

Formulas and definitions for turning - METRIC

Cutting speed, m/min

$$v_c = \frac{\pi \times D_m \times n}{1000}$$

Spindle speed, rpm

$$n = \frac{v_c \times 1000}{\pi \times D_m}$$

Machining time, min

$$T_c = \frac{l_m}{f_n \times n}$$

Metal removal rate, cm³/min

$$Q = v_c \times a_p \times f_n$$

Net power, kW

$$P_c = \frac{v_c \times a_p \times f_n \times k_c}{60 \times 10^3}$$



Symbol	Designation/ definition	Unit
D_m	Machined diameter	mm
f_n	Feed per revolution	mm/r
a_p	Cutting depth	mm
v_c	Cutting speed	m/min
n	Spindle speed	rpm
P_c	Net power	kW
Q	Metal removal rate	cm ³ /min
h_m	Average chip thickness	mm
h_{ex}	Maximum chip thickness	mm
T_c	Period of engagement	min
l_m	Machined length	mm
k_c	Specific cutting force	N/mm ²
K_r	Entering angle	degree