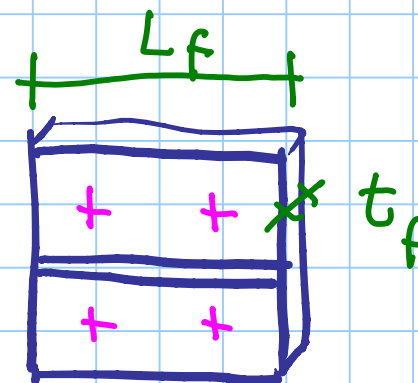


T → Tub



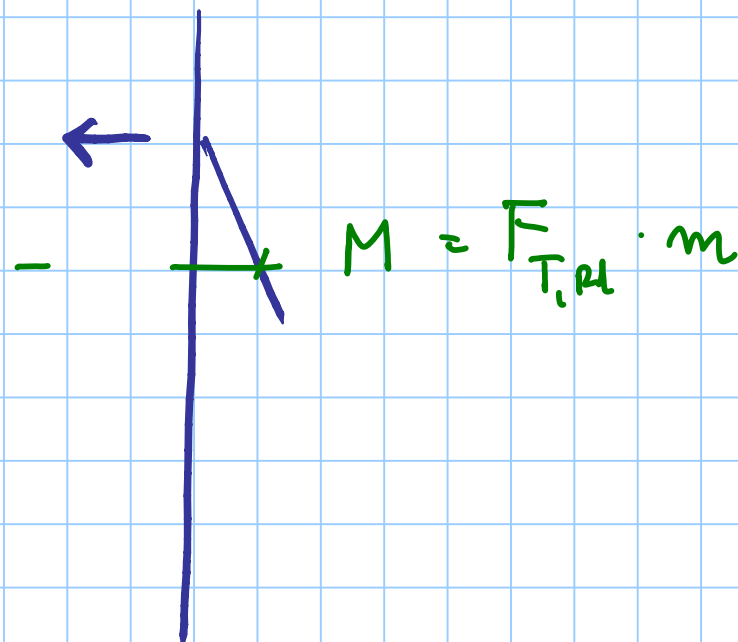
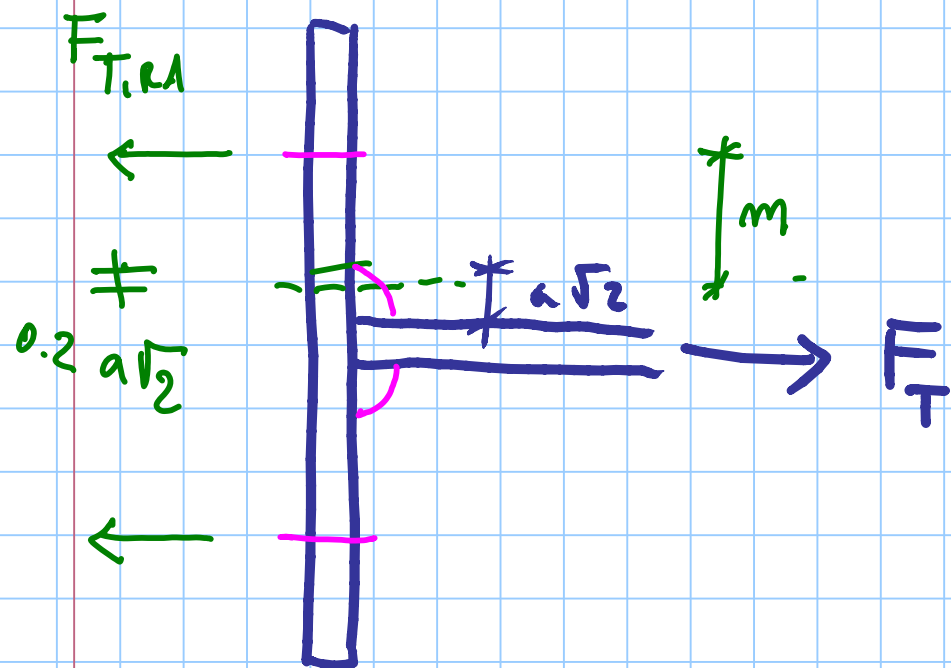
elemento a T equivalente

un bolles $F_{t,Rd} = 0.9 A_{us} \frac{f_{ub}}{\gamma_{M2}}$

punctuations $B_{p,Rd} = 0.6 \pi d_m t \frac{f_u}{\gamma_{M2}}$

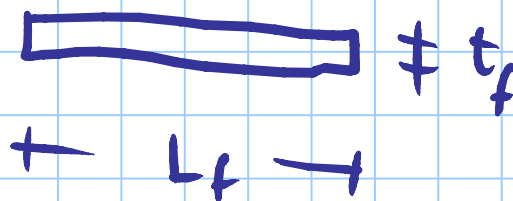
$$\text{MIN} (F_{t,Rd} ; B_{p,Rd})$$

$$F_{T,Rd} = \text{MIN} (F_{t,Rd} ; B_{p,Rd}) \times \underset{2}{n_b}$$



$$M = F_{T,pl} \cdot m$$

azione resistente
della flangia.

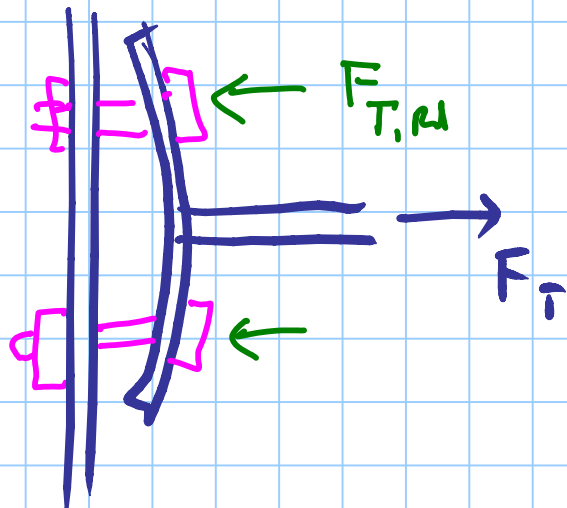


$$W_{pl} = \frac{L_f t_f^2}{4}$$

$$M_{ed} = \frac{L_f t_f^2}{4} \frac{f_y}{\gamma_{mo}}$$

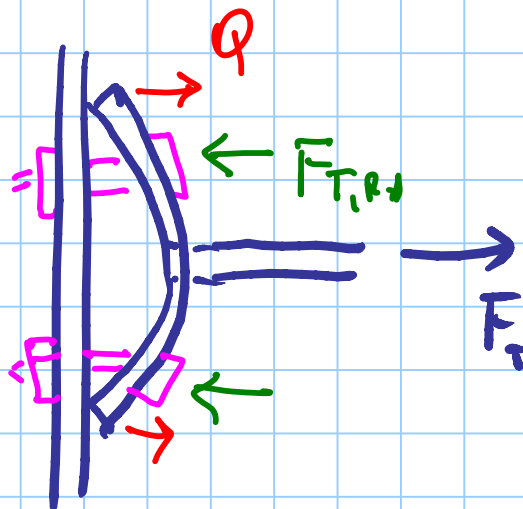
eff. tt. leva

Non C'E



$$F_T = 2 F_{T,R}$$

C'E'
EFFETTO
LEVA



$$F_T = 2 (F_{T,R} - Q)$$

bullet in Tee : rigid

$$\frac{NL_b}{EA} \rightarrow A_{us}$$

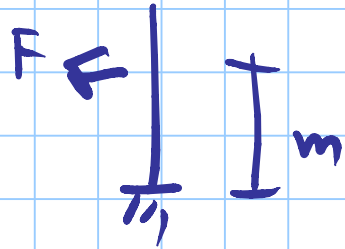
$$k = \frac{EA}{L_b}$$

$$t_s \approx 0.6d$$



$$L_b = 2t_f + t_h$$

flangia inferiore : rigida



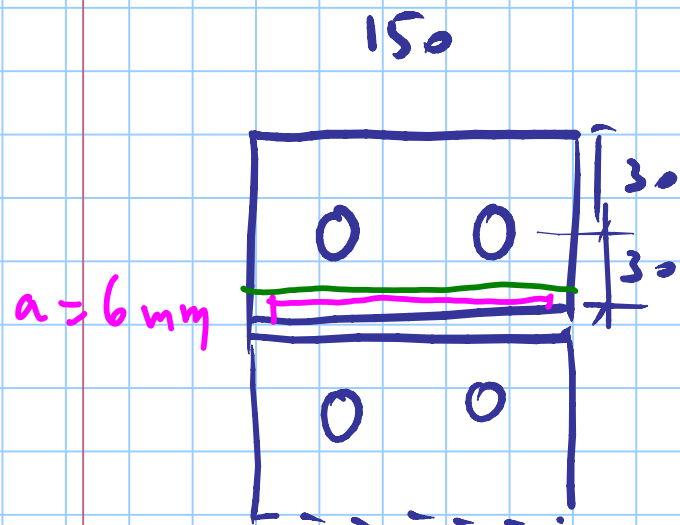
$$\frac{3 EI}{m^3} - \frac{L_f t_f^3}{12}$$

$$\frac{3 \cancel{E} L_f t_f^3 / 12}{m^3}$$

$$\frac{\cancel{E} A_{us}}{L_b} \geq \pi$$

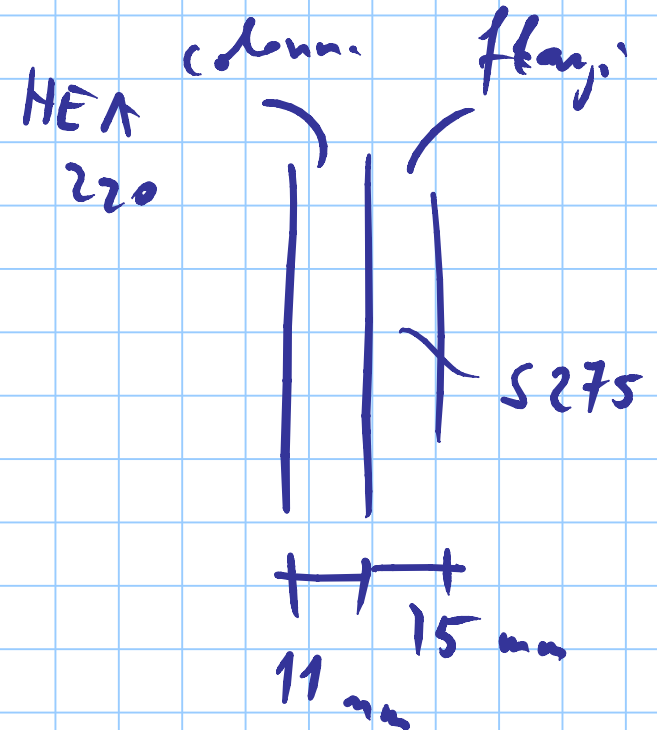
EC3 parte 1.8 punto 6.2.4.1

non c'è effetto leva \times $L_b \geq \frac{8.8 m^3 A_{us}}{L_f t_f^3}$



$$e = 30 \text{ mm}$$

$$m = 23 \text{ mm}$$



$6\sqrt{2} = 8.4$

$0.2 \times 8.4 = 1.68 \text{ mm}$

$6.72 \text{ mm} \approx 7$

6 mm

M 18 $t_{AR} \quad t_n \approx 11 \text{ mm}$

$A_{us} = 192 \text{ mm}^2$

$L_b = 11 + 15 + 11 = 37 \text{ mm}$

$$L_b \geq \frac{8.8 m^3 A_m}{L_f t_f^3}$$

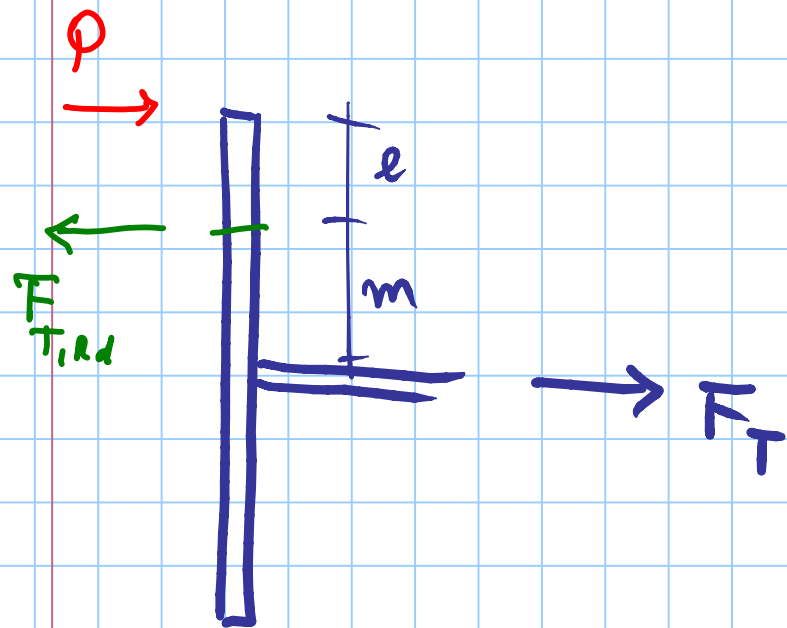


37 mm

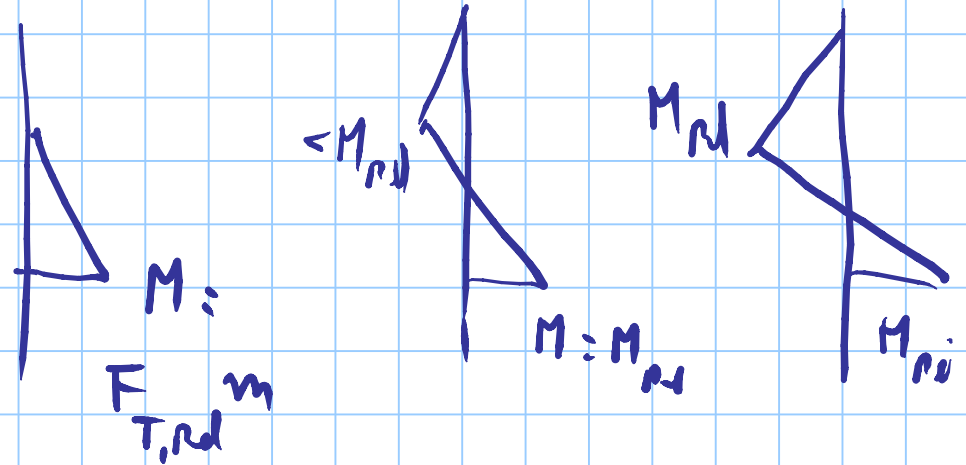
NON VERIFICATA

C'E' EFFETTO LEVA

$$\frac{8.8 \times 23^3 \times 192}{150 \times 15^3} = 40.6 \text{ mm}$$



symm. eff.
lev.



$$F_{t,rd} = 0.9 \times 192 \times \frac{500}{1.25} \times 10^{-3} = 69.1 \text{ kN}$$

$$F_{T,rd} = 2 \times 69.1 = 138.2 \text{ kN}$$

$$M_{b,rd} = \frac{150 \times 15^2}{4} \times \frac{275}{1.05} \times 10^{-6} = 2.21 \text{ kNm}$$

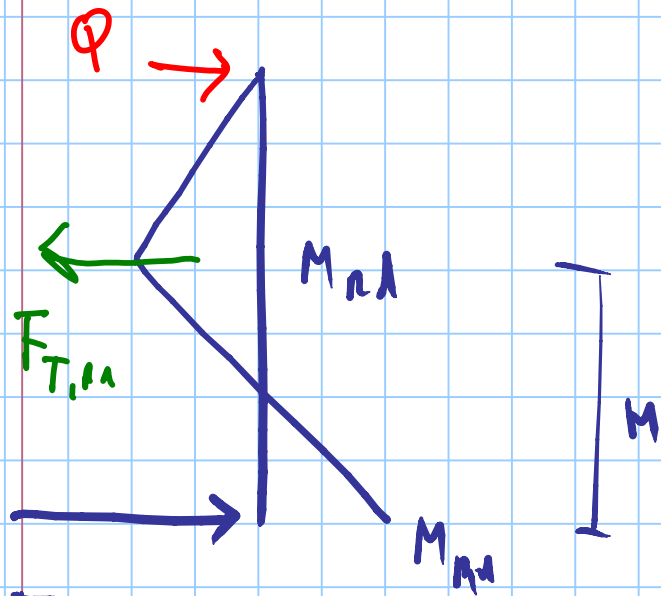
senza effetti lev.

$$M_{Ed} = 138.2 \times 0.023 = 3.18 \text{ kNm}$$

$$M_{Ed} > M_{Rd} \quad \text{non verifica}$$

il collegamento può portare il momento

$$F_T = \frac{M_{Rd}}{m} = \frac{2.21}{0.023} = 96.1 \text{ kN} \quad \times 2$$



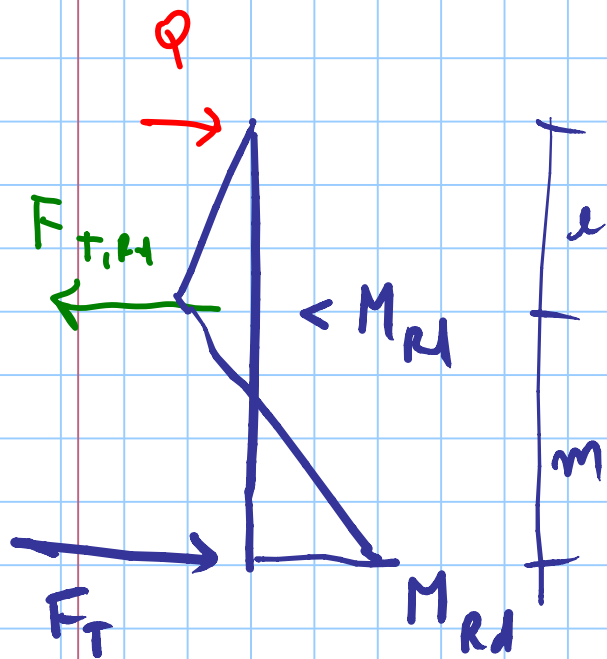
$$F_T = F_{T,M} - Q$$

$$F_T = 2 \frac{M_{M1}}{m} = 192.2$$

$$Q = \frac{M_{M1}}{e} = \frac{2.21}{0.030} = 73.67 \text{ kN}$$

$$F_{T,M} = F_T + Q = \frac{2 M_{M1}}{m} + \frac{M_{M1}}{e}$$

$$192.2 + 73.7 = 265.9 \text{ kN}$$



$$F_T = F_{T,Rd} - Q$$

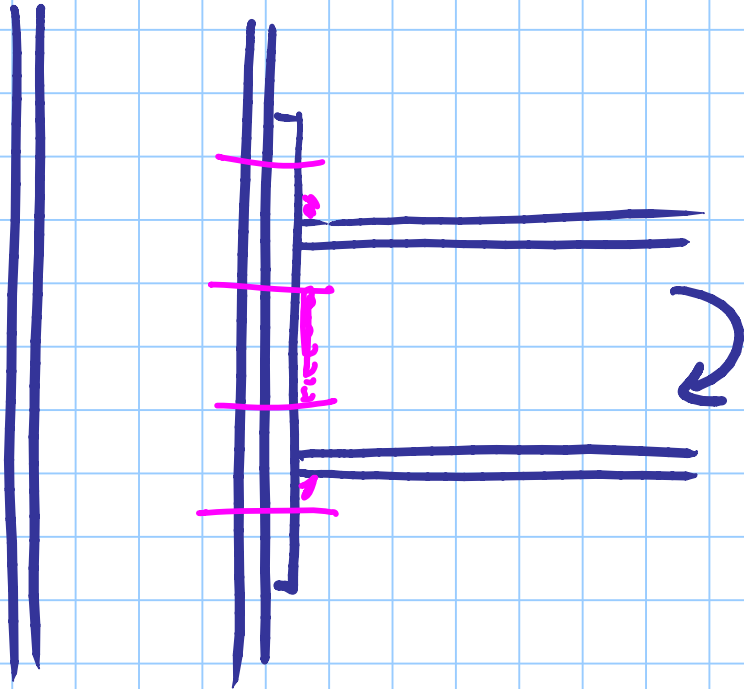
$$M_{Rd} = F_{T,Rd} m - Q (e + m)$$

$$Q = F_{T,Rd} - F_T$$

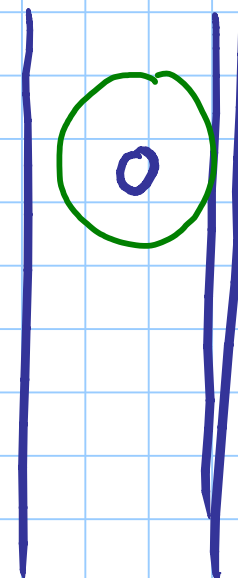
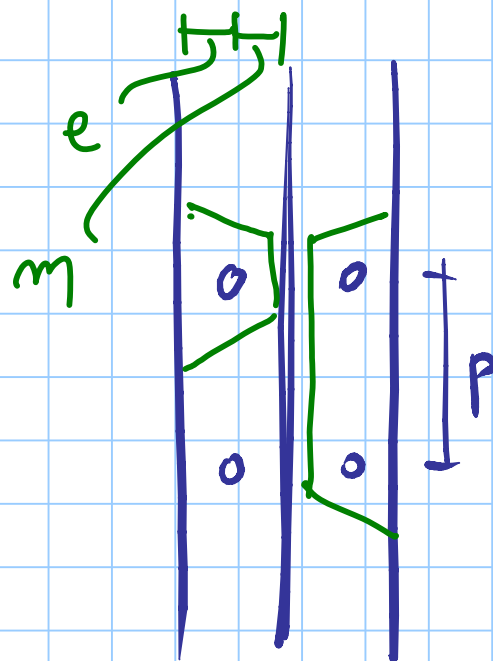
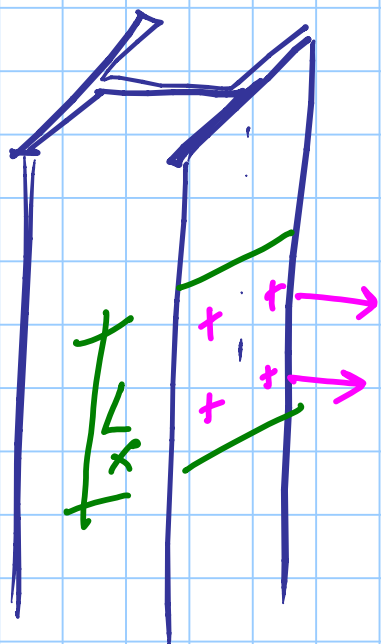
$$M_{Rd} = F_{T,Rd} m - (F_{T,Rd} - F_T) (e + m)$$

$$M_{RD} = -F_{T,Rd} e + F_T (e+m)$$

$$F_T = \frac{M_{RD} + F_{T,Rd} e}{e+m} = \frac{2.21 + 138.2 \times 0.030}{0.030 + 0.023} = 119.5 \text{ kN}$$



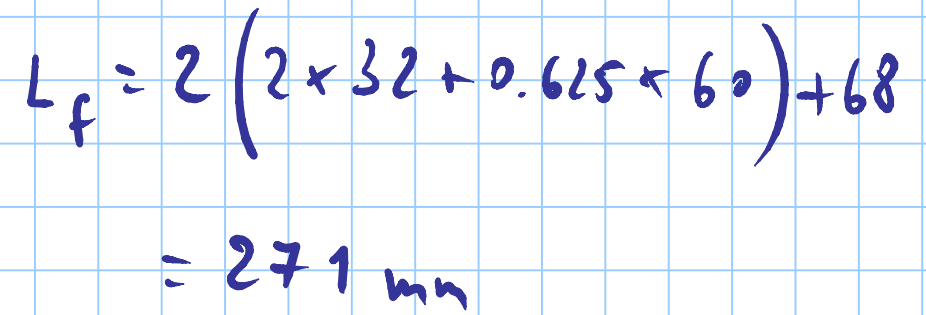
- 1) bulloni a trazione
+ punti pietà e
da colonne
- 2) verifica a flessione
della flangia
- 3) verifica a flessione
dell'ala della colonna

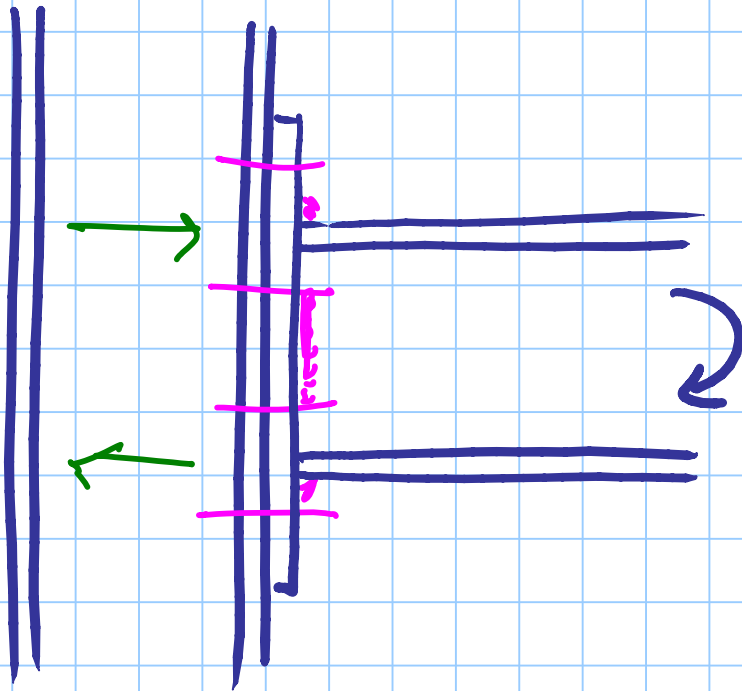


$$2(2m + 0.625e)$$

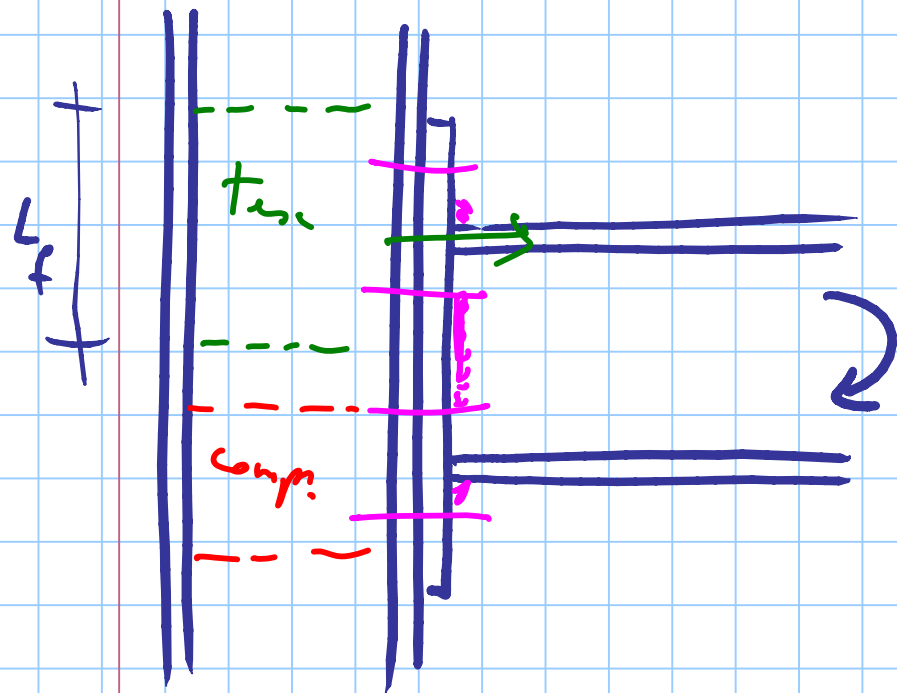
$$2(2m + 0.625e) + p$$

$$2\pi m$$





4) verifica e tipol. dell'anima
della colonna



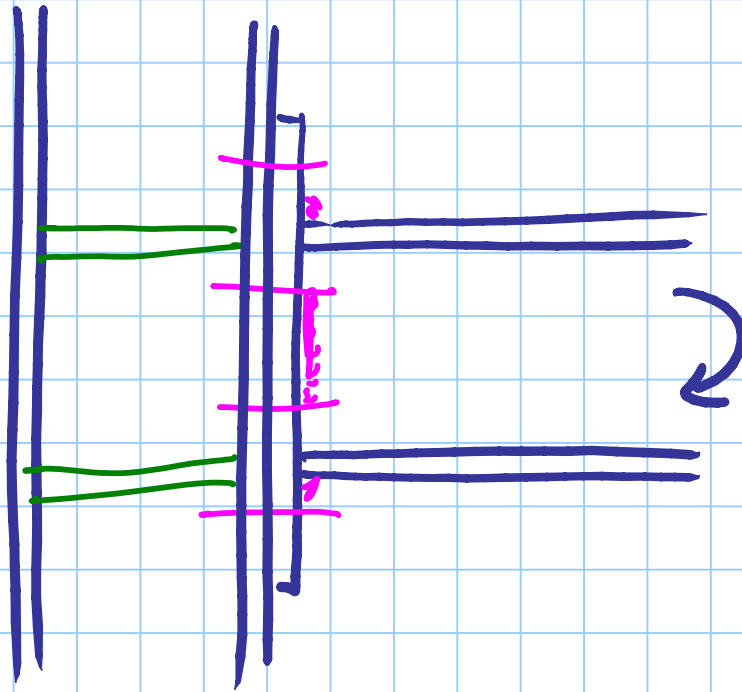
5) verifica a Tension
dell'anima della colonna.

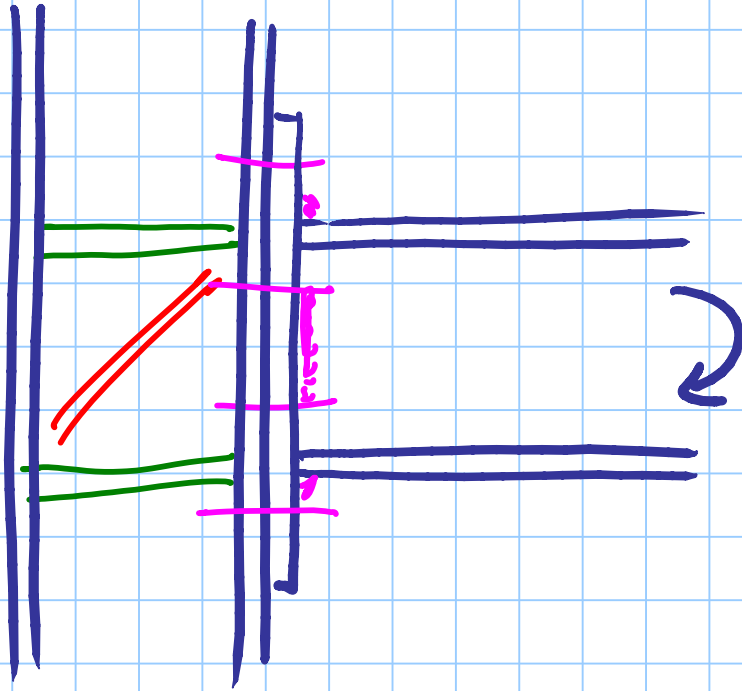
6) verifica a compression
dell'anima della colonna

(verifica come trave)

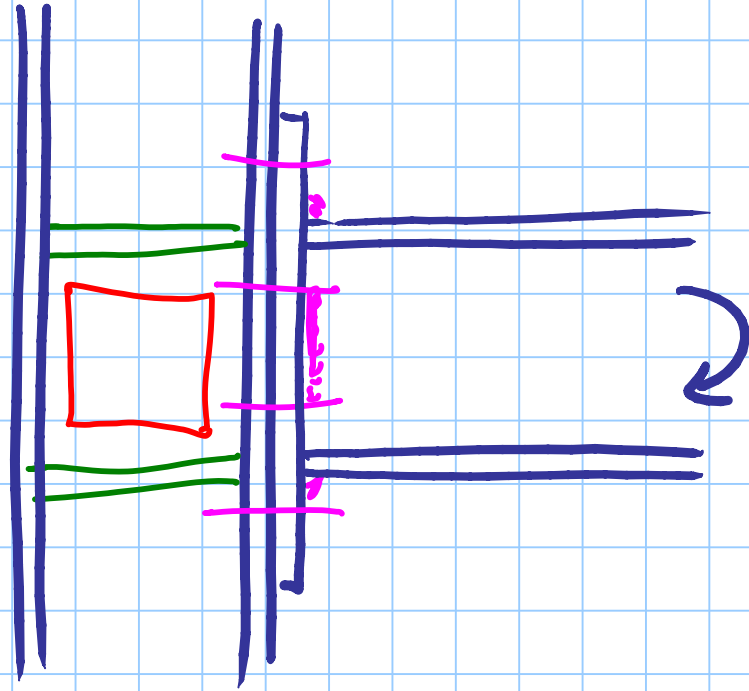
$\lambda_p \sim$

I problemi si riducono mettendo pezzi addetti



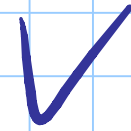


pu il taylor



RESISTENZA

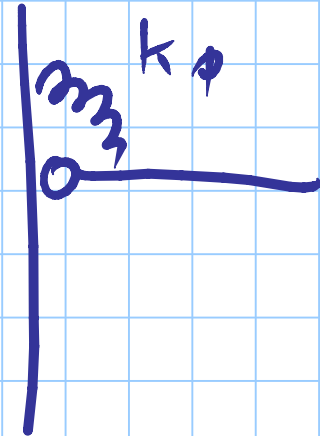
VISTO



RIGIDEZZA

a ciascuna verifica elementare
corrisponde una deformazione

che provoca rotazioni relative Trave-colonne



NODO RIGIDO

rigidez tant. elástica de
con deformaciones relative mínimas

$$K_{\phi} = \infty$$

NODO SEMIRIGIDO

rigidez intermedia

NODO CERNIERA

rigidez tant. boro de con
Transmisible

$$K_{\phi} = 0$$