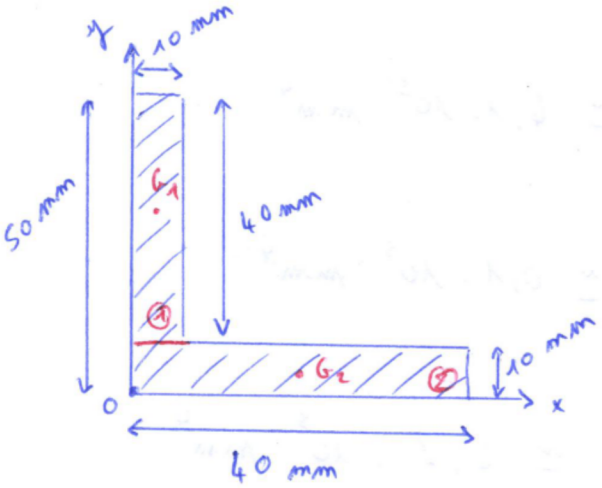
[rdm - 0011]



1) $\begin{cases} x_{G_1} = 5 \text{ mm} \\ y_{G_1} = 30 \text{ mm} \end{cases}$ $\quad \begin{cases} x_{G_2} = 20 \text{ mm} \\ y_{G_2} = 5 \text{ mm} \end{cases}$

Donc,

$$x_G = \frac{x_{G_1} \cdot S_1 + x_{G_2} \cdot S_2}{S_1 + S_2} = \frac{5 \cdot 10 \cdot 40 + 20 \cdot 10 \cdot 40}{10 \cdot 40 + 10 \cdot 40}$$

$$y_G = \frac{y_{G_1} \cdot S_1 + y_{G_2} \cdot S_2}{S_1 + S_2} = \frac{30 \cdot 10 \cdot 40 + 5 \cdot 10 \cdot 40}{10 \cdot 40 + 10 \cdot 40}$$

Donc, $\begin{cases} x_G = 12{,}5 \text{ mm} \\ y_G = 17{,}5 \text{ mm} \end{cases}$

② Calcul de I_x et I_y.

$$I_{Ox}^{①} = \frac{10 \cdot 40^3}{12} + S_1 \cdot y_{G_1}^2 \simeq 4,1 \cdot 10^5 \ mm^4$$

$$I_{Ox}^{②} = \frac{60 \cdot 10^3}{12} + S_2 \cdot y_{G_2}^2 \simeq 0,1 \cdot 10^5 \ mm^4$$

Donc $\boxed{I_{Ox} = I_{Ox}^{①} + I_{Ox}^{②} \simeq 4,2 \cdot 10^5 \ mm^4}$

$$I_{Oy}^{①} = \frac{10^3 \cdot 40}{12} + S_1 \cdot x_{G_1} = 0,1 \cdot 10^5 \ mm^4$$

$$I_{Oy}^{②} = \frac{40^3 \cdot 10}{12} + S_2 \cdot x_{G_2} = 2,1 \cdot 10^5 \ mm^4$$

Donc $\boxed{I_{Oy} = I_{Oy}^{①} + I_{Oy}^{②} = 2,3 \cdot 10^5 \ mm^4}$

③ Calcul de I_{Gx} et I_{Gy}

$$I_{Gx} = I_{G_1 x} + I_{G_2 x} + S_1 (y_G - y_{G_1})^2 + S_2 (y_G - y_{G_2})^2$$

$$I_{Gx} \simeq 1,8 \cdot 10^5 \ mm^4$$

$$I_{Gy} = I_{G_1 y} + I_{G_2 y} + S_1 (x_G - x_{G_1})^2 + S_2 (x_G - x_{G_2})^2$$

$$I_{Gy} \simeq 1,0 \cdot 10^5 \ mm^4$$

4) $I_{xy}(G) = I_{xy}(G_1) + I_{xy}(G_2)$

$+ S_1 (x_{G_1} - x_G)(y_{G_1} - y_G)$

$+ S_2 (x_{G_2} - x_G)(y_{G_2} - y_G)$

on peut vérifier que $I_{xy}(G_1) = I_{xy}(G_2) = 0$.

Donc

$$I_{xy}(G) = S_1 (x_{G_1} - x_G)(y_{G_1} - y_G) + S_2 (x_{G_2} - x_G)(y_{G_2} - y_G)$$

$$\simeq -75.10^3 \text{ mm}^4$$