$$\sum F = 0$$

$$\sum M = 0$$

$q =$ puntuale if reazioni vincolari true

else $q \neq$ puntuale

$$C_c = C_m \frac{w_m}{w_c} = C_m \frac{Z_2}{Z_1}$$

$$C = \frac{\sigma_A + \sigma_B}{2}$$

$$R = \sqrt{(C - \sigma_B)^2 + \tau_B^2}$$

$$\sigma_1 > \sigma_2 > \sigma_3 \rightarrow @\tau = 0$$

$$\alpha_A = \frac{1}{2} \arcsin\left(\frac{\tau_A}{R}\right)$$

$$q = \frac{dT}{dx} = EJv^{IV}$$

$$T = -\frac{dM}{dx}$$

$$M = -EJ\frac{d^2v}{dx^2}$$

$$v'(x_{max}) = 0$$

$$\sigma_x = \frac{N}{A} + \frac{M}{J_y}y$$

Rettangolo: $J_x = \frac{bh^3}{12}$

Circolare: $J_x = \frac{\pi D^4}{64} = J_y \implies J_p = \frac{\pi D^4}{32}$

$$J_p = J_x + J_y$$

Flettente $\implies$ J_x e J_y

Torcente $\implies$ J_p

$$\sigma_{rect\,max} = \frac{6M_f}{bh^2}$$

$$\sigma_{circ\,max} = \frac{32M_f}{\pi D^3}$$

$$\tau_{rect\,max} = \frac{2}{3}\frac{T}{A}$$

$$\tau_{circ\,max} = \frac{4}{3}\frac{T}{A}$$

$$\tau_{M_t} = \frac{16 \cdot M_t}{\pi D^3}$$

Sezione Cava: $\sigma = \frac{32M_f D_2}{\pi(D_2^4 - D_1^4)}$

$$\sigma = E\varepsilon$$

$$\sigma_{eq} < \frac{\sigma_{lim}}{\eta}$$

$$\tau^* < \frac{\tau_{lim}}{\eta}$$

$$\sigma^*_{GT} = \sqrt{\sigma^2 + 4\tau^2} = \sigma_I - \sigma_{III}$$

$$\sigma^*_{VM} = \sqrt{\sigma^2 + 3\tau^2}$$

$$= (\sigma_I^2 + \sigma_{II}^2 + \sigma_{III}^2 - \sigma_I\sigma_{II} - \sigma_I\sigma_{III} - \sigma_{II}\sigma_{III})^{1/2}$$

$$\sigma_{nom} = \frac{F}{(h-d)b}$$

$$k_T = \frac{\sigma_{max}}{\sigma_{nom}}$$

Plasticizzazione Totale $\implies$ σ_n e τ_n

Prima Plasticizzazione $\implies$ σ_{max} e τ_{max}

$$\sigma_{Faf} = 0,5R_m$$

$$\tau_{FAt} = 0,25R_m$$

$$k_f = q(k_t - 1) + 1$$

$$\sigma'_{FA} = \frac{\sigma_{FA} b_2 b_3}{k_f}$$

$\eta = 1,5 \implies$ Duttili Statico

$\eta = 3 \implies$ Fragile Statico

$\eta = 2 \implies$ Dinamico

$$R = \frac{\sigma_{min}}{\sigma_{max}}$$

$R = -1 \implies \sigma_{lim} = \sigma'_{FA}$

$R = 0 \implies \sigma_{lim} = \left(\frac{1}{\sigma'_{FA}} + \frac{1}{R_m}\right)^{-1}$

else:

$$\sigma_{alim} = \frac{\sigma^*_a}{\sigma^*_m}\sigma_{mlim}$$

$$\frac{\sigma_{alim}}{\sigma'_{FA}} + \frac{\sigma_{mlim}}{R_m} = 1$$

$$\left(\frac{\sigma_a}{\sigma_{FAf}}\right)^2 + \left(\frac{\tau_a}{\tau_{FAt}}\right)^2 = 1$$

$$\sigma^*_{GP} = \sqrt{\sigma_a^2 + H^2\tau^2}$$

if $\tau = cost = \tau_m \implies H = \frac{\sigma_{lim}}{0,77R_m} \leftarrow \left(\tau_{lim} = \frac{R_s}{\sqrt{3}}\right)$

elif $\tau = \tau_a \implies H = \frac{\sigma_{lim}}{\tau'_{FAt}} if \sigma_m \nexists \implies \sigma_{lim} = \sigma'_{FAt}$

$$align$$

$$\overline{\overline{\sigma}} \begin{bmatrix} \sigma_{xx} & \tau_{xy} & \tau_{xz} \\ \tau_{yx} & \sigma_{yy} & \tau_{yz} \\ \tau_{zx} & \tau_{zy} & \sigma_{zz} \end{bmatrix}$$