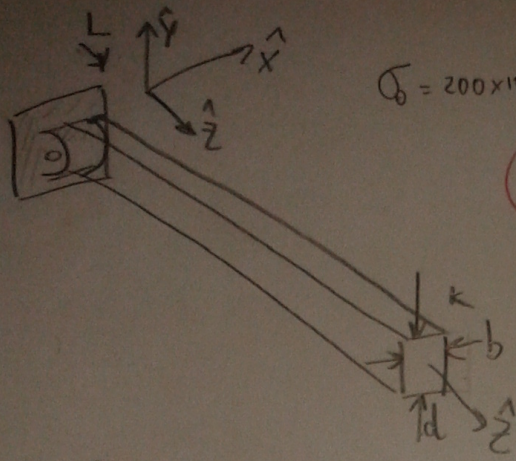
3]



$\sigma_b = 200 \times 10^3$ psi

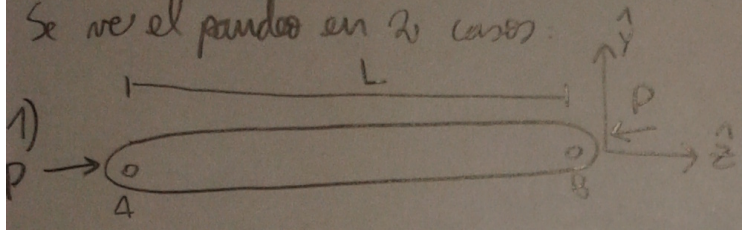
70

$I_y = \frac{1}{12} b d^3 = \overset{\text{parte (a)}}{0,211\ [in^4]}$

$I_x = \frac{1}{12} d b^3 = 0,053\ [in^4]$ (parte (b))

Se ve el pandeo en 2 casos:

1)

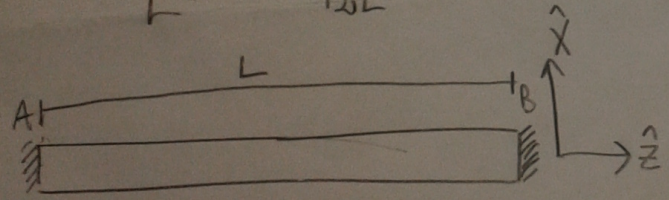


$L_{eq} = L$

$P_{cr_1} = \frac{\pi^2 E I_y}{L^2} = \frac{\pi^2 E b d^3}{12 L^2}$ $[psi \cdot in^4]$

$psi = \frac{lb}{in^2}$

2)



$L_{eq} = 0,5 L$

$P_{cr_2} = \frac{\pi^2 E I_x}{(0,5L)^2} = \frac{\pi^2 E d b^3}{12 \cdot 0,25 L^2}$

(a) Factor de seguridad iguales $\rightarrow P_{cr_1} = P_{cr_2}$

$\frac{\pi^2 E b d^3}{12 L^2} = \frac{\pi^2 E d b^3}{12 \cdot 0,25 L^2} \Rightarrow d^2 = \frac{b^2}{0,25} \Rightarrow d = \frac{b}{0,5} \Rightarrow \frac{d}{2} = b$

$0,5\, d = b$

$\frac{d}{2} = b$

(b) Factor de seguridad para los siguientes datos.

$P = 1{,}8[\text{kips}] = 1800\ \text{lbs}$.

$L = 84\ [\text{in}]$

$d = 1{,}5[\text{in}] \Rightarrow b = 0{,}175$.

$d = 2b$

$E = 15 \times 10^6\ [\text{psi}]$.

$$\frac{P_{cri}}{FS} = P_o \Rightarrow FS = \frac{P_{cri}}{P_o}$$

$$\Rightarrow P_{cr1} = P_{cr2} = \frac{\pi^2 \cdot 15 \cdot 10^6 \cdot 0{,}211}{84^2} = 4427{,}054$$

$$\Rightarrow FS = \frac{4427{,}054}{1800} = 2{,}459$$