 35 HRC	HSM ¹ 	≤ 0.1	≤ APMX	410 (328-492)	RPM	12530	6265	4177	3132	2506	2088	1566
Fz				0.00045	0.0012	0.0023	0.0030	0.0033	0.0036	0.0042					
Feed (ipm)				28.2	37.6	48.0	47.0	41.3	37.6	32.9					
Fz			0.00027	0.0007	0.0014	0.0018	0.0020	0.0022	0.0025						
Feed (ipm)			12.8	16.6	22.1	21.3	18.9	17.4	14.8						
Slot ² 			1	≤ 1	250 (200-300)	RPM	7640	3820	2547	1910	1528	1273	955		
						Fz	0.00027	0.0007	0.0014	0.0018	0.0020	0.0022	0.0025		
						Feed (ipm)	10.3	13.4	17.8	17.2	15.3	14.0	11.9		

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Series Z5, Z5CR, Z5L, Z5LC Fractional								Vc (sfm)	DC • in						
Hardness		Ae x DC	Ap x DC				1/8	1/4	3/8	1/2	5/8	3/4	1		
K	CAST IRONS (LOW & MEDIUM ALLOY) Gray, Malleable, Ductile	≤ 220 Bhn or ≤ 19 HRc	HSM ¹ 	≤ 0.1	≤ APMX	575 (460-690)	RPM	17572	8786	5857	4393	3514	2929	2197	
			Fz	0.00071	0.0019	0.0035	0.0047	0.0052	0.0056	0.0066					
			Feed (ipm)	62.4	83.5	102.5	103.2	91.4	82.0	72.5					
		≤ 260 Bhn or ≤ 26 HRc	Profile 	≤ 0.4	≤ APMX	445 (356-534)	RPM	13599	6800	4533	3400	2720	2267	1700	
			Fz	0.00042	0.0011	0.0021	0.0028	0.0031	0.0034	0.0039					
			Feed (ipm)	28.6	37.4	47.6	47.6	42.2	38.5	33.1					
		Slot ² 	1	≤ 1	355 (284-426)	RPM	10849	5424	3616	2712	2170	1808	1356		
			Fz	0.00042	0.0011	0.0021	0.0028	0.0031	0.0034	0.0039					
			Feed (ipm)	22.8	29.8	38.0	38.0	33.6	30.7	26.4					
	CAST IRONS (HIGH ALLOY) Gray, Malleable, Ductile	≤ 260 Bhn or ≤ 26 HRc	HSM ¹ 	≤ 0.1	≤ APMX	440 (352-528)	RPM	13446	6723	4482	3362	2689	2241	1681	
			Fz	0.00053	0.0014	0.0026	0.0035	0.0039	0.0042	0.0049					
			Feed (ipm)	35.6	47.1	58.3	58.8	52.4	47.1	41.2					
≤ 300 Bhn or ≤ 32 HRc		Profile 	≤ 0.4	≤ APMX	340 (272-408)	RPM	10390	5195	3463	2598	2078	1732	1299		
		Fz	0.00031	0.0008	0.0016	0.0021	0.0023	0.0025	0.0029						
		Feed (ipm)	16.1	21.8	27.7	27.3	23.9	21.6	18.8						
Slot ² 		1	≤ 1	270 (216-324)	RPM	8251	4126	2750	2063	1650	1375	1031			
		Fz	0.00031	0.0008	0.0016	0.0021	0.0023	0.0025	0.0029						
		Feed (ipm)	12.8	17.3	22.0	21.7	19.0	17.2	15.0						
S	SUPER ALLOYS (NICKEL , COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400	≤ 300 Bhn or ≤ 32 HRc	HSM ¹ 	≤ 0.1	≤ APMX	115 (92-138)	RPM	3514	1757	1171	879	703	586	439	
			Fz	0.00042	0.0011	0.0021	0.0028	0.0031	0.0034	0.0039					
			Feed (ipm)	7.4	9.7	12.3	12.3	10.9	10.0	8.6					
		≤ 400 Bhn or ≤ 43 HRc	Profile 	≤ 0.4	≤ APMX	80 (64-96)	RPM	2445	1222	815	611	489	407	306	
			Fz	0.00025	0.0007	0.0013	0.0017	0.0019	0.0020	0.0024					
			Feed (ipm)	3.1	4.2	5.2	5.2	4.6	4.2	3.6					
		Slot ² 	1	≤ 1	65 (52-78)	RPM	1986	993	662	497	397	331	248		
			Fz	0.00025	0.0007	0.0013	0.0017	0.0019	0.0020	0.0024					
			Feed (ipm)	2.5	3.4	4.2	4.2	3.7	3.4	3.0					
	SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 718, X-750, Incoloy, Waspaloy, Hastelloy, Rene	≤ 400 Bhn or ≤ 43 HRc	HSM ¹ 	≤ 0.1	≤ APMX	100 (80-120)	RPM	3056	1528	1019	764	611	509	382	
			Fz	0.00030	0.0008	0.0015	0.0020	0.0022	0.0024	0.0028					
			Feed (ipm)	4.6	6.1	7.6	7.6	6.7	6.1	5.3					
		≤ 440 Bhn or ≤ 47 HRc	Profile 	≤ 0.4	≤ APMX	62 (50-74)	RPM	1895	947	632	474	379	316	237	
			Fz	0.00018	0.0005	0.0009	0.0012	0.0013	0.0014	0.0017					
			Feed (ipm)	1.7	2.3	2.8	2.8	2.5	2.2	2.0					
		Slot ² 	1	≤ 1	50 (40-60)	RPM	1528	764	509	382	306	255	191		
			Fz	0.00018	0.0005	0.0009	0.0012	0.0013	0.0014	0.0017					
			Feed (ipm)	1.4	1.8	2.3	2.3	2.0	1.8	1.6					
	TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si	≤ 350 Bhn or ≤ 38 HRc	HSM ¹ 	≤ 0.1	≤ APMX	280 (224-336)	RPM	8557	4278	2852	2139	1711	1426	1070	
			Fz	0.00050	0.0013	0.0025	0.0033	0.0036	0.0040	0.0046					
			Feed (ipm)	21.4	27.8	35.7	35.3	30.8	28.5	24.6					
		≤ 400 Bhn or ≤ 47 HRc	Profile 	≤ 0.4	≤ APMX	215 (172-258)	RPM	6570	3285	2190	1643	1314	1095	821	
			Fz	0.00030	0.0008	0.0015	0.0020	0.0022	0.0024	0.0028					
			Feed (ipm)	9.9	13.1	16.4	16.4	14.5	13.1	11.5					
		Slot ² 	1	≤ 1	170 (136-204)	RPM	5195	2598	1732	1299	1039	866	649		
			Fz	0.00030	0.0008	0.0015	0.0020	0.0022	0.0024	0.0028					
			Feed (ipm)	7.8	10.4	13.0	13.0	11.4	10.4	9.1					
	TITANIUM ALLOYS (DIFFICULT) Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al	≤ 440 Bhn or ≤ 47 HRc	HSM ¹ 	≤ 0.1	≤ APMX	155 (124-186)	RPM	4737	2368	1579	1184	947	789	592	
			Fz	0.00050	0.0013	0.0025	0.0033	0.0036	0.0040	0.0046					
			Feed (ipm)	11.8	15.4	19.7	19.5	17.1	15.8	13.6					
		≤ 440 Bhn or ≤ 47 HRc	Profile 	≤ 0.4	≤ APMX	75 (60-90)	RPM	2292	1146	764	573	458	382	287	
			Fz	0.00030	0.0008	0.0015	0.0020	0.0022	0.0024	0.0028					
			Feed (ipm)	3.4	4.6	5.7	5.7	5.0	4.6	4.0					
		Slot ² 	1	≤ 1	60 (48-72)	RPM	1834	917	611	458	367	306	229		
			Fz	0.00030	0.0008	0.0015	0.0020	0.0022	0.0024	0.0028					
			Feed (ipm)	2.8	3.7	4.6	4.6	4.0	3.7	3.2					

Note:

- Bhn (Brinell) HRc (Rockwell C) HSM (High Speed Machining)

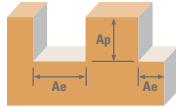
- rpm = Vc x 3.82 / DC

- ipm = Fz x 5 x rpm

- ¹ HSM method strongly recommended, particularly when using 4 x DC tools

- ² reduce Ap to ≤ 5 x DC when slotting with 4 x DC tools

- ramp at 5 degrees or less, using slotting speed and feed rates (do not plunge)
- reduce speed and feed for materials harder than listed
- reduce feed and Ae when finish milling (.02 x DC maximum)
- refer to the SGS Tool Wizard[®] for complete technical information (www.kyocera-sgstool.com)



Series
Z5M, Z5MCR,
Z5ML, Z5MLC
Metric

Hardness

Ae x DC

Ap x DC

Vc
(m/min)

DC • mm

6 8 10 12 16 20 25

CARBON STEELS
1018, 1040, 1080, 1090,
10L50, 1140, 1212,
12L15, 1525, 1536

≤ 275 Bhn
or
≤ 28 HRC



≤ 0.1

≤ APMX

219
(176-263)

RPM	11633	8725	6980	5816	4362	3490	2792
Fz	0.050	0.083	0.104	0.125	0.146	0.165	0.183
Feed (mm/min)	2931	3630	3629	3629	3183	2885	2548



≤ 0.4

≤ APMX

169
(135-203)

RPM	8967	6725	5380	4484	3363	2690	2152
Fz	0.029	0.049	0.061	0.074	0.087	0.099	0.108
Feed (mm/min)	1291	1650	1650	1668	1463	1327	1157



1

≤ 1

134
(107-161)

RPM	7109	5332	4265	3555	2666	2133	1706
Fz	0.029	0.049	0.061	0.074	0.087	0.099	0.108
Feed (mm/min)	1024	1308	1308	1322	1160	1052	917

ALLOY STEELS
4140, 4150, 4320, 5120,
5150, 8630, 86L20,
50100

≤ 375 Bhn
or
≤ 40 HRC



≤ 0.1

≤ APMX

125
(100-150)

RPM	6624	4968	3975	3312	2484	1987	1590
Fz	0.036	0.062	0.077	0.091	0.108	0.123	0.133
Feed (mm/min)	1192	1537	1537	1510	1335	1219	1053



≤ 0.5

≤ APMX

96
(77-115)

RPM	5089	3817	3054	2545	1909	1527	1221
Fz	0.022	0.036	0.045	0.055	0.067	0.075	0.080
Feed (mm/min)	550	692	692	702	635	570	489



1

≤ 1

76
(61-91)

RPM	4039	3029	2424	2020	1515	1212	969
Fz	0.022	0.036	0.045	0.055	0.067	0.075	0.080
Feed (mm/min)	436	549	549	557	504	452	388

TOOL STEELS
A2, D2, H13, L2, M2,
P20, S7, T15, W2

≤ 375 Bhn
or
≤ 40 HRC



≤ 0.1

≤ APMX

73
(59-88)

RPM	3878	2908	2327	1939	1454	1163	931
Fz	0.029	0.049	0.061	0.072	0.084	0.096	0.105
Feed (mm/min)	558	714	713	698	614	558	489



≤ 0.4

≤ APMX

56
(45-68)

RPM	2989	2242	1793	1495	1121	897	717
Fz	0.017	0.030	0.037	0.043	0.051	0.059	0.065
Feed (mm/min)	251	335	335	323	287	263	233



1

≤ 1

44
(35-53)

RPM	2343	1757	1406	1171	879	703	562
Fz	0.017	0.030	0.037	0.043	0.051	0.059	0.065
Feed (mm/min)	197	262	262	253	225	206	183

**STAINLESS STEELS
(FREE MACHINING)**
303, 416, 420F, 430F,
440F

≤ 275 Bhn
or
≤ 28 HRC



≤ 0.1

≤ APMX

194
(155-232)

RPM	10260	7695	6156	5130	3847	3078	2462
Fz	0.036	0.062	0.077	0.091	0.108	0.123	0.133
Feed (mm/min)	1847	2381	2380	2339	2068	1888	1631



≤ 0.4

≤ APMX

149
(119-179)

RPM	7917	5938	4750	3958	2969	2375	1900
Fz	0.022	0.036	0.045	0.055	0.067	0.075	0.080
Feed (mm/min)	855	1077	1077	1092	988	887	760



1

≤ 1

119
(95-143)

RPM	6301	4726	3781	3151	2363	1890	1512
Fz	0.022	0.036	0.045	0.055	0.067	0.075	0.080
Feed (mm/min)	680	857	857	869	786	706	605

**STAINLESS STEELS
(DIFFICULT)**
304, 304L, 316, 316L

≤ 275 Bhn
or
≤ 28 HRC



≤ 0.1

≤ APMX

134
(107-161)

RPM	7109	5332	4265	3555	2666	2133	1706
Fz	0.029	0.049	0.061	0.072	0.084	0.096	0.105
Feed (mm/min)	1024	1308	1308	1280	1126	1024	896



≤ 0.4

≤ APMX

104
(83-124)

RPM	5493	4120	3296	2747	2060	1648	1318
Fz	0.017	0.030	0.037	0.043	0.051	0.059	0.063
Feed (mm/min)	461	615	615	593	527	483	412



1

≤ 1

82
(66-99)

RPM	4362	3272	2617	2181	1636	1309	1047
Fz	0.017	0.030	0.037	0.043	0.051	0.059	0.063
Feed (mm/min)	366	489	489	471	419	384	327

**STAINLESS STEELS
(PH)**
13-8 PH, 15-5PH,
17-4 PH, CUSTOM 450

≤ 325 Bhn
or
≤ 35 HRC



≤ 0.1

≤ APMX

125
(100-150)

RPM	6624	4968	3975	3312	2484	1987	1590
Fz	0.029	0.049	0.061	0.072	0.084	0.096	0.105
Feed (mm/min)	954	1219	1219	1192	1049	954	835



≤ 0.4

≤ APMX

94
(76-113)

RPM	5009	3756	3005	2504	1878	1503	1202
Fz	0.017	0.030	0.037	0.043	0.051	0.059	0.063
Feed (mm/min)	421	561	561	541	481	441	376



1

≤ 1

76
(61-91)

RPM	4039	3029	2424	2020	1515	1212	969
Fz	0.017	0.030	0.037	0.043	0.051	0.059	0.063
Feed (mm/min)	339	452	452	436	388	355	303

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Series Z5M, Z5MCR, Z5ML, Z5MLC Metric							Vc (m/min)	DC • mm							
Hardness	Ae x DC	Ap x DC	6	8	10	12		16	20	25					
K	CAST IRONS (LOW & MEDIUM ALLOY) Gray, Malleable, Ductile	≤ 220 Bhn or ≤ 19 HRc	HSM ¹ 	≤ 0.1	≤ APMX	175 (140-210)	RPM	9290	6968	5574	4645	3484	2787	2230	
			Fz	0.046	0.075	0.093	0.113	0.133	0.149	0.165					
			Feed (mm/min)	2118	2602	2601	2620	2319	2081	1840					
		Profile 	≤ 0.4	≤ APMX	136 (109-163)	RPM	7190	5392	4314	3595	2696	2157	1726		
			Fz	0.026	0.045	0.056	0.067	0.079	0.091	0.098					
			Feed (mm/min)	949	1208	1208	1208	1070	978	841					
	CAST IRONS (HIGH ALLOY) Gray, Malleable, Ductile	≤ 260 Bhn or ≤ 26 HRc	Slot ² 	1	≤ 1	108 (87-130)	RPM	5736	4302	3441	2868	2151	1721	1377	
							Fz	0.026	0.045	0.056	0.067	0.079	0.091	0.098	
							Feed (mm/min)	757	964	964	964	853	780	671	
		CAST IRONS (HIGH ALLOY) Gray, Malleable, Ductile	≤ 260 Bhn or ≤ 26 HRc	HSM ¹ 	≤ 0.1	≤ APMX	134 (107-161)	RPM	7109	5332	4265	3555	2666	2133	1706
								Fz	0.034	0.055	0.069	0.084	0.100	0.112	0.123
								Feed (mm/min)	1194	1479	1479	1493	1331	1194	1045
SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400	≤ 300 Bhn or ≤ 32 HRc		Profile 	≤ 0.4	≤ APMX	104 (83-124)	RPM	5493	4120	3296	2747	2060	1648	1318	
							Fz	0.020	0.034	0.043	0.050	0.059	0.067	0.073	
							Feed (mm/min)	554	703	703	692	606	549	478	
	SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 718, X-750, Incoloy, Waspaloy, Rene	≤ 400 Bhn or ≤ 43 HRc	Slot ² 	1	≤ 1	82 (66-99)	RPM	4362	3272	2617	2181	1636	1309	1047	
							Fz	0.020	0.034	0.043	0.050	0.059	0.067	0.073	
							Feed (mm/min)	440	558	558	550	482	436	380	
TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si		≤ 350 Bhn or ≤ 38 HRc	HSM ¹ 	≤ 0.1	≤ APMX	35 (28-42)	RPM	1858	1394	1115	929	697	557	446	
							Fz	0.026	0.045	0.056	0.067	0.079	0.091	0.098	
							Feed (mm/min)	245	312	312	312	276	253	217	
	TITANIUM ALLOYS (DIFFICULT) Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al	≤ 440 Bhn or ≤ 47 HRc	Profile 	≤ 0.4	≤ APMX	24 (20-29)	RPM	1293	969	776	646	485	388	310	
							Fz	0.016	0.027	0.034	0.041	0.048	0.054	0.060	
							Feed (mm/min)	105	132	132	132	116	105	92	
TITANIUM ALLOYS (DIFFICULT) Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al		≤ 350 Bhn or ≤ 38 HRc	Slot ² 	1	≤ 1	20 (16-24)	RPM	1050	788	630	525	394	315	252	
							Fz	0.016	0.027	0.034	0.041	0.048	0.054	0.060	
							Feed (mm/min)	86	108	108	107	94	86	75	
	TITANIUM ALLOYS (DIFFICULT) Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al	≤ 440 Bhn or ≤ 47 HRc	HSM ¹ 	≤ 0.1	≤ APMX	30 (24-37)	RPM	1616	1212	969	808	606	485	388	
							Fz	0.019	0.032	0.040	0.048	0.056	0.064	0.070	
							Feed (mm/min)	155	194	194	194	171	155	136	
TITANIUM ALLOYS (DIFFICULT) Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al		≤ 440 Bhn or ≤ 47 HRc	Profile 	≤ 0.4	≤ APMX	19 (15-23)	RPM	1002	751	601	501	376	301	240	
							Fz	0.012	0.019	0.024	0.029	0.033	0.037	0.043	
							Feed (mm/min)	58	72	72	72	63	56	51	
	TITANIUM ALLOYS (DIFFICULT) Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al	≤ 440 Bhn or ≤ 47 HRc	Slot ² 	1	≤ 1	15 (12-18)	RPM	808	606	485	404	303	242	194	
							Fz	0.012	0.019	0.024	0.029	0.033	0.037	0.043	
							Feed (mm/min)	47	58	58	58	50	45	41	
TITANIUM ALLOYS (DIFFICULT) Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al		≤ 440 Bhn or ≤ 47 HRc	HSM ¹ 	≤ 0.1	≤ APMX	85 (68-102)	RPM	4524	3393	2714	2262	1696	1357	1086	
							Fz	0.031	0.053	0.067	0.079	0.092	0.107	0.115	
							Feed (mm/min)	706	905	905	896	782	724	624	
	TITANIUM ALLOYS (DIFFICULT) Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al	≤ 440 Bhn or ≤ 47 HRc	Profile 	≤ 0.4	≤ APMX	66 (52-79)	RPM	3474	2605	2084	1737	1303	1042	834	
							Fz	0.019	0.032	0.040	0.048	0.056	0.064	0.070	
							Feed (mm/min)	333	417	417	417	367	333	292	
TITANIUM ALLOYS (DIFFICULT) Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al		≤ 440 Bhn or ≤ 47 HRc	Slot ² 	1	≤ 1	52 (41-62)	RPM	2747	2060	1648	1373	1030	824	659	
							Fz	0.019	0.032	0.040	0.048	0.056	0.064	0.070	
							Feed (mm/min)	264	330	330	330	290	264	231	
	TITANIUM ALLOYS (DIFFICULT) Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al	≤ 440 Bhn or ≤ 47 HRc	HSM ¹ 	≤ 0.1	≤ APMX	47 (38-57)	RPM	2504	1878	1503	1252	939	751	601	
							Fz	0.031	0.053	0.067	0.079	0.092	0.107	0.115	
							Feed (mm/min)	391	501	501	496	433	401	346	
TITANIUM ALLOYS (DIFFICULT) Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al		≤ 440 Bhn or ≤ 47 HRc	Profile 	≤ 0.4	≤ APMX	23 (18-27)	RPM	1212	909	727	606	454	364	291	
							Fz	0.019	0.032	0.040	0.048	0.056	0.064	0.070	
							Feed (mm/min)	116	145	145	145	128	116	102	
	TITANIUM ALLOYS (DIFFICULT) Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al	≤ 440 Bhn or ≤ 47 HRc	Slot ² 	1	≤ 1	18 (15-22)	RPM	969	727	582	485	364	291	233	
							Fz	0.019	0.032	0.040	0.048	0.056	0.064	0.070	
							Feed (mm/min)	93	116	116	116	102	93	81	

Note:

- Bhn (Brinell) HRc (Rockwell C) HSM (High Speed Machining)
- rpm = (Vc x 1000) / (DC x 3.14)
- mm/min = Fz x 5 x rpm

¹ HSM method strongly recommended, particularly when using 4 x DC tools

² reduce Ap to ≤ 5 x DC when slotting with 4 x DC tools

- ramp at 5 degrees or less, using slotting speed and feed rates (do not plunge)
- reduce speed and feed for materials harder than listed
- reduce feed and Ae when finish milling (0.2 x DC maximum)
- refer to the SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)