

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.**

HPP – Haas Positive 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 | | | 0.0033 | 0.0066 | |
| | | 0.45% C Annealed | 190 | 225 | 255 | 210 | 245 | 225 | 255 | | | | | |
| | | 0.45% C Tempered | 250 | 210 | 240 | 200 | 230 | 210 | 240 | | | | | |
| | | 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 | | | 0.0031 | 0.0061 | |
| | | Tempered | 275 | 185 | 210 | 175 | 200 | 185 | 210 | | | | | |
| | | Tempered | 300 | 170 | 195 | 160 | 190 | 170 | 195 | | | | | |
| High-Alloyed Steel and Tool Steel | Annealed | 200 | 130 | 150 | 125 | 145 | 130 | 150 | | | 0.0029 | 0.0057 | | |
| | Hardened and Tempered | 325 | 95 | 105 | 90 | 100 | 95 | 105 | | | | | | |
| M Stainless Steel | Stainless Steel | Ferritic/Martensitic | 200 | | | 125 | 145 | 130 | 150 | | | 0.0023 | 0.0047 | |
| | | Martensitic | 240 | | | 105 | 120 | 110 | 130 | | | | | |
| | | 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 | 0.0036 | 0.0073 | |
| | | Perlitic/Martensitic | 260 | | | 160 | 190 | | | 190 | 220 | | | |
| | Ductile Cast Iron | Ferritic | 160 | | | 185 | 215 | | | 220 | 255 | 0.0033 | 0.0066 | |
| | | Perlitic | 250 | | | 125 | 145 | | | 145 | 170 | | | |
| | Malleable Cast Iron | Ferritic | 130 | | | 225 | 260 | | | 265 | 305 | 0.0033 | 0.0066 | |
| | | 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 | |