Mechanics of Materials II:

Thin-Walled Pressure Vessels and Torsion

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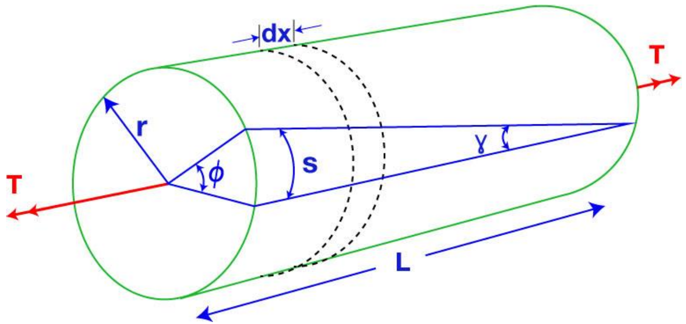
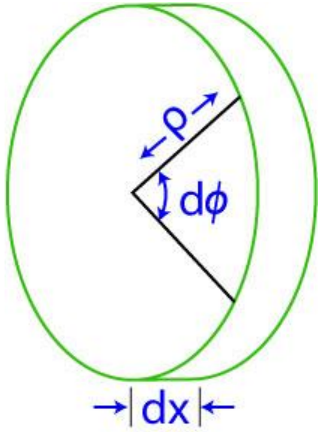
Module 14 Learning Outcome

- Develop the expression for the Angle of Twist, ϕ

Circular Bar Torsion



Let's look at a small element

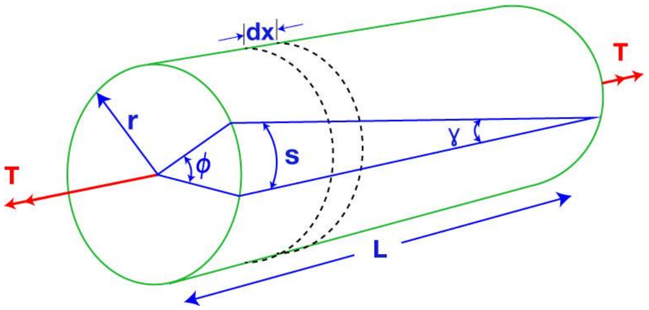


Rate of Twist, θ

(angle of twist per unit length)

$$\theta = \frac{d\phi}{dx}$$

Circular Bar Torsion



Rate of Twist, θ
(angle of twist per unit length)

$$\theta = \frac{d\phi}{dx} = \frac{\phi}{L}$$

$$\tau_{MAX} = G\gamma_{MAX}$$

$$\tau_{MAX} = \frac{T\,r}{J}$$

$$\tau_{MAX} = Gr\theta$$

$$\frac{T\,r}{J} = G\,r\,\theta$$

$$T = G\,\theta\,J$$

$$T = \frac{G\,\phi\,J}{L}$$

Angle of Twist, ϕ

$$\phi = \frac{T\,L}{GJ}$$