

OTPORNOST MATERIJALA

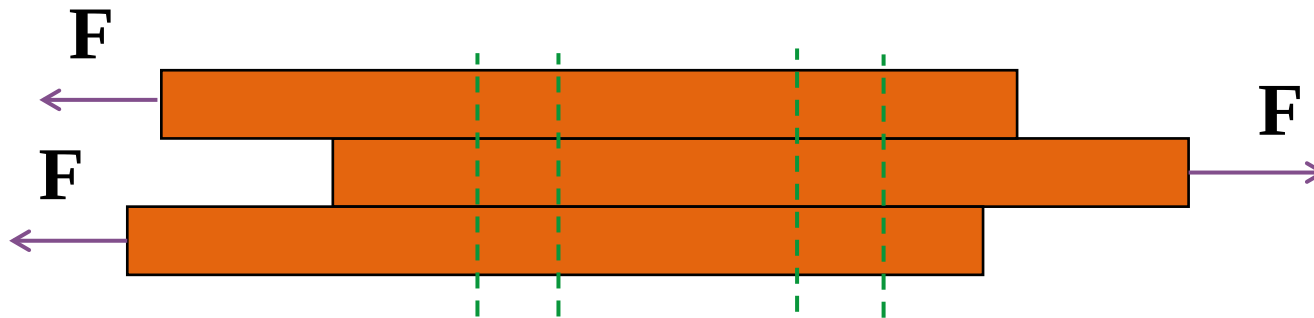
VEŽBE BR. 6

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ZADATAK 1.

Tri pljosnata štapa treba spojiti zakivcima da bi preneli silu $F = 260kN$. Odrediti potreban broj zakivaka, ako je prečnik zakivka $d = 20\text{ mm}$, a izrađeni su od materijala sa dozvoljenim naprezanjem $\tau_{doz} = 12 \frac{kN}{cm^2}$.



ZADATAK 1.

Podaci:

$$F = 260 \text{ kN}$$

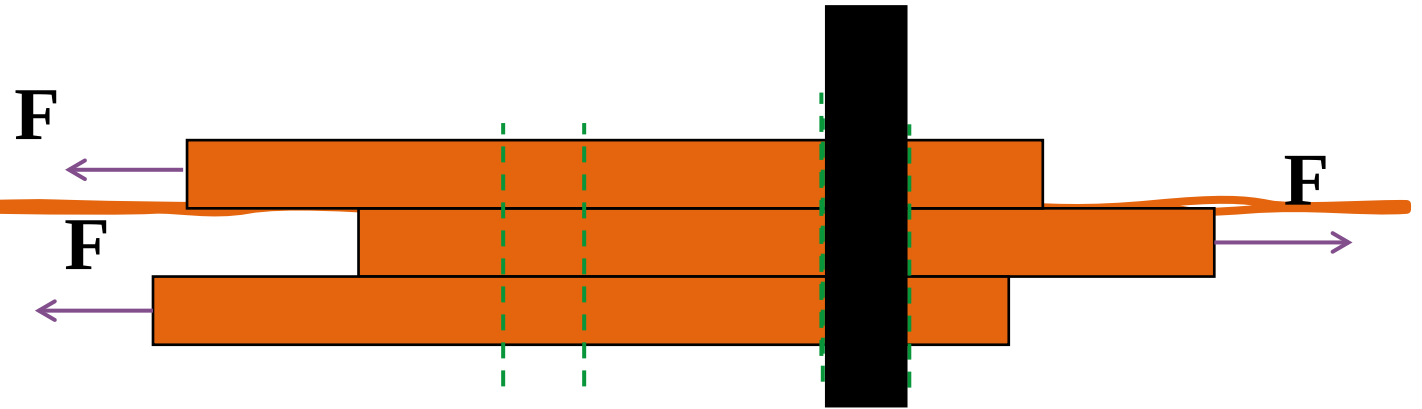
$$\tau_{doz} = 12 \frac{\text{kN}}{\text{cm}^2}$$

$$d = 20 \text{ mm}$$

$$n = ?$$

$$\tau_s = \frac{F_t}{A} \leq \tau_{doz}$$

$$A_S \geq \frac{F}{\tau_{doz}} \geq \frac{260}{12} \geq \underline{21.67 \text{ cm}^2} \quad n \geq \frac{21.67}{6.28} \quad n \geq 3.45 \quad \underline{n = 4}$$



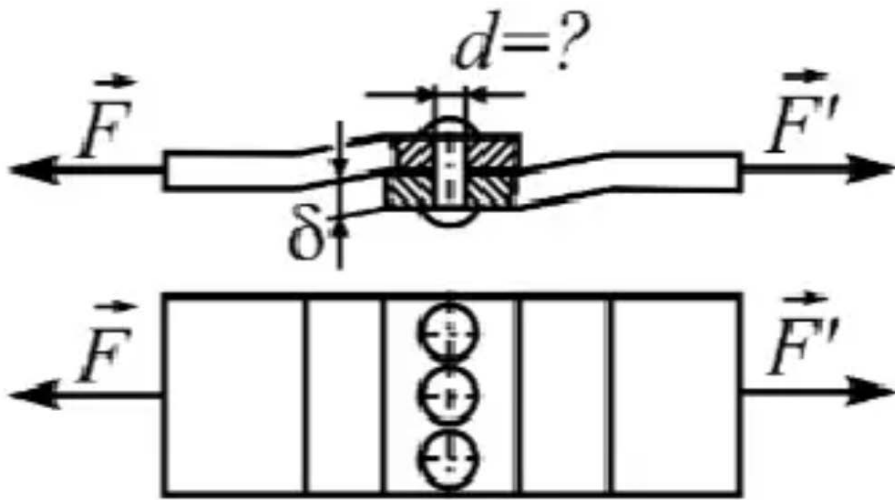
$$A_S = A_1 * n * k$$

$$A_1 = \frac{d^2 \pi}{4} = \frac{2^2 * 3.14}{4} = 3.14 \text{ cm}^2$$

$$k = 2 \longrightarrow \text{broj smičućih površina}$$

$$21.67 \leq 3.14 * n * 2$$

ZADATAK 2.



- Dva lima, opterećena silom $F=30$ kN, kao na slici povezana su sa tri jednake zakovice. Dimenzionisati zakovice na smicanje, ako je dozvoljeni napon smicanja za materijal zakovica $\tau_{doz} = 10 \frac{kN}{cm^2}$

ZADATAK 2.

$$\tau_s = \frac{F_t}{A} \leq \tau_{doz}$$

$$A_s \geq \frac{F_t}{\tau_{doz}}$$

$$A_s \geq \frac{30}{10} \geq \underline{3 \text{ cm}^2}$$

$$A_s = A_1 * n * k$$

$$k = 1 \longrightarrow \text{broj smičućih površina}$$

$$n = 3$$

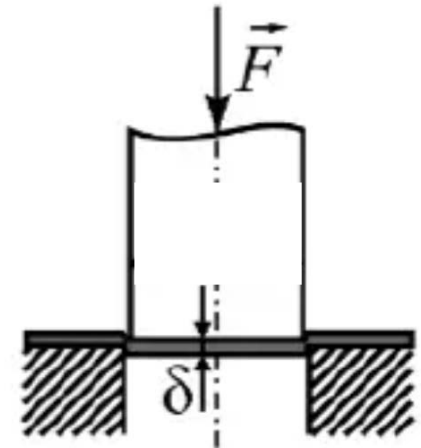
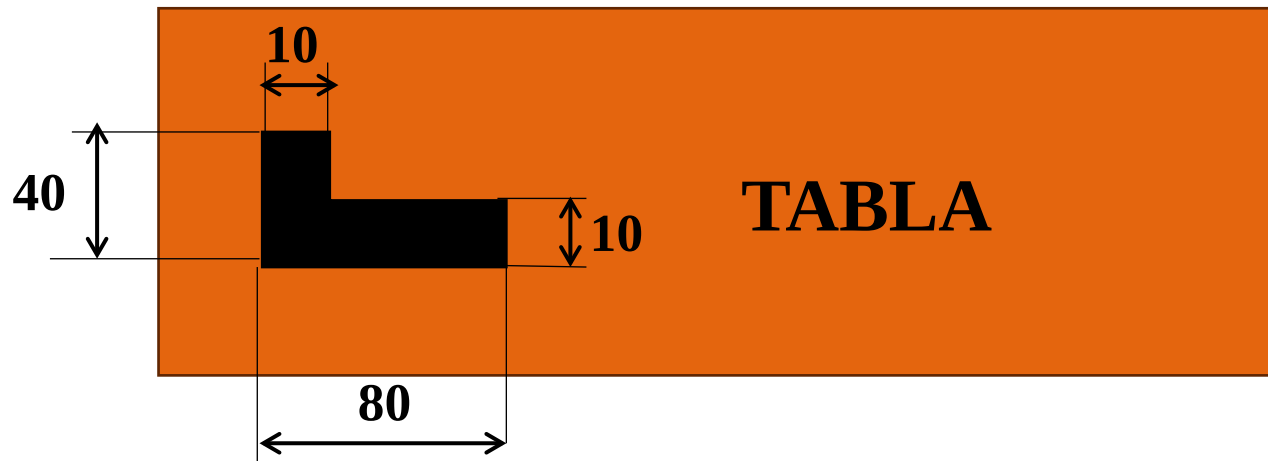
$$A_s = \frac{d^2 \pi}{4} * 3 * 1$$

$$3 = \frac{d^2 \pi}{4} * 3 * 1$$

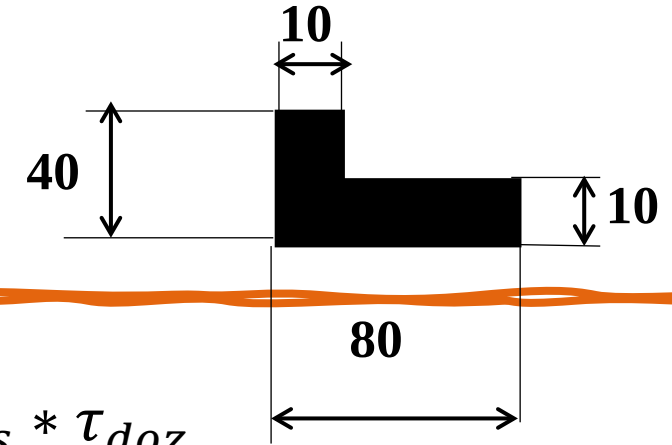
$$d^2 = \frac{3 * 4}{3 * \pi} \quad d = \sqrt{\frac{4}{\pi}} = 1,128 \text{ cm} \quad \underline{d = 1,2 \text{ cm}}$$

ZADATAK 3.

- Iz table lima debljine 3mm potrebno je udarcem iseći 4 konture, odrediti potrebnu silu za probijanje ako je $\tau_{doz} = 30 \frac{N}{cm^2}$.



ZADATAK 3.



$$\tau_s = \frac{F_t}{A} \leq \tau_{doz}$$

$$F \geq A_s * \tau_{doz}$$

$$A_s = 4 * O_k * \delta$$

$$F \geq 288 * 30$$

$$A_s = (30 + 10 + 70 + 10 + 80 + 40) * 0.3 * 4$$

$$F \geq 8640 \text{ N}$$

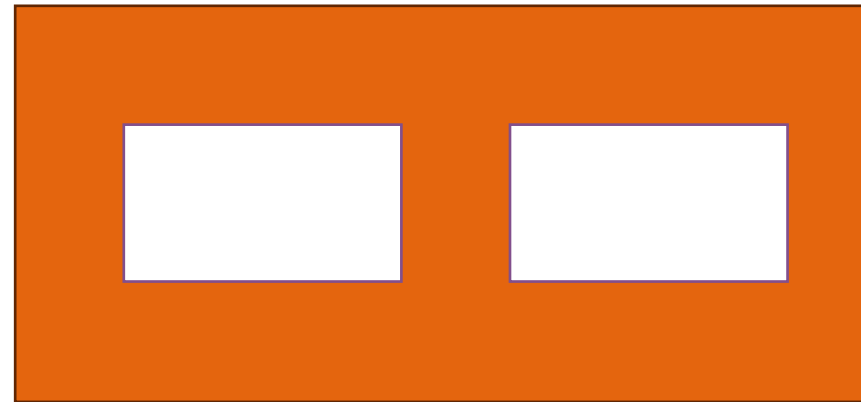
$$A_s = 288 \text{ cm}^2$$

ZADATAK 4.

Iz pločice veličine 500x50x3mm od čelika sa dozvoljenim naprezanjem $\tau_{doz} = 450 \frac{N}{mm^2}$, dobija se otvor dimenzija 50x50x3mm u sredini, postupkom probijanja. Iz jednog koraka trake dobijaju se dva komada prema slici:

Odrediti:

- a) Silu probijanja otvora,
- b) Pritisak probojca,



ZADATAK 4.

Sila probijanja otvora:

$$\tau_s = \frac{F_1}{A_s} \leq \tau_{doz}$$

$$F_1 \geq A_s * \tau_{doz}$$

$$A_s = 2 * O_K * \delta$$

$$O_K = 4 * 50 = 200 \text{ mm}$$

$$A_s = 2 * 200 * 3$$

$$A_s = 1200 \text{ mm}^2$$

$$F_1 \geq A_s * \tau_{doz} = 540 \text{ kN}$$

Pritisak probojca:

$$\sigma = \frac{F_1}{2A_p} \leq \sigma_{doz}$$

$$A_p = a * b$$

$$A_p = 50 * 50 = 2500 \text{ mm}^2$$

$$\sigma = \frac{F_1}{2A_{p1}} = \frac{540}{2 * 2500}$$

$$\sigma = 0,108 \frac{\text{kN}}{\text{mm}^2}$$

HVALA NA PAŽNJI!