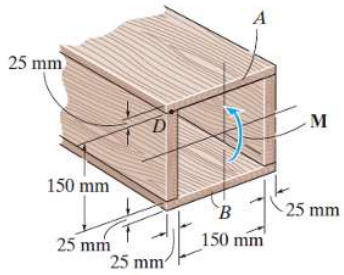
Hollow rectangular cross section

*6–52. Determine the moment **M** that should be applied to the beam in order to create a compressive stress at point D of $\sigma_D = 30$ MPa. Also sketch the stress distribution acting over the cross section and compute the maximum stress developed in the beam.



Probs. 6–51/52

Source: Russell C. Hibbeler-Mechanics of Materials 10th Edition-Pearson (SI)

$$\sigma_D = \frac{M c_D}{I}$$

$$\Rightarrow M = \frac{\sigma_D I}{c_D}$$

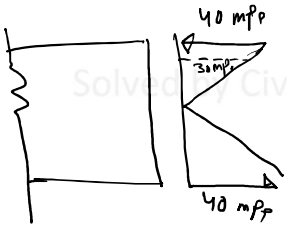
$$\sigma_D = 30\ \text{mPa} = 30 \times 10^6\ \text{N/m}^2$$

$$I = \frac{(0.2 \times 0.2^3) - (0.15 \times 0.15^3)}{12} = 7/76800\ \text{m}^4$$

$$c_D = \frac{0.150}{2} = 0.075\ \text{m}$$

$$\Rightarrow M = 36460\ \text{N.m}$$

$$\sigma_A = \frac{M c_A}{I} = \frac{36460 \times \frac{0.200}{2}}{7/76800} = 40\ \text{MPa}$$



☑ Engineering Software (ANSYS, ETABS, MATLAB, Revit, SAP2000, AutoCAD, Staad Foundation Advanced, Staad.Pro, etc.) Let us help you solve your engineering challenges! 🚀	