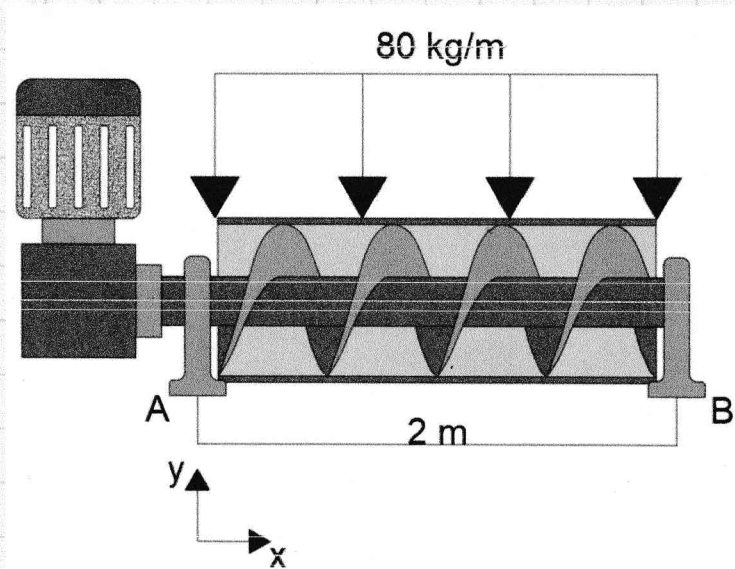




$$S_y = 1800 \text{ kg/m}^2 = 182 \text{ MPa}$$

$$S_{xy} = 3600 \text{ kg/m}^2 = 343 \text{ MPa}$$



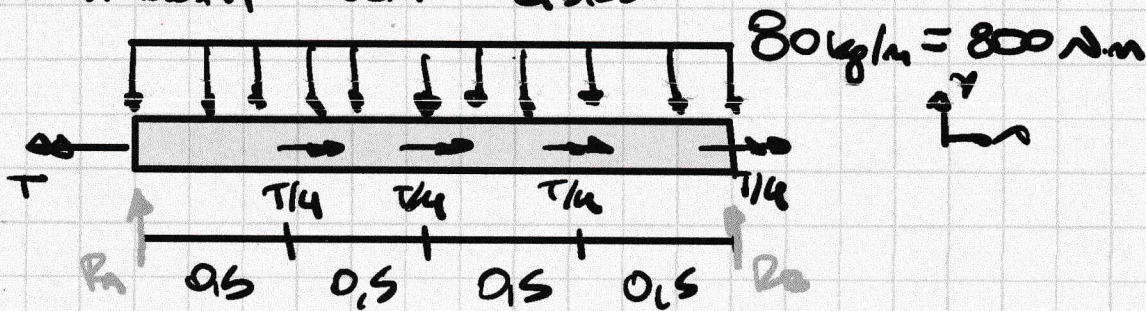
$$P = 5.5 \text{ kW}$$

$$n = 60 \text{ RPM}$$

$$P = T\omega$$

$$5500 = T \cdot 60 \cdot \frac{2\pi}{60} \rightarrow T = \frac{5500}{2\pi} \approx 880 \text{ Nm}$$

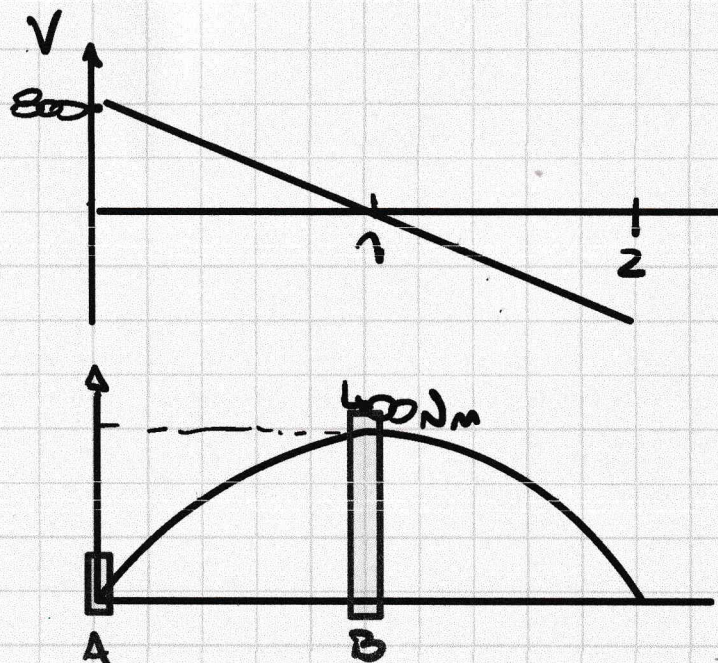
DIAGRAMA CUERPO LIBRE



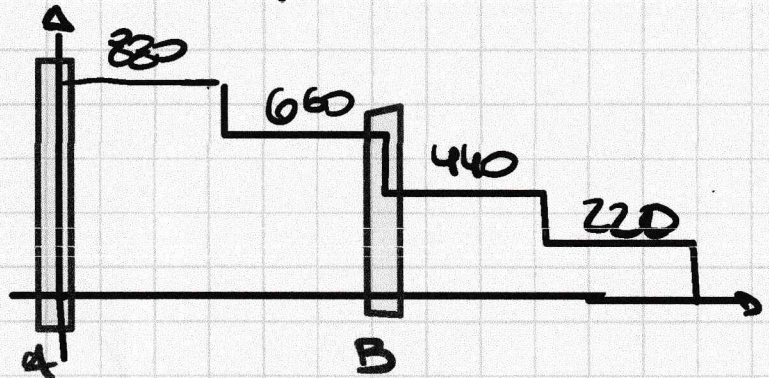
$$\sum F_y = -2800 + R_A + R_B = 0$$

$$\sum M_A = -2800 \cdot 1 + R_B \cdot 2 = 0 \rightarrow R_B = 800 \text{ N} \rightarrow R_A = 800 \text{ N}$$

LOZANTE Y FLECHA



TORCIÓN



PUNTO A

$$M=0$$

$$T=880$$

$$\sigma_{adm} = \min(0.3 \times 182; 0.18 \times 343) \times 0.75 = 40.95 \text{ MPa}$$

$$C_T = 1$$

$$C_H = 1.5$$

$$\sigma_{adm} = \frac{16}{\pi D^3} \sqrt{(C_H M)^2 + (C_T T)^2} - D^3 = \frac{16}{\pi \sigma_{adm}} \cdot 880$$

$$D = 0.04784 = 47.8 \text{ mm}$$

$$D \approx 50 \text{ mm}$$

PUNTO B

$$M = 400 \text{ Nm}$$

$$T = 600 \text{ Nm}$$



$$\sigma_{adm} = 54,6 \text{ MPa}$$

$$D^3 = \frac{16}{\pi \sigma_{adm}} \cdot \sqrt{(400 \cdot 1,5)^2 + 600^2} \rightarrow D = 0,0437 = 43,7 \text{ mm}$$
$$D = 45 \text{ mm}$$

MAYOR DIAMETRO

$$D = 50 \text{ mm}$$

CHAVETA CUADRADA $b = h = d/4 = 12,5 \text{ mm}$

FALLA POR CORTE

$$\frac{\sigma_y}{2} \geq \frac{T}{\left(\frac{d}{2}\right) \cdot b \cdot l} \rightarrow l_1 = 0,031 \text{ m} = 31 \text{ mm}$$

$$l = 31 \text{ mm} < d$$

$$l = 50 \text{ mm}$$

FALLA POR APLASTAMIENTO

$$\sigma_y \geq \frac{T}{\left(\frac{d}{2}\right) \left(\frac{h}{2}\right) l_2} \rightarrow l_2 = 0,031 = 31 \text{ mm}$$

Permisiones

$$\text{energía rotacional} \rightarrow P_R = 800 \text{ N}$$

$$L_{10h} = \frac{24 \text{ hrs}}{\text{día}} \cdot \frac{36.5 \text{ día}}{\text{AÑO}} \cdot S = 43800 \text{ hs}$$

$$L_{10} = \frac{43800 \cdot 60 \cdot 60}{10^6} = 157,68 \text{ hrev}$$

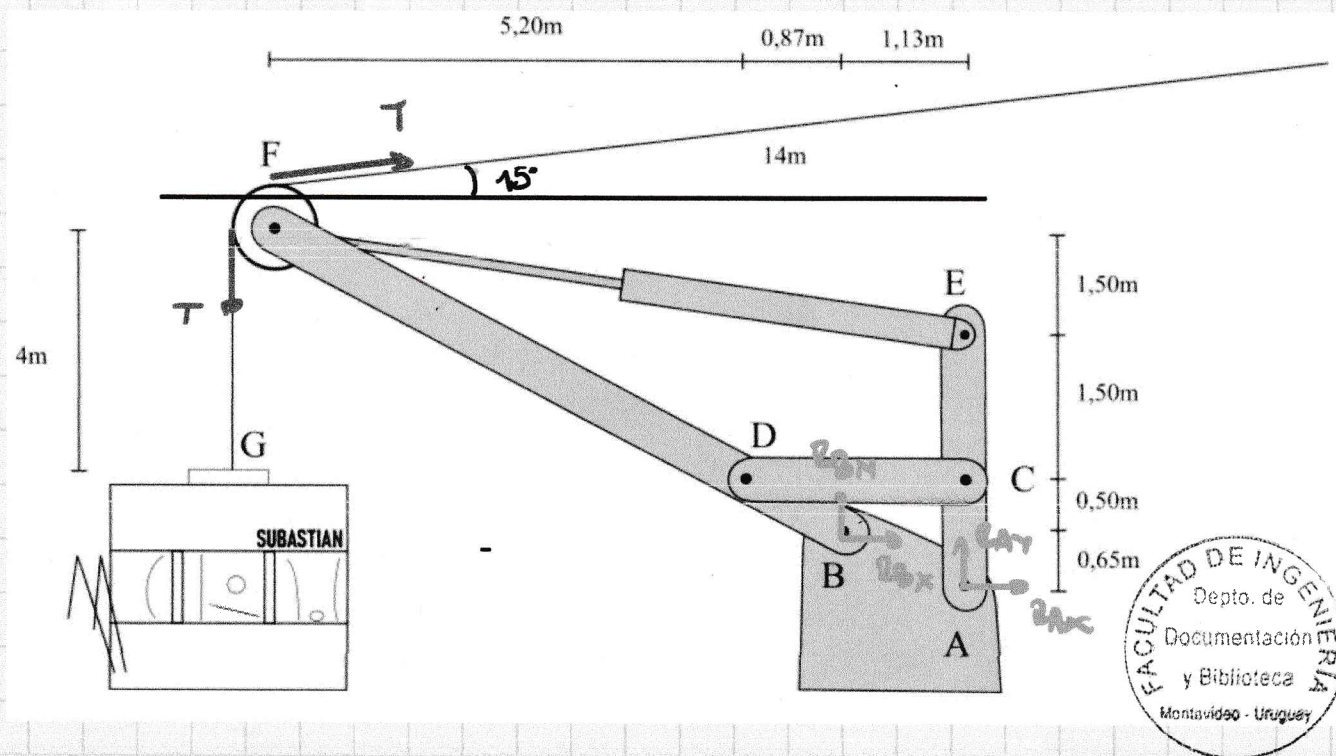
$$L_D = \left(\frac{C}{P} \right)^{P=3} \left. \vphantom{\frac{C}{P}} \right\} \rightarrow C = 4322 \text{ N} = 4,32 \text{ kN}$$

$P = 800$

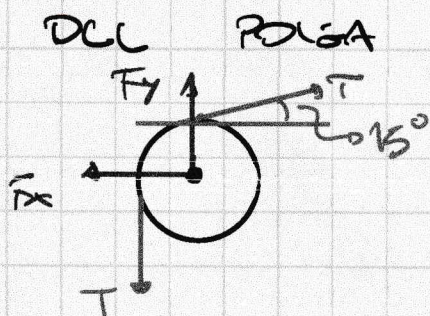
$$12105 \rightarrow \begin{cases} C = 22,8 \text{ kN} > 4,32 \text{ kN} \checkmark \\ C_0 = 8,10 \text{ kN} \end{cases}$$



$$P_0 = 800 \text{ N} \rightarrow S_0 = \frac{8100}{800} = 10,125 > 2 \checkmark$$

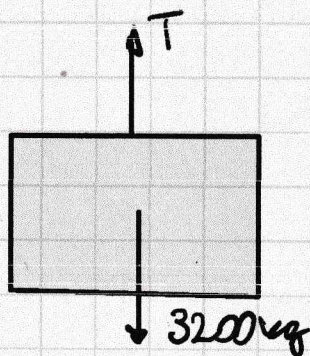


AL RETIRAR LOS CABLES SOBRE LAS PULGAS APARECEN LAS TENSIONES QUE ESTA RECIBE DEL CABLE



$$\begin{aligned}\sum F_x &= T \cos 15 = F_x = 0 \\ \sum F_y &= -T + T \sin 15 + F_y = 0 \\ \sum M_D &= -T \cdot 5 + T \cdot 7 = 0 \checkmark\end{aligned}$$

$$\begin{aligned}F_x &= 3091 \text{ kg} \\ F_y &= 2372 \text{ kg}\end{aligned}$$



$$T = 3200 \text{ kg}$$

DCL AL SISTEMA RETIRANDO LA POLEA Y LA BASE AB

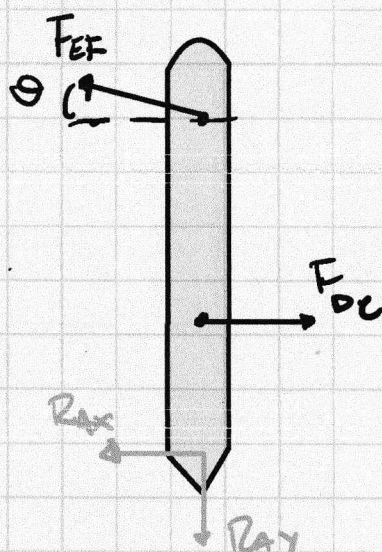


$$\sum F_x = 3091 + R_{Ax} + R_{Bx} = 0$$

$$\sum F_y = -2372 + R_{Ay} + R_{By} = 0$$

$$\sum M_A = -3091 \cdot 4,15 + 2372 \cdot 7,2 - R_{Bx} \cdot 0,65 - R_{By} \cdot 1,13 = 0$$

DEL A BARRA ECA



TANTO EF COMO DC SON ELEMENTOS A DOS FUERZAS POR LO QUE SU FUERZA ESTÁ EN LA DIRECCIÓN DE LOS AXIALES DE LAS MISMAS

$$\tan(\theta) = \frac{1,5}{7,2} \rightarrow \theta = 11,5^\circ$$

$$\sum F_x = -R_{Ax} + F_{DC} - F_{EF} \cdot \cos(11,5) = 0$$

$$\sum F_y = -R_{Ay} + F_{EF} \cdot \sin(11,5) = 0$$

$$\sum M_A = -F_{DC} \cdot 1,15 + F_{EF} \cdot \cos(11,5) \cdot 2,65 = 0$$

FUERZA EN PISTÓN $F_{EP} = 33236.7 \text{ N}$ TRACCIÓN

TENSIÓN en el cable

$$T = 3200 \text{ kg} = 31360 \text{ N} \quad A = 1.45 \times 10^{-3} \text{ m}^2$$

$$\sigma = \frac{T}{A} = 21.6 \text{ MPa} \text{ tracción}$$



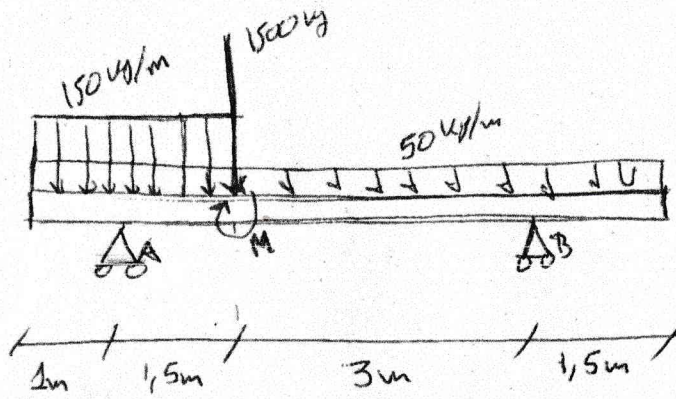
FUERZA DEL CABLE A CABLES SE ESTIRA

$$\Delta L = \frac{F \cdot L}{EA} = \frac{31360 \cdot 18}{83 \times 10^9 \cdot 1.45 \times 10^{-3}} = 4.08 \times 10^{-3} \text{ m}$$

CUANDO SE SUPLEMENTA LA TENSIÓN SE
LIBERA POR EL EFECTO DE EMPUJE Y

$$\Delta L = -4.08 \times 10^{-3} \text{ m}$$

Ej 3



$$M = 1500 \cdot 3,5 = 5250 \text{ kg} \cdot \text{m}$$

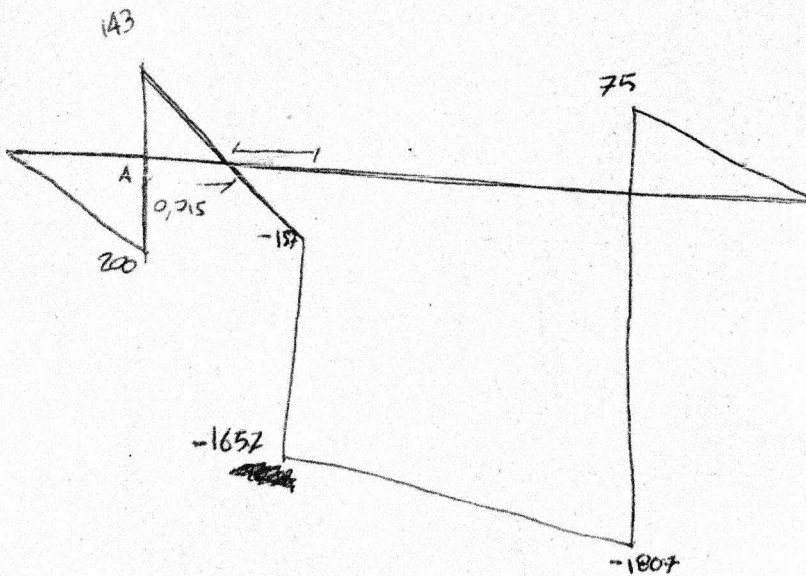


$$\sum F_y = 0 \Rightarrow A_y + B_y = 1500 + 150 \cdot 2,5 + 50 \cdot 7$$

$$\sum M_A = 0 \Rightarrow 1500 \cdot 2,5 + 1500 \cdot 1,5 + M + 50 \cdot 7 \cdot 2,5 - B_y \cdot 4,5 = 0$$

$$\Rightarrow B_y = 1881,9 \text{ kg} = 18442,6 \text{ N}$$

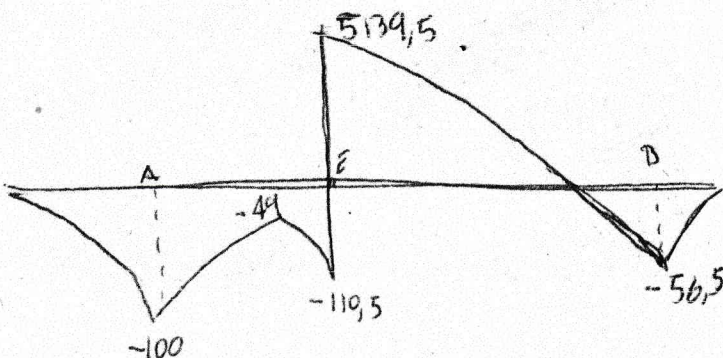
$$\Rightarrow A_y = 343,1 \text{ kg} = 3362,4 \text{ N}$$



$$W \geq \frac{M \cdot F_s}{5 \times} = \frac{5139,5 \cdot 3}{2530/100} = 609,4 \text{ cm}^3$$

Sierra dos vigas entonces

$$W_{\text{viga}} \geq \frac{609,4}{2} = 304,7 \text{ cm}^3$$



[Viga IR 203 x 35,9]