

Speeds and Feeds



- 1) Select your material in the ISO colored chart.
- 2) Start with the recommended cutting speed, v_c (m/min) and feed rate, v_f (mm/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.**

HOP – Haas Octagon Positive

Material				Recommended Cutting Speed										Recommended Feed Rate				
Group	Description	Condition	Hardness (HB)	Insert Grades										Application				
				HP30		HMP20		HMP35		HK25		HN25		Finishing	Medium Cut	Roughing		
				a_e / D	a_e / D	a_e / D	a_e / D	a_e / D	a_e / D	a_e / D	a_e / D	a_e / D	a_e / D					
				1/1 3/4	1/5	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	245	285	230	265	245	285					0.0024	0.003			
		0.45% C Annealed	190	210	245	200	230	210	245									
		0.45% C Tempered	250	200	230	185	215	200	230									
		0.75% C Annealed	270	175	200	165	190	175	200									
		0.75% C Tempered	300	160	190	150	175	160	190									
	Low-alloyed Steel	Annealed	180	210	245	200	230	210	245					0.0022	0.0028			
		Tempered	275	175	200	165	190	175	200									
		Tempered	300	160	190	150	175	160	190									
High-Alloyed Steel and Tool Steel	Annealed	200	125	145	115	135	125	145					0.0021	0.0027				
	Hardened and Tempered	325	90	100	85	95	90	100										
M Stainless Steel	Stainless Steel	Ferritic/Martensitic	200			115	135	125	145					0.0017	0.0021			
		Martensitic	240			100	115	105	120									
		Austenitic	180			125	145	130	155									
		Austenitic/Ferritic	240			100	115	105	120									
K Cast Iron	Grey Cast Iron	Perlitic/Ferritic	180			255	295				270	315		0.0027	0.0033			
		Perlitic/Martensitic	260			150	175				160	190						
	Ductile Cast Iron	Ferritic	160			175	200				185	215		0.0024	0.003			
		Perlitic	250			115	135				125	145						
	Malleable Cast Iron	Ferritic	130			210	240				225	260		0.0024	0.003			
Perlitic	230			140	160				150	175								
N Non-Ferrous	Aluminum Alloys Wrought	Cannot be Hardened	60										1205	1390	0.002	0.0026		
		Hardened	100										980	1140				
	Cast Aluminum Alloys	≤ 12% Si, not Hardened	75											435	500	0.002	0.0026	
		≤ 12% Si, Hardened	90											350	405			
		> 12% Si, not Hardened	130											180	205			
	Copper and Copper Alloys (bronze/brass)	Machining Steel, PB> 1%	110											140	160	0.0018	0.0023	
		CuZn, CuSnZn	90											170	200			
CuSn, Pb-free Copper, Electrolytic Copper		100											310	360				



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

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

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

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

Cutting Speed (m/min)
$v_c = \frac{\pi \cdot D_{tool} \cdot n}{1000}$

Spindle Speed (rev/min)
$n = \frac{v_c \cdot 1000}{\pi \cdot D_{tool}}$

Material Removal Rate (mm ³ /min)
$MMR = \frac{a_p \cdot a_e \cdot v_f}{1000}$

Metric

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