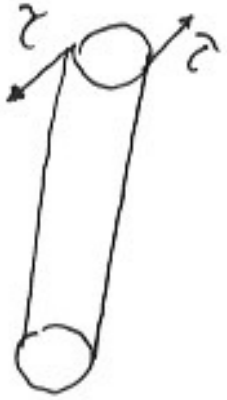
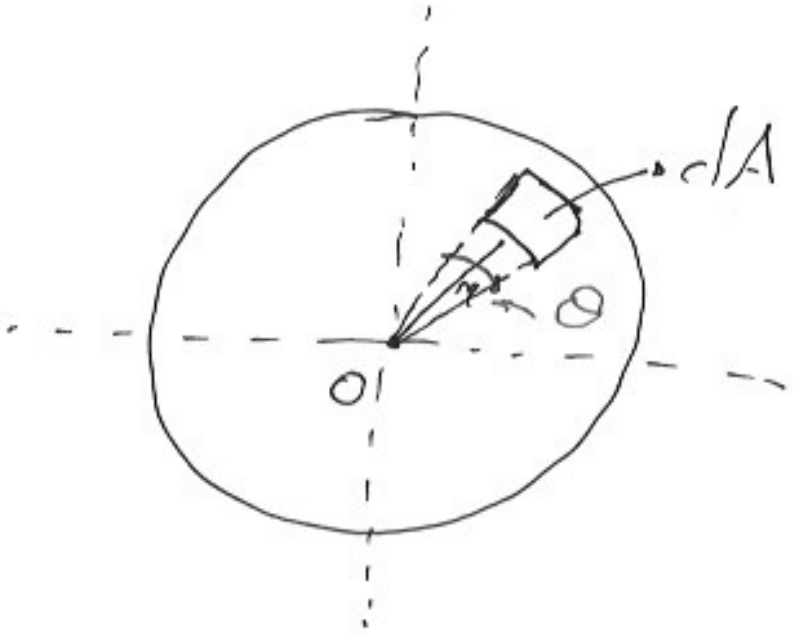
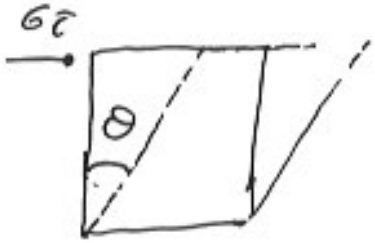
Stress normale

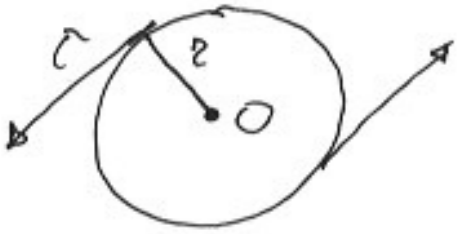
$$\sigma = \frac{F}{A}$$





sforzo di taglio





$$M_t = \tau \cdot r$$

J = momento di Inerzia Torsionale

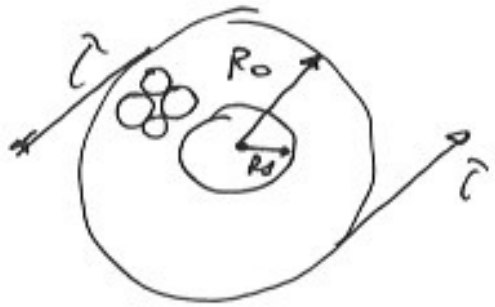
$$\sigma_\tau = \frac{M_t \cdot r}{J}$$

$$J = \sum r^2 dA = \int_S r^2 dA \qquad dA = r\, dr\, d\theta$$

$$J = \int_S r^3 dr\, d\theta = \iint r^3 dr\, d\theta = \int_0^{2\pi} d\theta \int_0^r r^3 dr = 2\pi \frac{r^4}{4} = \pi \frac{r^2}{2}$$

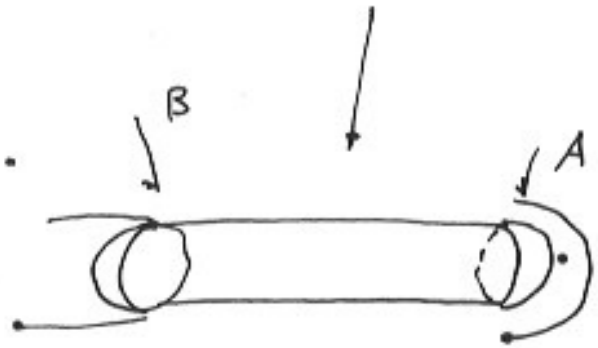
(2)

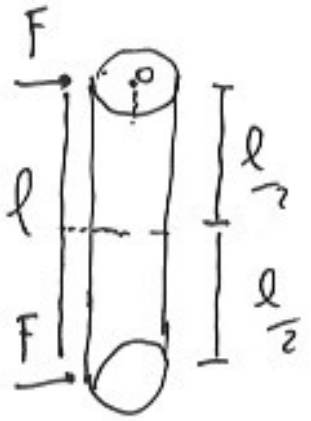
$$J = \frac{\pi}{2}\left(R_o^4 - R_i^4\right)$$



$$\sigma_r = \frac{M_f \cdot r}{\frac{\pi}{2}\left(R_o^4 - R_i^4\right)}$$

Forza di bending



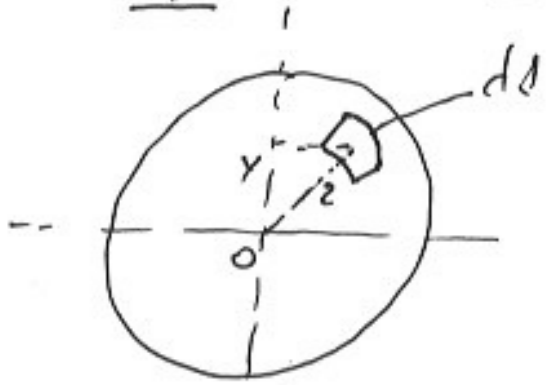


$$M_b = F \cdot \frac{l}{2}$$

$$\sigma_b = \frac{M_b \cdot r}{I}$$

I = momento di bending

$$I = \sum y^2 dA$$



$$y = r \cdot \cos\theta \qquad y^2 = r^2 \cos^2\theta$$

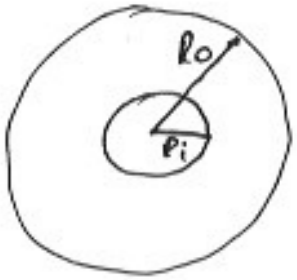
$$I = \int_S \rho^2 \cos^2\theta \cdot \rho \, d\rho \, d\theta = \iint \rho^3 d\rho \cos^2\theta d\theta = \int \rho^3 d\rho \int \cos^2\theta d\theta$$

$$= \frac{r^4}{4} \int \cos^2\theta d\theta \qquad \cos^2\theta = \frac{1+\cos 2\theta}{2}$$

$$\int \cos^2\theta \, d\theta = \int \frac{1+\cos^2\theta}{2} \, d\theta = \int_0^{2\pi} \frac{1}{2} \, d\theta + \int_0^{2\pi} \frac{\cos 2\theta}{2} \, d\theta = \frac{1}{2} \cdot 2\pi = \pi$$

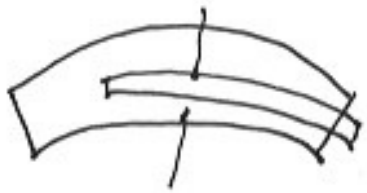
"ϕ

$$I = \frac{\pi}{4} r^4$$



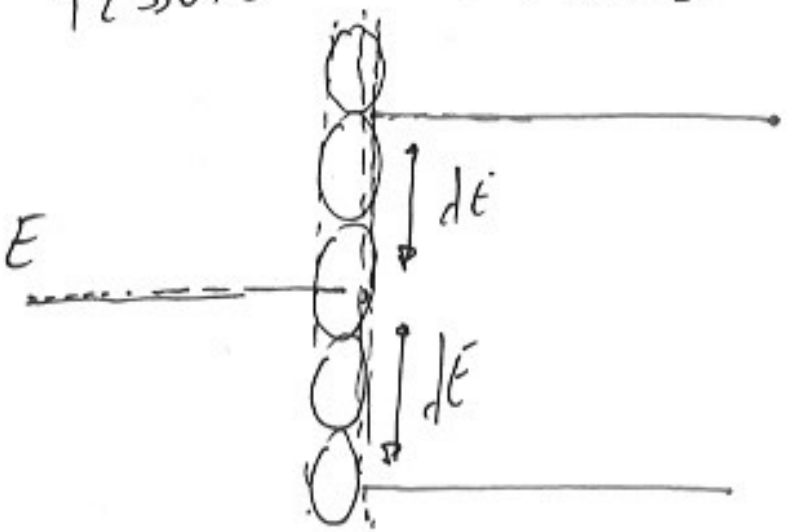
$$I = \frac{\pi}{4} (R_o^4 - R_i^4)$$

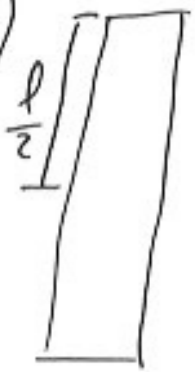
$$\sigma_b = \frac{M_b \cdot r}{\frac{\pi}{4}(R_o^4 - R_i^4)}$$

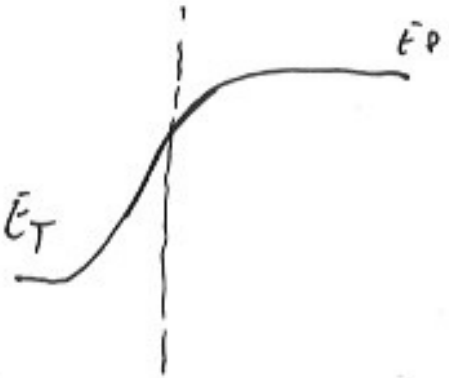


TESSUTO

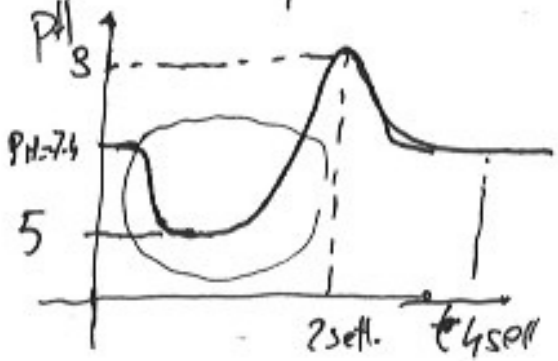
Protesi

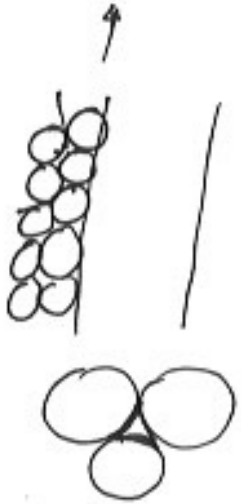






$$E = E_0 (1 - p)^{\alpha}$$



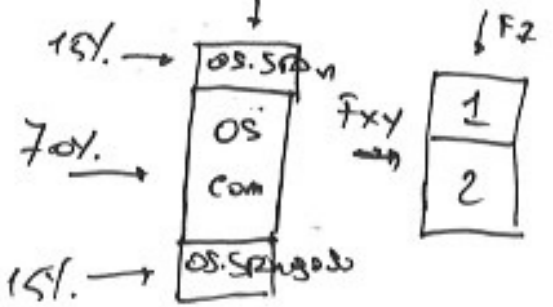


$$\varepsilon_{osso\,sano} = \varepsilon_{osso\,residuo+protesi}$$

$$\sigma = \varepsilon E \qquad \varepsilon = \frac{\sigma}{E}$$

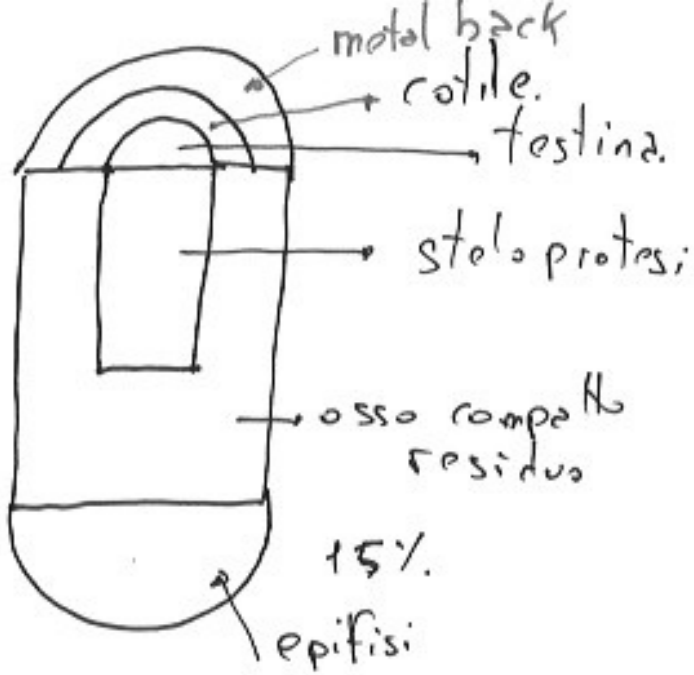
$$\frac{\sigma_{osso\,sano}}{E_{osso\,sano}} = \frac{\sigma_{osso\,residuo+protesi}}{E_{osso\,residuo+protesi}}$$

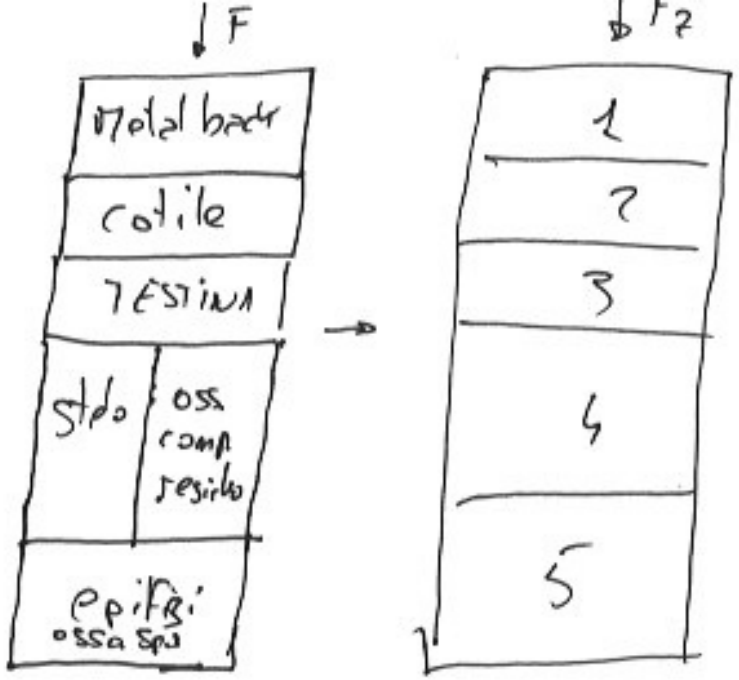
$$\boxed{E_{osso\,sano} = E_{osso\,residuo+protesi}}$$



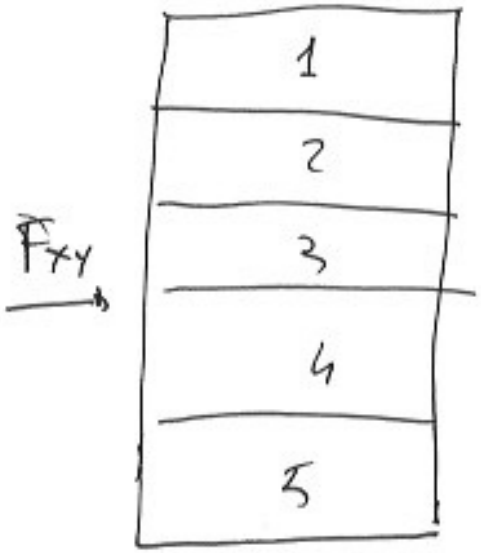
$$E^{z}_{oss.\,sano} = \frac{E^{z}_{oc} \cdot E_{os}}{f_{os} \cdot E^{z}_{oc} + f_c E_{os}}$$

$$E^{-xy} = E_{oc} \cdot f_{oc} + E_{os} \cdot f_{os}$$


metal back
cotile.
testina.
stelo protesi
osso compatto residuo
15%
epifisi


F
metal back
cotile
TESTINA
stelo
oss. comp. residuo
epifisi ossa spu
F2
1
2
3
4
5

$$f_s = \frac{V_s}{V_T}$$


1
2
3
4
5
Fxy