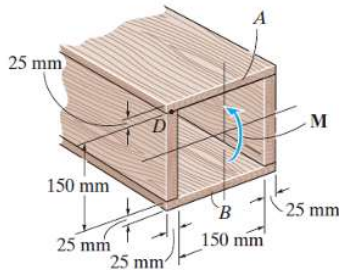


Hollow rectangular cross section

*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)

Solved by Civil Thinking (<https://civilthinking.com>)

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

Solved by Civil Thinking (<https://civilthinking.com>)

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

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

Solved by Civil Thinking (<https://civilthinking.com>)

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

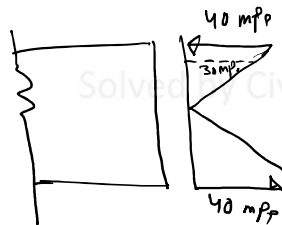
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$$c_D = \frac{0.150}{2} = 0.075 \text{ m}$$

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

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



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