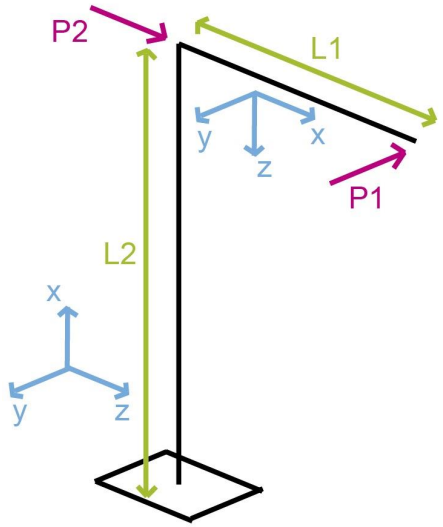
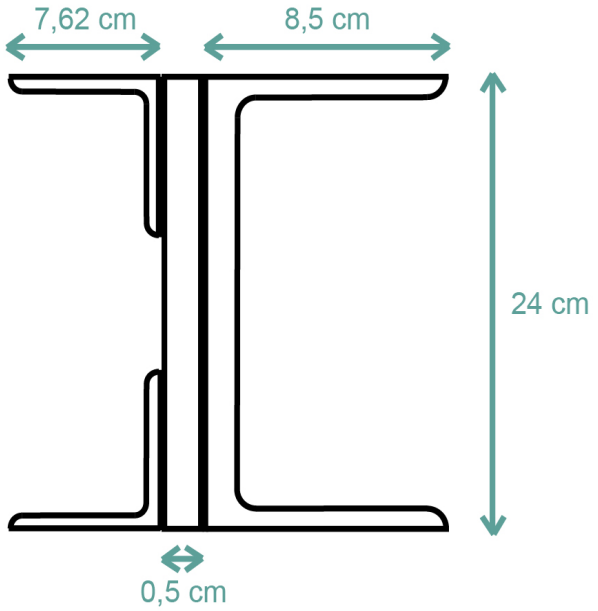
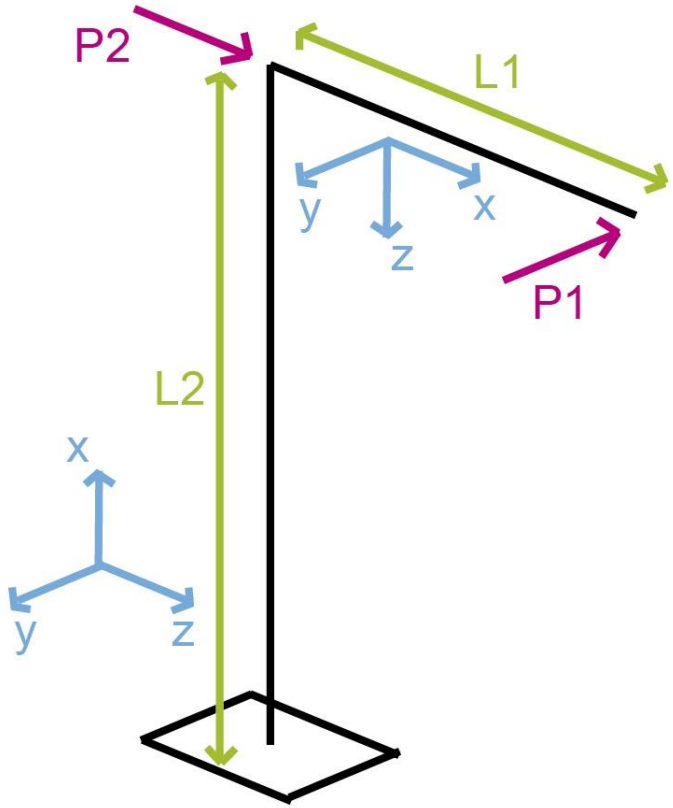
Repaso de Estabilidad I





Catalina Urteneche - Clara Zaccaria

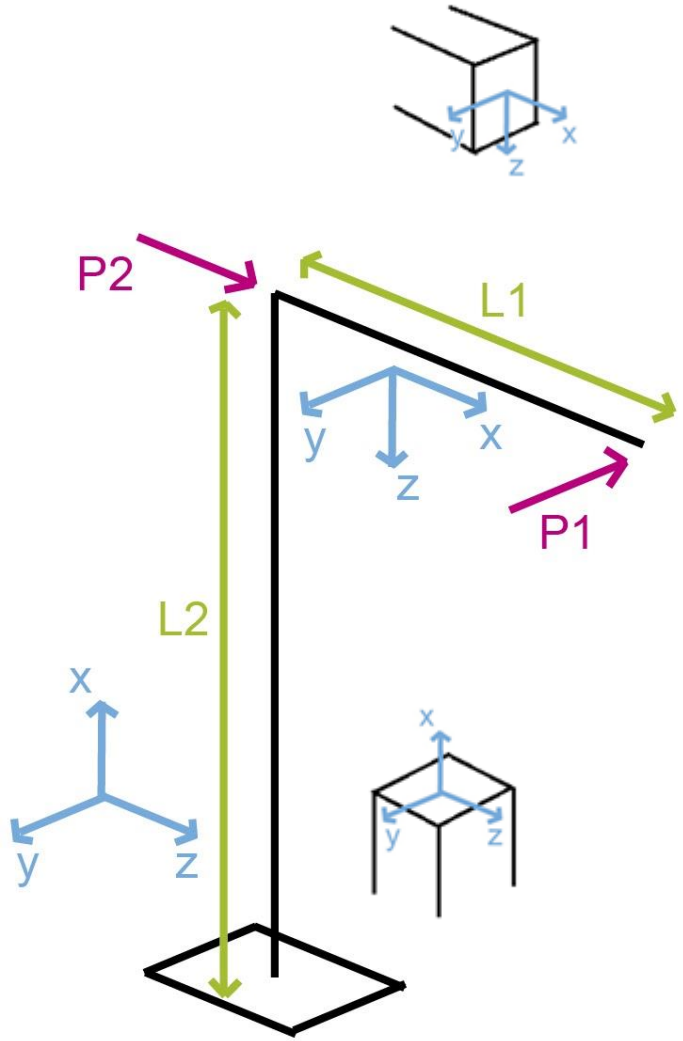
Diagramas de características

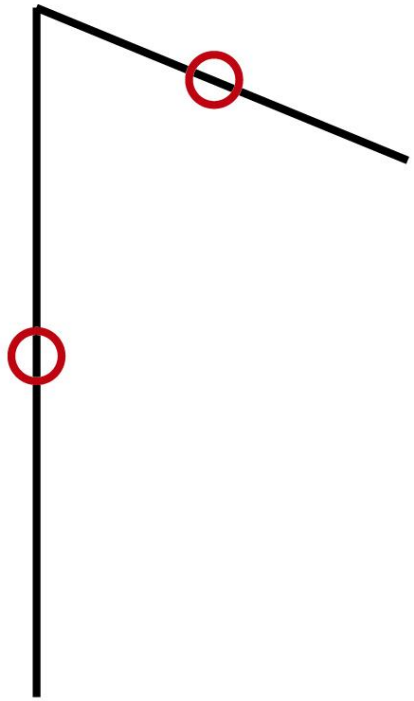


Ejercicio 1: Trazar los diagramas de características

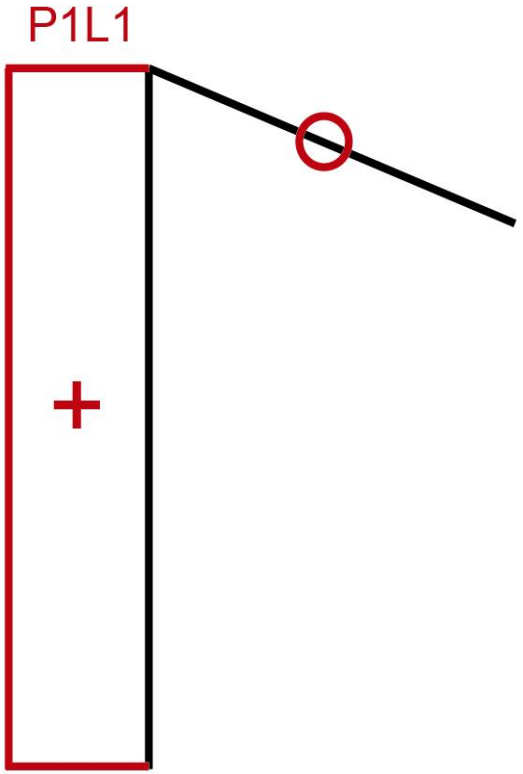
¡Observación!

No calcular reacciones de vínculo a menos que sea necesario o que lo pida el ejercicio. Esto nos ayuda a evitar errores.

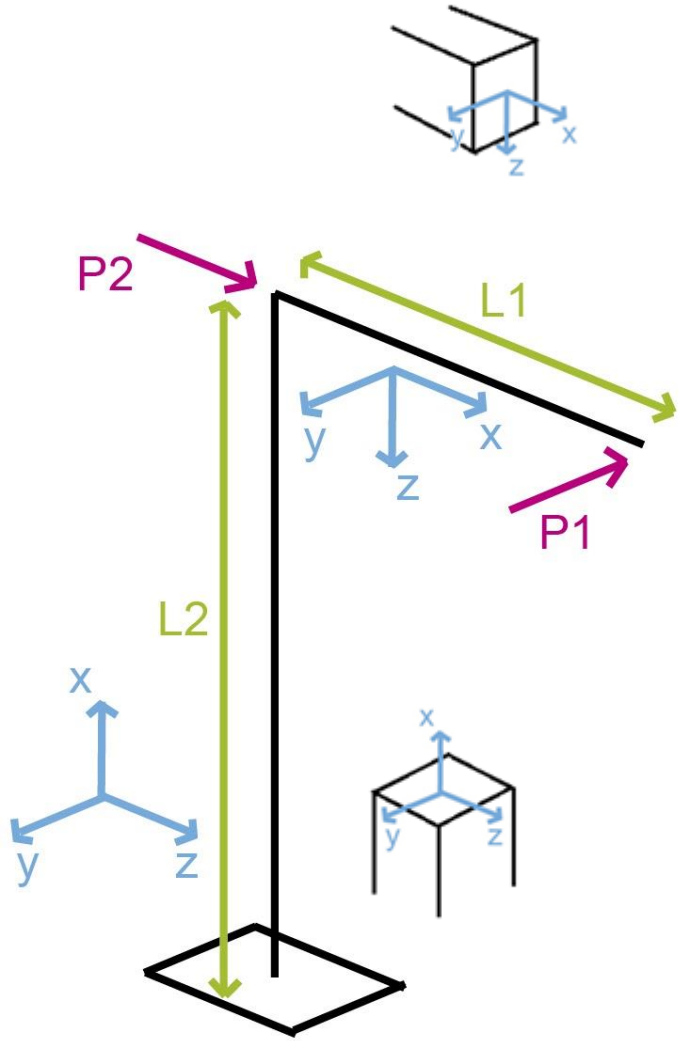


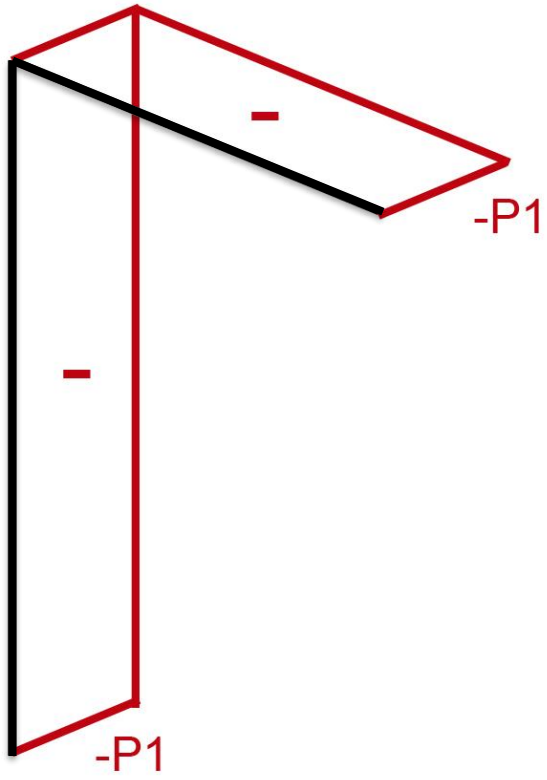


N [kN]
(cualquier plano)

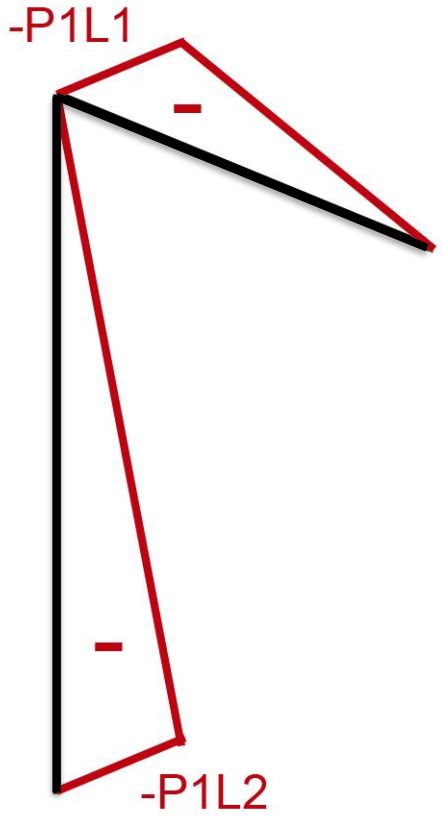


Mx [kN m]
(cualquier plano)

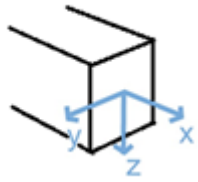


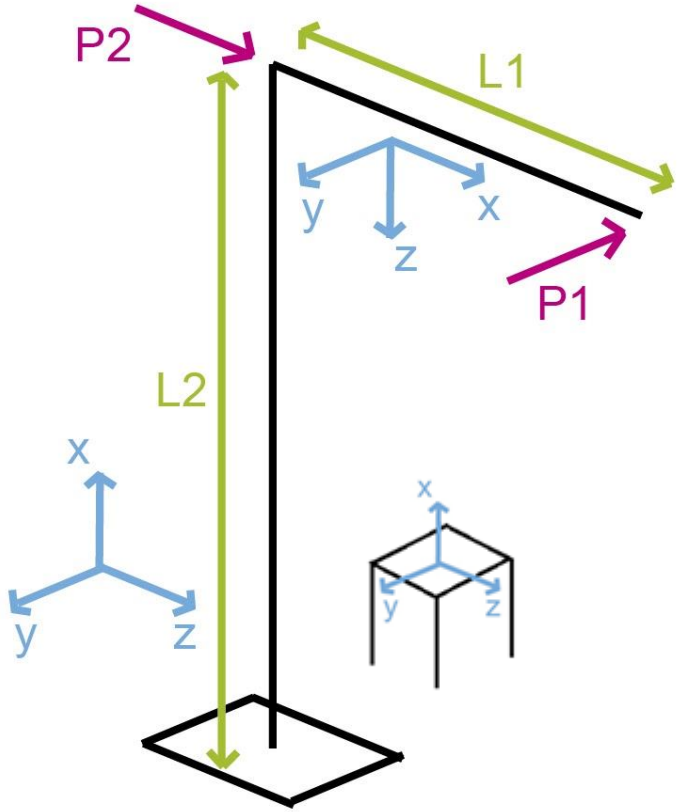


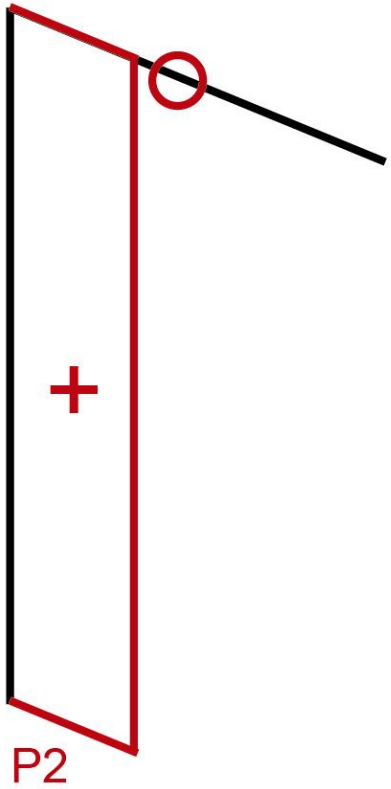
Qy [kN]
(plano xy)



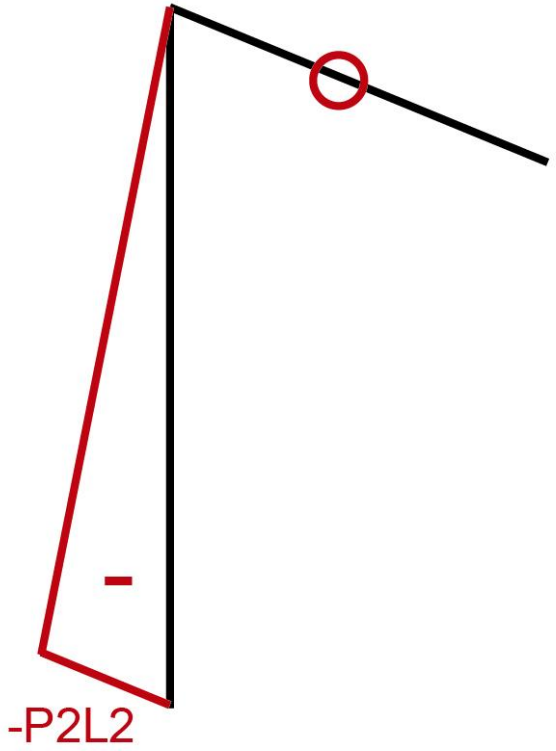
Mz [kN m]
(plano xy)





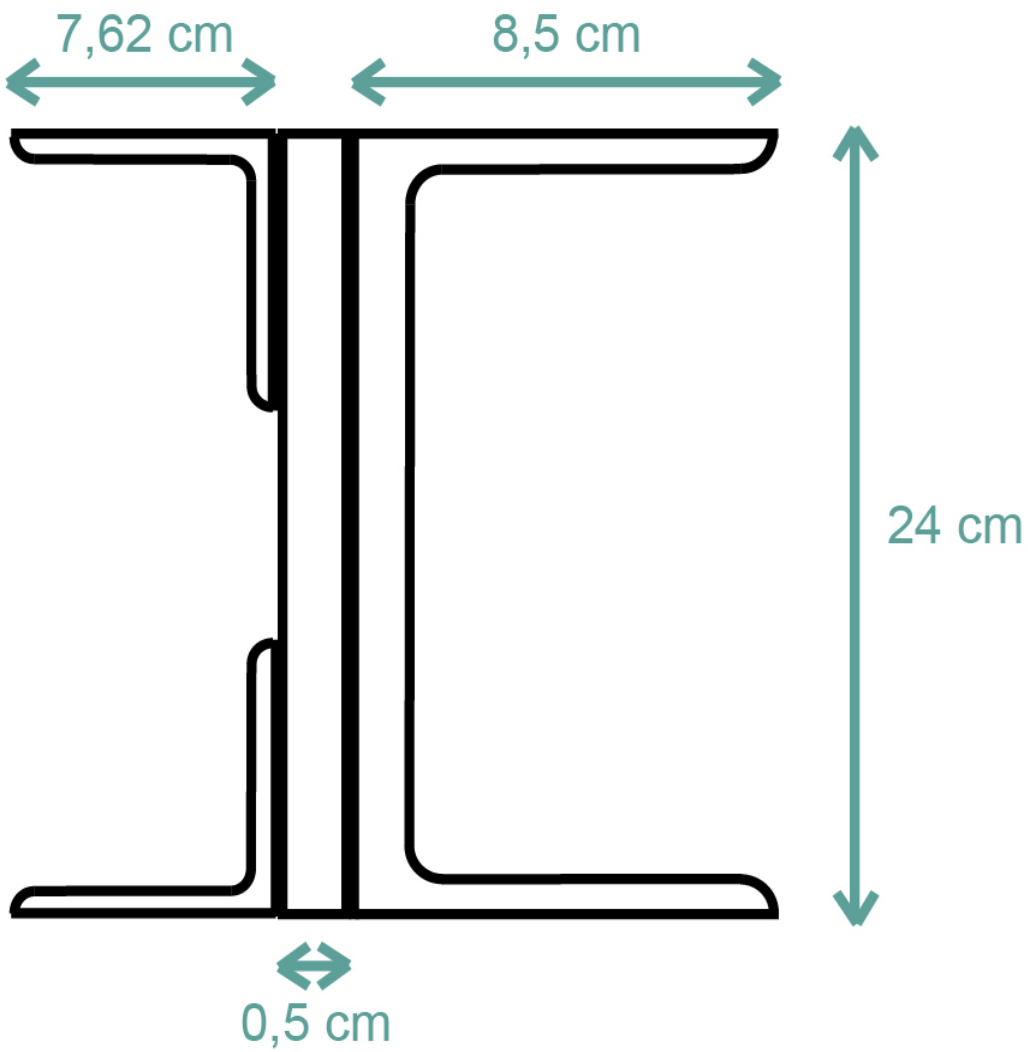


Qz [kN]
(plano xz)

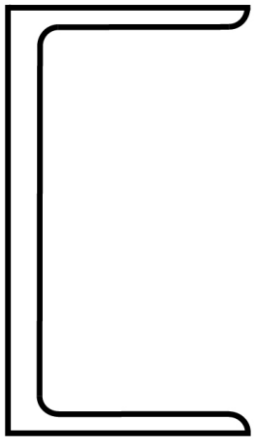


My [kN m]
(plano xz)

Geometría de las superficies



Ejercicio 2: Hallar el baricentro, y los momentos de inercia principales de la sección.

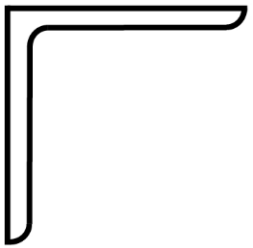


$UPN\ 240$

$A = 42{,}3cm^2$

$I_{MÁX} = 3600cm^4$

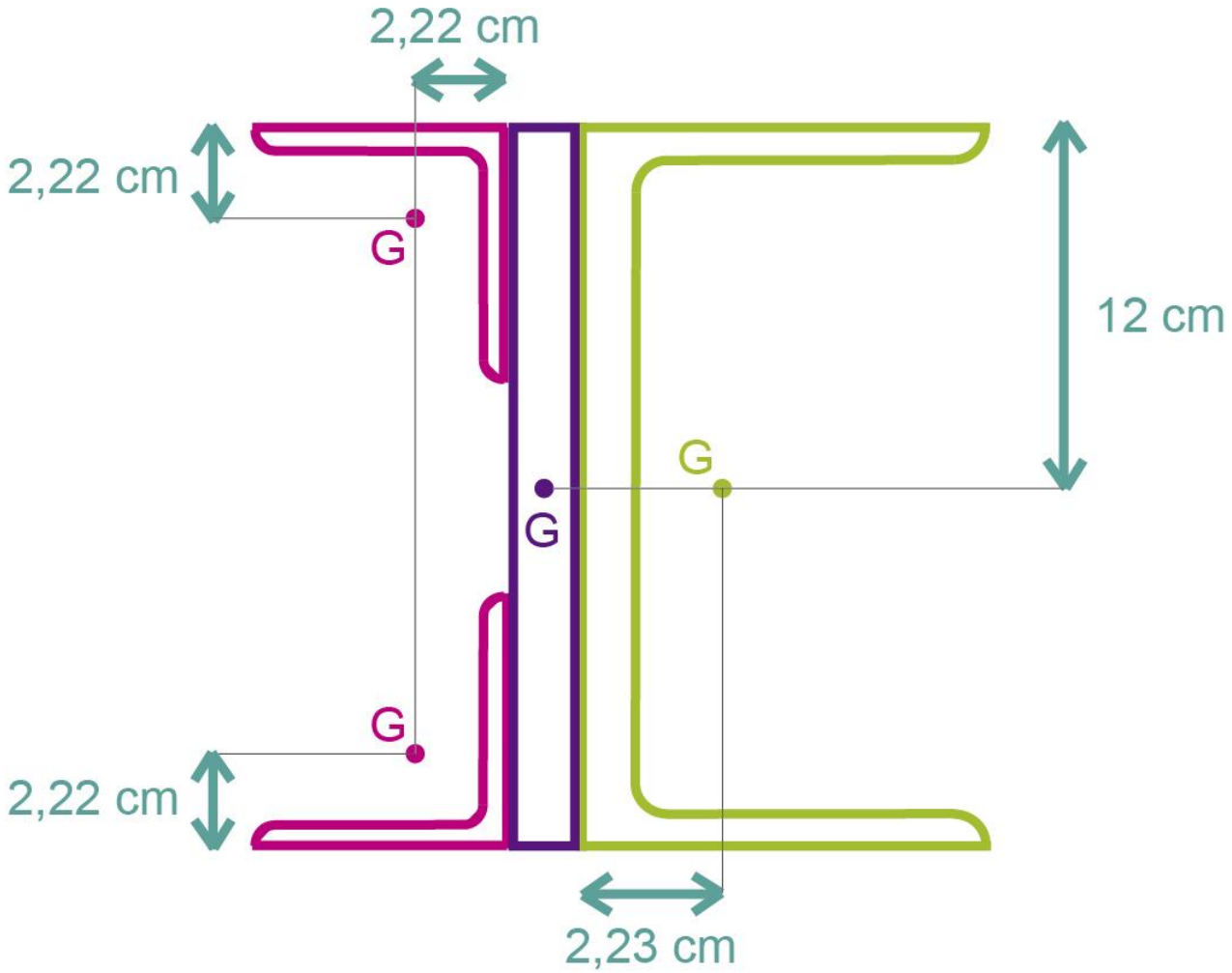
$I_{MÍN} = 248cm^4$



$3" \times {}^{3}/_{8}"$

$A = 13{,}64cm^2$

$I_x = I_y = 71{,}15cm^4$



$UPN\ 240$

$A = 42{,}3cm^2$

$I_{MÁX} = 3600cm^4$

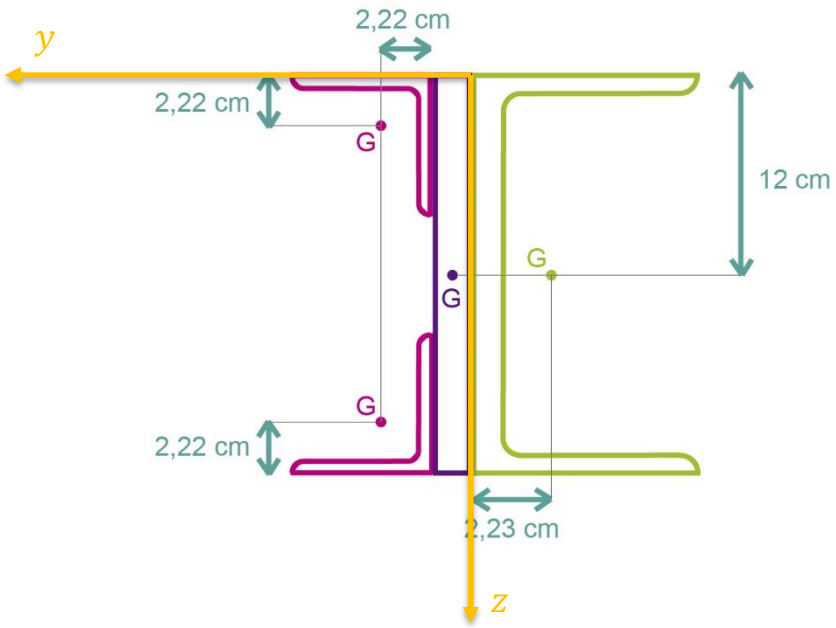
$I_{MÍN} = 248cm^4$

$3" \times {}^{3}/_{8}"$

$A = 13{,}64cm^2$

$I_x = I_y = 71{,}15cm^4$

Calculamos el momento estático para hallar el baricentro total:



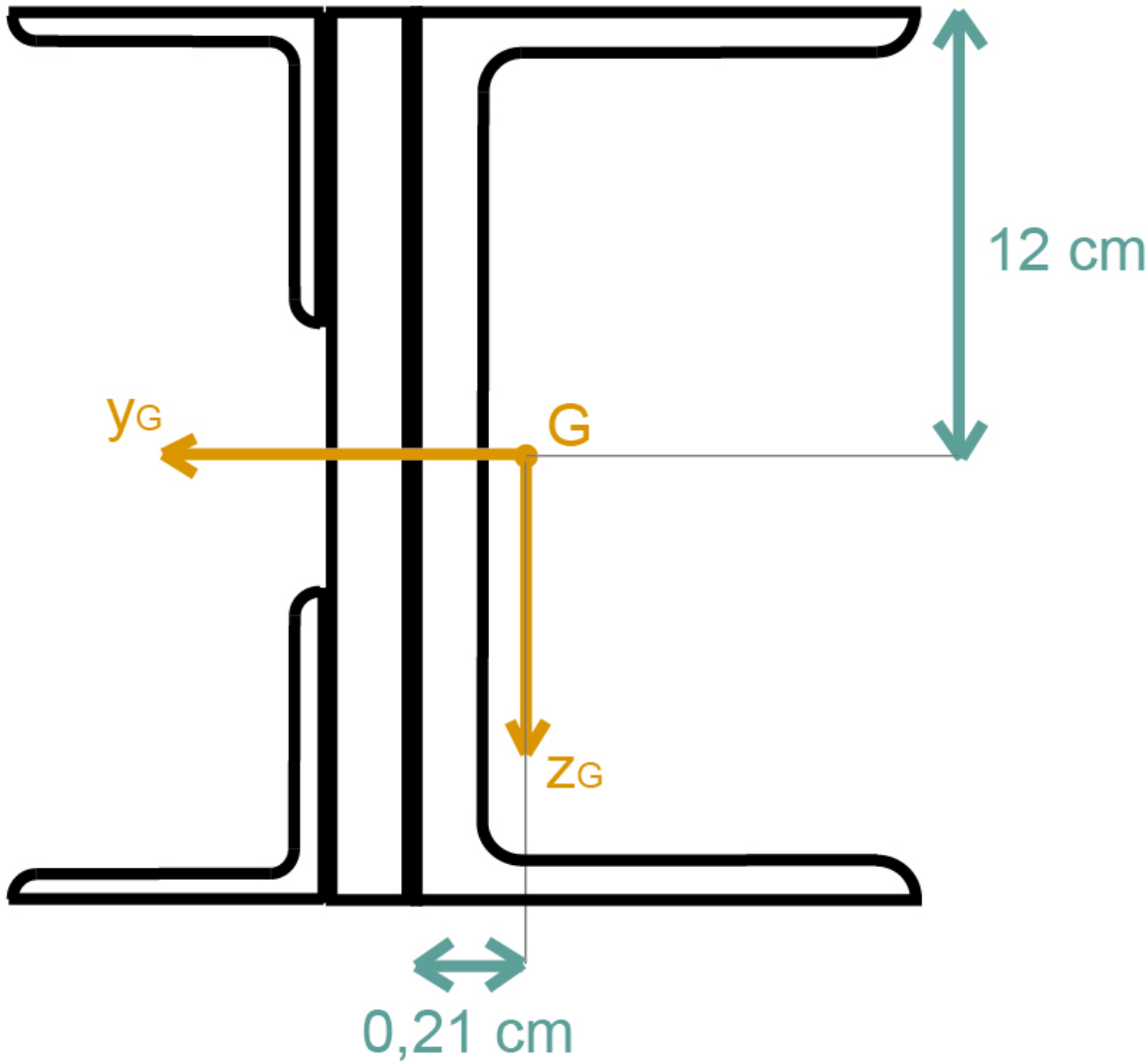
$$S_z^{(A_t)} = \sum S_i^{(A_i)}$$

$$A_t \,.\, y_G = \sum A_i \,.\, y_{G_i}$$

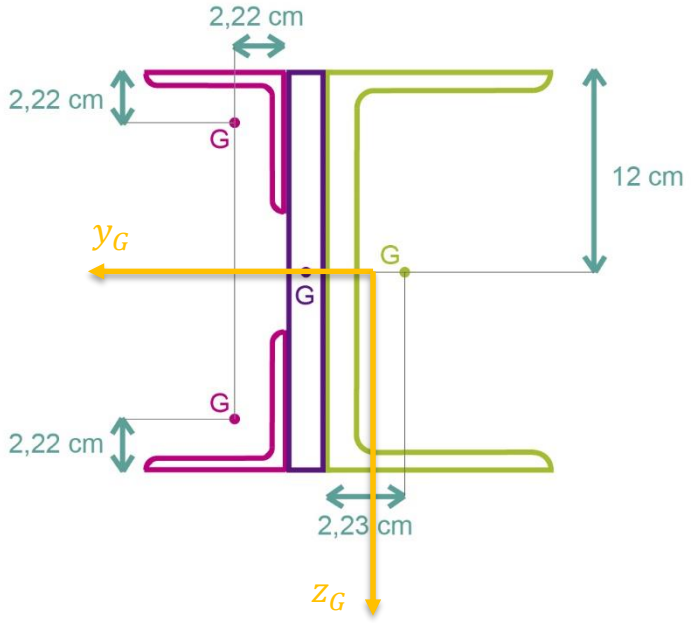
$$y_G = \frac{2 \cdot 13{,}64\ cm^2 \cdot (2{,}22cm + 0{,}5cm) + 12cm^2 \cdot \frac{0{,}5cm}{2} + 42{,}3cm^2 \cdot (-2{,}23cm)}{2 \cdot 13{,}64cm^2 + 12cm^2 + 42{,}3cm^2}$$

$$y_G = -0{,}2066cm \cong -0{,}21cm$$

$$G = (-0{,}21cm\ ;\ 12cm)$$


12 cm
yG
G
zG
0,21 cm

Calculamos el momento de inercia respecto de los ejes baricéntricos de la figura total:



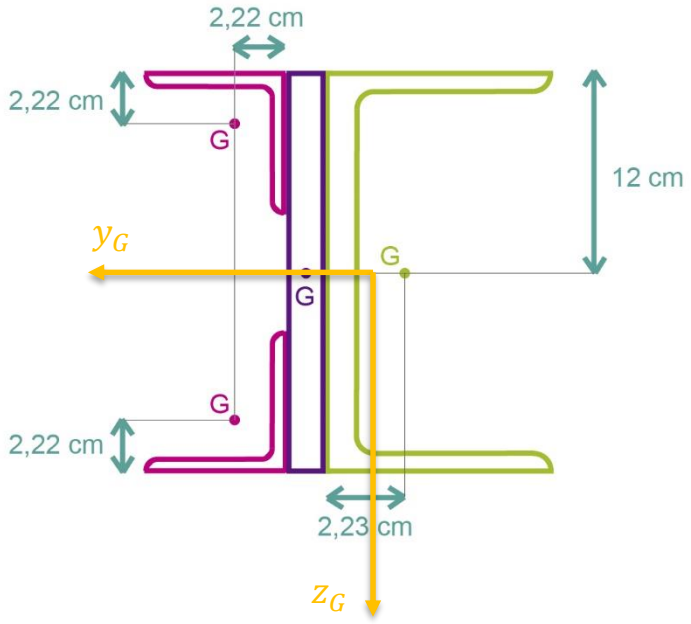
$$I_{y_G} = [71{,}15cm^4 + 13{,}64cm^2 \cdot (2{,}22cm - 12cm)^2] \cdot 2 + \frac{0{,}5cm \cdot (24cm)^3}{12} + 3600cm^4$$

$$I_{y_G} = 6927{,}59cm^4 \cong 6928\ cm^4$$

$$I_{z_G} = [71{,}15cm^4 + 13{,}64cm^2 \cdot (2{,}22cm + 0{,}5cm + 0{,}21cm)^2] \cdot 2 + 0{,}25cm^4 + 12cm^2 \cdot \left(\frac{0{,}5cm}{2} + 0{,}21cm\right)^2 + 248cm^4 + 42{,}3cm^2 \cdot (2{,}23cm - 0{,}21cm)^2$$

$$I_{z_G} = 799{,}89cm^4 \cong 800cm^4$$

Calculamos el momento estático de cada perfil respecto a y_G



$$S_{y_G}^{Ai} = 13{,}64cm^2 \cdot (12cm - 2{,}22cm)$$

$$S_{y_G}^{As} = 13{,}64cm^2 \cdot (-12cm + 2{,}22cm)$$

$$S_{y_G}^{R} = 12cm^2 \cdot (0cm)$$

$$S_{y_G}^{UPN} = 42{,}3cm^2 \cdot (0cm)$$

$$S_{y_G}^{Tot} = 0$$

Hipo/Iso/Hiper-estaticidad

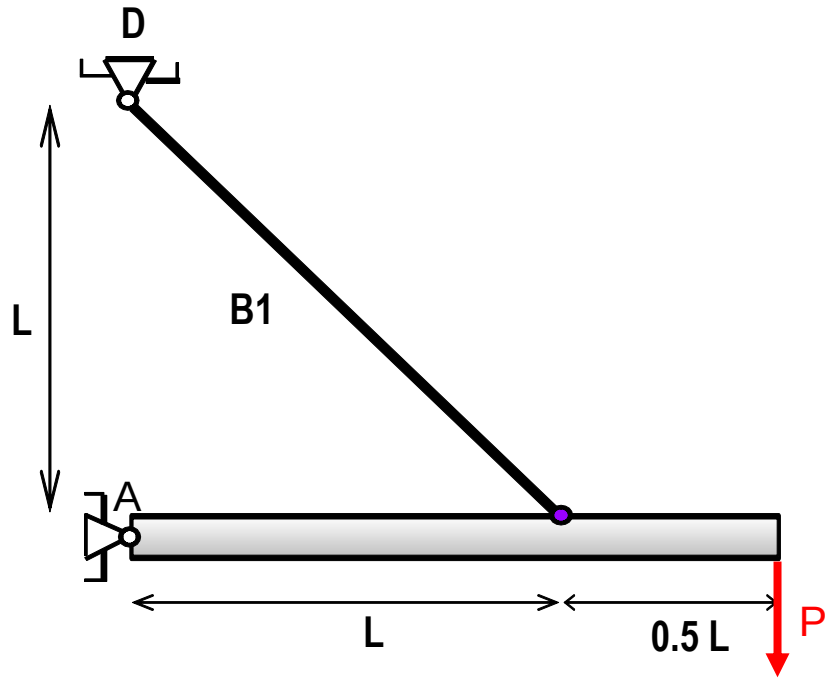
Hipostatico

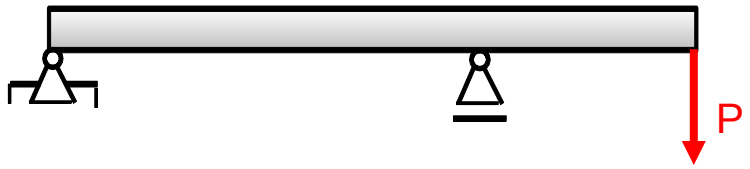
Isostatico

Hiperestatico

Ejercicios adicionales

Diagramas de características:





Geometría de las superficies:

1) Calcular los momentos de inercia principales del perfil.
2) Calcular el momento estático de: A) Rectángulo verde.
B) Rectángulos verde + naranja.
C) Rectángulos verde + naranja + violeta.