Formulas and definitions for milling - INCH

Table feed, inch/min

$$v_f = f_z \times n \times z_c$$

Cutting speed, ft/min

$$v_c = \frac{\pi \times D_{cap} \times n}{12}$$

Spindle speed, rpm

$$n = \frac{v_c \times 12}{\pi \times D_{cap}}$$

Feed per tooth, inch

$$f_z = \frac{v_f}{n \times z_c}$$

Feed per revolution, inch/rev

$$f_z = \frac{v_f}{n}$$

Metal removal rate, inch^3/min

$$Q = a_p \times a_e \times v_f$$

Net power, HP

$$P_c = \frac{a_e \times a_p \times v_f \times k_c}{396 \times 10^3}$$

Torque, lbf ft

$$M_c = \frac{P_c \times 16501}{\pi \times n}$$

Symbol	Designation/ definition	Unit
a_e	Working engagement	inch
a_p	Cutting depth	inch
D_{cap}	Cutting diameter at cutting depth a_p	inch
D_m	Machined diameter (component diameter)	inch
f_z	Feed per tooth	inch
f_n	Feed per revolution	inch
n	Spindle speed	rpm
v_c	Cutting speed	ft/min
v_f	Table feed	inch/min
z_c	Number of effective teeth	pcs
h_{ex}	Maximum chip thickness	inch
h_m	Average chip thickness	inch
k_c	Specific cutting force	lbs/inch^2
P_c	Net power	HP
M_c	Torque	lbf ft
Q	Metal removal rate	inch^3/min
ψ_r	Lead angle	degree