# Turning - Cutting data

SECO

## Nomenclature and formulae

**RPM**

$$n = \frac{v_c \cdot 1000}{\pi \cdot D} \quad \text{(rev/min)}$$

**Cutting speed**

$$v_c = \frac{n \cdot \pi \cdot D}{1000} \quad \text{(m/min)}$$

**Surface finish**

$$R_a = \frac{f^2 \cdot 50}{r_\varepsilon} \quad (\mu m)$$

$$R_a = \frac{R_t}{3{,}5} \quad (\mu m)$$

$$R_y = \frac{f^2}{8 \cdot r_\varepsilon} \quad (\mu m)$$

**Profile depth**

$$R_t = k \cdot \frac{f^2 \cdot 1000}{8 \cdot r_\varepsilon} \quad (\mu m)$$

**Power demand**

$$P_c = \frac{v_c \cdot f \cdot a_p}{25} \quad \text{(kW)}$$

$$P_c = \frac{v_c \cdot f \cdot a_p \cdot k_c}{60\,000 \cdot \eta} \quad \text{(kW)}$$

$$k_c = \frac{1 - 0{,}01 \cdot \gamma_o}{h^{mc}} \cdot k_{c1.1} \quad (N/mm^2)$$

$$h = f \cdot \sin \kappa$$

**Metal removal rate**

$$Q = v_c \cdot f \cdot a_p \quad (cm^3/min)$$

| | | |
|---|---|---|
| $a_p$ | = Depth of cut | (mm) |
| D | = Workpiece diameter | (mm) |
| f | = Feed rate | (mm/rev) |
| h | = Chip thickness | (mm) |
| k | = Constant. 1.4 for steels and stainless steels and 1.0 for cast iron | |
| $k_c$ | = Specific cutting force | ($N/mm^2$) |
| $k_{c1.1}$ | = Cutting force (1 $mm^2$) (See page 252) | ($N/mm^2$) |
| mc | = Exponent (See page 252) | |
| n | = RPM | (rev/min) |
| $P_c$ | = Power demand | (kW) |
| Q | = Metal removal rate | ($cm^3$/min) |
| $R_a$ | = Surface finish | ($\mu m$) |
| $r_\varepsilon$ | = Nose radius | (mm) |
| $R_t$ | = Profile depth | ($\mu m$) |
| $R_y$ | = Max. height of profile | ($\mu m$) |
| $v_c$ | = Cutting speed | (m/min) |
| $\kappa$ | = Setting angle | (°) |
| $\eta$ | = Efficiency | |
| $\gamma_o$ | = Cutting rake angle | (°) |