

Speeds and Feeds


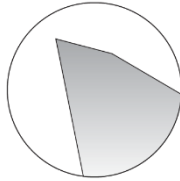

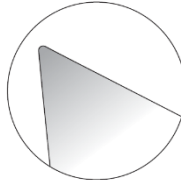

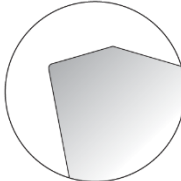

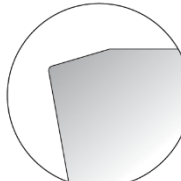


- 1) Select your material in the ISO colored chart.
- 2) Start with the recommended cutting speed, v_c (ft/min) and feed rate, v_f (in/min). Adjust the cutting speed and/or feed rate based on your cutting conditions. Calculated RPM may exceed the maximum RPM of the cutter body. **WARNING: Never exceed the maximum RPM rating of the cutter body.**

	Workpiece	Hardness	Grades	Cutting conditions				
				v_c (sfm)	fz (ipt)	ap (inch)	ae (inch)	
P	Low carbon steel	HB80~180	HU40	328~820	0.028~0.005	0.012~0.236	0.7D~0.1D	
	High carbon steel	HB180~280	HU40	328~722	0.028~0.005	0.012~0.236	0.7D~0.1D	
	Low alloy steel	Under HRC27	HP25	590~951	0.024~0.008	0.012~0.236	0.7D~0.1D	
			HU30 / HU40	328~656	0.024~0.008	0.012~0.236	0.7D~0.1D	
	Low pre-hardened steel	HRC20~50	HP25	426~820	0.020~0.012	~0.020	0.7D~0.1D	
			HH10 / HU30	164~492	0.020~0.012	~0.020	0.7D~0.1D	
	High alloy steel	Under HRC27	HP25	426~820	0.020~0.012	~0.020	0.7D~0.1D	
HU30			164~492	0.020~0.012	~0.020	0.7D~0.1D		
High pre-hardened steel	HRC20~48	HH10 / HU30	164~492	0.020~0.012	~0.020	0.7D~0.1D		
M	Stainless steel	Under HB270	HU30 / HU40	328~492	0.024~0.008	0.012~0.236	0.7D~0.1D	
K	Gray cast iron, Ductile cast iron	Under 350MPa	HU30	394~689	0.024~0.008	0.012~0.236	0.7D~0.1D	
N	Aluminum	-	HN25A	984~2,625	0.024~0.012	0.012~0.236	0.7D~0.1D	
S	Heat resistant alloys	Fe	HRC30~40	HU30 / HU40	115~197	0.020~0.012	~0.020	0.7D~0.1D
		Ni or Co	HRC40~45	HU30 / HU40	98~164	0.020~0.012	~0.020	0.7D~0.1D
		Titanium	HRC35~45	HU30 / HU40	131~230	0.020~0.012	~0.059	0.7D~0.1D
H	High hardened materials	Over HRC50	HU30 / HU40	98~164	0.020~0.012	~0.020	0.7D~0.1D	

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Insert	Chip Breaker	Cutting Edge Shape	Application
	HMA		Machining Aluminum
	HML		Machining Titanium & Inconel
	HMM		General Machining
	None		Machining Die Steel & Heat Resistant Alloys

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Feed Rate, Per Revolution (in/min)
$v_f = f_n \cdot n$

Feed Rate, Per Tooth (in/min)
$v_f = f_z \cdot n \cdot Z$

Feed Per Revolution (in/rev)
$f_n = \frac{v_f}{n}$

Feed Per Tooth (in)
$f_z = \frac{v_f}{n \cdot Z}$

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 (in ³ /min)
$MMR = a_p \cdot a_e \cdot v_f$

Imperial

Symbol	Definition	Unit
v_f	Feed rate	in/min
f_n	Feed per revolution	in/rev
f_z	Feed per tooth	in
v_c	Cutting speed	ft/min (SFM)
n	Spindle speed	rev/min (RPM)
D_{tool}	Tool cutting diameter	in
MMR	Material removal rate	(in ³ /min)
a_e	Radial depth of cut	in
a_p	Axial depth of cut	in
Z	Number of teeth/flutes	