

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.**

**HSNP – Haas Square
Negative Positive**

Material				Recommended Cutting Speed								Recommended Feed Rate			
Group	Description	Condition	Hardness (HB)	Insert Grades								Application			
				HP30		HMP20		HMP35		HK25		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				
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	260	300	245	285	260	300						
		0.45% C Annealed	190	225	255	210	245	225	255						
		0.45% C Tempered	250	210	240	200	230	210	240				0.0027	0.0030	
		0.75% C Annealed	270	185	210	175	200	185	210						
		0.75% C Tempered	300	170	195	160	190	170	195						
	Low-alloyed Steel	Annealed	180	225	255	210	245	225	255						
		Tempered	275	185	210	175	200	185	210				0.0025	0.0028	
		Tempered	300	170	195	160	190	170	195						
High-Alloyed Steel and Tool Steel	Annealed	200	130	150	125	145	130	150				0.0023	0.0027		
	Hardened and Tempered	325	95	105	90	100	95	105							
M Stainless Steel	Stainless Steel	Ferritic/Martensitic	200			125	145	130	150						
		Martensitic	240			105	120	110	130				0.0019	0.0021	
		Austenitic	180			130	155	140	160						
		Austenitic/Ferritic	240			105	120	110	130						
K Cast Iron	Grey Cast Iron	Perlitic/Ferritic	180			270	315			320	370		0.0029	0.0034	
		Perlitic/Martensitic	260			160	190			190	220				
	Ductile Cast Iron	Ferritic	160			185	215			220	255		0.0027	0.0030	
		Perlitic	250			125	145			145	170				
	Malleable Cast Iron	Ferritic	130			225	260			265	305		0.0027	0.0030	
		Perlitic	230			150	175			175	205				



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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	