Drilling – Formulas

Nomenclature and formulas

RPM

$$n = \frac{v_c \cdot 12}{\pi \cdot D} \quad \text{(rev/min)}$$

Cutting speed

$$v_c = \frac{n \cdot \pi \cdot D}{12} \quad \text{(ft/min)}$$

Feed speed

$$v_f = f \cdot n \quad \text{(inch/min)}$$

Cross section area of the hole

$$A_T = \pi \cdot R^2 \quad \text{(in}^2\text{)}$$

Material removal rate

$$Q = v_f \cdot A_T \quad \text{(inch}^3\text{/min)}$$

Power requirement

$$P_c = \frac{D/4 \cdot f \cdot v_c \cdot k_c}{33,000 \cdot \eta} \quad \text{(Hp)}$$

Torque

$$M_c = \frac{Hp \cdot 5252}{n} \quad \text{(ft/lbs)}$$

Feed force (approx.)

$$F_f = .7 \cdot D/2 \cdot f \cdot k_c \quad \text{(lbs)}$$

Machining time

$$T_c = \frac{L + h}{v_f} \quad \text{(Min/piece)}$$

f	= Feed per revolution	(inch/rev)
h	= Distance from drill point to workpiece before feeding	(inch)
k_c	= Specific cutting force	(Lbf/inch^2)
L	= Depth of hole	(inch)
η	= Machine efficiency	(%)