

# Speeds and Feeds



Material				Recommended Cutting Speed								HONP2 - Haas Octagon Negative Positive 2				
Group	Description	Condition	Hardness (HB)	Insert Grades								Recommended Feed Per Tooth				
				HMP20		HMP35		HMM35		HN25		Application				
				a <sub>e</sub> / D	a <sub>e</sub> / D	a <sub>e</sub> / D	a <sub>e</sub> / D	a <sub>e</sub> / D	a <sub>e</sub> / D	a <sub>e</sub> / D	a <sub>e</sub> / D	Finishing	Medium Cut	Roughing		
				1/1   3/4	1/5	1/1   3/4	1/5	1/1   3/4	1/5	1/1   3/4	1/5					
P Steel	Unalloyed Steel	0.15% C Annealed	125	771	902	853	984	738	853				0.009			
		0.45% C Annealed	190	656	771	738	837	640	738							
		0.45% C Tempered	250	623	722	689	787	591	689							
		0.75% C Annealed	270	541	640	607	689	525	607							
		0.75% C Tempered	300	509	591	558	640	492	558							
	Low-alloyed Steel	Annealed	180	656	771	738	837	640	738				0.009			
		Tempered	275	541	640	607	689	525	607							
		Tempered	300	509	591	558	640	492	558							
		Tempered	350	427	509	476	541	410	476							
	High-Alloyed Steel and Tool Steel	Annealed	200	394	459	427	492	377	427				0.008			
Hardened and Tempered		325	279	328	312	344	262	312								
M Stainless Steel	Stainless Steel	Ferritic/Martensitic	200	394	459	427	492	377	427				0.006			
		Martensitic	240	328	394	361	427	312	361							
		Austenitic	180	410	492	459	525	394	459							
		Austenitic/Ferritic	230	328	394	361	427	312	361							
K Cast Iron	Grey Cast Iron	Perlitic/Ferritic	180	853	837			820	951				0.009			
		Perlitic/Martensitic	260	509	492			492	558							
	Ductile Cast Iron	Ferritic	160	591	574			558	640				0.008			
		Perlitic	250	394	377			377	427							
	Malleable Cast Iron	Ferritic	130	705	689			673	771				0.009			
Perlitic	230	476	459			443	525									
N Non-Ferrous	Aluminum Alloys Wrought	Cannot be Hardened	60							4938	5692		0.008			
		Hardened	100							4019	4659					
	Cast Aluminum Alloys	≤ 12% Si, not Hardened	75								1772	2034		0.008		
		≤ 12% Si, Hardened	90								1427	1657				
		> 12% Si, not Hardened	130								722	837				
	Copper and Copper Alloys (bronze/brass)	Machining Steel, PB> 1%	110								558	640		0.008		
		CuZn, CuSnZn	90								689	804				
	CuSn, Pb-free Copper, Electrolytic Copper	100								1263	1460					
S High-Temp Alloys	Heat-resistant Alloys	Annealed	200													
		Hardened	280													
		Annealed	250													
		Hardened	350													
		Cast	320													
	Titanium Alloys	Pure Titanium	Rm 400													
		Hardened	Rm 1050													



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