

Machinability ratings of Various Materials

MACHINABILITY RATINGS 1.2 BASED ON CUTTING SPEEDS FOR 30 MINUTES TOOL LIFE FOR HSS AND CARBIDE TOOLS

Material	Condition & Microstructure	BHN	HSS Tool for 30 min. Life ft/min.	Carbide Tool for 30 min. Life ft/min.
B 1112	Annealed 10 % Pearlite - 90% Ferrite-Sulfides	135	240	920
AISI 1020	Annealed 10 % Pearlite-90% Ferrite	115	180	800
AISI 8620	Annealed 30% Pearlite - 70% Ferrite	135	182	660
AISI 3140	Annealed 75% Pearlite - 25 % Ferrite	190	90	367
AISI 3140	Quenched and Tempered Martensite	302	71	340
AISI 3140 (Resulfurized)	Annealed 75% Pearlite - 25 % Ferrite-Sulfides	190	130	485
AISI 3140 (Resulfurized)	Quenched & Tempered Tempered Martensite and Sulfides	296	106	305
AISI 4140	Spherodized Carbides & Ferrite	166	15	700
AISI 4140	Annealed 90% Pearlite-10% Ferrite	192	95	385
AISI 4140	Quenched & Tempered Tempered Martensite	300	69	303
AISI 4140 (Resulfurized)	Annealed 90%Pearlite-10%Ferrite	190	123	400
AISI 4140 (Resulfurized)	Quenched & Tempered Tempered Martensite- Sulfides	300	90	310
AISI 4340	Spherodized Spherodized Carbides & Ferrites	206	98	480
AISI 4340	Annealed 100% Pearlite	221	88380	
AISI 4340	Quenched & Tempered Tempered & Martensite	300	63	300

TECHNICAL SECTION

Material	Condition & Microstructure	BHN	HSS Tool for 30 min. Life ft/min.	Carbide Tool for 30 min. Life ft/min.
AISI 5140	Annealed 80%Pearlite-20%Ferrite	192	120	362
AISI 8640	Annealed 75%Pearlite-25%Ferrite	190	107	450
AISI 8640	Quenched & Tempered Tempered & Martensite	300	72	225
AISI 8640 (Resulfurized)	Annealed 65%Pearlite - 35%Ferrite-Sulfides	185	135	460
AISI 8640 (Resulfurized)	Quenched & Tempered Tempered Martensite- Sulfides	300	102	307
AISI 52100	Spherodized Spherodized Carbides & Ferrite	190	123	340
14CMV	Quenched & Tempered Tempered Martensite	341	54	375
17-22-AS	Quenched & Tempered Tempered Martensite	341	41	215
D6AC	Quenched & Tempered Tempered Martensite	56R		64
18% Nickel 250 Grade Maraging Steel	Annealed Martensite	341	92	415
18% Nickel 250 Grade Maraging	Annealed and Maraged Martensite	53R	53180	
18% Nickel- 300 Grade Maraging Steel	Annealed Martensite	302	87450	
18% Nickel- 300 Grade Maragin Steel	Annealed B & Maraged Martensite	54Rc	40175	
HP 9-4-25	Annealed Spherodized	375	76305	
HP 9-4-25	Quenched & Tempered Tempered Martensite	415	74300	
Vascojet 1000	Quenched & Tempered Tempered Martensite	346	60200	

Material	Condition & Microstructure	BHN	HSS Tool for 30 min. Life ft/min.	Carbide Tool for 30 min. Life ft/min.
Vascojet 1000	Quenched & Tempered Tempered Martensite	52Rc	23133	
302SS	Annealed Austenite	170	93310	
347 SS	Annealed Austenite-Carbides	175	70280	
430 SS	Annealed Ferrite-Carbides	181	160	800
410 SS	Annealed	202	158	640
410 SS	Quenched & Tempered Tempered Martensite	352	73260	
422 SS	Quenched & Tempered Tempered Martensite	352	62300	
17-7 PH	Annealed Austenite	170	70	430
Ti 8Al-1Mo-1V	Solution Treated Alpha	311	250	
Ti 8Al-1Mo-1V	Solution Treated and aged Alph	31	51210	
Ti 2Fe-2Cr-2Mo	Annealed Alpha-Beta	302	43190	
Ti 6Al-4V	Annealed Alpha-Beta	312	72180	
Ti 6Al-4V	Solution treated & Aged Alpha-Beta	365	59158	
Ti 6Al-6V-2Sn	Annealed Alpha-Beta	331	62200	
Ti 6Al-6V-2Sn	Solution treated & aged Alpha-Beta	429	45175	
Ti 4 Al-4Mn-1V	Annealed Alpha-Beta	341	25140	
Ti 3Al-5Cr	As forged Alpha-Beta	363	15118	
Ti 7Al-4Mo	Annealed Alpha-Beta	341	35270	
Ti 7Al-4Mo	Solution Treated and Aged Alpha-Beta	388	32220	
Ti 3Al-13V-11Cr	Solution Treated Beta	285	15120	
Ti-3Al-13V-11Cr	Solution Treated & Aged Beta	400	1090	
Inconel 700	Solution Treated Austentic	302	1878	
Inconel 718	Solution Treated Austentic	279	3996	
Inconel 718	Solution Treated Aged Austentic	45Rc	32114	
Inconel 901	Solution treated Austentic	262	2877	
Udimet 500	Solution Treated Austentic	340	1750	

TECHNICAL SECTION

Material	Condition & Microstructure	BHN	HSS Tool for 30 min. Life ft/min.	Carbide Tool for 30 min. Life ft/min.
Udimet 500	Solution Treated & Aged Austentic	360	1856	
Waspaloy	Solution Treated Austentic	341	26130	
Waspaloy	Solution Treated & Aged Austentic	388	23130	
Rene 41	Solution Treated Austentic	321	1773	
Rene 41	Solution Treated & Aged Austentic	365	1366	
HS-25	Solution Treated Austentic	229	2696	
A-286	Solution Treated Austentic	197	52150	
N-155	Solution Treated & Aged Austentic	200	31160	
19-9DL	Stress Relieved Austentic	210	39155	
Moly-TZM	Extruded and H.R. Austentic	217		350
Moly-0.5 Ti	Stress Relieved Austentic	220		250
D-31	Extruded and Stress Relieved Austentic	207	70305	
90-Ta-low	As forged Austentic	207	6880	

Reference : Cutting and Grinding Fluids : Selection and Application by R.K. Sprinborn, Editor Published by American Society of Tool and Manufacturing Engineering.

DO YOU KNOW

Where does the heat (energy) from the engine go?

