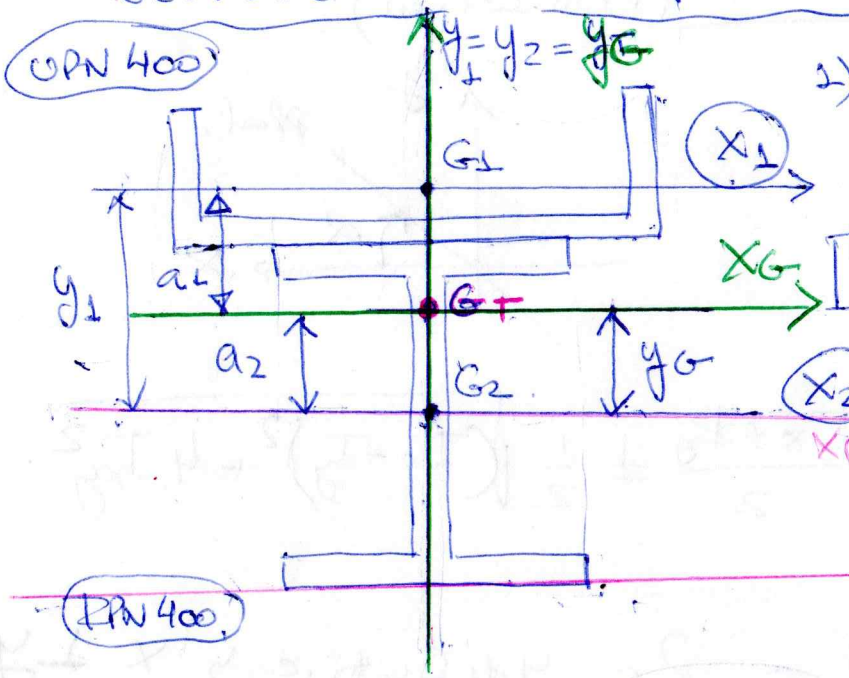
GEOMETRÍA DE LAS SUPERFICIES

$$I_x = \int y^2 dA \qquad I_y = \int x^2 dA$$



1) Calcular el BARICENTRO.

$A_T = A_1 + A_2 = 209{,}5\,cm^2$

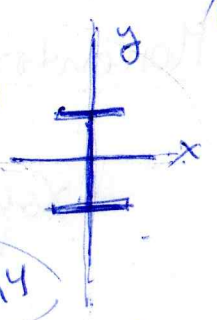
$X_G = 0$

$A_T \cdot y_G = A_1 \cdot y_1$

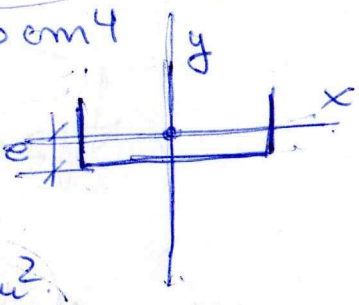
$$y_G = \frac{A_1 \cdot y_1}{A_T}$$

$$y_G = \frac{91{,}50\,cm^2 \cdot 22{,}65\,cm}{209{,}5\,cm^2} \Rightarrow \boxed{y_G = 9{,}9\,cm}$$

IPN 400 (2)
$h = 40\,cm$
$A = 118\,cm^2$
$I_x = 29210\,cm^4$
$I_y = 1160\,cm^4$



(1) UPN 400
$h = 40\,cm$
$A = 91{,}50\,cm^2$
$I_x = 846\,cm^4$
$I_y = 20350\,cm^4$
$e = 2{,}65\,cm$



Falta $29210\,cm^4$

$$I_{xG} = I_{x1} + A_1 a_1^2 + I_{x2} + A_2 \cdot a_2^2 \qquad \boxed{I_x = I_{xG} + A \cdot d^2}$$

$$I_{xG} = 846\,cm^4 + 91{,}50\,cm^2 \cdot (y_1 - y_G)^2 + 118\,cm^2 \cdot (9{,}9\,cm)^2$$

$$[(22{,}65 - 9{,}9)\,cm]^2$$

$$I_{xG} = 846\,cm^4 + 91{,}50\,cm^2 (12{,}75)^2 + 29210\,cm^4 + 118\,cm^2 (9{,}9)^2$$

$$\boxed{I_{xG} = 56495{,}65\,cm^4} \qquad \boxed{I_{yG} = 21510\,cm^4}$$

$$I_{yG} = I_{y1} + I_{y2} = 20350\,cm^4 + 1160\,cm^4 \Rightarrow$$

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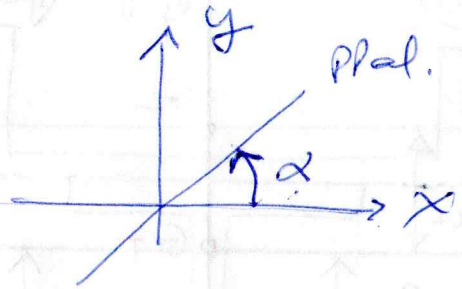
Momentos de Inercia Ppales — Direcciones Ppales. (Baricentrico)

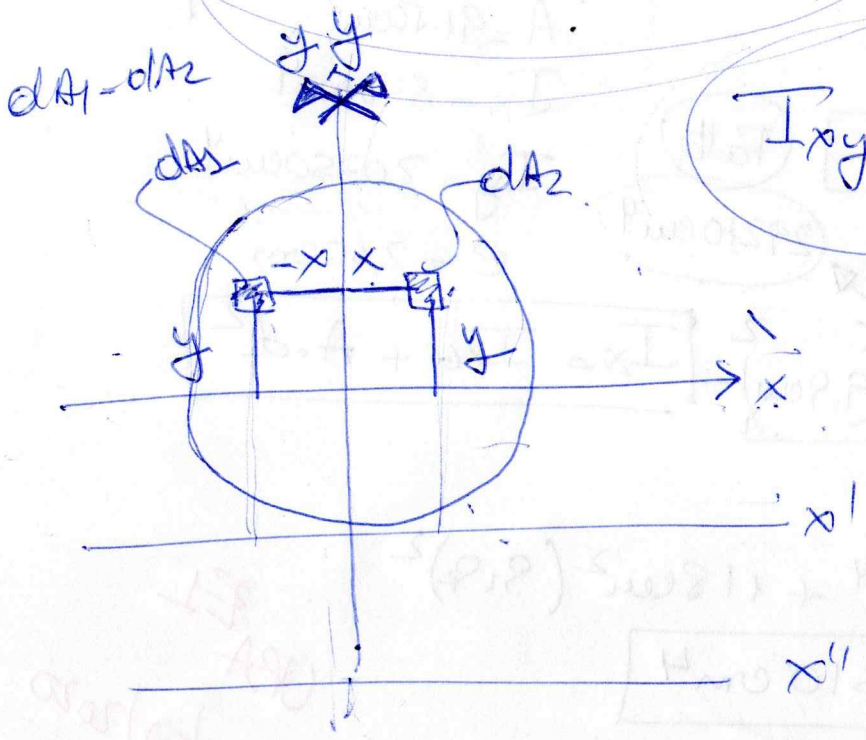
$I_{x_G y_G} = 0$ Si x_G, y_G Ppales.

y además $x_G, y_G \rightarrow$ (1)



$$\operatorname{tg} 2\alpha = \frac{2 I_{xy}}{I_y - I_x}$$

$$I_{1,2} = \frac{I_x + I_y}{2} \pm \frac{1}{2}\sqrt{(I_x - I_y)^2 + 4 I_{xy}^2}$$

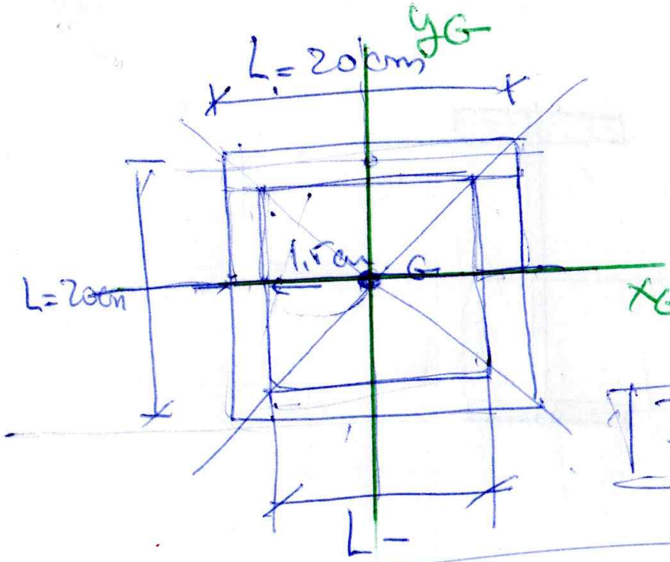


$$I_{xy} = \int_A x\,y\,dA = 0$$ Para y de fuerza y x 1y

$$dI_{xy} = \underbrace{dA_1 \cdot (-x)(y) + dA_2\,(x)(y)}_{=0}$$

Por simetría $I_{xG} = I_1$

$I_{yG} = I_2$



Borrador.
Monto de Rencap:

Por Simetría → Borrador:

$e = 1,5cm$

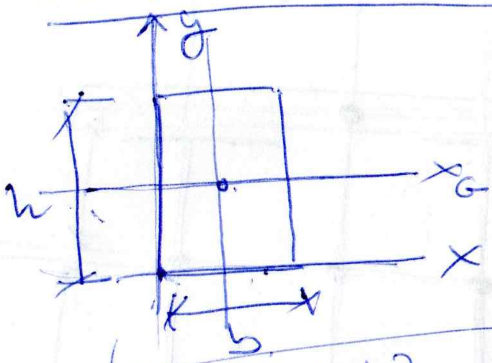
$$I_{XG} = I_{YG}$$

$$I_{XG} = \frac{L^4}{12} - \frac{(L-2e)^4}{12}$$

$$I_{XG} = \frac{(20cm)^4}{12} - \frac{(20cm - 3cm)^4}{12}$$

$$I_{XG} = 6373,25 cm^4$$

Momentos Rectángulo

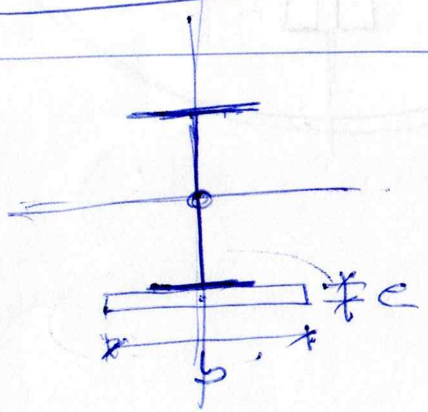


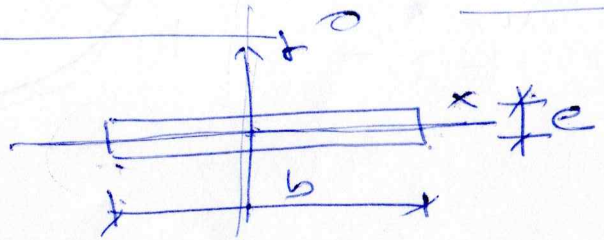
$$I_x = \frac{bh^3}{3}$$

$$I_y = \frac{hb^3}{3}$$

$$I_{XG} = \frac{bh^3}{12}$$

$$I_{YG} = \frac{hb^3}{12}$$





$$I_x = \frac{be^3}{12}$$

$$I_y = \frac{eb^3}{12}$$

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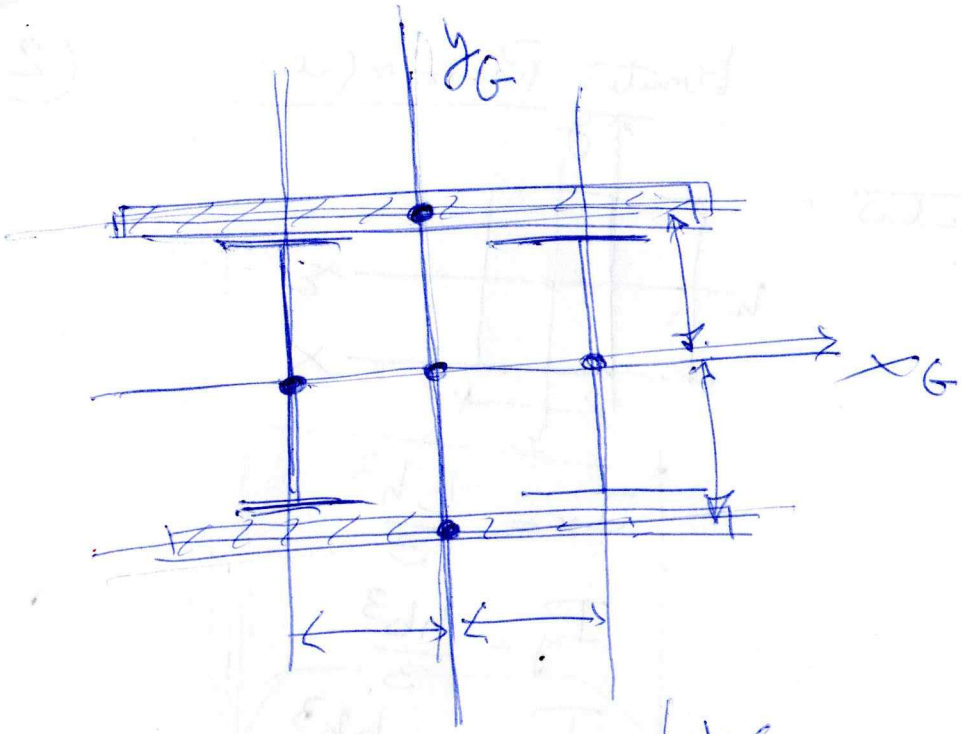
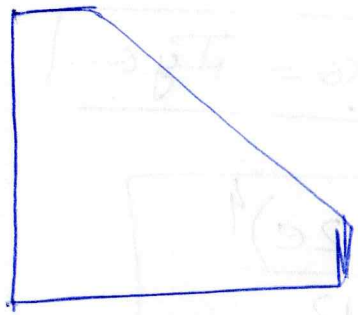
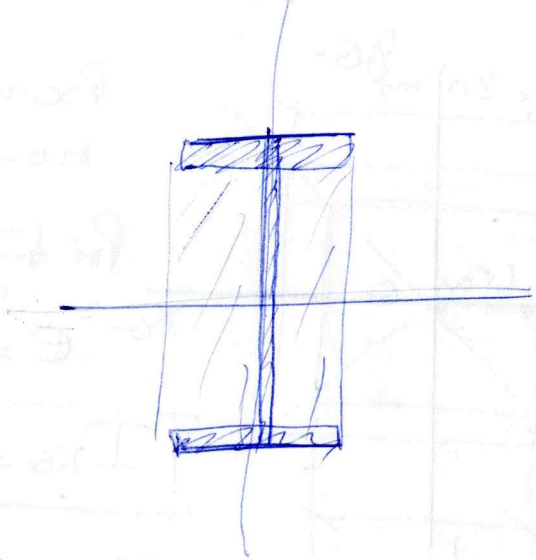
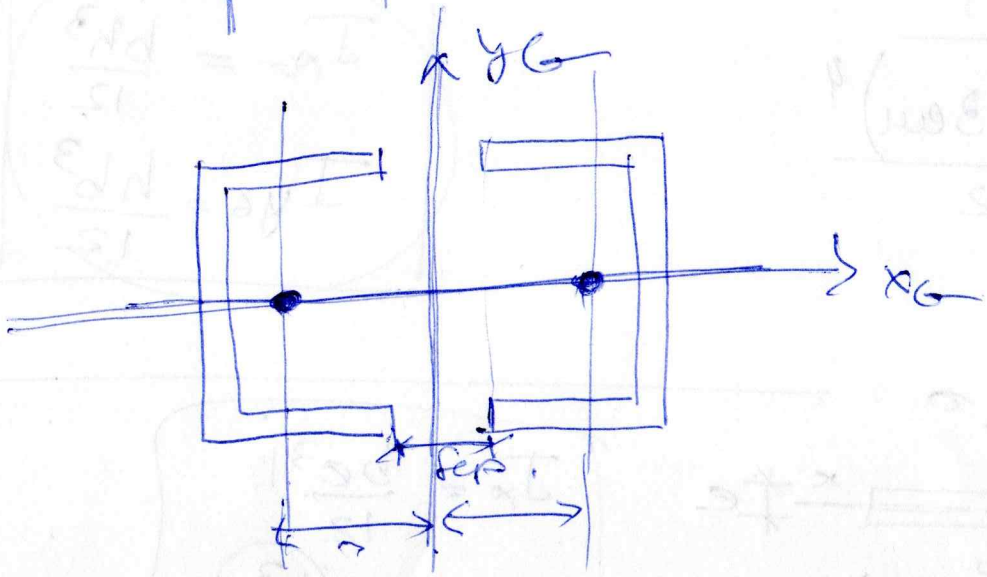
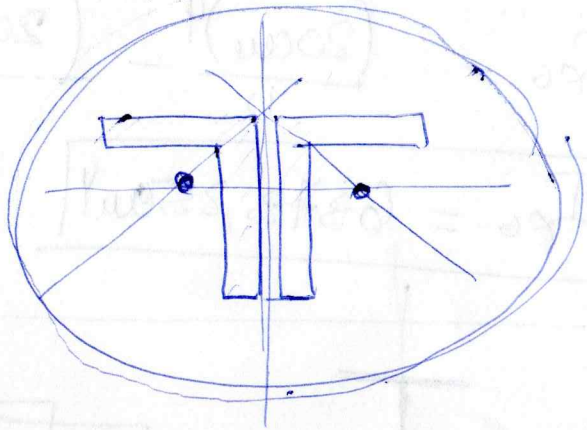
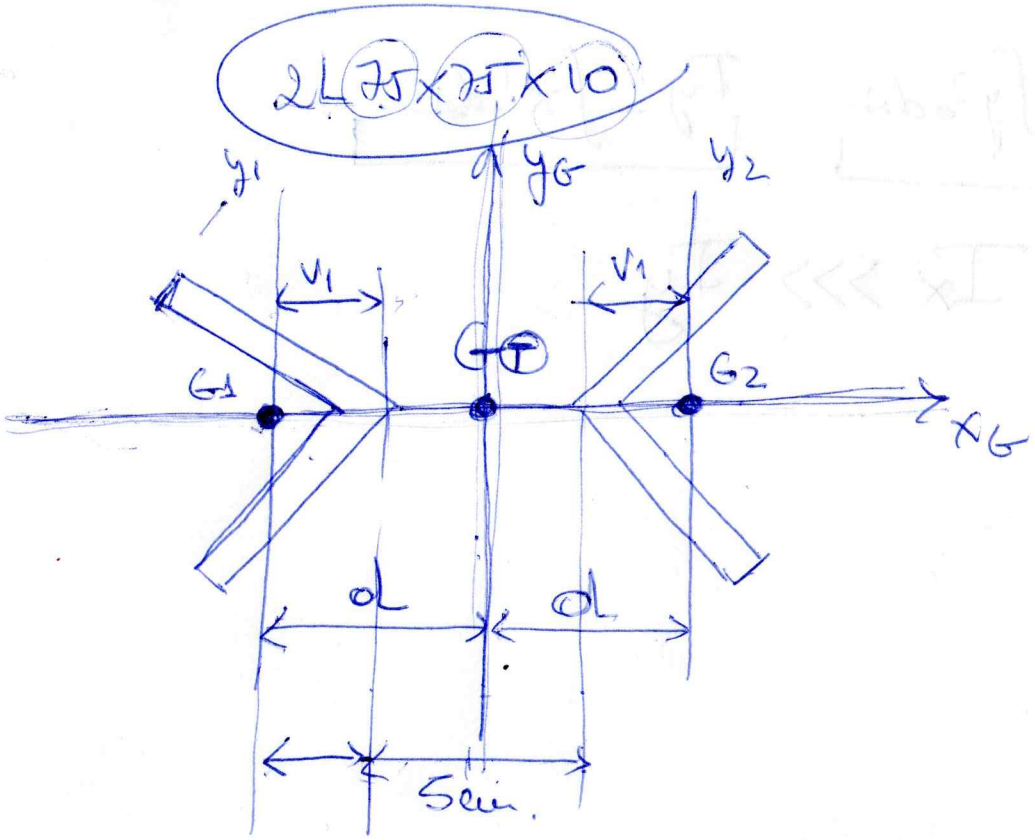

yG
xG

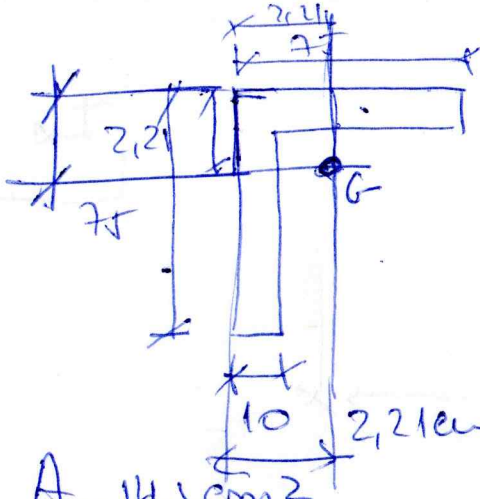


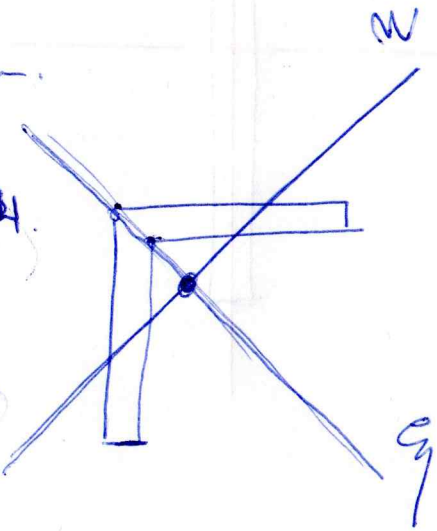



yG
xG









$J_x = J_y = 71.4\,cm^4$

$J_q = 113\,cm^4$

$J_\eta = 29,8\,cm^4$

$V_1 = 3,12$

$$I_{xG} = I_{xG_1} + I_{xG_2} = 2I_{xG_1} = 2 \cdot 113\,cm^4 = 226\,cm^4$$

$$I_{yG} = 2\left(I_{y_1} + A_1 \cdot d^2\right) = 2\left[29,8\,cm^4 + 14,1\,cm^2\,(2,5\,cm + 3,12\,cm)^2\right]$$

$$\boxed{I_{yG} = 950,28\,cm^4}$$

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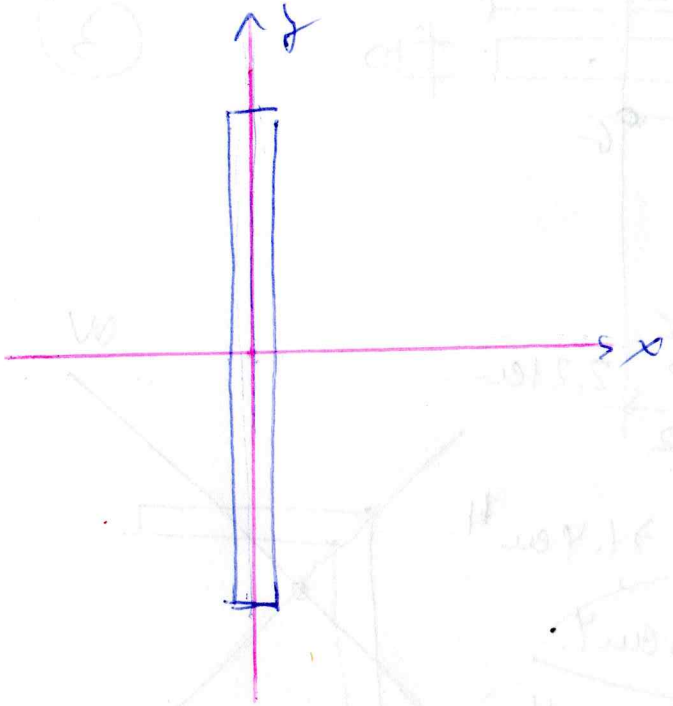

$$I_x = \int y^2 \cdot dA \qquad I_y = \int x^2 \cdot dA$$

$$I_x >>> I_y$$