



A block is held tight by a vise as shown above. If a machinist exerts couple forces  $F$  on the handle, determine the compressive force  $P$  on the block. Neglect friction at the bearing  $A$  and assume that the guide at  $B$  is smooth. The single square-threaded screw has a mean radius of  $r$  mm and a lead of  $t$  mm. The static coefficient of friction is  $\mu_s$ .

Find the lead angle  $\theta$  and the angle of static friction  $\phi$ .

$$\phi = \tan^{-1}(\mu_s)$$

$$\theta = \tan^{-1}\left(\frac{t}{2\pi r}\right)$$

Find the compressive force  $P$ .

$$+ \rightarrow \Sigma F_x = 0 \rightarrow \frac{2d \cdot F}{r} - R \sin(\theta + \phi) = 0$$

$$+ \uparrow \Sigma F_y = 0 \rightarrow R \cos(\theta + \phi) - P = 0$$

$$\Rightarrow P = \frac{2d \cdot F}{r \tan(\theta + \phi)}$$