

# 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 per tooth,  $f_z$  (in). Adjust the cutting speed and/or feed 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.**

## HSPP - Haas Square Positive Positive

Material				Recommended Cutting Speed						Recommended Feed Per Tooth			
Group	Description	Condition	Hardness (HB)	Insert Grades						Application			
				HP30		HMP20		HN25		Finishing	Medium Cut	Roughing	
				$a_e / D$		$a_e / D$		$a_e / D$					
				1/1	3/4	1/5	1/1	3/4	1/5				1/1
P Steel	Unalloyed Steel	0.15% C Annealed	125	804	935	722	837				0.005	0.007	0.009
		0.45% C Annealed	190	689	804	623	722						
		0.45% C Tempered	250	656	755	591	673						
		0.75% C Annealed	270	574	656	509	591						
		0.75% C Tempered	300	525	623	476	558						
	Low-alloyed Steel	Annealed	180	689	804	623	722				0.004	0.006	0.008
		Tempered	275	574	656	509	591						
		Tempered	300	525	623	476	558						
	High-Alloyed Steel and Tool Steel	Tempered	350	443	525	410	476				0.004	0.006	0.008
Annealed		200	410	476	361	427							
M Stainless Steel	Stainless Steel	Hardened and Tempered	325	295	328	262	295				0.003	0.005	0.006
		Ferritic/Martensitic	200			361	427						
		Martensitic	240			312	361						
		Austenitic	180			394	459						
		Austenitic/Ferritic	230			312	361						
N Non-Ferrous	Aluminum Alloys Wrought	Cannot be Hardened	60					3953	4560		0.004	0.006	0.008
		Hardened	100					3215	3740				
	Cast Aluminum Alloys	≤ 12% Si, not Hardened	75					1427	1640		0.004	0.006	0.008
		≤ 12% Si, Hardened	90					1148	1329				
		> 12% Si, not Hardened	130					591	673				
	Copper and Copper Alloys (Bronze/Brass)	Machining Steel, PB> 1%	110					459	525		0.004	0.005	0.007
		CuZn, CuSnZn	90					558	656				
CuSn, Pb-free Copper, Electrolytic Copper		100					1017	1181					



# Speeds and Feeds



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 <sup>3</sup> /min)
$MMR = a_p \cdot a_e \cdot v_f$

## Inch

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 <sup>3</sup> /min)
$a_e$	Radial depth of cut	in
$a_p$	Axial depth of cut	in
$Z$	Number of teeth/flutes	