Tabella 1. Dati

Carichi
$C = 350\ Nm$

Geometria struttura
$a = 150\ mm$
$b = 400\ mm$
$c = 350\ mm$
$r_p = 200\ mm$
$d = 32\ mm$

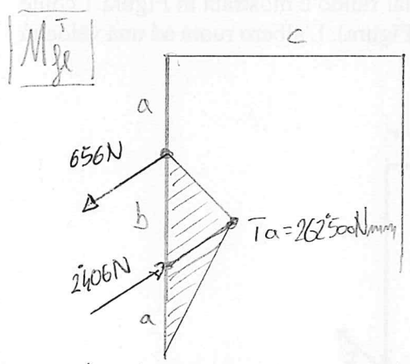
Fattori geometrici/sovrasollecitazioni locali:
$b_2 = 0.9$
$b_3 = 0.9$
$q = 0.85$
$Kt_{f,ang} = 1.8$; $Kt_{t,ang} = 1.6$ (angoli struttura)
$Kt_{f,cus} = 1.4$ (zone alloggiamento cuscinetti)

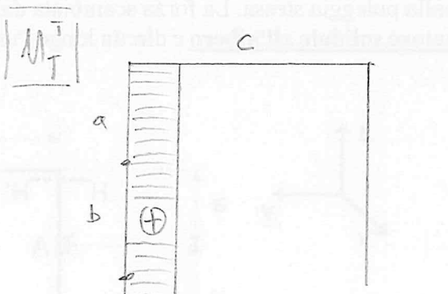
Materiale: 30NiCrMo3
$\sigma_R = 600MPa$
$\sigma_{sn} = 500MPa$

SOLUTION

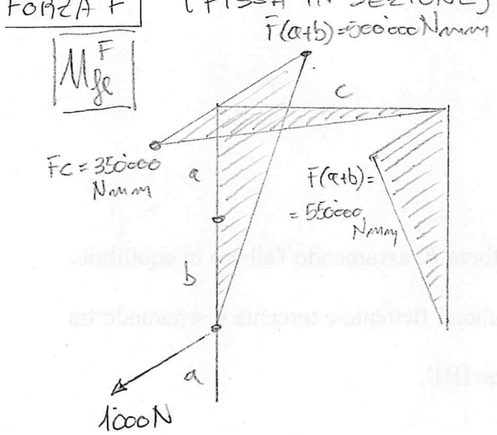
1) $C = T \cdot r_p \quad \Rightarrow \quad T = C/r_p = 1'750N \quad ; \quad F_C = C \quad \Rightarrow \quad F = \frac{C}{c} = 1000N$

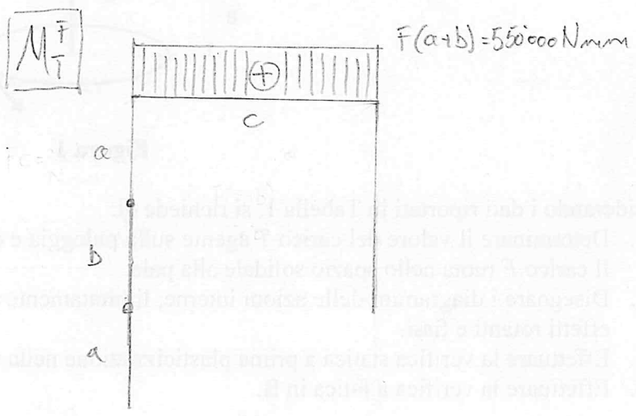
2) FORZA T (ROTANTE IN SEZIONE)





FORZA F (FISSA IN SEZIONE)





3) SEZIONE H-H'

$$M_{fl}^{TOT} = F(a+b) = 550'000\ Nmm$$

$$M_T = M_T^T = 350'000\ Nmm$$

$$\begin{cases} \sigma_{M_{fl}^{TOT}} = \dfrac{32\ M_{fl}^{TOT}}{\pi\ d^3} \simeq 171{,}0\ MPa \\ \tau_{M_T} = \dfrac{16\ M_T}{\pi\ d^3} = 54{,}4\ MPa \end{cases}$$

$$\sigma^*_{GT,MAX} = \sqrt{\left(K_{tf,ang}\ \sigma_{M_{fl}^{TOT}}\right)^2 + 4\left(K_{tt,ang} \cdot \tau_{M_T}\right)^2} \simeq 353{,}6\ MPa$$

$$\sigma^*_{VM,MAX} = \sqrt{\left(K_{tf,ang}\ \sigma_{M_{fl}^{TOT}}\right)^2 + 3\left(K_{tt,ang} \cdot \tau_{M_T}\right)^2} \simeq 342{,}7\ MPa$$

$$n_{GT} = \frac{\sigma_y}{\sigma^*_{GT,MAX}} \simeq \boxed{1{,}41} \quad OK$$

$$n_{VM} = \frac{\sigma_y}{\sigma^*_{VM,MAX}} \simeq \boxed{1{,}46} \quad OK$$

4) CUSCINETTO IN B → SOLO σ ALTERNATA E τ COSTANTE

$$\sigma_a = \frac{32\ (T_a)}{\pi\ d^3} \simeq 81{,}6\ MPa$$

$$\sigma^*_{GP} = \sqrt{\sigma_a^2 + H^2 \tau_m^2} \leq \frac{\sigma_{lim}}{n}$$

$$H = \frac{\sigma_{lim}}{\tau_{lim}} \longrightarrow \begin{cases} \sigma_{lim} = \dfrac{(0{,}5\ \sigma_R) \cdot b_2 b_3}{1 + q\ (K_{tf,m} - 1)} \simeq 181{,}3\ MPa \\ \tau_{lim} = (0{,}8\ \sigma_R) = 480\ MPa \end{cases}$$

$$H \simeq 0{,}38$$

$$\sigma^*_{GP} \simeq 84{,}1\ MPa \quad \Rightarrow \quad \boxed{n \simeq 2{,}15} \quad (OK)$$