



# ENGINEERING MECHANICS - STATICS

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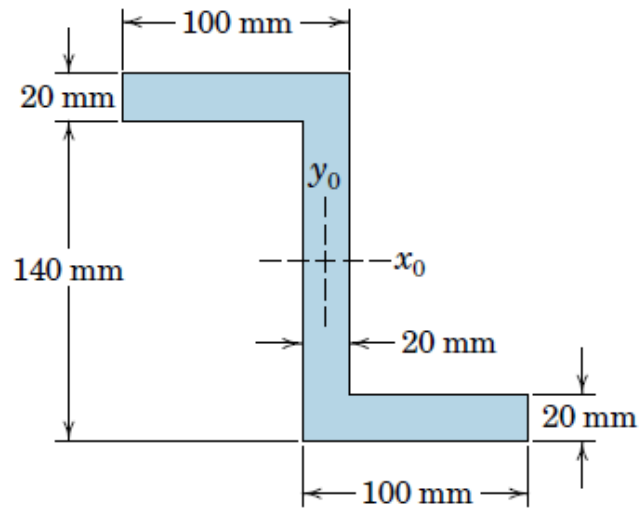
## DISTRIBUTED FORCES

### Session- 11

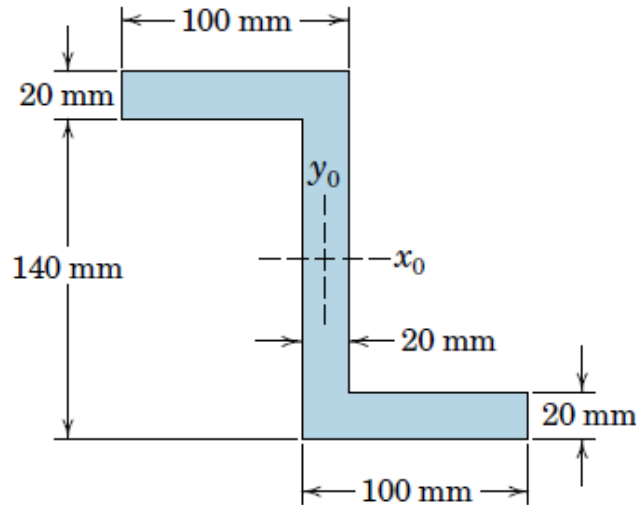
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**Problem A/44.** Determine the moments of inertia of the Z-section about its centroidal  $x_0$ - and  $y_0$ -axes.



### SOLUTION:



**Moment of Inertia about centroidal x-axis:**

= MI of rectangle (1) + MI of rectangle (2)

+ MI of rectangle (3)

$$= \left( \frac{bh^3}{12} + ad^2 \right) + \left( \frac{bh^3}{12} \right) + \left( \frac{bh^3}{12} + ad^2 \right)$$

$$= \left( \frac{80(20)^3}{12} + (80 \times 20)(70)^2 \right) + \left( \frac{20(160)^3}{12} \right) +$$

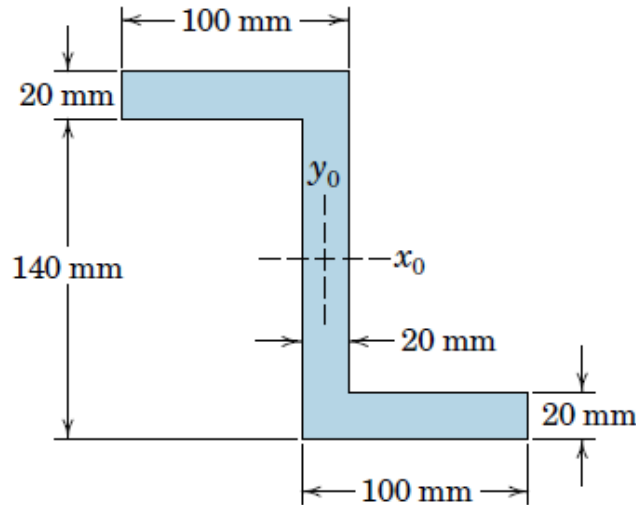
$$\left( \frac{80(20)^3}{12} + (80 \times 20)(70)^2 \right)$$

$$= 7893333 + 6826666 + 7893333$$

$$= 22613332 \text{ mm}^4$$

$$I_{x_0} = 22613332 \text{ mm}^4$$

### SOLUTION:



**Moment of Inertia about centroidal y -axis:**

= MI of rectangle (1) + MI of rectangle (2)

+ MI of rectangle (3)

$$\begin{aligned} &= \left( \frac{hb^3}{12} + ad^2 \right) + \left( \frac{hb^3}{12} \right) + \left( \frac{hb^3}{12} + ad^2 \right) \\ &= \left( \frac{20(80)^3}{12} + (80 \times 20)(50)^2 \right) + \left( \frac{160(20)^3}{12} \right) + \\ &\quad \left( \frac{20(80)^3}{12} + (80 \times 20)(50)^2 \right) \\ &= 4853333.33 + 106666.67 + 4853333.33 \\ &= 22613332 \text{ mm}^4 \end{aligned}$$

$$I_{x_0} = 9813333 \text{ mm}^4$$



# THANK YOU

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