

[Remarks:](#) See §6.2, pages 415 till 426

[Comment:](#)

Consider the cross-section to be thin-walled.

[Answers:](#)

- a. $M_t = 112 \text{ Nm}$
- b. $M_t = 410 \text{ Nm}$
- c. Maximum torsional moment $M_{t,\max} = 112 \text{ Nm}$

[Explanation:](#)

$$I_p = 2\pi r^3 t = 2\pi \cdot \left(\frac{63+3}{2} \times 10^{-3} \text{ m}\right)^3 (3 \times 10^{-3} \text{ m}) = 677,4 \times 10^{-9} \text{ m}^4.$$

$$\text{a. } M_t = GI_p \chi = (38 \times 10^9 \text{ N/m}^2)(6,77 \times 10^{-7} \text{ m}^4) \left(\frac{0,25^\circ}{360^\circ} \times 2\pi \text{ rad}\right) = 112 \text{ Nm}$$

$$\text{b. } M_t = \frac{\tau I_p}{r} = \frac{(20 \times 10^6 \text{ N/m}^2)(677,4 \times 10^{-9} \text{ m}^4)}{33 \times 10^{-3} \text{ m}} = 410 \text{ Nm}$$