

Tema 2 - Ejercicio 1:

$$Mt := 12 \text{ kN m}$$

Sección 1

Sección 2

$$CS := 1.6$$

$$L1 := 7 \text{ m}$$

$$Dext1 := 10 \text{ cm}$$

$$Dext2 := 10 \text{ cm}$$

$$\tau_{f1} := 15.25 \frac{\text{kN}}{\text{cm}^2} \quad \tau_{adm} := \frac{\tau_{f1}}{CS} = 9.5312 \frac{\text{kN}}{\text{cm}^2}$$

$$L2 := 5 \text{ m}$$

$$Dint1 := 9.5 \text{ cm}$$

$$Dint2 := 5 \text{ cm}$$

$$G := 80 \text{ GPa} = 8000 \frac{\text{kN}}{\text{cm}^2}$$

$$Jp1 := \frac{\pi \cdot (Dext1^4 - Dint1^4)}{32} = 182.1081 \text{ cm}^4$$

$$Jp2 := \frac{\pi \cdot (Dext2^4 - Dint2^4)}{32} = 920.3885 \text{ cm}^4$$

$$Mtb = (Mt - Mta)$$

$$\left(\theta_a = \frac{Mta \cdot L1}{G \cdot Jp1} - \frac{Mtb \cdot L2}{G \cdot Jp2} \right) = 0$$

$$\left(\theta_a = \frac{Mta \cdot L1}{G \cdot Jp1} - \frac{(Mt - Mta) \cdot L2}{G \cdot Jp2} \right) = 0$$

$$Mta := \frac{Mt \cdot L2}{G \cdot Jp2 \cdot \left(\frac{L1}{G \cdot Jp1} + \frac{L2}{G \cdot Jp2} \right)} = 1.4859 \text{ kN m}$$

$$Mtb := (Mt - Mta) = 10.5141 \text{ kN m}$$

$$\theta_c := \frac{Mta \cdot L1}{G \cdot Jp1} = 0.0714$$

$$\theta_c := \frac{Mtb \cdot L2}{G \cdot Jp2} = 0.0714$$

$$\chi1 := \frac{Mta}{G \cdot Jp1} = 0.0001 \frac{1}{\text{cm}} \quad \chi2 := \frac{Mtb}{G \cdot Jp2} = 0.0001 \frac{1}{\text{cm}}$$

$$\Omega1 := \frac{\pi \cdot \left(\frac{Dext1 + Dint1}{2} \right)^2}{4} = 74.6619 \text{ cm}^2$$

$$\tau1 := \frac{Mta}{2 \cdot \left(\frac{Dext1 - Dint1}{2} \right) \cdot \Omega1} = 3.9804 \frac{\text{kN}}{\text{cm}^2}$$

$$\tau2max := \frac{Mtb \cdot Dext2}{Jp2 \cdot 2} = 5.7118 \frac{\text{kN}}{\text{cm}^2}$$

$$\gamma2max := \frac{\tau2max}{G} = 0.0007$$

$$Mtbmax := \frac{\tau_{adm} \cdot Jp2 \cdot 2}{Dext2} = 17.5449 \text{ kN m}$$

$$Mtmax := Mtbmax \cdot \frac{Mt}{Mtb} = 20.0245 \text{ kN m}$$

$$\gamma1 := \frac{\tau1}{G} = 0.0005$$

$$\tau2min := \frac{Mtb \cdot Dint2}{Jp2 \cdot 2} = 2.8559 \frac{\text{kN}}{\text{cm}^2}$$

$$\gamma2min := \frac{\tau2min}{G} = 0.0004$$

$$Mtamax := \tau_{adm} \cdot 2 \cdot \left(\frac{Dext1 - Dint1}{2} \right) \cdot \Omega1 = 3.5581 \text{ kN m}$$

$$Mtmax := Mtamax \cdot \frac{Mt}{Mta} = 28.7342 \text{ kN m}$$

