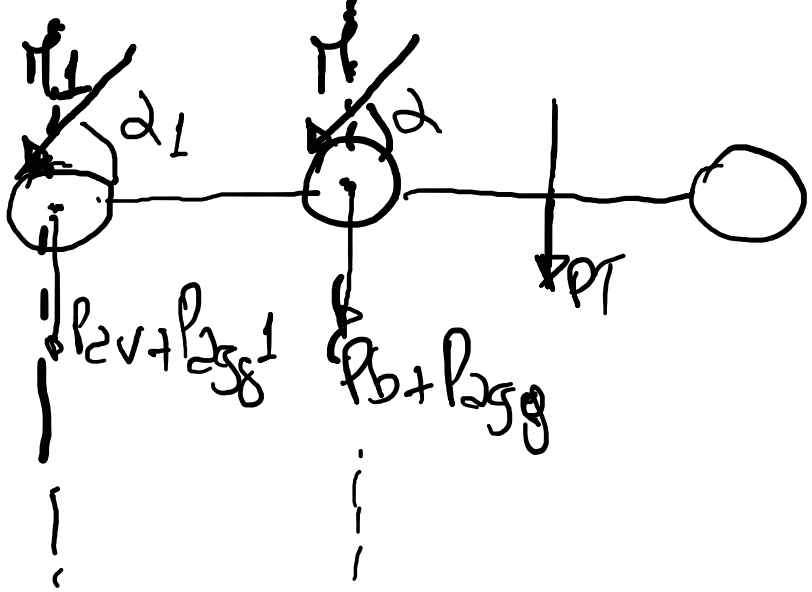
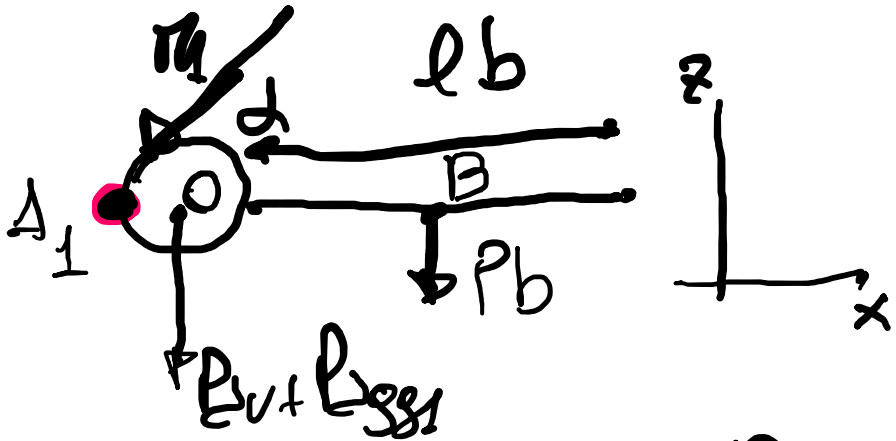


$\alpha = 30°$

$\alpha_1 = \alpha = 30°$

$P_{2gg} = P_{2gg1} = 100\ N$

l_b = lunghezza braccio

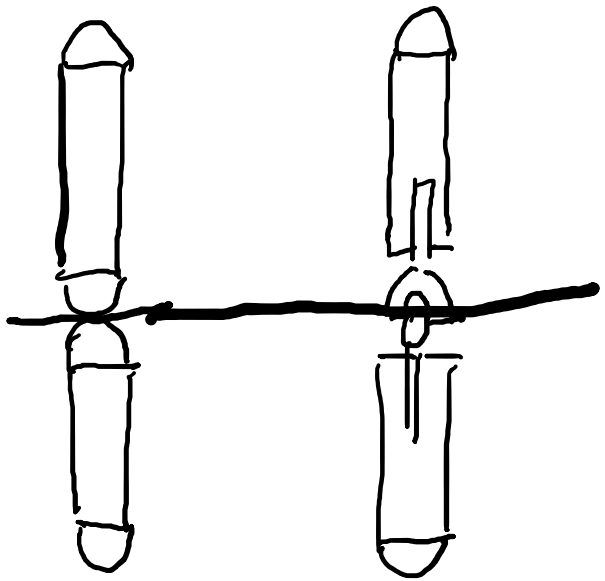


$\Pi_1 \cdot OA_1 = P_b \cdot OB$

$\Pi_1 = P_b \cdot \frac{OB}{OA_1} = P_b \frac{l_b}{2 \cdot 2 \cdot 8 \cdot 8}$

$R_z = -P_b - P_{2v} - P_{2gg1} - \Pi_1 \sin\alpha$

$R_{xy} = -\Pi_1 \cos\alpha$



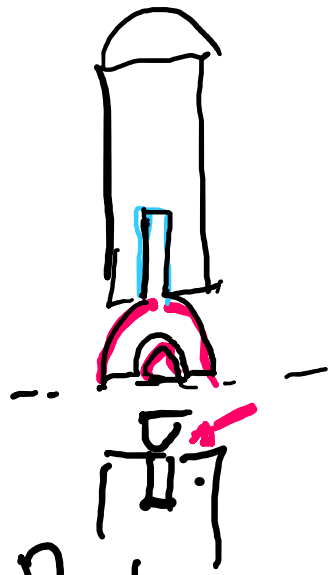
$$\varepsilon_{z\,osso} = \varepsilon_{z\,osso+protesi}$$

Omerale

sano

$$\varepsilon_z = \frac{R_z}{2\pi R_{1ep}^2} \cdot \frac{1}{\hat{E}_{os}} + \frac{R_z}{\pi R_{om}^2} \cdot \frac{1}{E_{oc}^z} + \frac{R_z}{\pi R_{ep1}^2} \cdot \frac{1}{\hat{E}_{os}}$$

$$\varepsilon_{xy} = \frac{R_{xy}}{\frac{2}{3}\pi \frac{R_{ep1}^3}{h_{ep1}}} \cdot \frac{1}{\hat{E}_{os}} + \frac{R_{xy}}{\pi R_{om} \cdot h_{om}} \cdot \frac{1}{E_{oc}^{xy}} + \frac{R_{xy}}{\frac{2}{3}\pi \frac{R_{ep1}^3}{h_{ep1}}} \cdot \frac{1}{\hat{E}_{os}}$$



$$\varepsilon_z = \frac{R_z}{2\pi R^2_{cpl}} \cdot \frac{1}{E_{os.r}} + \frac{R_z}{\pi R^2_{om}} \cdot \frac{1}{E^z_{ocs}} + \frac{R_z}{\pi R^2_{st}} \cdot \frac{1}{E_{nct}} +$$

$$\frac{R_z}{2\pi R^2_{est.p.om}} \cdot \frac{1}{E_{nct}}$$

R_{st}

h_{st}

$z_{est.om}$

$z_{int.om}$

$$\varepsilon_{xy} = \frac{R_{xy}}{\frac{2}{3}\pi \frac{R^3_{cpl}}{h_{cpl}}} \cdot \frac{1}{E_{os.r}} + \frac{R_{xy}}{2\pi R_{om} h_{om}} \cdot \frac{1}{E^{xy}_{ocr}} + \frac{R_{xcr}}{2\pi R_{st} h_{st} E_{nct}} \cdot 1$$

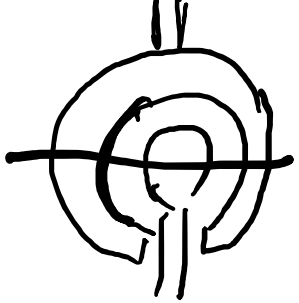
$$+ \frac{R_z}{2\pi R^2_{est.p.om}} \cdot \frac{1}{E_{nct}}$$

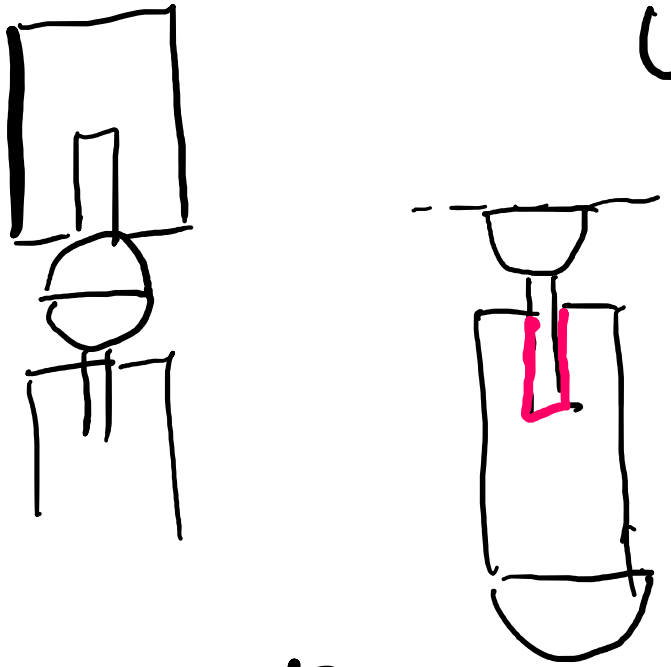
$\varepsilon^{om}_z = \varepsilon^{om}_{xy}$

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

$$\varepsilon_{TOR} = \frac{\pi_{TOR} \cdot R_{om}}{J} =$$

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





ULNARE

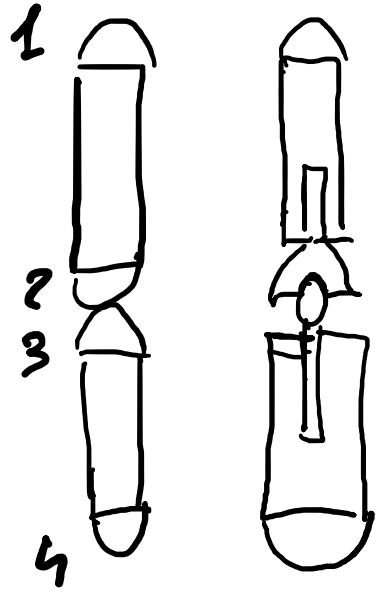
$$\varepsilon_z = \frac{R_z}{\pi R_{g.u}^2} \cdot \frac{1}{E_{NOT}} + \frac{R_z}{\pi R_{stul}^2} \cdot \frac{1}{E_{NOT}} +$$

$$+ \frac{R_z}{\pi\left(R_{ul}^2 - R_{stul}^2\right)} \cdot \frac{1}{E_{ost}} + \frac{R_z}{\pi R_{epul}^2} \cdot \frac{1}{E_{OST}}$$

$$\varepsilon_{xy} = \frac{R_{xy}}{2\pi R_{g.u}^2} \cdot \frac{1}{E_{NOT}} + \frac{R_{xy}}{2\pi R_{stul}\, h_{ulN}} \cdot \frac{1}{E_{NOT}} + \frac{R_{xy}}{2\pi R_{ul} \cdot h_{ulN}} \cdot \frac{1}{E_{ost}^{-xy}} +$$

$$+ \frac{R_{xy}}{\frac{2}{3}\pi R_{epn}^3}$$

$$\sigma_z = \sigma_{xy} \quad \frac{R_z}{\pi R_{stul}^2} = \frac{R_{xy}}{2\pi R_{stu} h_{stul}}$$



osso sano

$$\varepsilon_z = \frac{R_z}{2\pi R_{ep1}^2} \cdot \frac{1}{E_{OS}} + \frac{R_z}{\pi R_{om}^2} \cdot \frac{1}{E_{OC}^z} + \frac{R_z}{2\pi R_{ep2}^2} \cdot \frac{1}{E_{OS}} +$$

$$+ \frac{R_z}{2\pi R_{ep3}^2} \cdot \frac{1}{E_{OS}} + \frac{R_z}{\pi R_{U2}^2} \cdot \frac{1}{E_{OC}^z} + \frac{R_z}{\pi R_{ep1}^2} \cdot \frac{1}{E_{OS}}$$

$$\varepsilon_{xy} = \frac{R_{xy}}{\frac{2}{3}\pi \frac{R_{ep1}^3}{h_{ep1}}} \cdot \frac{1}{E_{OS}} + \frac{R_{xy}}{2\pi R_{om} h_{om}} \cdot \frac{1}{E_{OC}^{xy}} + \frac{R_{xy}}{\frac{2}{3}\pi \frac{R_{ep2}^3}{h_{ep2}}} \cdot \frac{1}{E_{OS}} +$$

$$+ \frac{R_{xy}}{\frac{2}{3}\pi \frac{R_{ep3}^3}{h_{ep3}}} \cdot \frac{1}{E_{OS}} + \frac{R_{xy}}{2\pi R_{U2} h_{U2N}} \cdot \frac{1}{E_{OC}^{xy}} + \frac{R_{xy}}{\frac{2}{3}\pi \frac{R_{ep4}^3}{h_{ep4}}} \cdot \frac{1}{E_{OS}}$$

$$\varepsilon_z = \frac{R_z}{2\pi R^2_{ep1}} \cdot \frac{1}{E_{osr}} + \frac{R_z}{\pi R^2_{om}} \cdot \frac{1}{E^z_{ocr}} + \frac{R_z}{\pi R^2_{st1}} \cdot \frac{1}{E_{net}} +$$

$$+ \frac{R_z}{2\pi R^2_{g.om}} \cdot \frac{1}{E_{net}} + \frac{R_z}{4\pi R^2_{g.u2} - \pi R^2_{st.u2}} \cdot \frac{1}{E_{net}} +$$

$$+ \frac{R_z}{\pi R^2_{st.uv}} \cdot \frac{1}{E_{net}} + \frac{R_z}{\pi (R^2_{u2} - R^2_{st})} \cdot \frac{1}{E^z_{ocr}} +$$

$$+ \frac{R_z}{\pi R^2_{ep4}} \cdot \frac{1}{E_{osr}}$$

$$\varepsilon_{xy} = \frac{R_{xy}}{\frac{2}{3}\pi \frac{R^3_{ep1}}{h_{ep1}}} \cdot \frac{1}{E_{osr}} + \frac{R_{xr}}{2\pi R_{om} h_{om}} \cdot \frac{1}{E^{xy}_{ocr}} + \frac{R_{xr}}{2\pi R_{stom} h_{stom}} \cdot \frac{1}{E_{net}} +$$

$$+\frac{R_{x\gamma}}{2\pi R^2_{g\text{-}om}}\cdot\frac{1}{E_{NET}}+\frac{R_{x\gamma}}{4\pi R^2_{g\text{-}UL}-\pi R^2_{STUL}}\cdot\frac{1}{E_{NET}}+$$

$$+\frac{R_{x\gamma}}{2\pi R_{STUL}\,h_{STULN}}\cdot\frac{1}{E_{NET}}+\frac{R_{x\gamma}}{2\pi R_{UL}\,h_{ULN}}\cdot\frac{1}{E^{x\gamma}_{OCR}}+$$

$$+\frac{R_{x\gamma}}{\frac{2}{3}\pi R^3_{epi}}\cdot\frac{1}{E_{OSJ}}$$

Isostress om $\dfrac{R_z}{\pi R^2_{STom}}=\dfrac{R_{x\gamma}}{2\pi n_{STom}\,h_{STom}}$ $\sigma_{TOR.om}=\dfrac{M_T\cdot R_{om}}{J_{om}}$

Isostress UL $\dfrac{R_z}{\pi R^2_{STULN}}=\dfrac{R_{x\gamma}}{2\pi R_{SULN}\,h_{ST.UL.}}$ $\sigma_{TOR.UL}=\dfrac{M_T\cdot R_{ULN}}{J_{UL}}$

$$J_{om} = \frac{\pi}{2}\left(R^4_{om} - R^4_{st.om}\right)$$

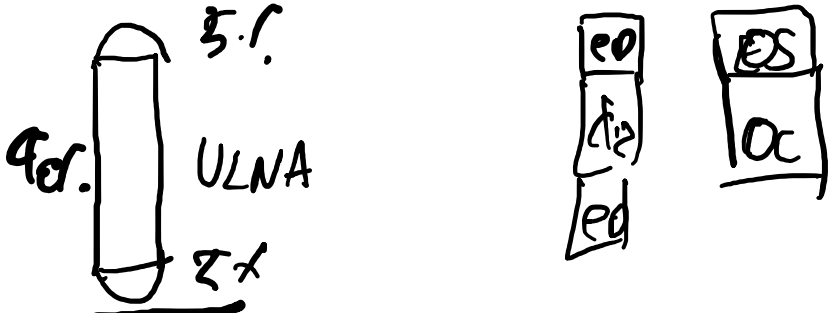
$$M_{T\,om} = R_{x-1} \cdot n_{om}$$

$$J_{ol} = \frac{\pi}{2}\left(R^4_{ol} - R^4_{st.ol}\right)$$

$$M_{T\,ol} = R_{x-1} \cdot n_{ol}$$

$$\sigma_T = \frac{M_T \cdot R}{J}$$

<u>omezale.</u>



QSY. OS

ZY. OC.

$$E_z^{UL} = \frac{E_{oc}^z E_{os}}{f_{os} \cdot E_{oc}^z + f_{oc} E_{os}}$$

parti: 6

$$E_{xy}^{UL} = E_{oc}^{xy} f_{oc} + f_{os} E_{os}$$

$f_{oc} + f_{os} = 1$

$$E_z^{car} = \frac{E_{oc}^z E_{os}}{f_{os} E_{oc}^z + f_{oc} E_{os}}$$

$$E_{xy}^{car} = E_{oc}^{xy} f_{oc} + f_{os} E_{os}$$

$f_{oc} + f_{os} = 1$

Protesi di polso

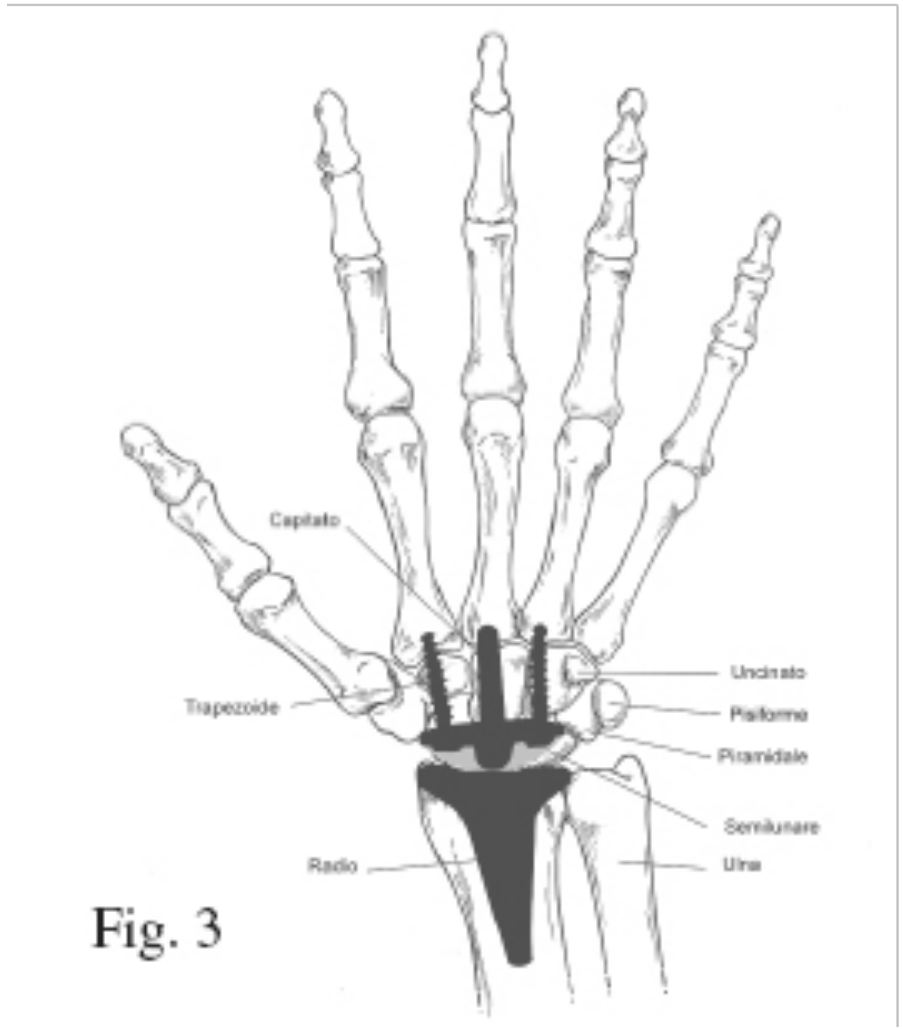
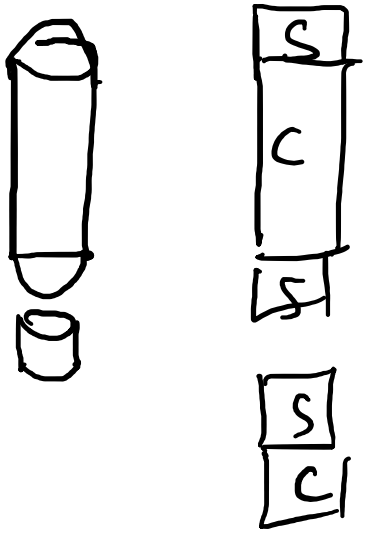


Fig. 3

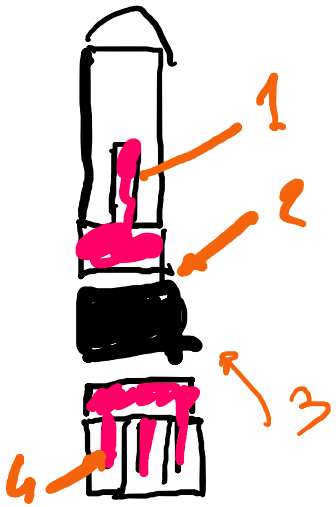


$S_{p_{TOT}} = 108\ \%$ → $f_{Sp_{TOT}} = 54\%$

$S_{C_{TOT}} = 92\ \%$ $f_{C_{TOT}} = 46\%$

$$E_z = \frac{E_{\not{c}}^{z} \cdot E_S}{f_{Sp_{TOT}} E_C^z + f_{C_{TOT}} E_S}$$

$$\hat{E}_{xy} = f_{Sp_{TOT}} \hat{E}_{Sp} + f_{C_{TOT}} \hat{E}_C^{xy}$$



R_{STOL}, h_{STOLN}

R_{piatto}, $sp_{piatto\ dentro}$

R_{corpo}, sp_{corpo}

$R_{piatto\ carpale}$, $sp_{piatto\ carpale}$

h_{perno}, r_{perno}

3 - mag

4 isostress

1 mot. for ulN.

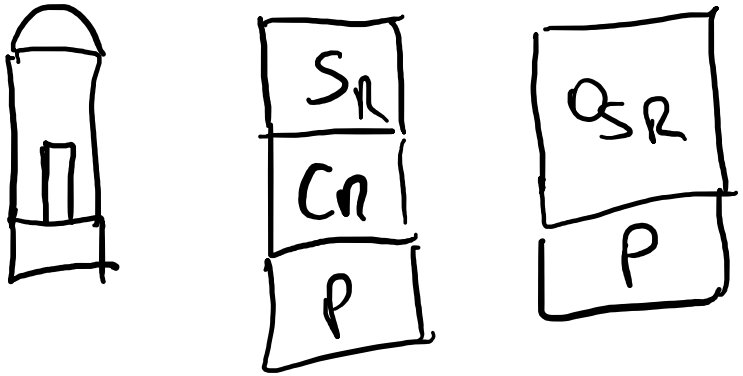
Sp. corpo calotta di usura

$0,5 < \delta < 1$ cm

$R_{piatto\ ulN} = R_{ulN}$

$R_{piatto\ carpale} = R_{carp}$

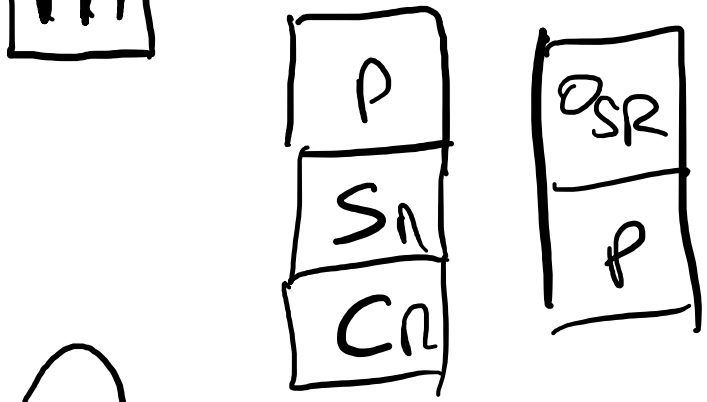
$R_{corpo} = \min(R_{ulN}, R_{carp})$

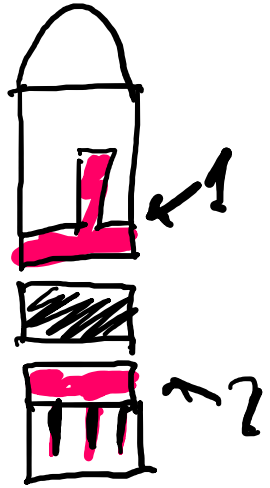


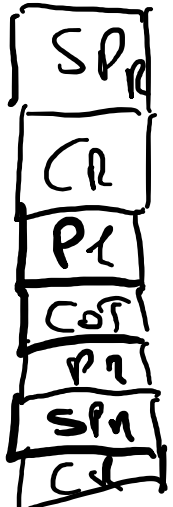
$$E_z = \frac{E^z_{osn} \cdot E_p}{f_p E^z_{osn} + f_{osn} E_p}$$

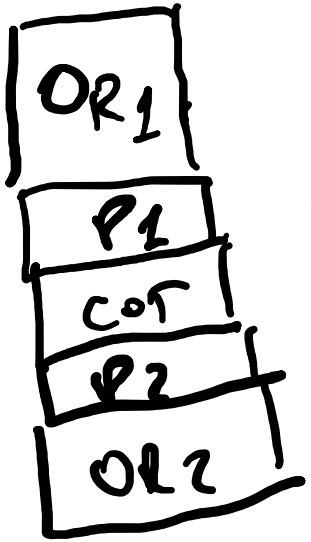
$$E_{xy} = f_{osn} E^{xy}_{osn} + f_p E_p$$

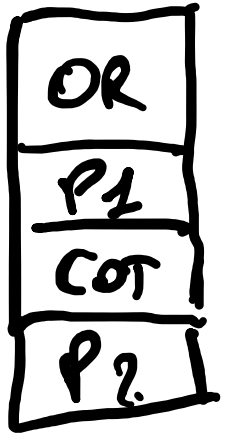
$$f_{osn} + f_p = 1$$











$$\frac{1}{E_z} = \frac{f_{osn}}{E^z_{osn}} + \frac{f_{p1}}{E_{p1}} + \frac{f_{pcot}}{E_{cot}} + \frac{f_{p2}}{E_{p2}}$$

$$E_{xy} = f_{osn} E^{xy}_{osn} + f_{p1} E_{p1} + f_{pcot} E_{cot} + f_{p2} E_{p2}$$

$$f_{OSM} + f_{COT} + R_{P1} + R_{P2} = 1$$

ISOSTRESS 1 $$\frac{R_z}{\pi R^2_{SUC}} = \frac{R_{xy}}{2\pi R_{STH_{SUC}}}$$

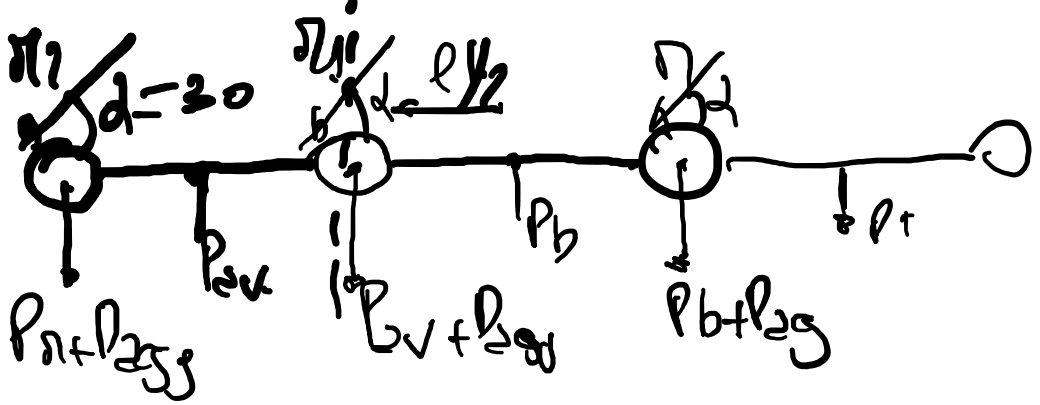
ISOSTRESS 4 $$\frac{R'_z}{\pi R^2_P} = \frac{R'_{xy}}{2\pi R_P h_P}$$

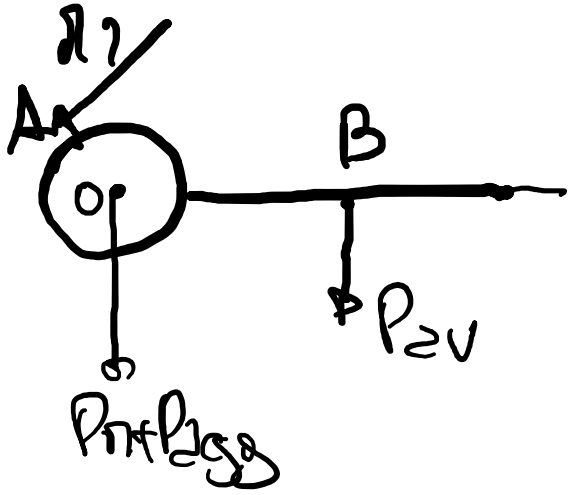
$$R'_z = \frac{R_z}{3}$$

$$R'_{xy} = \frac{R_{xy}}{3}$$

$$\sigma_T = \frac{M_{TOT} \cdot R_{OUT}}{J}$$

$$J = \frac{\pi}{2}\left(R^4_{OUT} - R^4_{STUC}\right)$$



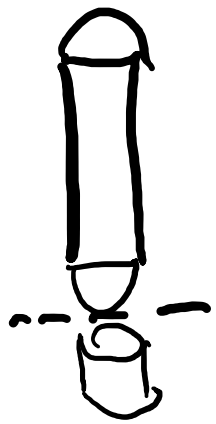


$$\Pi_1 \cdot OA = P_{AV} \cdot OB \qquad OB = \frac{l_{AV}}{2}$$

$$\Pi_2 = P_{AV} \cdot \frac{OB}{OA}$$

$$R_z = -P_{AV} - P_n - P_{zgg} - \Pi_2 \sin\alpha$$

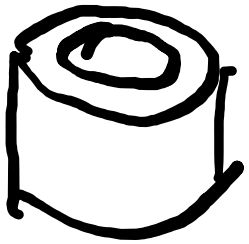
$$R_{xy} = -\Pi_2 \cos\alpha$$



ИЛИ

$$\varepsilon_z = \frac{R_z}{2\pi R^2_{ep1}} \cdot \frac{1}{\bar{\varepsilon}_{os}} + \frac{R_z}{\pi R^2_{ep2}} \cdot \frac{1}{\bar{\varepsilon}^z_{oc}} + \frac{R_z}{\pi R^2_{ep2}} \cdot \frac{1}{\bar{\varepsilon}_{os}}$$

$$\varepsilon_{xy} = \frac{R_{xy}}{\frac{2}{3}\pi \frac{R^3_{ep1}}{h_{ep1}}} \cdot \frac{1}{\bar{\varepsilon}_{os}} + \frac{R_{xy}}{2\pi R_{o2} h_{o2}} \cdot \frac{1}{\bar{\varepsilon}^{xy}_{oc}} + \frac{R_{xy}}{\frac{2}{3}\pi \frac{R^3_{ep2}}{h_{ep1}}} \cdot \frac{1}{\bar{\varepsilon}_{os}}$$



САПР

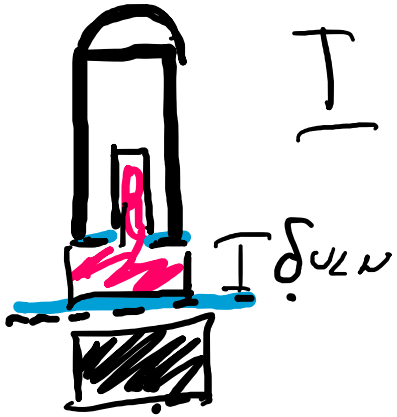
$$\varepsilon_z = \frac{R_z}{\pi R^2_{carp}} \cdot \frac{1}{\bar{\varepsilon}^z_o}$$

$$\varepsilon_{xy} = \frac{R_{xy}}{2\pi R_{carp} h_{carp}} \cdot \frac{1}{\bar{\varepsilon}^{xy}_o}$$

Completo

$$\varepsilon_z = \frac{R_z}{2\pi R^2 \varepsilon_{p1}} \cdot \frac{1}{E_{OS}} + \frac{R_z}{\pi R^2 \nu_{2N}} \cdot \frac{1}{E_{OC}^z} + \frac{R_z}{\pi R^2 \varepsilon_{p1}} \cdot \frac{1}{E_{OS}} + \frac{R_z}{\pi R^2_{carp}} \cdot \frac{1}{E_{OM}^z}$$

$$\varepsilon_{xy} = \frac{R_{xy}}{\frac{2}{3}\pi \frac{R^3 \varepsilon_{p1}}{n \varepsilon_{p2}}} \cdot \frac{1}{E_{OS}} + \frac{R_{xy}}{2\pi R \nu_{2N} h \nu_{2N}} \cdot \frac{1}{E_{OC}^{xy}} + \frac{R_{xy}}{\frac{2}{3}\pi \frac{R^3 \varepsilon_{p2}}{n \varepsilon_{p1}}} \cdot \frac{1}{E_{OS}} + \frac{R_{xx}}{2\pi R h_{OM}} \cdot \frac{1}{E_{OM}^{xx}}$$



I $$\varepsilon_z = \frac{R_z}{2\pi R^2 e_{p1}} \cdot \frac{1}{E_{OSR}} + \frac{R_z}{\pi R^2_{uln}} \cdot \frac{1}{E^z_{OCR}} + \frac{R_z}{\pi R^2_{ST}} \cdot \frac{1}{E_n} + \frac{R_z}{\pi R^2_{uln}} \cdot \frac{1}{E_n}$$

$$\varepsilon_{xy} = \frac{R_{xy}}{\frac{2}{3}\pi R^3 \frac{e_{p1}}{h_{ep1}}} \cdot \frac{1}{E_{OCR}} + \frac{R_{xy}}{2\pi R_{uln} h_{uln}} \cdot \frac{1}{E^{xy}_{OCR}} + \frac{R_{xy}}{2\pi R_{ST} h_{ST}} \cdot \frac{1}{E_n} +$$

$$+ \frac{R_z}{2\pi R_{uln} \cdot \delta_{uln}} \cdot \frac{1}{E_n}$$

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

II $$\varepsilon_z = \frac{R_z}{\pi R^2_{cegły}} \cdot \frac{1}{E_n} + \frac{R_z}{3\pi R^2 D} \cdot \frac{1}{E_n} + \frac{R_z}{(\pi R^2_{cegło} - 3\pi R^2 D)} \cdot \frac{1}{E^z_{OCR}}$$

$$\varepsilon_{xy} = \frac{R_{xy}}{2\pi R_{сар} \delta_{сар}} \cdot \frac{1}{\varepsilon_{пет}} + \frac{R_{xy}}{2\pi R_{сар} \delta_{осс\,сар}} \cdot \frac{1}{\varepsilon_{осн}} +$$

$$+ \frac{R_{xy}}{6\pi R_p h_p} \cdot \frac{1}{\varepsilon_{пет}}$$

$$\frac{R_z}{3\pi R^2_p} = \frac{R_{xy}}{6\pi R_p h_{pp}}$$

TOTALES

2 E_z

E_{z-1}

2 ISOBARAS

1 ROT. TORSIONAL

$$R_{COT} = \min(R_{UÑA}, R_{CUBO})$$

$$\sigma_{TOR.CORTE} = \frac{T_{TOR.} \cdot R_{COT}}{J} = \frac{R_{z-1} \cdot R_{COT} \cdot R_{COT}}{\frac{\pi}{2} R_{COT}^4} = \frac{2R_{z-1}}{\pi R_{COT}^3}$$

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

$$\sigma_{TOR\ CORTE} = \frac{R_z}{3\pi R^2 p}$$

Protesi di dito