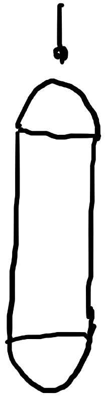
$\varepsilon_{oss\ sano} = \varepsilon_{oss\ protesi}$

puntuale semplificato



sistema II

I

II

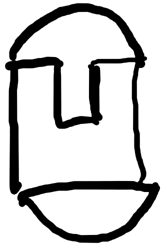
$$\varepsilon_z = \frac{R_z}{2\pi R_{1ep}^2} \cdot \frac{1}{E_{os}} + \frac{R_z}{\pi R_{om}^2} \cdot \frac{1}{E_{oc}^z} + \frac{R_z}{2\pi R_{2ep}^2} \cdot \frac{1}{E_{os}}$$

$$\varepsilon_{xy} = \frac{R_{xy}}{\frac{2}{3}\pi \frac{R_{1ep}^3}{h_{1ep}}} \cdot \frac{1}{E_{os}} + \frac{R_z}{2\pi R_{om} h_{om}} \cdot \frac{1}{E_{oc}^{xy}} + \frac{R_{xy}}{\frac{2}{3}\pi \frac{R_{2ep}^3}{h_{2ep}}} \cdot \frac{1}{E_{os}}$$

parametri da determinar

R_t

R_{st}, h_{st}

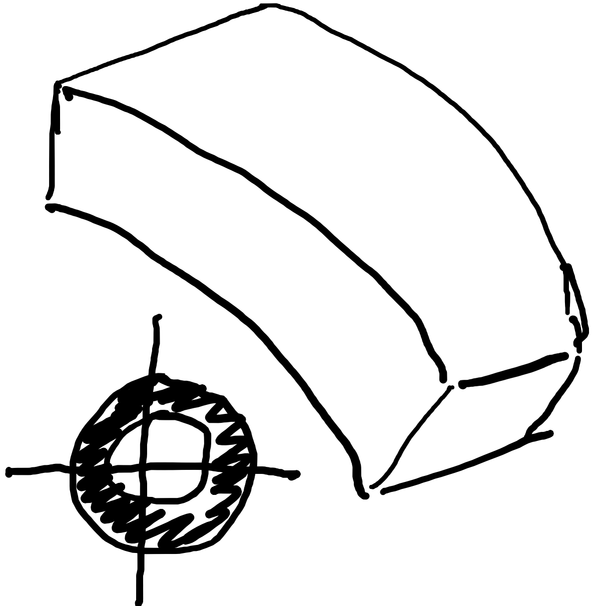


$$\varepsilon_z = \frac{R_z}{2\pi R_{tes}^2} \cdot \frac{1}{E_{Tes}} + \frac{R_z}{\pi(R_{om}^2 - R_{st}^2)} \cdot \frac{1}{E_{oc.R.}^z} + \frac{R_z}{\pi R_{ep}^2} \cdot \frac{1}{E_{osr}} + \frac{R_z}{\pi R_{st}^2} \cdot \frac{1}{E_{st}}$$

$$\varepsilon_{xy} = \frac{R_{xy}}{\frac{2}{3}\pi \frac{R^3_{test}}{h_{test}}} \cdot \frac{1}{E_{TEST}} + \frac{R_{xy}}{2\pi R_{om} h_{om}} \cdot \frac{1}{E^{xy}_{oct}} + \frac{R_{xy}}{2\pi R_{st} h_{st}} \cdot \frac{1}{E_{st}}$$

$$+ \frac{R_{xy}}{\frac{2}{3}\pi \frac{R^3_{epi}}{h_{epi}}} \cdot \frac{1}{E_{os.res}}$$

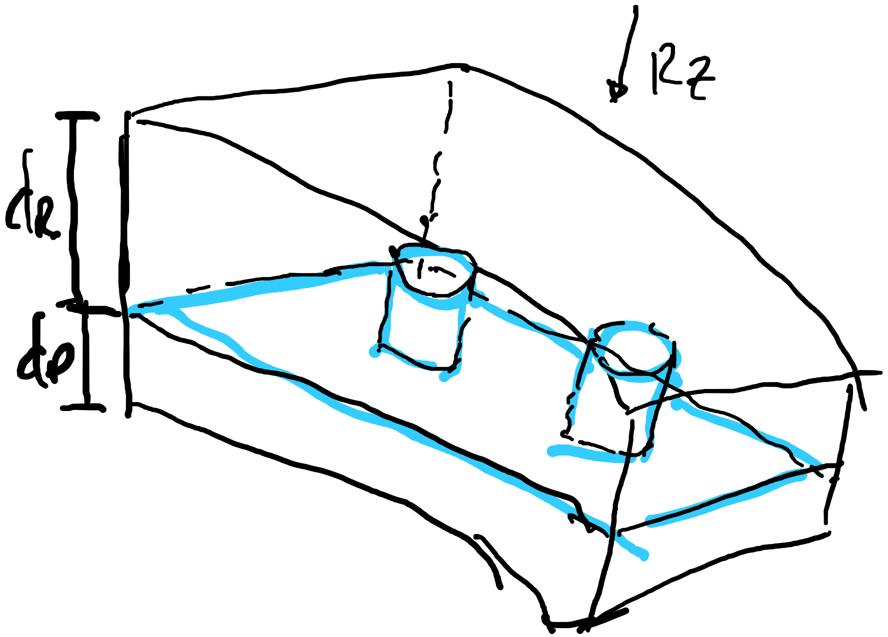
$\sigma_z = \sigma_{xy}$ $\qquad$ $\dfrac{R_z}{\pi R^2_{st}} = \dfrac{R_{xy}}{2\pi R_{st} h_{st}}$

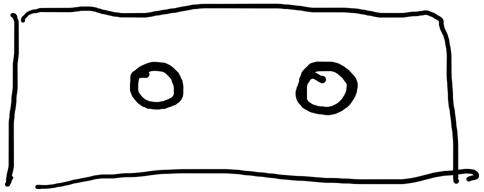


zona glenoidea $\qquad$ osso compatto

superficie $\frac{1}{4}$ di sfera

$$\varepsilon_z = \frac{R_z}{\pi R^2_{glenoide}} \cdot \frac{1}{E^z_{oc}} \qquad \varepsilon_{xy} = \frac{R_{xy}}{\frac{1}{4}\pi\left(R^2_{est\,gl} - R^2_{int\,gl}\right)} \cdot \frac{1}{E^{xy}_{oc}}$$





parametri da determinare

r_p, h_p

Sp glenoide.

$$\varepsilon_z = \frac{R_z}{\pi R_{est\,gl}^2}\cdot\frac{1}{E_{ocr}^{z}} + \frac{R_z}{\pi (R_{int\,gl}+\delta_p)^2}\cdot\frac{1}{E_p}$$

Spes

$$d_{glenoide} = R_{gl}^{est} - R_{gl}^{int} = d_{pr} + d_{res}.$$

$$\varepsilon_{xy} = \frac{R_{xy}}{\frac{\pi}{4}\left[R_{esl}^2 - (R_{int}+\delta_p)^2\right]}\cdot\frac{1}{E_{ocr}^{xy}} + \frac{R_{xy}}{4\pi R_p h_p}\cdot\frac{1}{E_{pr}} + \frac{R_{xy}}{\frac{\pi}{4}\left[(R_{int}+\delta_p)^2 - R_{int}^2\right]}\cdot\frac{1}{E_{pr}}$$

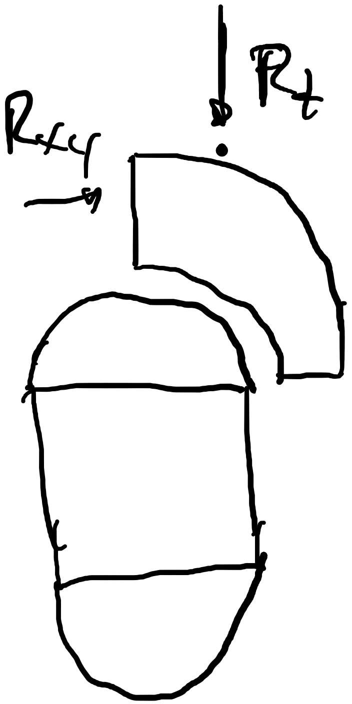
$$\sigma_z = \sigma_{xy}$$

$$\frac{R_t}{\pi \left(R_{int\,gl} + t_{\epsilon}\, \rho \right)^2} = \frac{R_{xy}}{4 \pi r_\rho h_\rho}$$

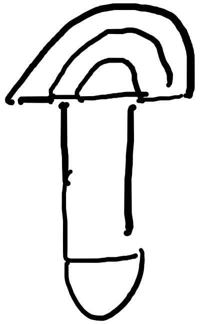
$$\delta\rho = R_{est\,\rho} - R_{int\,\rho}$$

protesi

R_p, h_p
δp
R_t
R_{ct}, h_{st}

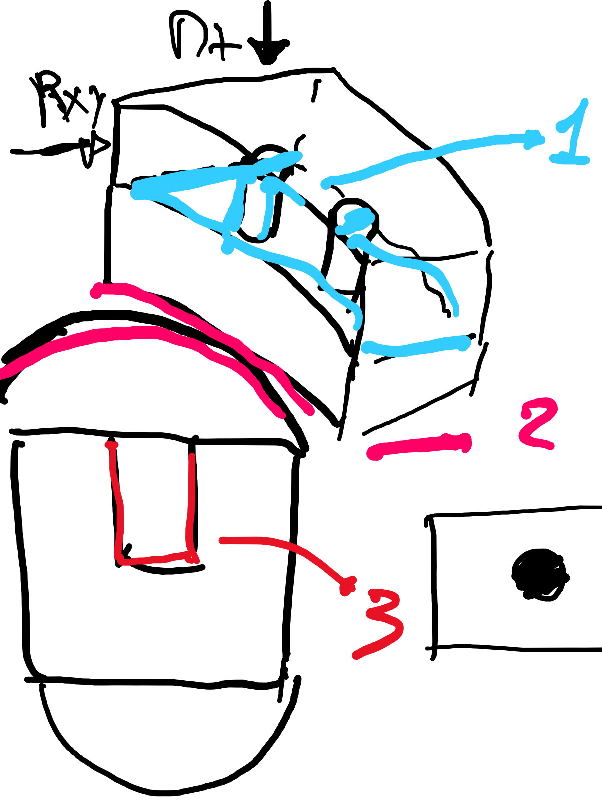


Sano



$$\varepsilon_z = \frac{R_z}{\pi R^2_{est\,gl}} \frac{1}{E^{z}_{ocg}} + \frac{R_z}{2\pi R^2_{ep1}} \cdot \frac{1}{E_{os}} + \frac{R_z}{\pi R^2_{om}} \cdot \frac{1}{E^{t}_{ocom}} + \frac{R_z}{\pi R^2_{ep2}} \frac{1}{E_{os}}$$

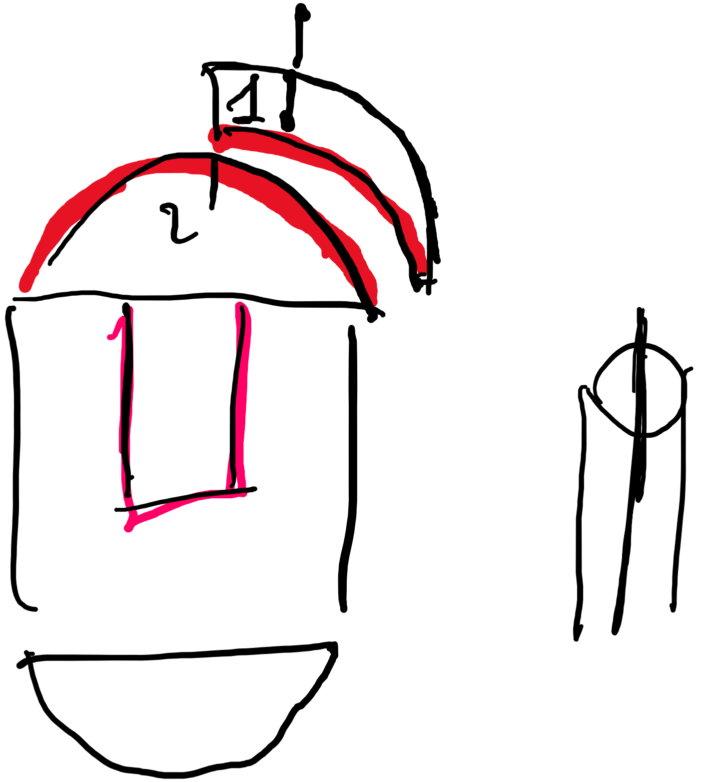
$$\varepsilon_{xy} = \frac{R_{xy}}{\frac{1}{4}\pi\left(R^{est\,2}_{gl} - R^{int\,2}_{gl}\right)} \cdot \frac{1}{E^{xy}_{ocg}} + \frac{R_{xy}}{\frac{2}{3}\pi \frac{R^3_{ep1}}{h_{ep1}}} \cdot \frac{1}{E_{os}} + \frac{R_{xy}}{2\pi R_{om} h_{om}} \cdot \frac{1}{E^{xy}_{oc.om}} + \frac{R_{xy}}{\frac{2}{3}\pi \frac{R^3_{ep2}}{h_{ep2}}} \cdot \frac{1}{E_{os}}$$



$$\varepsilon_z = \frac{R_z}{\pi R^2_{estg}} \cdot \frac{1}{E^z_{oc.res\,g}} + \frac{R_z}{\pi (R_{intg}+\delta_p)^2} \cdot \frac{1}{E_{pr1}} + \frac{R_z}{2\pi R^2_{tes}} \cdot \frac{1}{E_{pr2}} + \frac{R_z}{\pi R^2_{st}} \cdot \frac{1}{E_{pr1}} + \frac{R_z}{\pi (R^2_{om} - R^2_{st})} \cdot \frac{1}{E^z_{oc.r.om}} + \frac{R_z}{\pi R^2_{ep2}} \cdot \frac{1}{E_{os.r}}$$

$$\varepsilon_{xy} = \frac{R_{xy}}{\frac{1}{4}\pi [R^2_{estg} - (R_{intg}+\delta_p)^2]} \cdot \frac{1}{E^{xy}_{oc.res.g}} + \frac{R_{xy}}{4\pi R_{php}} \cdot \frac{1}{E_{pr1}} + \frac{R_{xy}}{\frac{1}{4}\pi [(R_{intg}+\delta_p)^2 - R^2_{intg}]} \cdot \frac{1}{E_{pr1}} + \frac{R_{xy}}{\frac{2}{3}\pi \frac{R^3_{tes}}{h_{tes}}} \cdot \frac{1}{E_{pr2}} + \frac{R_{xy}}{2\pi R_{om} h_{om}} \cdot \frac{1}{E^{xy}_{ocr}} + \frac{R_{xy}}{2\pi R_{st} h_{st}} \cdot \frac{1}{E_{pr2}} + \frac{R_{xy}}{\frac{2}{3}\pi \frac{R^3_{ep2}}{h_{ep2}}} \cdot \frac{1}{E_{os.r}}$$

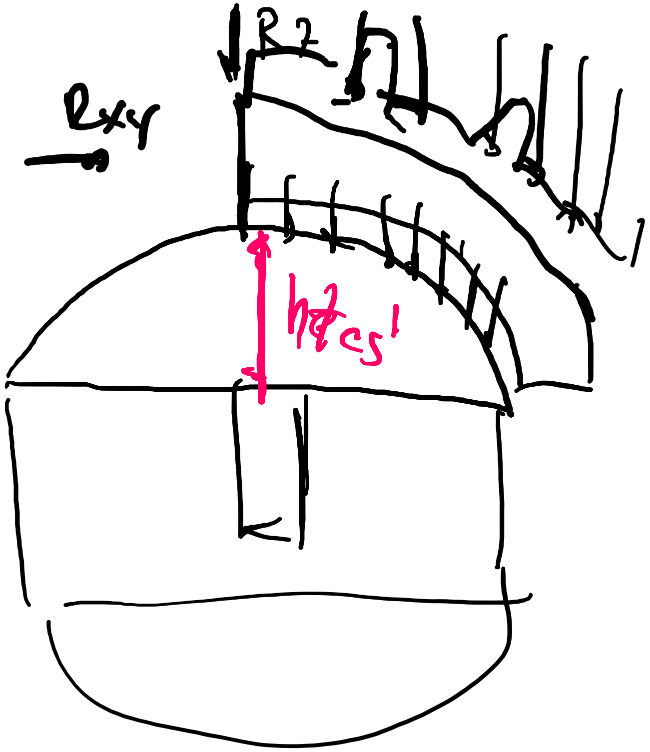
1) $$\frac{R_z}{\frac{\pi}{4}(R'_{int\,g}+\delta_p)^2} = \frac{R_{xy}}{4\pi R_p h_p}$$



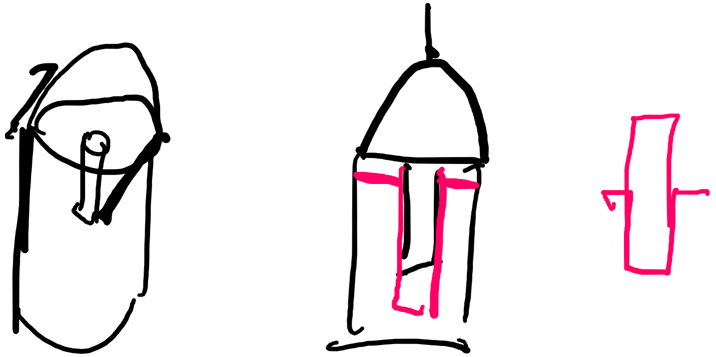
2) $$\frac{R_z}{\pi R^2_{int\,g}} = \frac{R_{xy}}{\frac{2}{3}\pi \frac{R^3_{test}}{h_{test}}}$$

3) $$\frac{R_z}{\pi R^2_{st}} = \frac{R_{xy}}{2\pi R_{st} h_{st}}$$

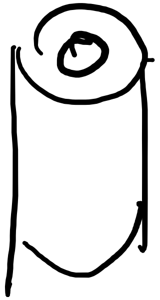
$$\sigma_T = \frac{M_{TOR} \cdot braccio}{J} \qquad \sigma_b = \frac{M_b \cdot braccio}{I}$$



$$M_{TOR} = (R_z \cdot h_{test})$$



$$\sigma_T = \frac{M_{TOR} \cdot h_{test}}{J}$$

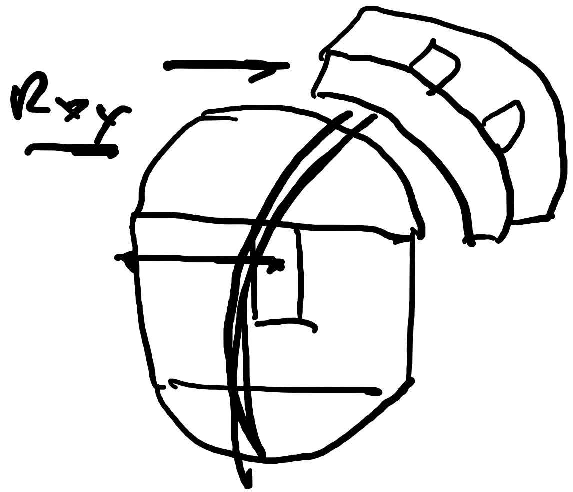


$$J = \frac{\pi}{2}\left(R_{est}^4 - R_{int}^4\right)$$

$$J = \frac{\pi}{2} R_{test}^4$$

$$\sigma_T = \frac{M_{TOR} \cdot h_{test}}{\frac{\pi}{2} R_{test}^4}$$

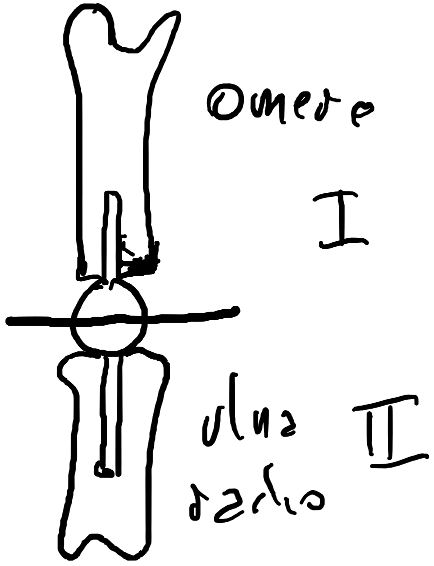
$$\sigma_b = \frac{M_b \cdot \text{braccio}}{I}$$

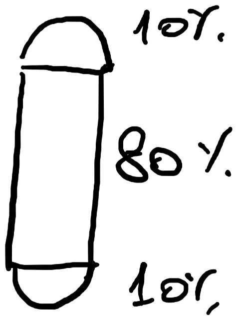


$$M_b = \frac{(M_{vs} \cdot r_{om}) \cdot r_{om}}{I}$$

$$I = \frac{\pi}{4}\left(R_{est}^4 - r_{int}^4\right)$$

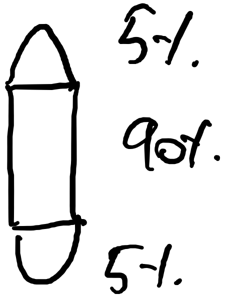
$$I = \frac{\pi}{4}\left[R_{om}^4 - r_{st}^4\right]$$





$$E_z^{om} = \frac{E_c^z E_s}{0.2\, E_c^z + 0.8\, E_s}$$

$$E_{xy}^{om} = 0.2\, E_s + 0.8\, E_c^{xy}$$



$$E_z^{ul} = \frac{E_c^z E_s}{0.1\, E_c^z + 0.9\, E_s}$$

$$E_{xy}^{ul} = 0.1\, E_s + 0.9\, E_c^{xy}$$

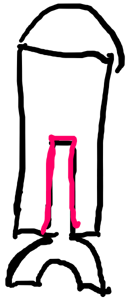
I°

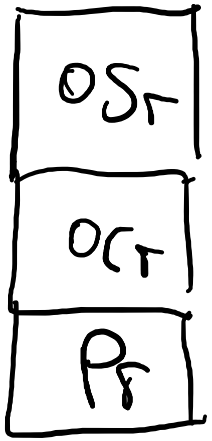
$\overset{\circ}{z}_{st}, \overset{\circ}{h}_{st}, \overset{\circ}{z}_{\delta ext}, \overset{\circ}{z}_{int\,\delta}$

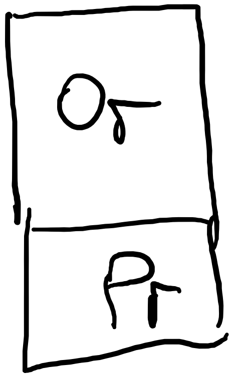
II°

$\overset{\cup}{z}_{st}, \overset{\cup}{h}_{st}, \overset{\cup}{z}_{\delta}$

Omerale







$$E_z = \frac{E_{or}^z \, E_{pr}}{f_{pr} E_{or}^z + f_{or} E_{pr}}$$

$$E_{xy} = f_{pr} E_p + f_{or} E_{or}^{xy}$$

$$f_{pr} + f_{or} = 1$$

$$V_{TOT} = \frac{2\pi}{3} R_{ep}^3 + \pi R_{om}^2 h_{omt} + \frac{2}{3}\pi\left(R_{est\,g}^3 - R_{int\,g}^3\right)$$

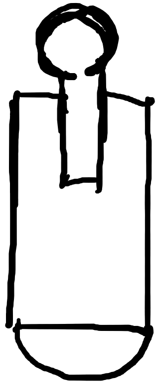
$$\frac{R_z}{\pi R_{st}^2} = \frac{R_{xy}}{2\pi R_{st} h_{st}}$$

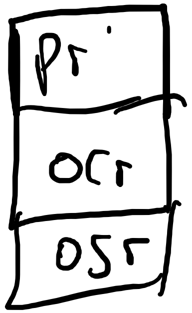
$$f_p = \frac{\frac{2}{3}\pi\left(R_{est\,g}^3 - R_{int\,g}^3\right) + \pi R_{st}^2 h_{st}}{V_{TOT}}$$

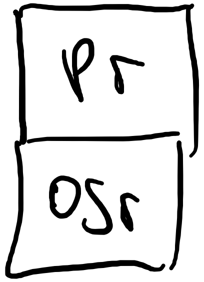
$$R_{est\,g} \leq R_g.$$

$$f_{os} = \frac{\frac{2}{3}\pi R_{ep}^3 + \pi R_{om}^2 h_{om} - \pi R_{st}^2 h_{st}}{V_{Tot}}$$

ULNARE







$$E_z = \frac{E_{pr} \cdot E_{or}^{z\,u2}}{f_p E_{or}^{u2} + f_{or} \cdot E_{pr}}$$

$$E_{xy} = f_p E_{pr} + E_{or}^{xy\,u2} f_{or}.$$

$$f_p + f_{or} = 1$$

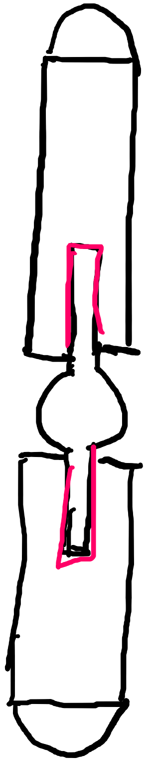
R_{st}^{u2}, h_{st}^{u2}, R_g^{u2}

$$R_g^{u2} = R_{in\,g}^{om}$$

$$V_{TOT} = \frac{2}{3}\pi R^3_{ep\,u2} + \pi R^2_{u2} \cdot h_{u2} + \frac{4}{3}\pi R^3_{g\,u2}.$$

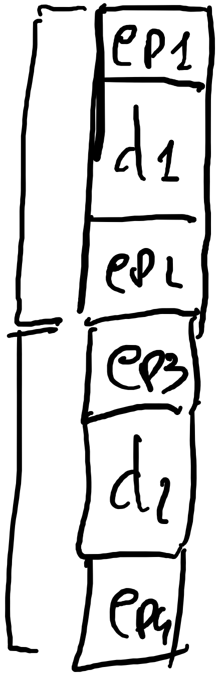
$$f_p = \frac{\pi R^2_{st} h_{st} + \frac{4}{3}\pi R^3_{g\,u2}}{V_{TOT}} \qquad f_{or} = \frac{\frac{2}{3}\pi R^3_{ep\,u2} + \pi R^2_{u2} h_{u2} - \pi R^2_{st} h_{st}}{V_{TOT}}$$

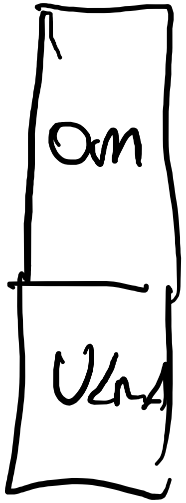
$R_{guz} + \delta_{gom} > R_{gom}.$

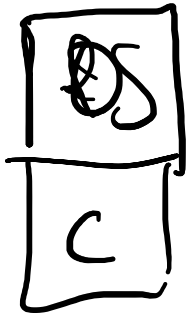


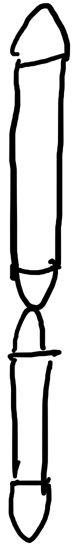
2st, hst
2st, hst

2g < 2guz
2int gom = 2guzo
2est gom.



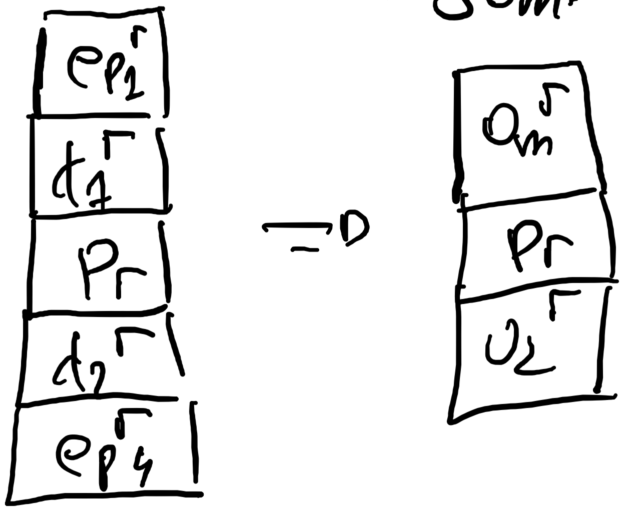


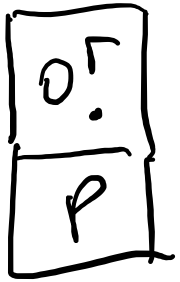




$$E_z = \frac{E_{oc}^{z} \cdot E_{os}}{0.15 E_{oc}^{z} + 0.85 E_{os}}$$

$$E_{xy} = 0.15 E_{os} + 0.85 E_{oc}^{\cancel{z}xy}$$





$$E_z = \frac{E_{or}^{z} E_p}{f_p E_{or}^{z} + f_{or} E_p}$$

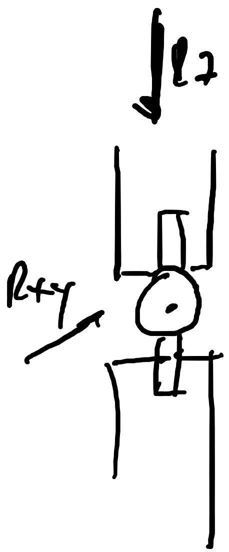
$$E_{xy} = f_{or} E_{or}^{xy} + f_p E_p$$

$$f_{or} + f_p = 1$$

$$\frac{R_z}{\pi R^2_{stom}} = \frac{R_{xy}}{2\pi R_{stom} h_{stom}}$$

$$\frac{R_z}{\pi R^2_{stuz}} = \frac{R_{xy}}{2\pi R_{stuz} h_{stuz}}$$

$$\sigma_{TOR} = \frac{M_{TOR} \cdot b}{J}$$



a) $M_{TOR} = R_{xy} \cdot R_g$

b) $M_{TOR} = R_{xy} (R_{gul} + \delta_{gom})$

a) $$\frac{R_{xy} R^2_g}{\frac{\pi}{2} R_g^4} = \sigma_{TOR} = \frac{R_{xy}}{\frac{\pi}{2} R_g^2}$$

b) $$\frac{R_{xy} (R_{gul} + \delta_{gom})^2}{\frac{\pi}{2} \left[(R_{gul} + \delta_{gom})^4 - R_{gul}^4 \right]}$$