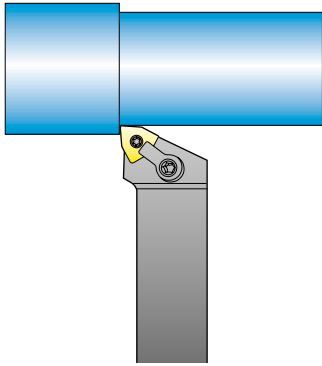


Turning - Technical information

Nomenclature and formulae



Revolutions per minute

$$n = 3.82 \times \frac{v_c}{D} \quad (\text{rev/min})$$

Cutting speed

$$v_c = .262 \times D \times n \quad (\text{ft/min})$$

Rate of metal removal

$$Q = 12 \times a_p \times f \times v_c \quad (\text{in}^3/\text{min})$$

Feed rate

$$f_m = f \times n \quad (\text{in/min, IPM})$$

Cutting time

$$t = \frac{L}{f_m} \quad (\text{min})$$

Horsepower required at spindle

$$HP_S = Q \times P$$

Horsepower required at motor

$$HP_M = \frac{Q \times P}{E}$$

Torque at spindle

$$T_s = \frac{63,030 \text{ HP}_S}{n}$$

Profile depth

$$R_{\text{max}} = \frac{f^2 \times 1,000,000}{24 r} \quad (\mu\text{in})$$

Surface finish

$$R_a = (1/y)^2 \text{ where:} \quad (\mu\text{in})$$

$$y = \frac{0.001 \times \sqrt{21.6 \times r}}{f} \quad (\mu\text{in})$$

a_p = Depth of cut (in)

D = Workpiece diameter (in)

E = Efficiency of spindle drive

f_m = Feed rate (in/min)

f = Feed (in/rev)

h = Chip thickness (in)

HP_M = Horsepower at motor (hp)

HP_S = Horsepower at spindle (hp)

L = Length of cut (in)

n = RPM (rev/min)

P = Unit power factor
horsepower per cubic inch per minute

Q = Metal removal rate (in³/min)

r = Nose radius

R_a = Surface finish (μin)

R_{max} = Profile depth (min)

t = Cutting time (min)

T_s = Torque at spindle, inch pounds

v_c = Cutting speed (ft/min)