Drilling Equations

Rotational Speed (RPM's)

$$N = \frac{v}{\pi D}$$

N = Rotational Speed (RPM's)
v = Cutting Speed (SFPM)
D = Drill Diameter

Feed Rate ($^{Dist}/_{Min}$)

$$f_r = N\,f$$

$f_r = {}^{Dist}/_{Min}$
N = Rotational Speed
f = Feed ($^{Dist.}/_{Rev.}$)

Drilling Equations

Approach Distance

$$A = 0.5 \, D \, \text{Tan}(90 - \Theta/2)$$

A = Approach Distance
D = Drill Diameter
Ɵ = Drill Point Angle

Machining Time

$$T_m = \frac{d \text{ or } t + A}{f_r}$$

T_m = Machining Time (Min.)
d or t = Part Thickness/Depth
A = Approach Distance
f_r = Feed Rate ($^{Dist.}/_{Min.}$)

Drilling Equations

Material Removal Rate $\left(^{cu.in.}/_{Min}\right)$

$$MRR = \frac{\pi\, D^2\, f_r}{4}$$

MRR = Material Removal Rate $\left(^{cu.in.}/_{Min}\right)$
D = Drill Dia.
f_r = Feed Rate $\left(^{In.}/_{Min.}\right)$

Drilling Example

Data: D = 0.375"; v = 130.50 SFPM; f = 0.002 $^{in}/_{rev}$; Θ = 112°; Through Hole
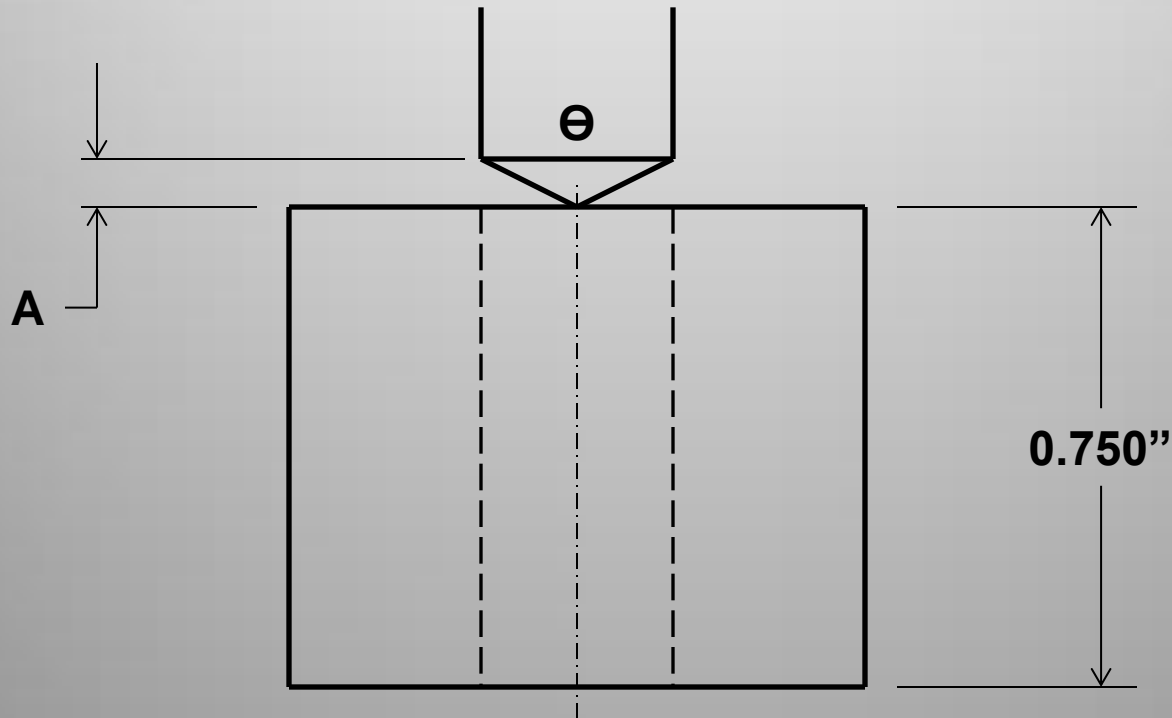
Drilling Example

Approach Distance

$A = 0.5\ D\ \text{Tan}\ (90 - {}^{\Theta}/_2)$

$A = (0.5)\ (0.375)\ \text{Tan}\ (90 - {}^{112}/_2)$

$A = \underline{0.1265"}$

Rotational Speed

$$N = \frac{v}{\pi\ D}$$

$$N = \frac{(130.50)\ (12)}{\pi\ 0.375}$$

$N = \underline{1{,}329.3718}\ \text{RPM's}$

Drilling Example

Feed Rate

$f_r = N f$

$f_r = (1329.3718)\,(0.002)$

$f_r = \underline{2.6587} \; ^{in}/_{Min}$

Machining Time

$$Tm = \frac{t + A}{f_r}$$

$$Tm = \frac{0.750 + 0.1265}{2.6587}$$

$$Tm = \underline{0.3297} \; Min$$

Drilling Example

Material Removal Rate

$$MRR = \frac{\pi \, D^2 \, f_r}{4}$$

$$MRR = \frac{\pi \, (0.375^2) \, (2.6587)}{4}$$

$$MRR = \underline{0.2936} \; {}^{in3}/_{Min}$$