

a) $T = \frac{63000 \times \text{HP}}{\text{RPM}}$

En el eje inferior:

$$\frac{R_1}{R_2} = \frac{m_2}{m_1} \Rightarrow m_2 = \frac{m_1}{2} = 157.5$$

Eje de entrada

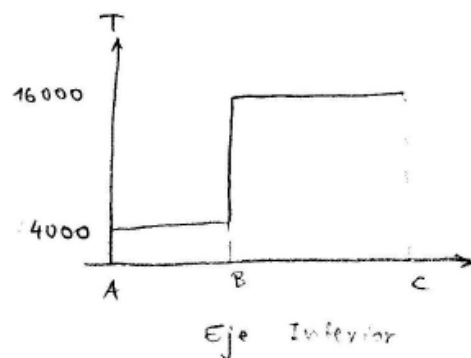
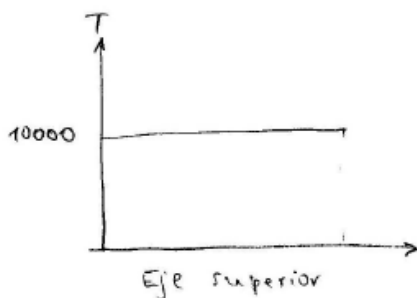
$$T = \frac{63000 \times 50}{315} = 10000 \text{ lb-in}$$

Eje AC

Parte AB $\Rightarrow T_{AB} = \frac{63000 \times 10}{157.5} = 4 \times 10^3 \text{ lb-in}$

Parte BC $\Rightarrow T_{BC} = \frac{63000 \times 40}{157.5} = 16 \times 10^3 \text{ lb-in}$

Diagramas:



b) Esfuerzos de corte por torsión

$$\tau = \frac{Tr}{I_p} \quad \text{con} \quad I_p = \frac{\pi \phi^4}{32}$$

$$\tau = \frac{T \phi/2}{\frac{\pi \phi^4}{32}} = \frac{16T}{\pi \phi^3}$$

$$\text{Luego } \tau_{AB} = \frac{16 T_{AB}}{\pi (2)^3} = 2546,43 \quad \text{lb/in}^2$$

$$\tau_{BC} = \frac{16 T_{BC}}{\pi (2)^3} = 10185,92 \quad \text{lb/in}^2$$

c) Desangulación

$$\phi_{B/A} = \frac{TL}{I_p G}$$

$$\phi_{B/A} = \phi_B - \phi_A$$

$$\begin{aligned} \phi_{C/A} &= \phi_C - \phi_A = (\phi_C - \phi_B) + (\phi_B - \phi_A) \\ &= \phi_{C/B} + \phi_{B/A} \end{aligned}$$

$$\phi_{C/B} = \frac{16000 \times 15}{1,57 \times 12 \times 10^6} = 0,0127$$

$$\phi_{B/A} = \frac{4000 \times 5}{1,57 \times 12 \times 10^6} = 0,0011$$

$$\left. \begin{array}{l} \phi_{C/B} = 0,0127 \\ \phi_{B/A} = 0,0011 \end{array} \right\} \Rightarrow \phi_{C/A} = 0,0138$$