



## HIGH-VOLUME ROUGHING

Material	Hardness	max. ap	max. ae	Max. Angle of Engagement	vc	fz by Nominal Diameter									
						3	4	5	6	8	10	12	16	20	25
Struct./free-cutting steels, unall. heat-treat./case hard. steels	up to 28 HRc	max $a_p$ = flute length ( $l_2$ )	0.15 x D	46°	280	0.026	0.034	0.043	0.051	0.084	0.105	0.125	0.167	0.209	0.261
Alloyed heat-treatable, tool and high speed steels	28 - 44 HRc		0.15 x D	46°	220	0.026	0.034	0.043	0.051	0.076	0.095	0.114	0.152	0.190	0.238
Stainless steel - easy to machine / sulphured	up to 20 HRc		0.10 x D	37°	160	0.024	0.032	0.040	0.048	0.064	0.081	0.097	0.129	0.161	0.201
Stainless steel - moderately difficult to machine	20 - 30 HRc		0.10 x D	37°	100	0.024	0.032	0.040	0.048	0.064	0.081	0.097	0.129	0.161	0.201
Titanium	up to 40 HRc		0.08 x D	31°	90	0.026	0.035	0.044	0.053	0.070	0.088	0.105	0.140	0.175	0.219
High Temp Alloys Inconel, Nimonic, Hastelloy, Monel	up to 40 HRc		0.08 x D	31°	60	0.023	0.030	0.038	0.045	0.060	0.075	0.090	0.120	0.150	0.188

## HIGH-SPEED ROUGHING

Material	Hardness	max. ap	max. ae	Max. Angle of Engagement	vc	fz by Nominal Diameter									
						3	4	5	6	8	10	12	16	20	25
Struct./free-cutting steels, unall. heat-treat./case hard. steels	up to 28 HRc	max $a_p$ = flute length ( $l_2$ )	0.10 x D	37°	310	0.031	0.041	0.052	0.062	0.101	0.127	0.152	0.202	0.253	0.316
Alloyed heat-treatable, tool and high speed steels	28 - 44 HRc		0.10 x D	37°	240	0.031	0.041	0.052	0.062	0.092	0.115	0.138	0.184	0.230	0.288
Stainless steel - easy to machine / sulphured	up to 20 HRc		0.08 x D	31°	170	0.026	0.035	0.044	0.053	0.070	0.088	0.105	0.140	0.175	0.219
Stainless steel - moderately difficult to machine	20 - 30 HRc		0.08 x D	31°	110	0.026	0.035	0.044	0.053	0.070	0.088	0.105	0.140	0.175	0.219
Titanium	up to 40 HRc		0.05 x D	26°	100	0.026	0.035	0.044	0.053	0.070	0.088	0.105	0.140	0.175	0.219
High Temp Alloys Inconel, Nimonic, Hastelloy, Monel	up to 40 HRc		0.05 x D	26°	70	0.023	0.030	0.038	0.045	0.060	0.075	0.090	0.120	0.150	0.188

## HIGH-SPEED FINISHING

Material	Hardness	max. ap	max. ae	Max. Angle of Engagement	vc	fz by Nominal Diameter									
						3	4	5	6	8	10	12	16	20	25
Struct./free-cutting steels, unall. heat-treat./case hard. steels	up to 28 HRc	max $a_p$ = flute length ( $l_2$ )	0.01 x D	11°	340	0.024	0.032	0.041	0.049	0.079	0.099	0.119	0.158	0.198	0.248
Alloyed heat-treatable, tool and high speed steels	28 - 44 HRc		0.01 x D	11°	270	0.024	0.032	0.041	0.049	0.072	0.090	0.108	0.144	0.180	0.225
Stainless steel - easy to machine / sulphured	up to 20 HRc		0.01 x D	11°	180	0.019	0.025	0.032	0.038	0.050	0.063	0.076	0.101	0.126	0.158
Stainless steel - moderately difficult to machine	20 - 30 HRc		0.01 x D	11°	120	0.019	0.025	0.032	0.038	0.050	0.063	0.076	0.101	0.126	0.158
Titanium	up to 40 HRc		0.01 x D	11°	100	0.019	0.025	0.032	0.038	0.050	0.063	0.076	0.101	0.126	0.158
High Temp Alloys Inconel, Nimonic, Hastelloy, Monel	up to 40 HRc		0.01 x D	11°	70	0.016	0.022	0.027	0.032	0.043	0.054	0.065	0.086	0.108	0.135