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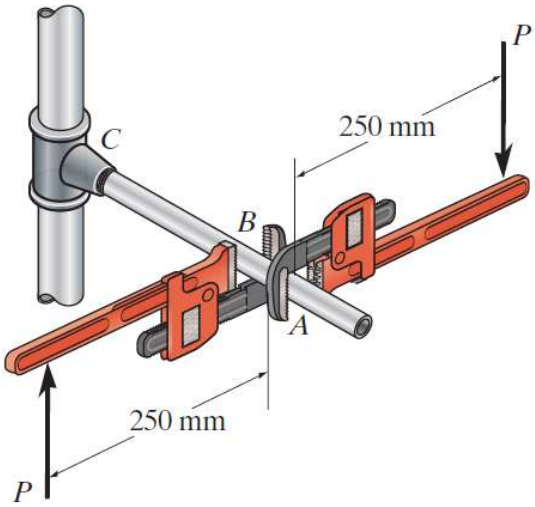


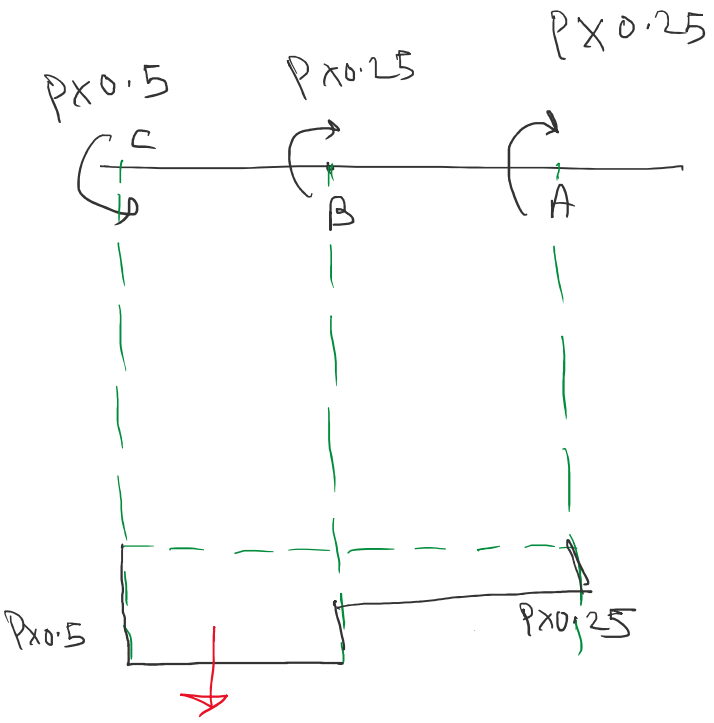
We know

$$\frac{\tau_{max}}{R} = \frac{T}{J}$$ [Torsion equation]

T is always internal Torque.

which is always found from

which is always found from internal Torque distribution diagram.



Max. T in BC ⇒ critical S/C

⇓

Shear Check on critical Section BC

$T_{max,BC} = P \times 0.5$

$\tau_{all} = 85 MPa$ [Given Data]

$\Rightarrow \tau_{max} = 85 \times 10^6 \ N/m^2$

From Torsion equation:

$$\frac{\tau_{max}}{R} = \frac{T_{max}}{J}$$

For BC (critical S/C^N):

$$\frac{\frac{85\times10^{6}}{\frac{0.025}{2}}}{} = \frac{P\times0.5}{\frac{\pi}{2}\left[\left(\frac{0.025}{2}\right)^4 - \left(\frac{0.020}{2}\right)^4\right]}$$

Solving gives

$$P = 307.925 \simeq 308\ N$$