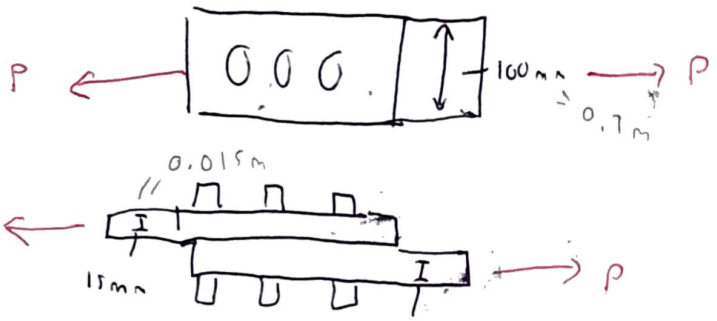
(5) Remaches de 15 mm = 0.015 m



a) Maxima P si el esfuerzo en cada remache cortante esta limitado a 60 MPa, el esfuerzo de las placas a 100 MPa y el esfuerzo de tension medio a 140 MPa

Esfuerzo cortante:

$$\tau = \frac{P}{A} = \frac{P}{\left(\pi \frac{(0.015)^2}{4}\right)} = 5658.84P \leq 60 \text{ MPa} \quad (1)$$

$$\therefore P \leq 10.602 \text{ kN}$$

Esfuerzo por aplastamiento

$$\sigma_{b_1} = \frac{P}{A_1} = \frac{P}{(0.015)(0.015)} = 4444.4P \leq 100 \text{ MPa} \quad (2)$$

$$P \leq 22.5 \text{ kN}$$

$$\sigma_{b_2} = \frac{P}{A_2} = \frac{P}{(0.01)(0.015)} = 6666.6P \leq 100 \text{ MPa} \quad (3)$$

$$P \leq 15 \text{ kN}$$

Esfuerzo normal promedio

$$\sigma_1 = \frac{P}{A} = \frac{P}{(0.1)(0.01)} = 1000P \leq 140 \text{ MPa} \quad (4)$$

$$P \leq 140 \text{ kN}$$

$$\sigma_2 = \frac{P}{P} = \frac{P}{(0.1)(0.015)} = 6666P \leq 140 \text{ MPa} \quad (5)$$

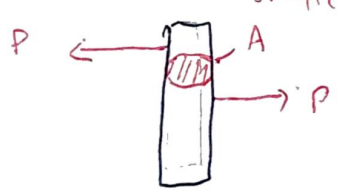
$$P \leq 210 \text{ kN}$$

$$\therefore P \leq 10.602 \text{ kN}$$

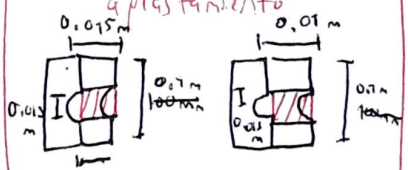
La maxima carga es el minimo valor de P porque sino ya excede las especificaciones

b)

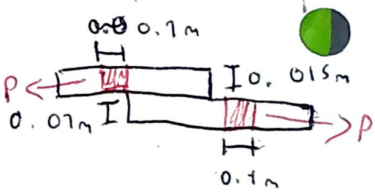
Esfuerzo cortante simple



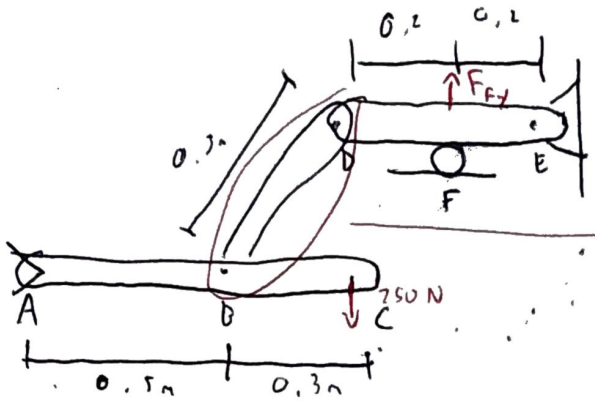
Esfuerzo por aplastamiento



Esfuerzo normal promedio



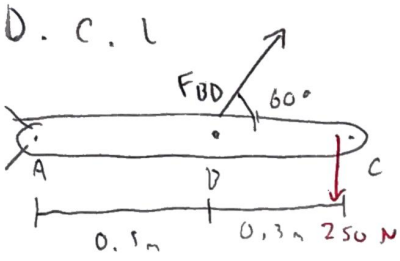
(6)



Elementos sujetos a carga axial

BD

D. C. L



$\circlearrowleft +\sum M_A = 0$

$-\underbrace{F_{BD}\,sen(60^\circ)}_{F_{BD_y}}(0.5m) + 250(0.8m) = 0$

$0.433\,F_{BD} = 200$

$\therefore F_{BD} = \frac{200}{0.433} = \underline{461.8937\ N}$

Datos:

$\nu = 0.29$

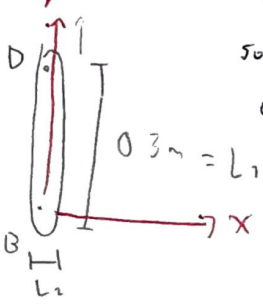
$E = 200\ GPa$

$A = 0.0001\ m^2$

Esfuerzo

$$\sigma_{BD} = \frac{F_{BD}}{A} = \frac{461.8937}{0.0001\,m^2} = 4.6189\ MPa$$

Deformación



El elemento solo tiene un esfuerzo en y

$$\therefore \varepsilon_x = \frac{\sigma_x}{E}^{0} - \frac{\nu\sigma_y}{E} - \frac{\nu\sigma_z}{E}^{0}$$

$$\therefore = -\frac{(0.29)(4.6189\times10^6)}{200\times10^9}$$

$$\varepsilon_x = -6.6974\times10^{-6}$$

$$\varepsilon_y = -\frac{\sigma_x}{E}^{0} + \frac{\sigma_y}{E} - \frac{\nu\sigma_z}{E}^{0}$$

$$\therefore \varepsilon_y = \frac{4.6189\ MPa}{200\times10^9\ GPa} = 23.0945\times10^{-6}$$

$\varepsilon_z = \varepsilon_x$

$\varepsilon = \frac{\delta}{L} \quad \therefore \delta = \varepsilon L$

$\therefore \delta_y = \varepsilon_y L_1 = (23.0945\times10^{-6})(0.3\,m)$

$$\delta_y = 6.9283\times10^{-6}\ m$$

$A = L_2^2 L_1 \quad 0.0001 = L_2^2 \quad L_2 = \sqrt{0.0001} \quad L_2 = 0.01$

$\therefore \delta_x = \varepsilon_x L_2 = (-6.6974\times10^{-6})(0.01)$

$$\delta_x = -66.974\times10^{-9}\ m$$

$$\delta_z = -66.974\times10^{-9}\ m$$