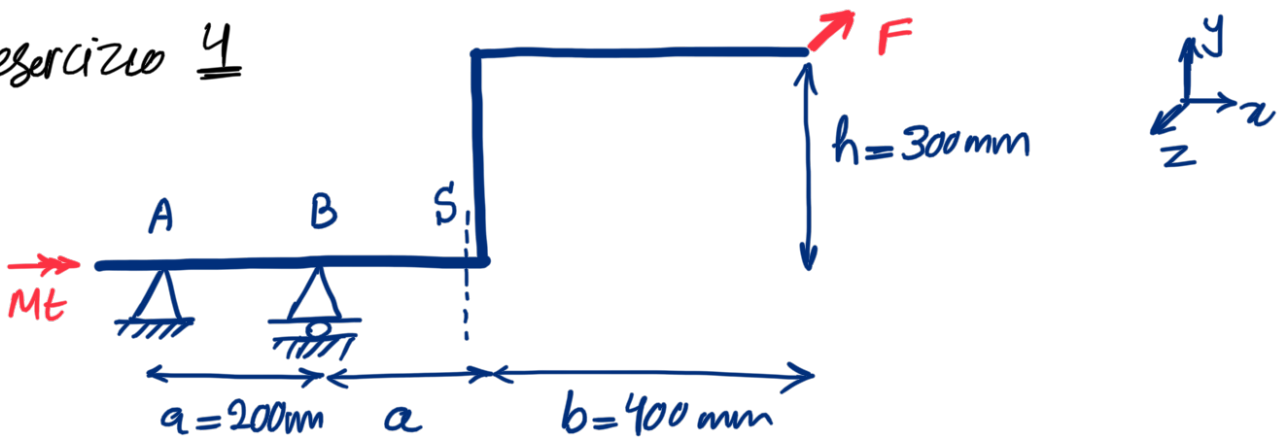
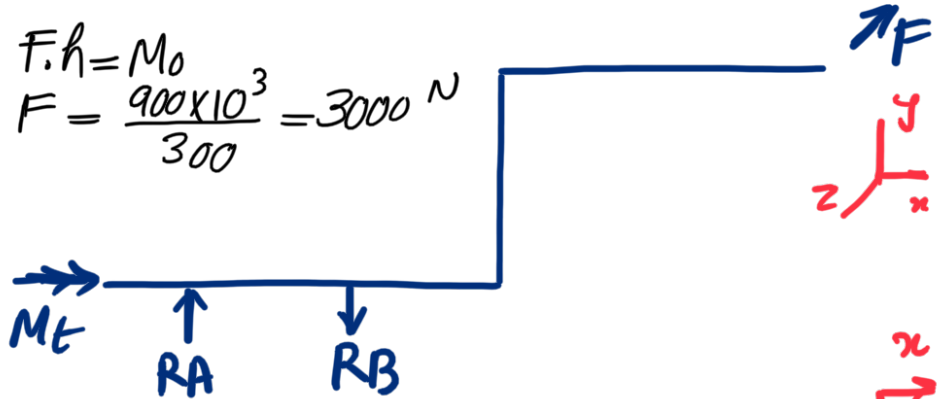


esercizio 4



1) $\sum M_x = 0 \Rightarrow F \cdot h = M_0$
 $\Rightarrow F = \frac{900 \times 10^3}{300} = 3000 \text{ N}$

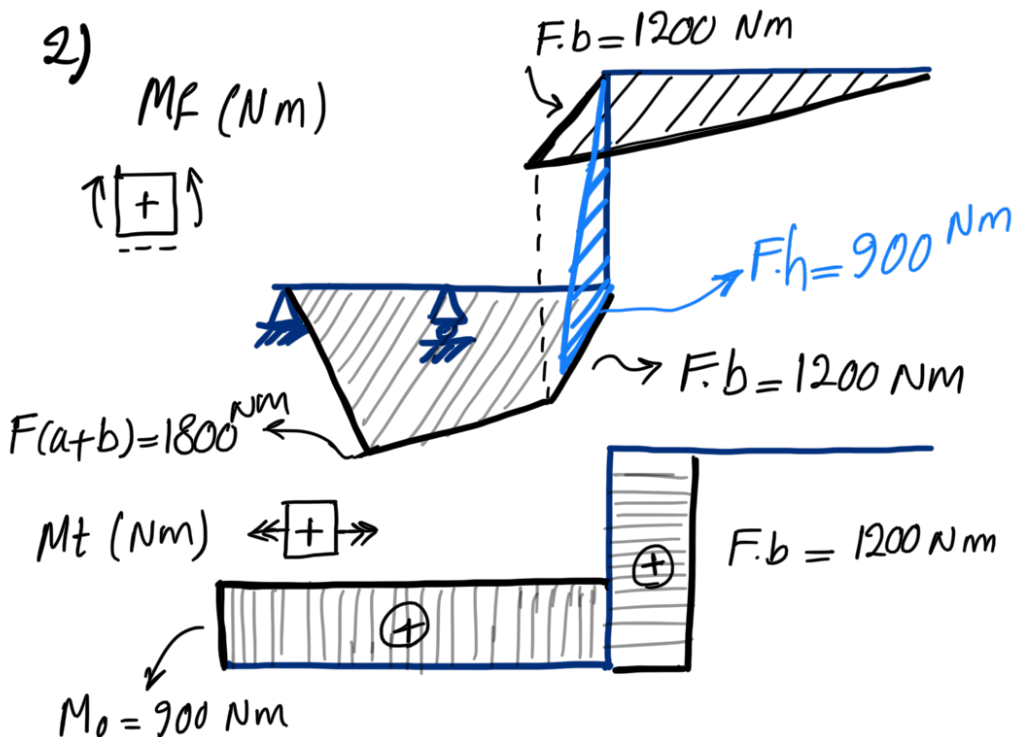


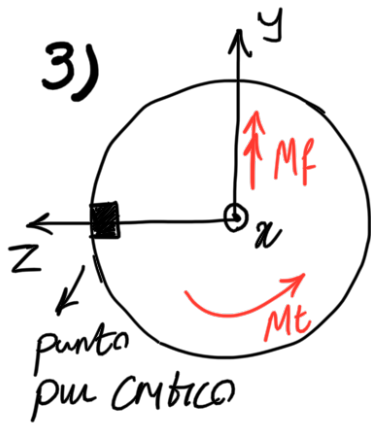
$\sum M_B = 0$
 $\Rightarrow F(a+b) - R_A a = 0$
 $\Rightarrow R_A = \frac{F(a+b)}{a} = 9000 \text{ N}$



$\sum F_z = 0 \Rightarrow R_B = F + R_A = 12000 \text{ N}$

2)





Verifica Statica

$$M_f = F \cdot b = 1200000 \text{ Nmm} \rightarrow \sigma = \frac{32 M_f}{\pi d^3} = 134.135 \text{ Mpa}$$

$$M_t = M_0 = 900000 \text{ Nmm} \rightarrow \tau = \frac{16 M_t}{\pi d^3} = 50.30 \text{ Mpa}$$

plasticizzazione totale: $\sigma_{VM} = \sqrt{\sigma^2 + 3\tau^2} = 159.95 \text{ Mpa} \rightarrow y_{VM} = \frac{159.95}{500} = 3.13 \checkmark$

$$\sigma_{GT} = \sqrt{\sigma^2 + 4\tau^2} = 167.67 \text{ Mpa} \rightarrow y_{GT} = \frac{167.67}{500} = 2.98 \checkmark$$

I° plasticizzazione $\sigma_{VM} = \sqrt{(K_t \sigma)^2 + 3(K_t \tau)^2} = 271.91 \text{ Mpa} \rightarrow y_{VM} = 1.84 \checkmark$

$$\sigma_{GT} = \sqrt{(K_t \sigma)^2 + 4(K_t \tau)^2} = 285.04 \text{ Mpa} \rightarrow y_{GT} = 1.75 \checkmark$$

Sezione verificata

4) Verifica a Fatica

$M_t \rightarrow$ Sinusoidale $\Rightarrow F \rightarrow$ Sinusoidale $\Rightarrow M_f \rightarrow$ Sinusoidale

$$\sigma_a = 134.135 \text{ Mpa} \quad \sigma_m = 0$$

$$\tau_a = 50.30 \text{ Mpa} \quad \tau_m = 0$$

$$K_{ff} = 1 + q(K_{tf} - 1) = 1.63 = K_{ft}$$

$$\sigma'_{FAf} = \frac{0.5 R_m b_2 b_3}{K_{ff}} = \frac{400 \times 0.85 \times 0.85}{1.63} = 177.3 \text{ Mpa}$$

$$\tau'_{FAf} = \frac{0.3 R_m b_2 b_3}{K_{ft}} = \frac{240 \times 0.85 \times 0.85}{1.63} = 106.38 \text{ Mpa}$$

MDA

$$H = \frac{\sigma'_{FAF}}{\tau'_{Fat}} = 1.67 \rightarrow \sigma_{GP}^* = \sqrt{\sigma_a^2 + H^2 \tau_a^2} = 158.18 \text{ MPa}$$

$$\rightarrow \gamma = \frac{\sigma'_{FAF}}{\sigma_{GP}^*} = 1.12$$

$$\tau'_{Fat} = \frac{0.25 R_m b_2 b_3}{K_{ft}} = 88.65 \text{ MPa}$$

Non
Verificata

$$\rightarrow \sigma_{GP}^* = 167.67 \text{ MPa} \rightarrow \gamma = 1.057$$