OSI IN GREDI

OSI SO ELEMENTI ZA PRENOS AKSIALNIH, PREČNIH IN UPOGIBNIH OBREMENITEV TER POVRŠINSKIH PRITISKOV.

GREDI POLEG NAŠTETEGA PREVZEMAJO ŠE UVOJNE OBREMENITVE.

OSI

- MIRUJOČE
- ROTIRAJOČE

MIRUJOČE OSI

1. PROJEKTNE ZAHTEVE

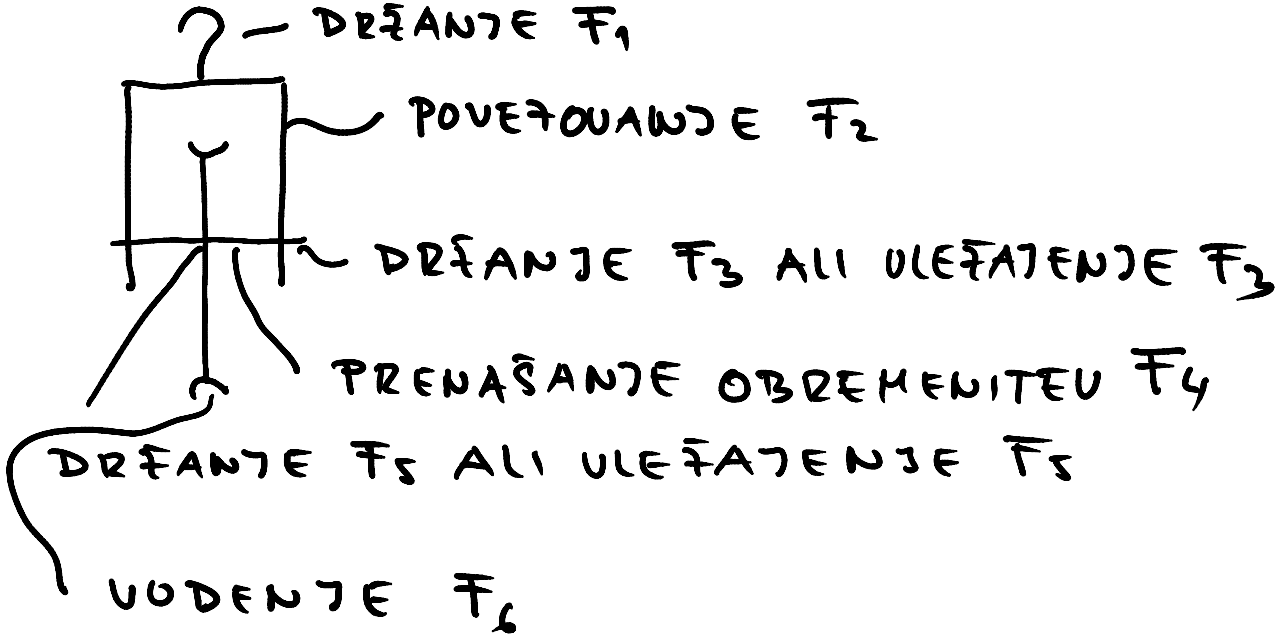
   IZDELATI JE POTREBNO ŠKRIPEC NOSILNOSTI F_{max}.

2. FUNKCIJA IZDELKA

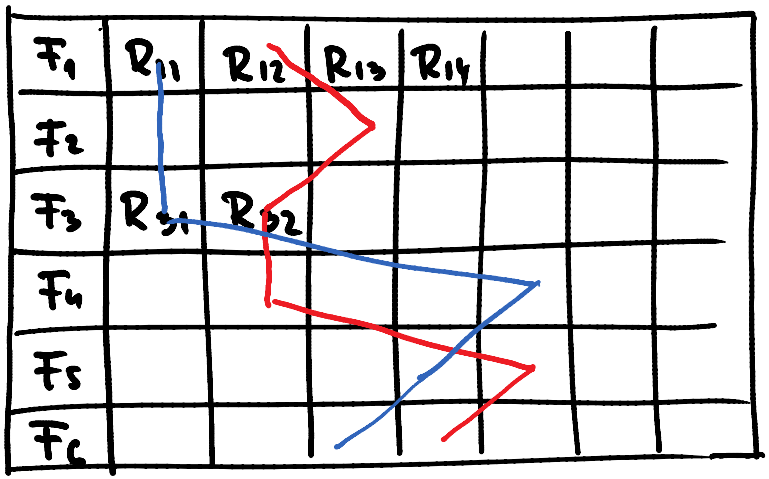
   TOČKE 2 DO 7 SE NAHAJAJO V SKUPINI

   DVIGANJE BREMEN DO F_{max}

3. RAZČLENITEV FUNKCIJE V DELNE FUNKCIJE



4. MORFOLOŠKA MATRIKA



Rij ← REŠITEV
↑
FUNKCIJA

Rij PREDSTAVLJA REŠITVE DELNIH FUNKCIJ

R_{11} – KLJUKA
R_{12} – OČESNI VIJAK
R_{13} – KARABIN
R_{14} – VIJAK
⋮

R_{31} – DRSNI LEŽAJ
R_{32} – KOTALNI LEŽAJ
⋮

5. KONCEPTI REŠITEV

- KONCEPT 1
- KONCEPT 2

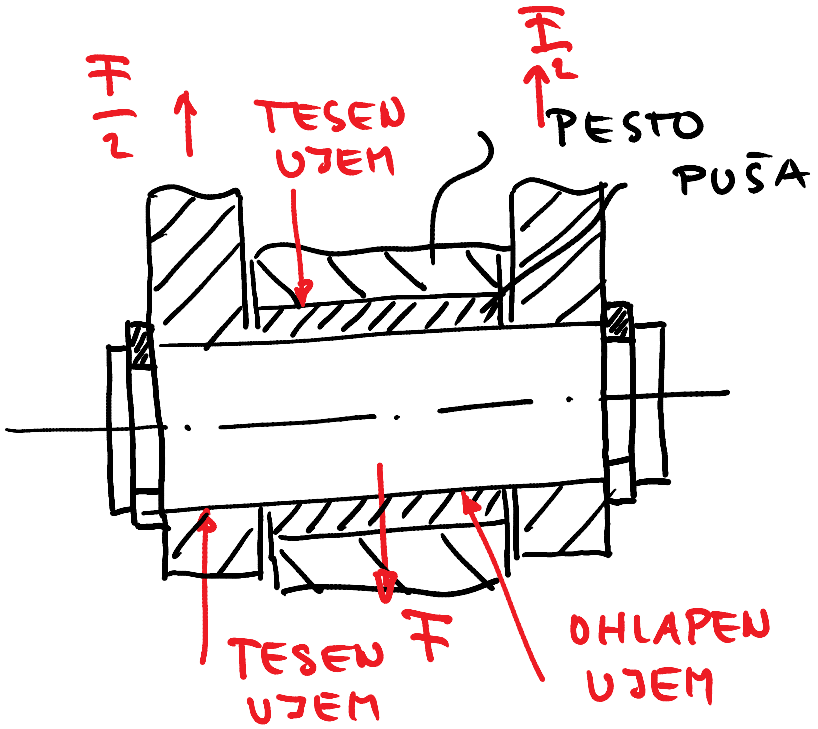
ZA IZBRANE KONCEPTE SE IZDELAJO SKICE

6. VREDNOTENJE KONCEPTOV REŠITEV

SE IZVAJA PO TEHNIČNIH IN EKONOMSKIH KRITERIJIH

7. IZBEREMO KONCEPTE ZA ZASNOVO

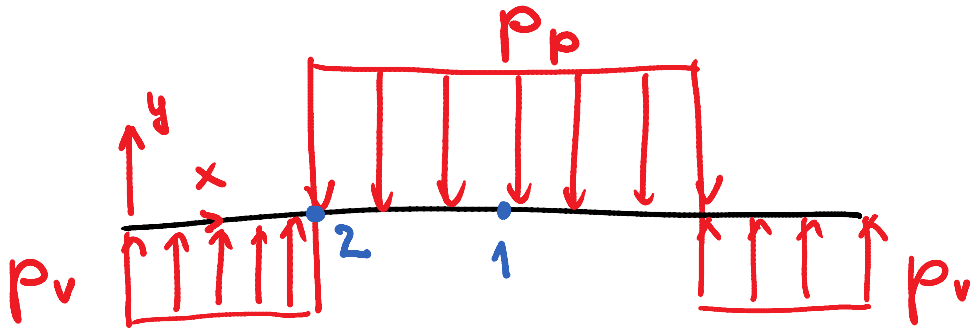
KONCEPT ZA ZASNOVO

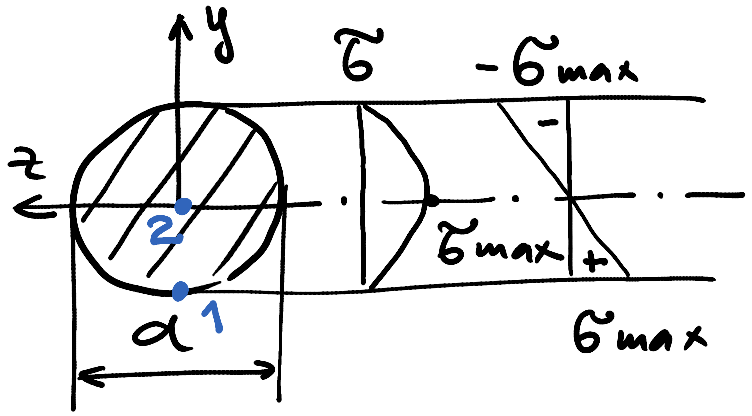


D.N. IZDELATI

KONCEPT S KOTALNIMI LEŽAJI.

UREDNOTENJE MIRUJOČE OSI





1,2 : KRITIČNI MESTI ZA KONTROLO

$\sigma_{max} \leq \sigma_{dop}$

$\tau_{max} \leq \tau_{dop}$

$p_p \leq p_{p\,dop}$

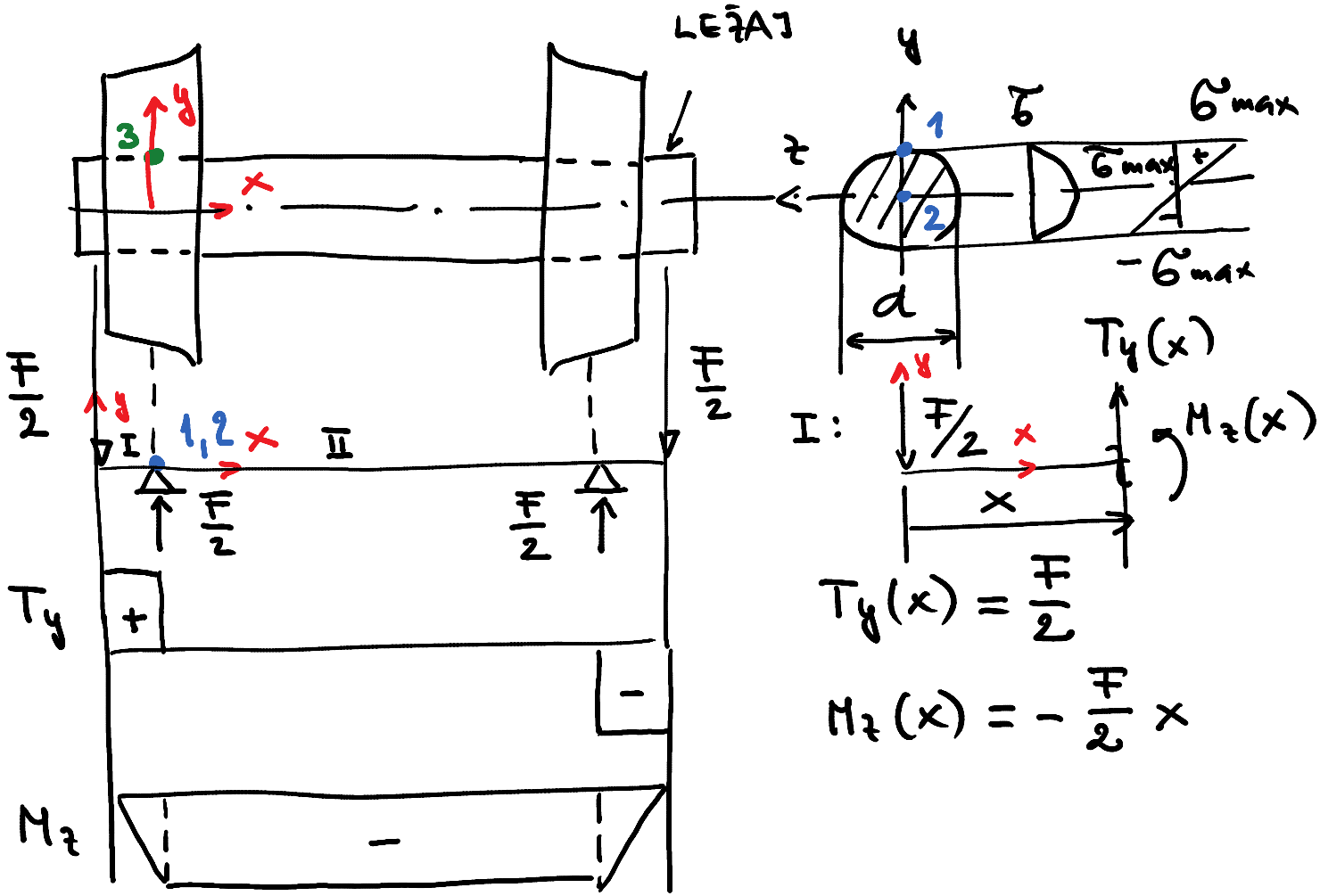
$p_v \leq p_{v\,dop}$

PRI KRATKIH OSEH JE DOMINANTEN STRIG, PRI DOLGIH PA UPOGIB.

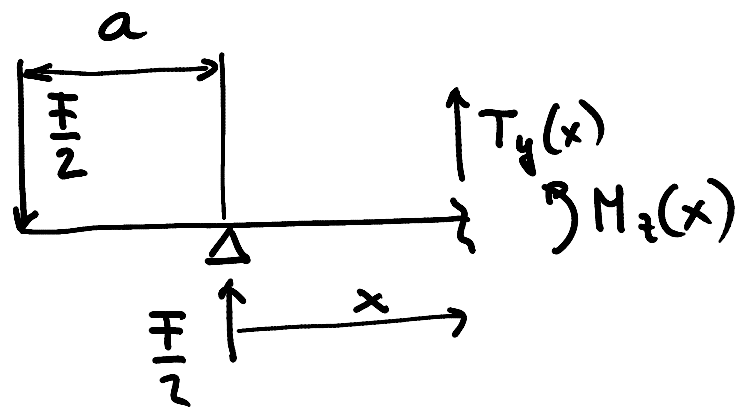
MOŽEN JE TRENUTNI LOM

VČASIH TUDI UTRUJENOSTNI LOM.

ROTIRAJOČE OSI



II:



$$T_y(x) = 0$$

$$M_z(x) = \frac{F}{2}x - \frac{F}{2}(x+a)$$

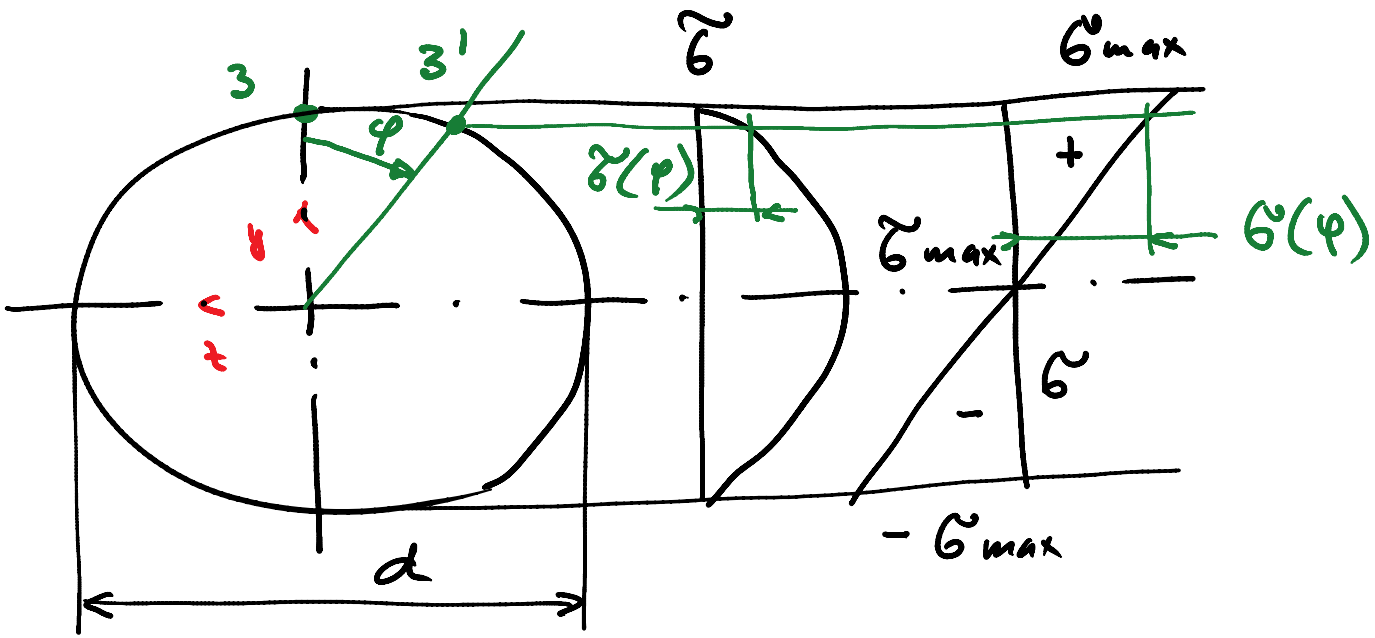
$$= -\frac{F}{2}a$$

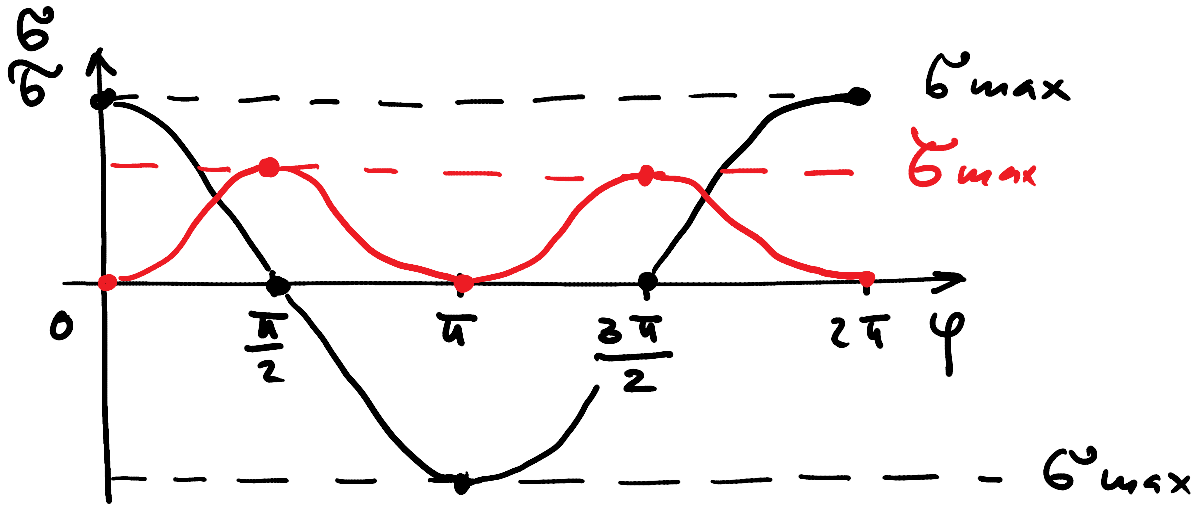
$$T_{y\,max} = \frac{F}{2} \; ; \quad M_{z\,max} = -\frac{Fa}{2}$$

1,2 : KRITIČNI MESTI ZA KONTROLO

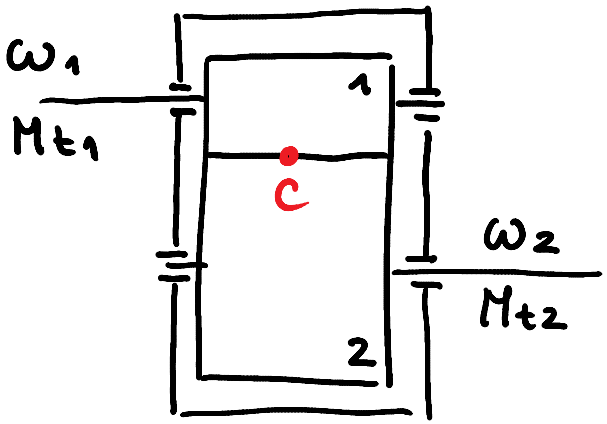
$\sigma_{max} \leq \sigma^R_{dop}$ ROTIRAJOČE OSI SO IZPOSTAVLJENE

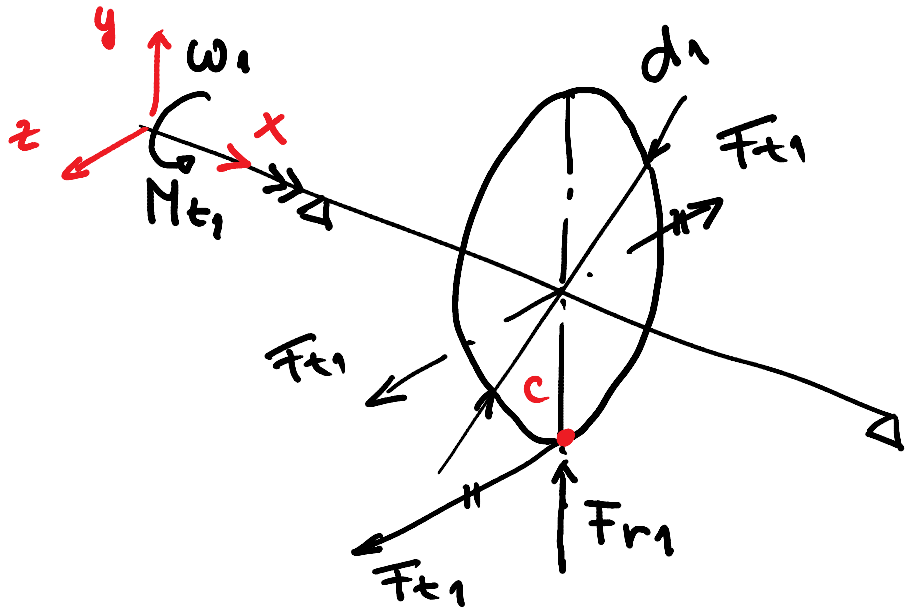
$\tau_{max} \leq \tau^R_{dop}$ NEVARNOST UTRUJENOSTNEGA LOMA


3
3'
φ
τ
σmax
γ(φ)
+
τmax
σ(φ)
σ
-
-σmax
d


σ
σmax
τmax
0
π/2
π
3π/2
2π
φ
-σmax

GRED1

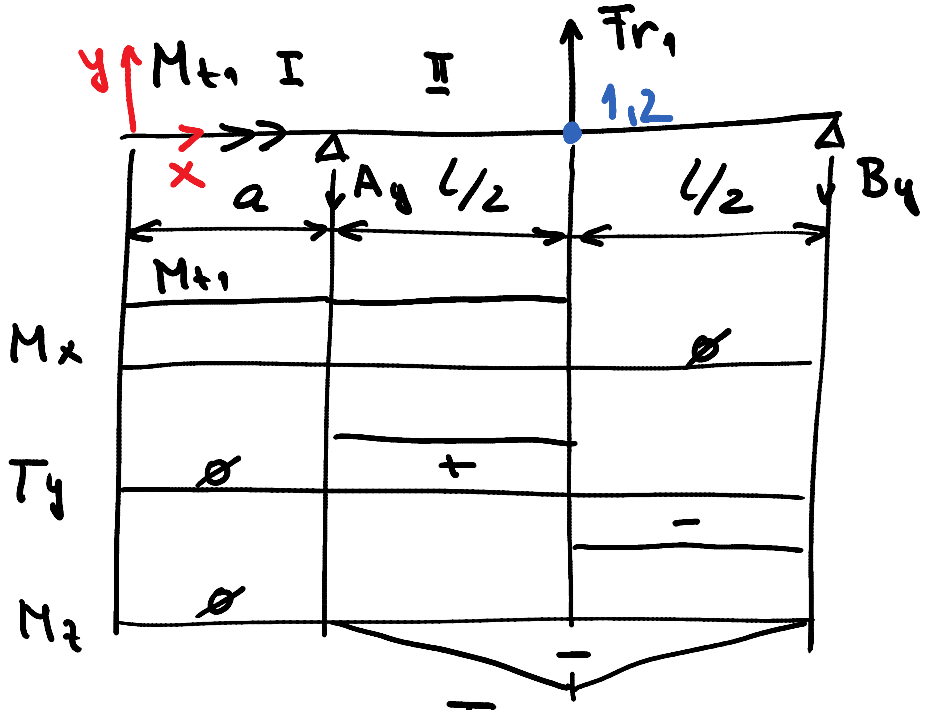




C : KINEMATIČNA TOČKA

$$M_{t1} = F_{t1} \cdot \frac{d_1}{2} \quad \rightarrow \quad F_{t1} = \frac{2 M_{t1}}{d_1}$$

(2 nad F_{t1}, V pod M_{t1})



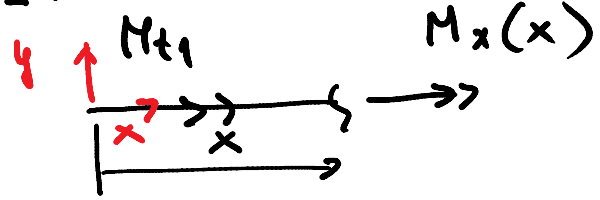
$$A_y = B_y = \frac{F_{r1}}{2}$$

$$M_{x\max} = M_{t1}$$

$$T_{y\max} = \frac{F_{r1}}{2}$$

$$M_{z\max} = -\frac{F_{r1}\,l}{4}$$

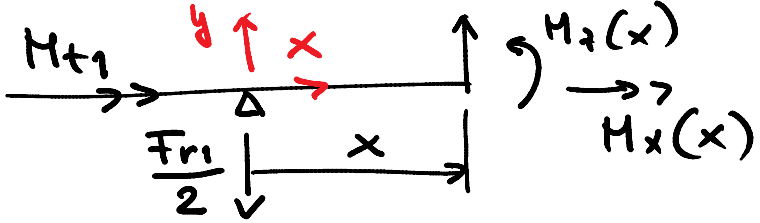
I:



$$M_x(x) = -M_{t1}$$

$T_y(x)$

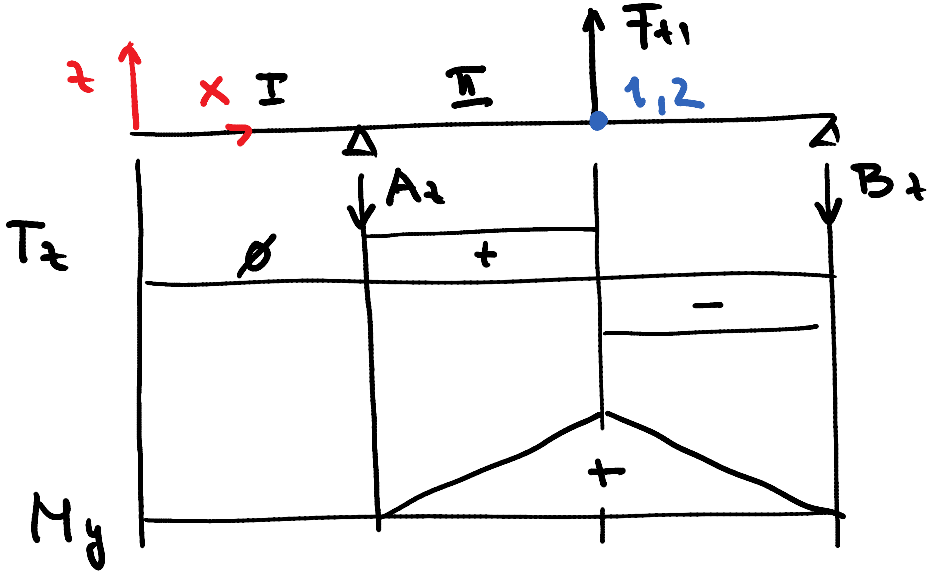
II



$$M_x(x) = -M_{t1}$$

$$T_y(x) = \frac{F_{r1}}{2}$$

$$M_z(x) = -\frac{F_{r1}}{2}\,x$$



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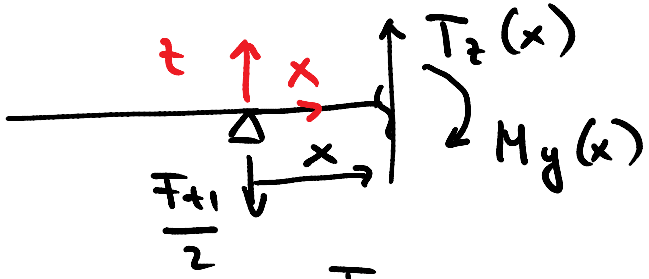


$$T_z(x) = \frac{F_{t1}}{2}$$

$$M_y(x) = \frac{F_{t1} \cdot x}{2}$$

$$A_z = B_z = \frac{F_{t1}}{2}$$

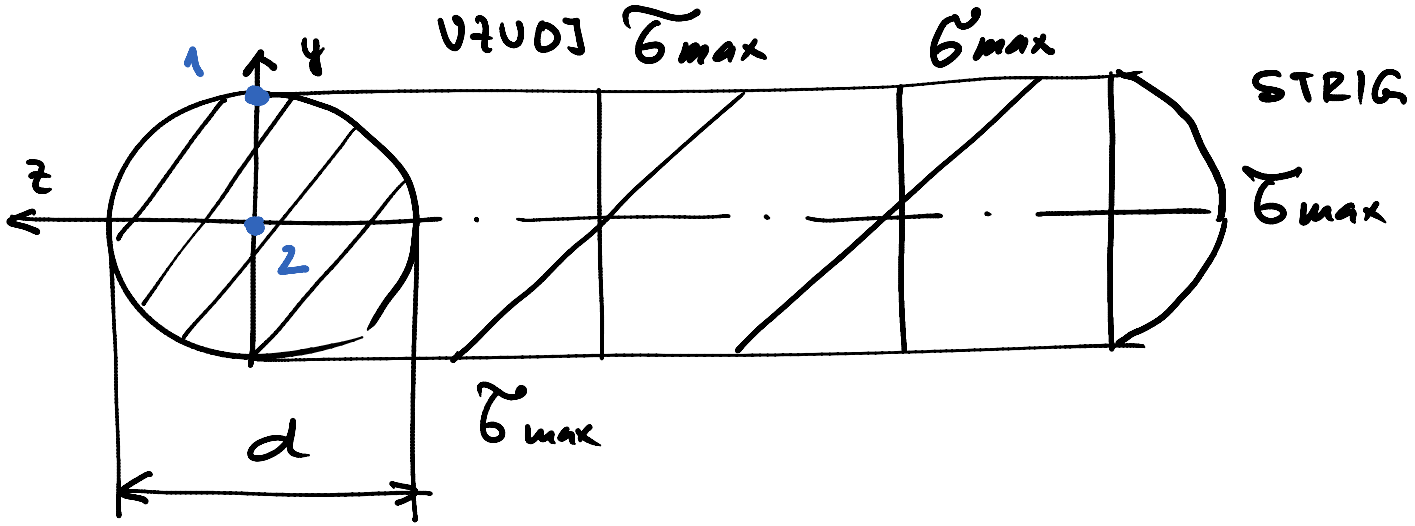
$$T_{z\,max} = \frac{F_{t1}}{2}$$

$$M_{y\,max} = \frac{F_{t1} \cdot e}{4}$$

$$A = \sqrt{A_y^2 + A_z^2}$$

$$B = \sqrt{B_y^2 + B_z^2}$$

SILI POTREBUJEMO PRI IZBIRI LEŽAJEV



STRIŽNIH NAPETOSTI NA PETOSTI NA REDEH NIKOLI NE KONTROLIRAMO

$$\tau_{max} = \frac{M_{xmax}}{W_{po}}$$ UTUOJNA NAPETOST

$$T_{max} = \sqrt{T_{ymax}^2 + T_{zmax}^2}$$

$$M_{max} = \sqrt{M_{ymax}^2 + M_{zmax}^2}$$

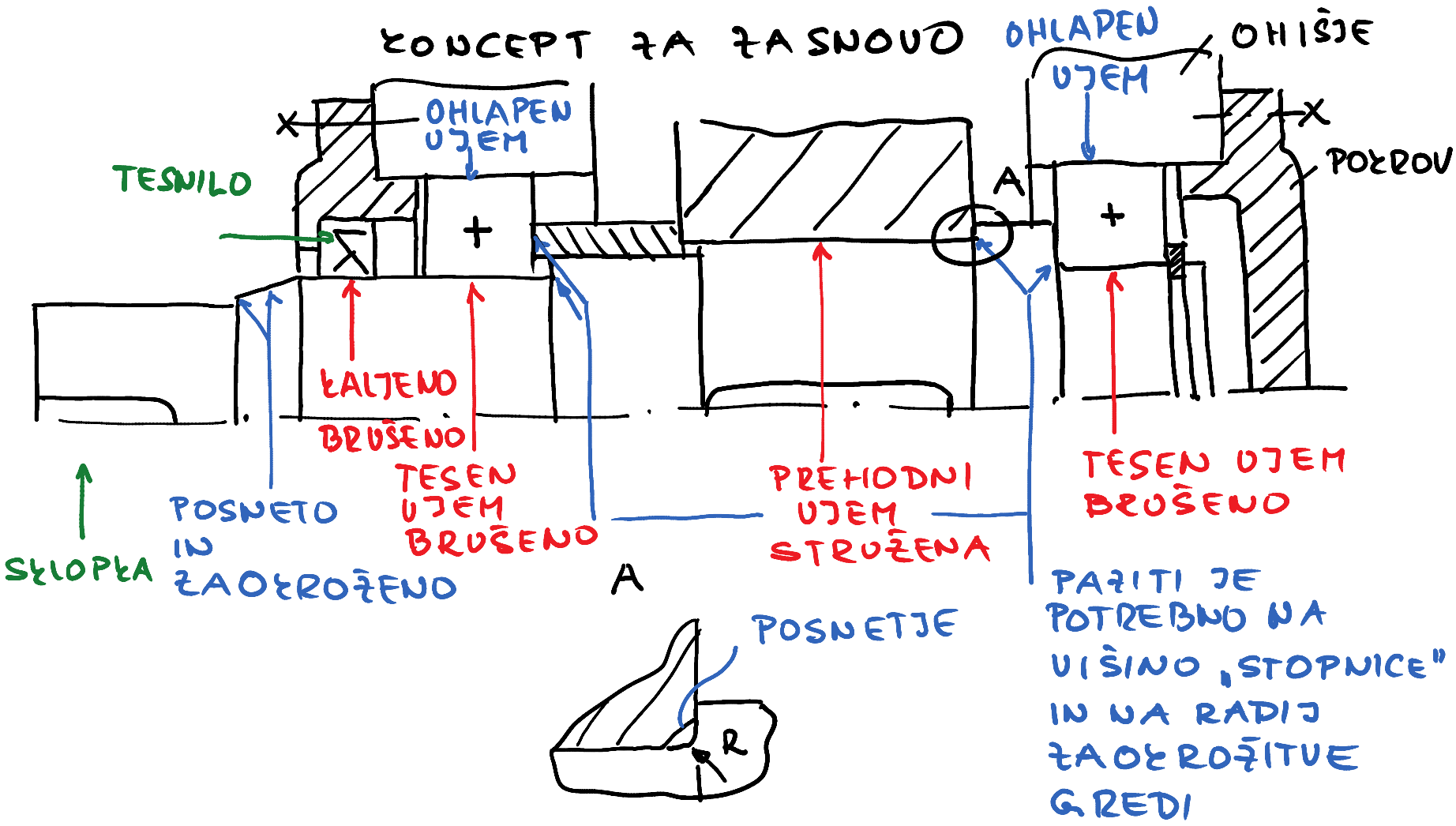
$$\tau_{max} = \frac{T_{max}\, S_a}{I_o\, d}$$
STRIŽNA NAPETOST

$$\sigma_{max} = \frac{M_{max}}{W_o}$$

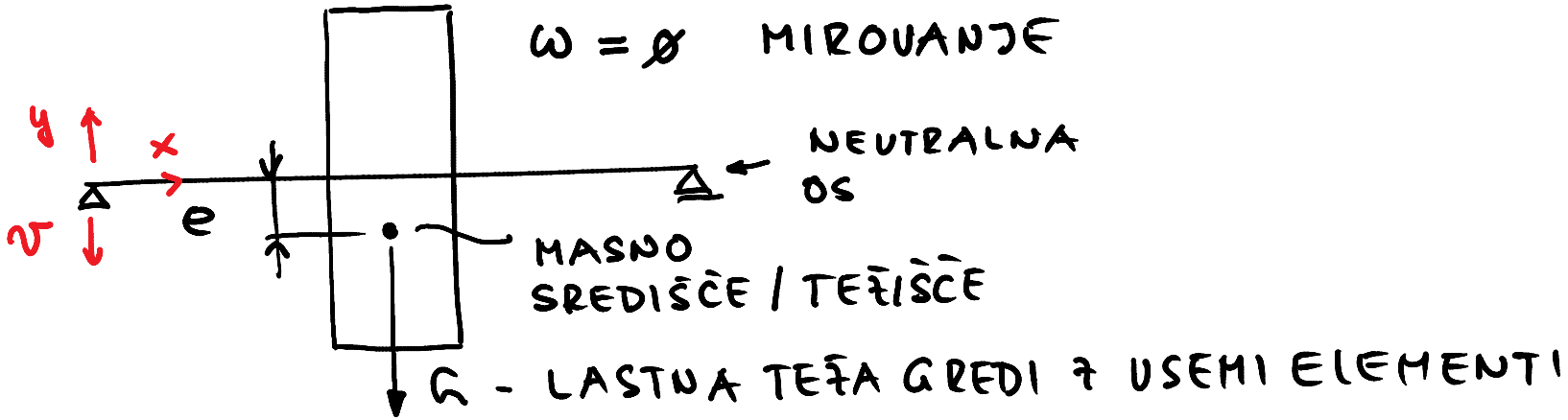
1 : KRITIČNO MESTO ZA KONTROLO

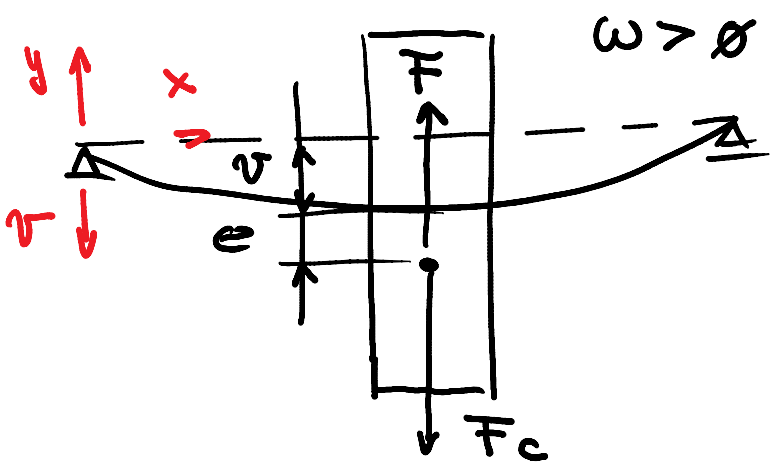
$\sigma_{v\,max} \leq \sigma^{R}_{dop}$ PRI GREDEH OBSTAJA NEVARNOST UTRUJENOSTNEGA LOMA

KONCEPT ZA ZASNOVO



VREDNOTENJE GREDI IN OSI NA LASTNE FREKVENCE





$$F_c = m(r+e)\omega^2 = F = C\,r$$

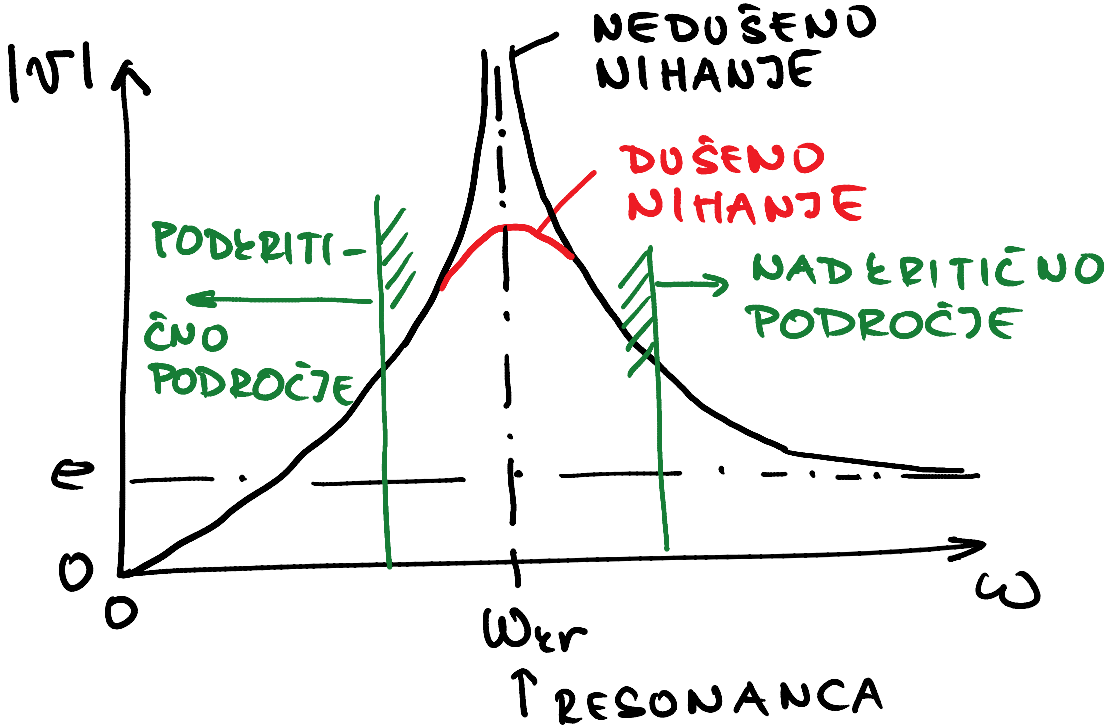
C — UPOGIBNA TOGOST GREDI

$$m(r+e)\omega^2 = C \cdot r \;\Big|\; : m$$

$$r\omega^2 + e\omega^2 = \frac{C}{m} r$$

$$e\omega^2 = r\left(\frac{C}{m} - \omega^2\right)$$

$$r = \frac{e\omega^2}{\frac{C}{m} - \omega^2}$$

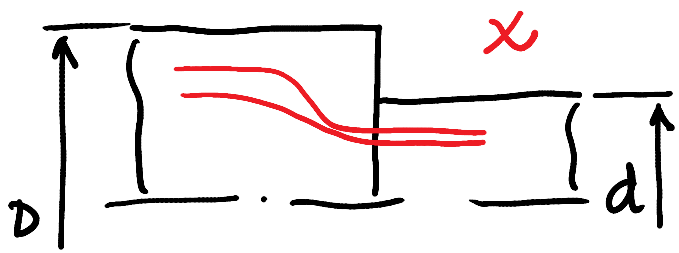


$$\omega_{kr} = \sqrt{\frac{c}{m}}$$

$$V = \frac{e}{\frac{c}{m \cdot \omega^2} - 1}$$

$$\omega \to \infty \to V = -e$$

OBLIKOVANJE GREDNIH PREHODOV



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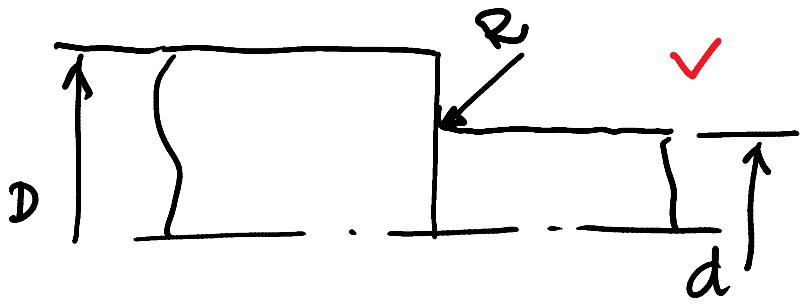

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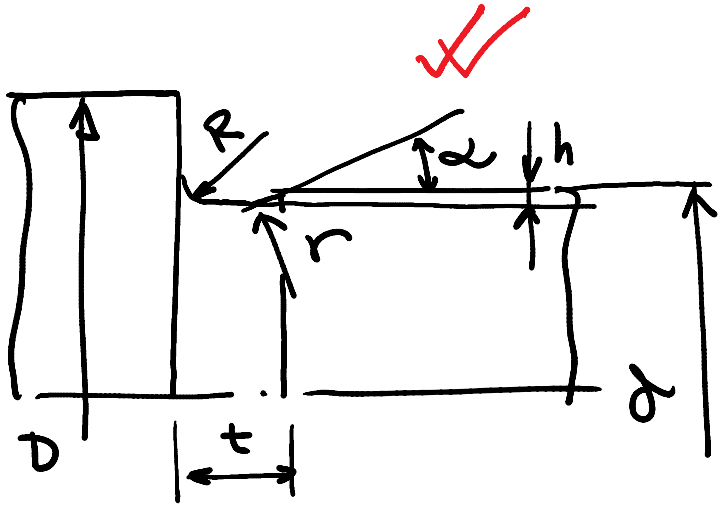
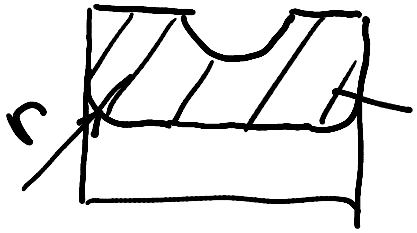


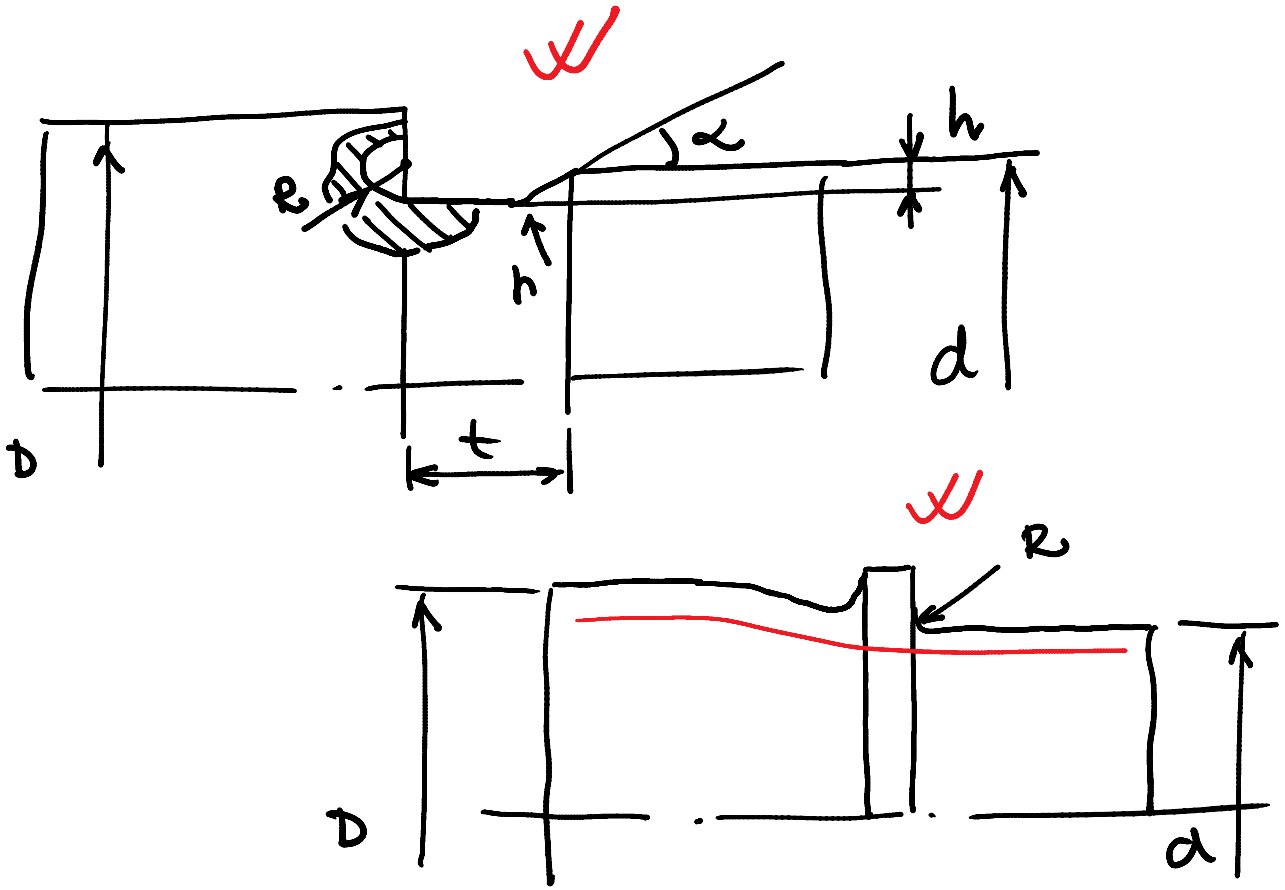
✓✓

SEDEŽ TA LEŽAJ PREDPISUJE R, (D-d)/2



r > R

NOTRANJI OBROČ LEŽAJA


α
h
R
h
d
D
t
R
D
d