

IPT13/IPC13 Application Guide – Speed & Feed (inch)

ISO Code	Work Material	Type of Cut	Axial DOC	Radial DOC	No. of Flutes	Speed (SFM)	Feed (Inches per Tooth)					
							1/2	5/8	3/4	1	1-1/4	
K	Gray ASTM-A48 Class 20, 25, 30, 35 & 40	Peripheral - HEM	≤ 2 x D	.07 x D	13	370	.0045	.0056	.0068	.0090	.0113	
		Peripheral - HEM	> 2 - 3 x D	.07 x D	13	370	.0040	.0050	.0060	.0080	.0100	
		Peripheral - HEM	> 3 - 3.5 x D	.07 x D	13	360	.0034	.0043	.0051	.0068	.0085	
		Peripheral - HEM	> 3.5 - 4 x D	.06 x D	13	360	.0030	.0038	.0045	.0060	.0075	
		Finish	3 x D	.01 x D	13	365	.0020	.0025	.0030	.0040	.0050	
	Cast Iron Malleable	Peripheral - HEM	≤ 2 x D	.07 x D	13	380	.0048	.0060	.0072	.0096	.0120	
		Peripheral - HEM	> 2 - 3 x D	.07 x D	13	380	.0042	.0053	.0063	.0084	.0105	
		Peripheral - HEM	> 3 - 3.5 x D	.07 x D	13	365	.0039	.0049	.0059	.0078	.0098	
		Peripheral - HEM	> 3.5 - 4 x D	.07 x D	13	365	.0036	.0045	.0054	.0072	.0090	
		Finish	3 x D	.01 x D	13	340	.0017	.0021	.0026	.0034	.0043	
	P	Low Carbon Steels ≤ 38 Rc 1018, 1020, 12L14, 5120, 8620	Peripheral - HEM	≤ 2 x D	.07 x D	13	450	.0044	.0055	.0066	.0088	.0110
			Peripheral - HEM	> 2 - 3 x D	.07 x D	13	430	.0039	.0049	.0059	.0078	.0098
			Peripheral - HEM	> 3 - 3.5 x D	.07 x D	13	420	.0036	.0045	.0054	.0072	.0090
			Peripheral - HEM	> 3.5 - 4 x D	.07 x D	13	410	.0034	.0043	.0051	.0068	.0085
Finish			3 x D	.01 x D	13	395	.0017	.0021	.0026	.0034	.0043	
Medium Carbon Steels ≤ 48 HRC 1045, 4140, 4340, 5140		Peripheral - HEM	≤ 2 x D	.06 x D	13	405	.0044	.0055	.0066	.0088	.0110	
		Peripheral - HEM	> 2 - 3 x D	.06 x D	13	405	.0041	.0051	.0062	.0082	.0103	
		Peripheral - HEM	> 3 - 3.5 x D	.05 x D	13	405	.0039	.0049	.0059	.0078	.0098	
		Peripheral - HEM	> 3.5 - 4 x D	.05 x D	13	405	.0036	.0045	.0054	.0072	.0090	
		Finish	3 x D	.01 x D	13	370	.0017	.0021	.0026	.0034	.0043	
Tool and Die Steels ≤ 48 Rc A2, D2, O1, S7, P20, H13		Peripheral - HEM	≤ 2 x D	.06 x D	13	420	.0045	.0056	.0068	.0090	.0113	
		Peripheral - HEM	> 2 - 3 x D	.06 x D	13	420	.0040	.0050	.0060	.0080	.0100	
		Peripheral - HEM	> 3 - 3.5 x D	.05 x D	13	415	.0037	.0046	.0056	.0074	.0093	
		Peripheral - HEM	> 3.5 - 4 x D	.05 x D	13	415	.0035	.0044	.0053	.0070	.0088	
		Finish	3 x D	.01 x D	13	385	.0015	.0019	.0023	.0030	.0038	
M		Martensitic & Ferritic Stainless Steels 410, 416, 440	Peripheral - HEM	≤ 2 x D	.06 x D	13	460	.0050	.0063	.0075	.0100	.0125
			Peripheral - HEM	> 2 - 3 x D	.06 x D	13	460	.0048	.0060	.0072	.0096	.0120
			Peripheral - HEM	> 3 - 3.5 x D	.06 x D	13	450	.0040	.0050	.0060	.0080	.0100
	Peripheral - HEM		> 3.5 - 4 x D	.06 x D	13	445	.0035	.0044	.0053	.0070	.0088	
	Finish		3 x D	.01 x D	13	390	.0018	.0023	.0027	.0036	.0045	
	Austenitic Stainless Steels, FeNi Alloys 303, 304, 316, Invar, Kovar	Peripheral - HEM	≤ 2 x D	.06 x D	13	450	.0041	.0051	.0062	.0082	.0103	
		Peripheral - HEM	> 2 - 3 x D	.06 x D	13	450	.0040	.0050	.0060	.0080	.0100	
		Peripheral - HEM	> 3 - 3.5 x D	.05 x D	13	450	.0037	.0046	.0056	.0074	.0093	
		Peripheral - HEM	> 3.5 - 4 x D	.05 x D	13	445	.0035	.0044	.0053	.0070	.0088	
		Finish	3 x D	.01 x D	13	415	.0015	.0019	.0023	.0030	.0038	
	Precipitation Hardening Stainless Steels 17-4, 15-5	Peripheral - HEM	> 2 - 3 x D	.06 x D	13	440	.0041	.0051	.0062	.0082	.0103	
		Peripheral - HEM	> 3 - 3.5 x D	.05 x D	13	435	.0038	.0048	.0057	.0076	.0095	
		Peripheral - HEM	> 3.5 - 4 x D	.05 x D	13	435	.0034	.0043	.0051	.0068	.0085	
		Finish	3 x D	.01 x D	13	400	.0017	.0021	.0026	.0034	.0043	
		S	Titanium Alloys 6Al-4V, 6-2-4	Peripheral - HEM	≤ 2 x D	.08 x D	13	395	.0050	.0063	.0075	.0100
Peripheral - HEM	> 2 - 3 x D			.07 x D	13	390	.0045	.0056	.0068	.0090	.0113	
Peripheral - HEM	> 3 - 3.5 x D			.06 x D	13	380	.0041	.0051	.0062	.0082	.0103	
Peripheral - HEM	> 3.5 - 4 x D			.06 x D	13	380	.0034	.0043	.0051	.0068	.0085	
Finish	3 x D			.015 x D	13	355	.0022	.0028	.0033	.0044	.0055	
Difficult-to-Machine Titanium Alloys 10-2-3	Peripheral - HEM		≤ 2 x D	.06 x D	13	350	.0050	.0063	.0075	.0100	.0125	
	Peripheral - HEM		> 2 - 3 x D	.06 x D	13	330	.0036	.0045	.0054	.0072	.0090	
	Peripheral - HEM		> 3 - 3.5 x D	.055 x D	13	315	.0035	.0044	.0053	.0070	.0088	
	Peripheral - HEM		> 3.5 - 4 x D	.05 x D	13	310	.0032	.0040	.0048	.0064	.0080	
	Finish		3 x D	.01 x D	13	300	.0017	.0021	.0026	.0034	.0043	
Precipitation Hardening Stainless Steels M 13-8	Peripheral - HEM		≤ 2 x D	.07 x D	13	105	.0071	.0089	.0107	.0142	.0178	
	Peripheral - HEM		> 2 - 3 x D	.065 x D	13	100	.0064	.0080	.0096	.0128	.0160	
	Peripheral - HEM		> 3 - 3.5 x D	.055 x D	13	90	.0062	.0078	.0093	.0124	.0155	
	Peripheral - HEM		> 3.5 - 4 x D	.05 x D	13	90	.0057	.0071	.0086	.0114	.0143	
	Finish		3 x D	.01 x D	13	90	.0044	.0055	.0066	.0088	.0110	
Hastalloy, Waspalloy	Peripheral - HEM		≤ 2 x D	.06 x D	13	100	.0052	.0065	.0078	.0104	.0130	
	Peripheral - HEM		> 2 - 3 x D	.05 x D	13	95	.0052	.0065	.0078	.0104	.0130	
	Peripheral - HEM		> 3 - 3.5 x D	.05 x D	13	95	.0048	.0060	.0072	.0096	.0120	
	Peripheral - HEM	> 3.5 - 4 x D	.04 x D	13	95	.0048	.0060	.0072	.0096	.0120		
	Finish	3 x D	.01 x D	13	90	.0023	.0029	.0035	.0046	.0058		
Inconel 718, Rene 88	Peripheral - HEM	≤ 2 x D	.06 x D	13	100	.0052	.0065	.0078	.0104	.0130		
	Peripheral - HEM	> 2 - 3 x D	.05 x D	13	95	.0052	.0065	.0078	.0104	.0130		
	Peripheral - HEM	> 3 - 3.5 x D	.05 x D	13	95	.0048	.0060	.0072	.0096	.0120		
	Peripheral - HEM	> 3.5 - 4 x D	.04 x D	13	95	.0048	.0060	.0072	.0096	.0120		
	Finish	3 x D	.01 x D	13	90	.0023	.0029	.0035	.0046	.0058		

D = Tool Diameter HEM = High-efficiency machining (chip thinning calculations have already been applied to HEM parameters)

≈ Approximately Equals < Less Than
 ≤ Less Than or Equal To > Greater Than
 ≥ Greater Than or Equal To = Equals
 x Multiply