Uncoated Carbide Grade Machining Recommendations for Milling

Type of Material	Hardness		Maximum Surface Speeds (ft/min)								
	Rc	BHN	G-60 G-53	G-70	G-50	G-10 G-02	G-23	G-20M	G-01M	G-40	G-74
Non-Alloy Carbon Steel:											
C < 0.25 %		110	720	780	460	N/A	N/A	N/A	N/A	N/A	N/A
C < 0.80 %	6	150	550	600	350	N/A	N/A	N/A	N/A	N/A	N/A
C < 1.40 %	33	310	440	480	280	N/A	N/A	N/A	N/A	N/A	N/A
Low-Alloy Steels:											
Annealed, Medium - High Carbon	12	180	460	500	290	N/A	N/A	N/A	N/A	N/A	N/A
Hardened	36	330	300	320	190	N/A	N/A	N/A	N/A	N/A	N/A
High-Alloy Steels:											
Annealed	16	200	280	300	180	N/A	N/A	N/A	N/A	N/A	N/A
Hardened	41	380	200	220	130	N/A	N/A	N/A	N/A	N/A	N/A
High-Alloy Tool Steel:											
Hardened	36	330	290	310	180	N/A	N/A	N/A	N/A	N/A	N/A
Cast Steel:											
Non-Alloy	6	150	550	600	350	N/A	N/A	N/A	N/A	N/A	N/A
Low-Alloy	16	200	440	480	280	N/A	N/A	N/A	N/A	N/A	N/A
High-Alloy	16	200	390	420	250	N/A	N/A	N/A	N/A	N/A	N/A
Stainless Steels:											
Ferritic, 400 Series	16	200	440	480	280	N/A	N/A	N/A	N/A	N/A	N/A
Austenitic, 300 Series	16	200	N/A	N/A	N/A	310	400	350	N/A	N/A	N/A
Gray, Perlitic Cast Irons:											
Low Tensile	12	180	N/A	N/A	N/A	450	600	500	N/A	N/A	N/A
High Tensile	26	260	N/A	N/A	N/A	200	250	230	N/A	N/A	N/A
Nodular / Malleable Irons:											
Short Chipping	6	150	680	740	440	N/A	N/A	N/A	N/A	N/A	N/A
Long Chipping	21	230	400	440	250	N/A	N/A	N/A	N/A	N/A	N/A
Aluminum Alloys:			N/A	N/A	N/A	1400	1800	1500	N/A	N/A	N/A
Brass, Copper, Bronze:			N/A	N/A	N/A	500	600	550	N/A	N/A	N/A
Hardened Steels (> 50 Rc):			N/A	50	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Chilled, Hardened Irons (> 50 Rc):			N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Titanium, Refractory Metals:			N/A	N/A	N/A	100	150	130	N/A	N/A	N/A
Nickel & Iron Based Superalloys:											
Inconels			N/A	N/A	N/A	80	N/A	100	N/A	N/A	N/A
Hastelloys			N/A	N/A	N/A	120	N/A	140	N/A	N/A	N/A
Waspoloys			N/A	N/A	N/A	80	N/A	100	N/A	N/A	N/A
Renes			N/A	N/A	N/A	60	N/A	80	N/A	N/A	N/A
Monels			N/A	N/A	N/A	60	N/A	80	N/A	N/A	N/A
Cobalt Based Superalloys:											
Stellites			N/A	N/A	N/A	50	N/A	60	N/A	N/A	N/A
Haynes Alloys			N/A	N/A	N/A	50	N/A	60	N/A	N/A	N/A

Feeds should be in the range of 0.003 in/tooth to 0.012 in/tooth.
Higher speeds require lower feeds, whereas, low speeds use higher feed rates.
A good general starting point for feed rate in milling is 0.004 in/tooth.

Greenleaf Sales
Phone: 814-763-2915 • 800-458-1850 • Fax: 814-763-4423
sales@greenleafcorporation.com • www.greenleafcorporation.com