11-15

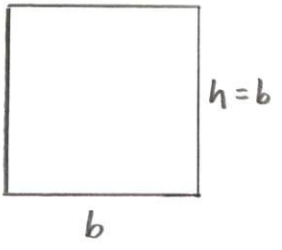
A short, cast iron machine member of square section is subjected to a compressive load of 40 kips. If the compressive ultimate strength of cast iron is 90 ksi, select the cross-sectional dimensions of the member using a factor of safety of 4.

Solution.

$P = 40 \text{ kips}$

$$\sigma_{allow} = \frac{\sigma_u}{F.S.} = \frac{90 \text{ ksi}}{4} = 22.5 \text{ ksi}$$

$$A = \frac{P}{\sigma_{allow}} = \frac{40 \text{ kips}}{22.5 \text{ ksi}} = 1.78 \text{ in.}^2$$



$$A = b^2 = 1.78 \text{ in.}^2$$

$$b = \sqrt{1.78 \text{ in.}^2} = 1.33 \text{ in.}$$

$3/8" = 0.375$

use $b = 1\ 3/8$ in.

$h = 1\ 3/8$ in.

or, $1\ 3/8$ in. $\times$ $1\ 3/8$ in. section