IPT7/IPC7 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) 3/16	1/4	3/8	1/2	5/8	3/4	1
K	Gray ASTM-A48 Class 20, 25, 30, 35 & 40	Peripheral - HEM	≤ 3 x D	.1 x D	7	400	.0027	.0036	.0054	.0072	.0090	.0108	.0144
		Peripheral - HEM	> 3 x D - 4 x D	.08 x D	7	400	.0024	.0032	.0049	.0065	.0081	.0097	.0130
		Peripheral - HEM	> 4 x D - 5 x D	.08 x D	7	390	.0022	.0029	.0043	.0058	.0072	.0086	.0115
		Finish	3 x D	.015 x D	7	450	.0010	.0013	.0020	.0026	.0033	.0039	.0052
	Cast Iron Malleable	Peripheral - HEM	≤ 3 x D	.08 x D	7	390	.0022	.0029	.0044	.0058	.0073	.0087	.0116
		Peripheral - HEM	> 3 - 4 x D	.08 x D	7	390	.0020	.0026	.0039	.0052	.0065	.0078	.0104
		Peripheral - HEM	> 4 - 5 x D	.08 x D	7	375	.0017	.0023	.0035	.0046	.0058	.0070	.0093
		Finish	3 x D	.015 x D	7	350	.0008	.0011	.0016	.0021	.0026	.0032	.0042
P	Low Carbon Steels ≤ 38 Rc 1018, 1020, 12L14, 5120, 8620	Peripheral - HEM	≤ 3 x D	.08 x D	7	485	.0028	.0038	.0056	.0075	.0094	.0113	.0150
		Peripheral - HEM	> 3 - 4 x D	.08 x D	7	485	.0025	.0034	.0051	.0068	.0084	.0101	.0135
		Peripheral - HEM	> 4 - 5 x D	.08 x D	7	465	.0023	.0030	.0045	.0060	.0075	.0090	.0120
		Finish	3 x D	.015 x D	7	420	.0011	.0014	.0021	.0028	.0035	.0042	.0056
	Medium Carbon Steels ≤ 48 HRC 1045, 4140, 4340, 5140	Peripheral - HEM	≤ 3 x D	.08 x D	7	450	.0027	.0036	.0053	.0071	.0089	.0107	.0142
		Peripheral - HEM	> 3 - 4 x D	.08 x D	7	450	.0024	.0032	.0048	.0064	.0080	.0096	.0128
		Peripheral - HEM	> 4 - 5 x D	.08 x D	7	425	.0021	.0028	.0043	.0057	.0071	.0085	.0114
		Finish	3 x D	.015 x D	7	390	.0009	.0013	.0019	.0025	.0031	.0038	.0050
	Tool and Die Steels ≤ 48 Rc A2, D2, O1, S7, P20, H13	Peripheral - HEM	≤ 3 x D	.08 x D	7	420	.0024	.0032	.0048	.0064	.0080	.0096	.0128
		Peripheral - HEM	> 3 - 4 x D	.08 x D	7	420	.0022	.0029	.0043	.0058	.0072	.0086	.0115
		Peripheral - HEM	> 4 - 5 xD	.08 x D	7	395	.0019	.0026	.0038	.0051	.0064	.0077	.0102
		Finish	3 x D	.015 x D	7	365	.0008	.0011	.0016	.0021	.0026	.0032	.0042
M	Martensitic & Ferritic Stainless Steels 410, 416, 440	Peripheral - HEM	≤ 3 x D	.08 x D	7	450	.0028	.0038	.0056	.0075	.0094	.0113	.0150
		Peripheral - HEM	> 3 - 4 x D	.08 x D	7	450	.0025	.0034	.0051	.0068	.0084	.0101	.0135
		Peripheral - HEM	> 4 - 5 x D	.08 x D	7	425	.0023	.0030	.0045	.0060	.0075	.0090	.0120
		Finish	3 x D	.015 x D	7	390	.0009	.0013	.0019	.0025	.0031	.0038	.0050
	Austenitic Stainless Steels, FeNi Alloys 303, 304, 316, Invar, Kovar	Peripheral - HEM	≤ 3 x D	.08 x D	7	450	.0024	.0032	.0048	.0064	.0080	.0096	.0128
		Peripheral - HEM	> 3 - 4 x D	.08 x D	7	440	.0022	.0029	.0043	.0058	.0072	.0086	.0115
		Peripheral - HEM	> 4 - 5 x D	.07 x D	7	425	.0019	.0026	.0038	.0051	.0064	.0077	.0102
		Finish	3 x D	.015 x D	7	390	.0009	.0012	.0018	.0024	.0030	.0036	.0048
	Precipitation Hardening Stainless Steels 17-4, 15-5	Peripheral - HEM	≤ 3 x D	.08 x D	7	440	.0023	.0031	.0047	.0062	.0078	.0093	.0124
		Peripheral - HEM	> 3 - 4 x D	.08 x D	7	440	.0021	.0028	.0042	.0056	.0070	.0084	.0112
		Peripheral - HEM	> 4 - 5 x D	.07 x D	7	415	.0019	.0025	.0037	.0050	.0062	.0074	.0099
		Finish	3 x D	.015 x D	7	380	.0008	.0010	.0015	.0020	.0025	.0030	.0040
S	Titanium Alloys 6Al-4V, 6-2-4	Peripheral - HEM	≤ 3 x D	.1 x D	7	405	.0015	.0021	.0031	.0041	.0051	.0062	.0082
		Peripheral - HEM	> 3 - 4 x D	.08 x D	7	405	.0014	.0018	.0028	.0037	.0046	.0055	.0074
		Peripheral - HEM	> 4 - 5 x D	.08 x D	7	390	.0012	.0016	.0025	.0033	.0041	.0049	.0066
		Finish	3 x D	.015 x D	7	350	.0006	.0008	.0012	.0016	.0020	.0024	.0032
	Difficult-to-Machine Titanium Alloys 10-2-3 Precipitation Hardening Stainless Steel M 13-8	Peripheral - HEM	≤ 2.5 x D	.08 x D	7	335	.0015	.0020	.0030	.0040	.0050	.0060	.0080
		Peripheral - HEM	> 2.5 - 3.5 x D	.07 x D	7	325	.0014	.0018	.0027	.0036	.0045	.0054	.0072
		Peripheral - HEM	> 3.5 - 4 x D	.06 x D	7	305	.0012	.0016	.0024	.0032	.0040	.0048	.0064
		Finish	3 x D	.01 x D	7	290	.0005	.0007	.0011	.0014	.0018	.0021	.0028
	Hastalloy, Waspalloy	Peripheral - HEM	≤ 1.5 x D	.08 x D	7	100	.0035	.0047	.0071	.0094	.0118	.0141	.0188
		Peripheral - HEM	> 1.5 - 2.5 x D	.08 x D	7	95	.0032	.0042	.0063	.0085	.0106	.0127	.0169
		Peripheral - HEM	> 2.5 - 3.5 x D	.06 x D	7	85	.0028	.0038	.0056	.0075	.0094	.0113	.0150
		Finish	2 x D	.01 x D	7	90	.0019	.0025	.0038	.0050	.0063	.0075	.0100
	Inconel 718, Rene 88	Peripheral - HEM	≤ 1.5 x D	.07 x D	7	95	.0035	.0047	.0070	.0093	.0116	.0140	.0186
		Peripheral - HEM	> 1.5 - 2.5 x D	.06 x D	7	90	.0031	.0042	.0063	.0084	.0105	.0126	.0167
		Peripheral - HEM	> 2.5 - 3 x D	.06 x D	7	85	.0028	.0037	.0056	.0074	.0093	.0112	.0149
		Finish	2 x D	.01 x D	7	85	.0018	.0024	.0036	.0048	.0060	.0072	.0096

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

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

Common Machining Formulas

$$RPM = \frac{SFM \times 3.82}{D}$$

$$SFM = RPM \times D \times .262$$

$$IPM = RPM \times IPT \times Z$$

$$MRR = RDOC \times ADOC \times IPM$$

$$RPM = \frac{M/min \times 318.3}{D}$$

$$M/min = RPM \times D \times .00314$$

$$MMPM = RPM \times MMPT \times Z$$

$$MRR = RDOC \times ADOC \times MMPM$$