

Speeds and Feeds



ISO	VDI 3323	Material Description	Parameter	Corner Rounding							
				7/16	1/2	5/8	7/8	1	1 1/8	1 1/4	1 1/2
P	1	Non-alloy steel	SFM	66	66	66	66	66	66	66	66
			RPM	576	504	403	288	252	224	202	168
			IPT	.0008	.0008	.0011	.0014	.0016	.0017	.0019	.0021
			IPM	1.8	1.6	1.8	1.6	1.6	1.5	1.5	1.4
	2		SFM	49	49	49	49	49	49	49	49
			RPM	428	374	299	214	187	166	150	125
			IPT	.0008	.0008	.0011	.0014	.0016	.0016	.0018	.0021
			IPM	1.3	1.2	1.4	1.2	1.2	1.1	1.1	1.1
	3		SFM	33	33	33	33	33	33	33	33
			RPM	288	252	202	144	126	112	101	84
			IPT	.0010	.0010	.0012	.0015	.0017	.0020	.0022	.0021
			IPM	1.1	1.0	0.9	0.9	0.8	0.9	0.9	0.7
	4		SFM	33	33	33	33	33	33	33	33
			RPM	288	252	202	144	126	112	101	84
			IPT	.0010	.0010	.0012	.0015	.0017	.0020	.0022	.0021
			IPM	1.1	1.0	0.9	0.9	0.8	0.9	0.9	0.7
	6	Low alloy steel	SFM	49	49	49	49	49	49	49	49
			RPM	428	374	299	214	187	166	150	125
			IPT	.0008	.0008	.0011	.0014	.0016	.0016	.0018	.0021
			IPM	1.3		1.4	1.2	1.2	1.1	1.1	1.1
	7		SFM	33	33	33	33	33	33	33	33
			RPM	288	252	202	144	126	112	101	84
			IPT	.0010	.0010	.0012	.0015	.0017	.0020	.0022	.0021
			IPM	1.1	1.0	0.9	0.9	0.8	0.9	0.9	0.7
	8		SFM	33	33	33	33	33	33	33	33
			RPM	288	252	202	144	126	112	101	84
			IPT	.0010	.0010	.0012	.0015	.0017	.0020	.0022	.0021
			IPM	1.1	1.0	0.9	0.9	0.8	0.9	0.9	0.7
	10	High alloy steel, and tool steel	SFM	49	49	49	49	49	49	49	49
			RPM	428	374	299	214	187	166	150	125
			IPT	.0008	.0008	.0011	.0014	.0016	.0016	.0018	.0021
			IPM	1.3	1.2	1.4	1.2	1.2	1.1	1.1	1.1
	11.1		SFM	33	33	33	33	33	33	33	33
			RPM	288	252	202	144	126	112	101	84
			IPT	.0010	.0010	.0012	.0015	.0017	.0020	.0022	.0021
			IPM	1.1	1.0	0.9	0.9	0.8	0.9	0.9	0.7

Speeds and Feeds



ISO	VDI 3323	Material Description	Parameter	Corner Rounding							
				7/16	1/2	5/8	7/8	1	1 1/8	1 1/4	1 1/2
P	10	High alloyed steel, and tool steel	SFM	49	49	49	49	49	49	49	49
			RPM	428	374	299	214	187	166	150	125
			IPT	.0008	.0008	.0011	.0014	.0016	.0016	.0018	.0021
			IPM	1.3	1.2	1.4	1.2	1.2	1.1	1.1	1.1
	11.1		SFM	33	33	33	33	33	33	33	33
			RPM	288	252	202	144	126	112	101	84
			IPT	.0010	.0010	.0012	.0015	.0017	.0020	.0022	.0021
			IPM	1.1	1.0	0.9	0.9	0.8	0.9	0.9	0.7
N	21	Aluminum-wrought alloy	Vc	295	295	295	295	295	295	295	295
			fz	2576	2254	1803	1288	1127	1002	902	751
			RPM	.0009	.0009	.0012	.0015	.0016	.0018	.0020	.0022
			FEED	9.4	8.3	8.7	7.7	7.1	7.2	7.2	6.6
	22		Vc	295	295	295	295	295	295	295	295
			fz	2576	2254	1803	1288	1127	1002	902	751
			RPM	.0009	.0009	.0012	.0015	.0016	.0018	.0020	.0022
			FEED	9.4	8.3	8.7	7.7	7.1	7.2	7.2	6.6
	23	Aluminum-cast, alloyed	Vc	295	295	295	295	295	295	295	295
			fz	2576	2254	1803	1288	1127	1002	902	751
			RPM	.0009	.0009	.0012	.0015	.0016	.0018	.0020	.0022
			FEED	9.4	8.3	8.7	7.7	7.1	7.2	7.2	6.6
	24		Vc	295	295	295	295	295	295	295	295
			fz	2576	2254	1803	1288	1127	1002	902	751
			RPM	.0009	.0009	.0012	.0015	.0016	.0018	.0020	.0022
			FEED	9.4	8.3	8.7	7.7	7.1	7.2	7.2	6.6
	25		Vc	295	295	295	295	295	295	295	295
			fz	2576	2254	1803	1288	1127	1002	902	751
			RPM	.0009	.0009	.0012	.0015	.0016	.0018	.0020	.0022
			FEED	9.4	8.3	8.7	7.7	7.1	7.2	7.2	6.6

Speeds and Feeds



**Penetration Rate
(mm/min)**

$$v_f = f_n \cdot n$$

**Feed Per Revolution
(mm/rev)**

$$f_n = \frac{v_f}{n}$$

**Cutting Speed
(m/min)**

$$v_c = \frac{\pi \cdot D_{tool} \cdot n}{1000}$$

**Spindle Speed
(rev/min)**

$$n = \frac{v_c \cdot 1000}{\pi \cdot D_{tool}}$$

**Material Removal Rate
(cm³/min)**

$$MRR = \frac{D_{tool} \cdot f_n \cdot v_c}{4}$$

Metric

Symbol	Definition	Unit
v_f	Penetration rate	mm/min
f_n	Feed per revolution	mm/rev
v_c	Cutting speed	m/min (SMM)
n	Spindle speed	rev/min (RPM)
D_{tool}	Tool cutting diameter	mm
MRR	Material removal rate	(cm ³ /min)

Speeds and Feeds



**Penetration Rate
(in/min)**

$$v_f = f_n \cdot n$$

**Feed Per Revolution
(in/rev)**

$$f_n = \frac{v_f}{n}$$

**Cutting Speed
(ft/min)**

$$v_c = \frac{\pi \cdot D_{tool} \cdot n}{12}$$

**Spindle Speed
(rev/min)**

$$n = \frac{v_c \cdot 12}{\pi \cdot D_{tool}}$$

**Material Removal Rate
(in³/min)**

$$MRR = D_{tool} \cdot f_n \cdot v_c \cdot 3$$

Inch

Symbol	Definition	Unit
v_f	Penetration rate	<i>in/min</i>
f_n	Feed per revolution	<i>in/rev</i>
v_c	Cutting speed	<i>ft/min (SFM)</i>
n	Spindle speed	<i>rev/min (RPM)</i>
D_{tool}	Tool cutting diameter	<i>in</i>
MRR	Material removal rate	<i>(in³/min)</i>