Printable cutting speed chart

Starting surface speed, SFM (× 0.3048 = m/min)

Material, condition	Turning, carbide	End mill, carbide	Drill, HSS	Drill, carbide	Tap, cut
1018, Hot rolled / annealed	975	510	95	383	63
1020, Hot rolled / annealed	975	510	95	383	63
1045, Annealed / normalized	684	429	74	362	58
1045, Quenched & tempered	619	389	74	362	58
12L14, Cold drawn	591	371	74	362	58
1144, Cold drawn / stress relieved	591	371	74	362	58
4140, Annealed	542	340	74	362	55
4140, Quenched & tempered (pre-hard, ~28-32 HRC)	394	247	39	251	55
4140, Hardened 50 HRC	–	–	–	108	–
4340, Annealed	542	340	74	362	55
4340, Quenched & tempered	394	247	39	251	55
4340, Hardened 50 HRC	–	–	–	108	–
8620, Annealed / as rolled	743	466	74	362	55
52100, Spheroidize annealed	500	314	74	362	55
52100, Hardened 60 HRC	–	–	–	108	–
A2, Annealed	700	200	58	248	55
A2, Hardened 60 HRC	–	–	–	108	–
D2, Annealed	700	200	58	248	55
D2, Hardened 60 HRC	–	–	–	108	–
H13, Annealed	700	200	58	248	55
H13, Hardened & tempered (pre-hard)	368	105	58	248	55
H13, Hardened 50 HRC	–	–	–	108	–
O1, Annealed	500	314	74	362	55
O1, Hardened 60 HRC	–	–	–	108	–
303, Annealed	551	270	33	176	30
304, Annealed	551	270	33	176	30
316, Annealed	551	270	33	176	30
410, Annealed	640	205	45	202	30
410, Hardened & tempered	388	124	45	202	30
416, Annealed	640	205	45	202	30
420, Annealed	640	205	45	202	30
420, Hardened & tempered	388	124	45	202	30
17-4 PH, Condition A (solution annealed)	412	132	45	202	30
17-4 PH, H1150	448	143	20	183	30
17-4 PH, H900	320	103	20	183	30
2205 Duplex, Solution annealed	394	–	–	–	30
Gray iron, Class 30, As cast	935	359	88	436	–
Ductile iron, 65-45-12, As cast (ferritic/pearlitic)	853	378	64	329	–
Ductile iron, 80-55-06, As cast (pearlitic)	692	378	64	329	–
6061, T6	1,645	600	250	651	80
6061, O (annealed)	1,645	600	250	651	80
7075, T6 / T651	1,645	600	250	651	80
2024, T3 / T351	1,645	600	250	651	80
A356 cast aluminum, T6	1,645	600	250	651	80
360 brass, Half hard	–	400	139	513	72
932 bearing bronze, As cast	–	400	139	513	72
C110 copper, Half hard	–	400	139	513	72
Ti-6Al-4V, Annealed	189	205	39	127	29
CP titanium, Grade 2, Annealed	283	205	39	127	29
Inconel 718, Solution annealed	184	63	15	118	16
Inconel 718, Aged	131	63	15	118	16
Inconel 625, Annealed	184	63	15	118	16
Hastelloy X, Solution annealed	184	63	15	118	16

Starting points from the median of the tool makers' charts; adjust for rigidity, tool and coolant. Turning: medium cut, coated carbide. Drills: Ø1/2" at 3×D. A dash: no maker publishes it. breakingchips.com/cutting-speed-chart/ Version 6 Nov 2026. Free to share under CC BY 4.0: credit BreakingChips (breakingchips.com).