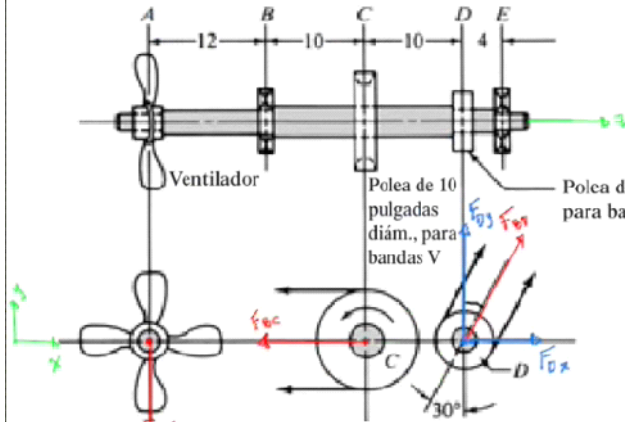


## Ejercicio

lunes, 22 de noviembre de 2021 08:48 a. m.

32. El eje de la figura P12-17 es parte de un sistema secador de granos. En A hay un ventilador tipo hélice, que requiere 12 HP para girar a 475 rpm. El ventilador pesa 34 lb, las cuales deben incluirse en el análisis. La polea para banda plana en D entrega 3.5 HP a un transportador de gusano que maneja el grano. Toda la potencia entra al eje a través de la polea para bandas V en C. Use acero AISI 1144 estirado en frío.



$$F_n = \frac{T}{r}$$

$$F_B = 1.5 F_n \quad ; \quad F_D = 2 F_n$$

$$F_{nD} = \frac{T}{r}$$

$$T = \frac{63000 \text{ HP}}{\omega} \quad P_C = 15.5 \text{ HP}$$

$$T_C = \frac{63000 (15.5 \text{ HP})}{475 \text{ rpm}} = 2055.78 \text{ lb} \cdot \text{in}$$

$$T_A = \frac{63000 (12 \text{ HP})}{475 \text{ rpm}} = 1591.57 \text{ lb} \cdot \text{in}$$

$$T_D = \frac{63000 (3.5 \text{ HP})}{475 \text{ rpm}} = 464.21 \text{ lb} \cdot \text{in}$$

$$F_{nD} = \frac{2055.78 \text{ lb} \cdot \text{in}}{6 \text{ in}} = 411.15 \text{ lb}$$

$$F_{DC} = 1.5 (411.15 \text{ lb}) = 616.73 \text{ lb}$$

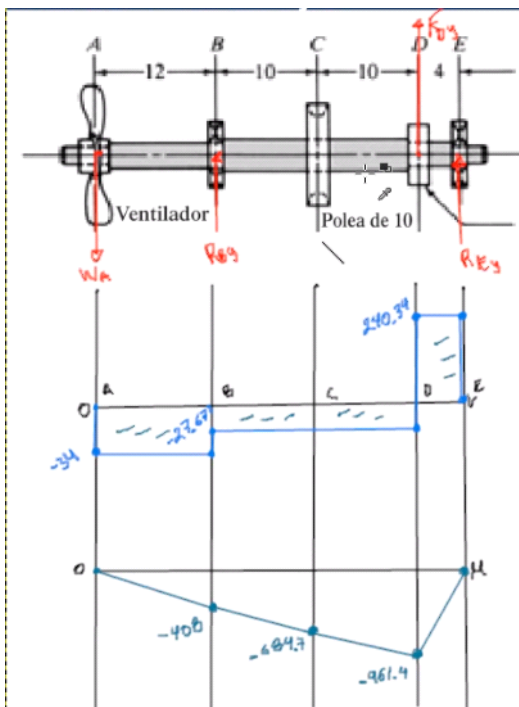
$$F_{nD} = \frac{464.21 \text{ lb} \cdot \text{in}}{3 \text{ in}} = 154.73 \text{ lb}$$

$$F_{BD} = 2 (154.73 \text{ lb}) = 309.42 \text{ lb}$$

$$F_{Dy} = 309.42 \text{ lb} \cos 30^\circ = 268.01 \text{ lb}$$

$$F_{Dx} = 309.42 \text{ lb} \sin 30^\circ = 154.71 \text{ lb}$$

Recorte de pantalla realizado: 22/11/2021 07:28 p. m.



Plano y-z

$$\sum M_x = 0$$

$$-34 \text{ lb} (12 \text{ in}) - 268.01 \text{ lb} (20 \text{ in}) - R_{Ey} (24 \text{ in}) = 0$$

$$R_{Ey} = -240.34 \text{ lb}$$

$$\sum F_y = 0$$

$$-34 \text{ lb} + R_{By} + 268.01 - 240.34 \text{ lb} = 0$$

$$R_{By} = 6.329 \text{ lb}$$

$$M_A = 0$$

$$M_B = 408 \text{ lb} \cdot \text{in}$$

$$M_C = \sqrt{(3339.26)^2 + (684.7)^2} = 3408.73 \text{ lb} \cdot \text{in}$$

$$M_D = \sqrt{(512.26)^2 + (961.4)^2} = 1089.35 \text{ lb} \cdot \text{in}$$

$$M_E = 0$$

$$V_A = 34 \text{ lb} \quad V_E = 528 \text{ lb}$$

Sacar los diámetros en el punto C y D

Recorte de pantalla realizado: 22/11/2021 08:58 a. m.

## Tarea

$$S_{0.1} = 100 \text{ ksi}$$

$$S_y = 90 \text{ ksi}$$

$$S'_0 = 0.5 (100 \text{ ksi}) = 50 \text{ ksi}$$

$$C_{carga} = 1$$

$$C_{tamaño} = 0.85$$

$$C_{superf} = 0.76$$

$$C_{tem} = 1$$

$$C_{conf} = 0.753$$

$$S_e = (50 \text{ ksi}) (1) (0.85) (0.76) (1) (0.753) = 24.32 \text{ ksi}$$

$$D = \left[ \frac{32 N}{\pi} \sqrt{\left( \frac{K_t M}{S_e} \right)^2 + \frac{3}{4} \left( \frac{T}{S_y} \right)^2} \right]^{1/3}$$

$$T_C = 2055.78$$

$$T_D = 464.21$$

$$M_C = 3408.734$$

$$M_D = 1089.35$$

$C_{ram} = 1$

$C_{conf} = 0.753$

$$D_e = \left[ \frac{32(2)}{\pi} \sqrt{\left[ \frac{(1.5)(4084 \cdot \text{in})}{24500 \text{ lb/in}^2} \right]^2 + \frac{3}{4} \left[ \frac{1591.57 \text{ lb.in}}{90000 \text{ psi}} \right]^2} \right]^{\frac{1}{3}} = 0.846 \text{ in}$$

$$M_c = 3408.734$$

$$M_D = 1089.357$$

$$D_e = \left[ \frac{32(2)}{\pi} \sqrt{\left[ \frac{(1.5)(4084 \cdot \text{in})}{24500 \text{ lb/in}^2} \right]^2 + \frac{3}{4} \left[ \frac{1591.57 \text{ lb.in}}{90000 \text{ psi}} \right]^2} \right]^{\frac{1}{3}} = 0.846 \text{ in}$$

$D_c$

$$1.6263$$

Recorte de pantalla realizado: 22/11/2021 07:31 p. m.

$$D_e = \left[ \frac{32(2)}{\pi} \sqrt{\left[ \frac{(1.5)(4084 \cdot \text{in})}{24500 \text{ lb/in}^2} \right]^2 + \frac{3}{4} \left[ \frac{1591.57 \text{ lb.in}}{90000 \text{ psi}} \right]^2} \right]^{\frac{1}{3}} = 0.846 \text{ in}$$

$D_D$

$$1.1111$$