



# ENGINEERING MECHANICS

## - STATICS

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Department of Civil Engineering

# ENGINEERING MECHANICS - STATICS

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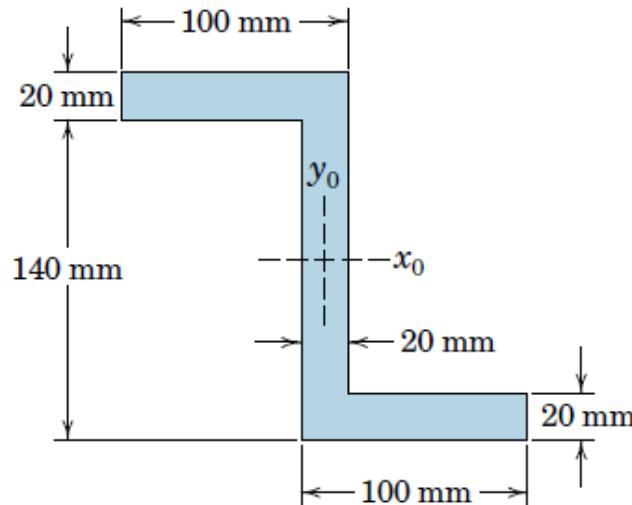
## DISTRIBUTED FORCES

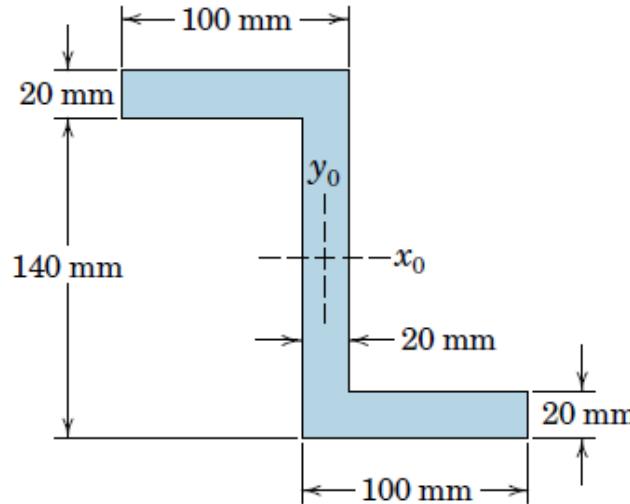
**Session- 11**

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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:**

$$= \text{MI of rectangle (1)} + \text{MI of rectangle (2)}$$

$$+ \text{MI of rectangle (3)}$$

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

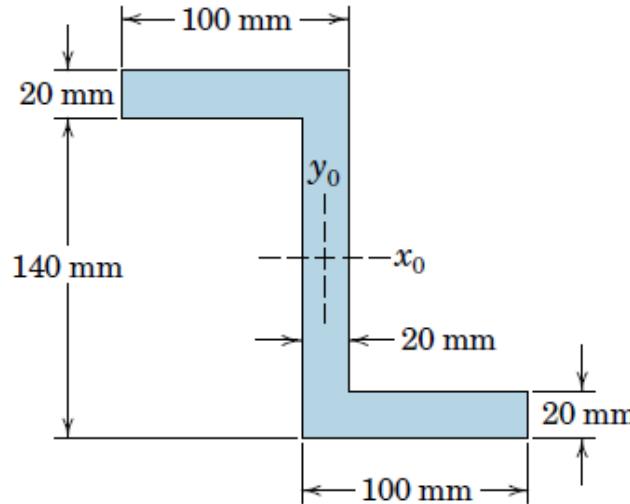
$$= \left( \frac{80(20)^3}{12} + (80 \times 20)(70)^2 \right) + \left( \frac{20(160)^3}{12} \right) +$$

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

$$= 7893333 + 6826666 + 7893333$$

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

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

**SOLUTION:**

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

$$= \text{MI of rectangle (1)} + \text{MI of rectangle (2)}$$

$$+ \text{MI of rectangle (3)}$$

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

$$= \left( \frac{20(80)^3}{12} + (80 \times 20)(50)^2 \right) + \left( \frac{160(20)^3}{12} \right) +$$

$$\left( \frac{20(80)^3}{12} + (80 \times 20)(50)^2 \right)$$

$$= 4853333.33 + 106666.67 + 4853333.33$$

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

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



**THANK YOU**

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