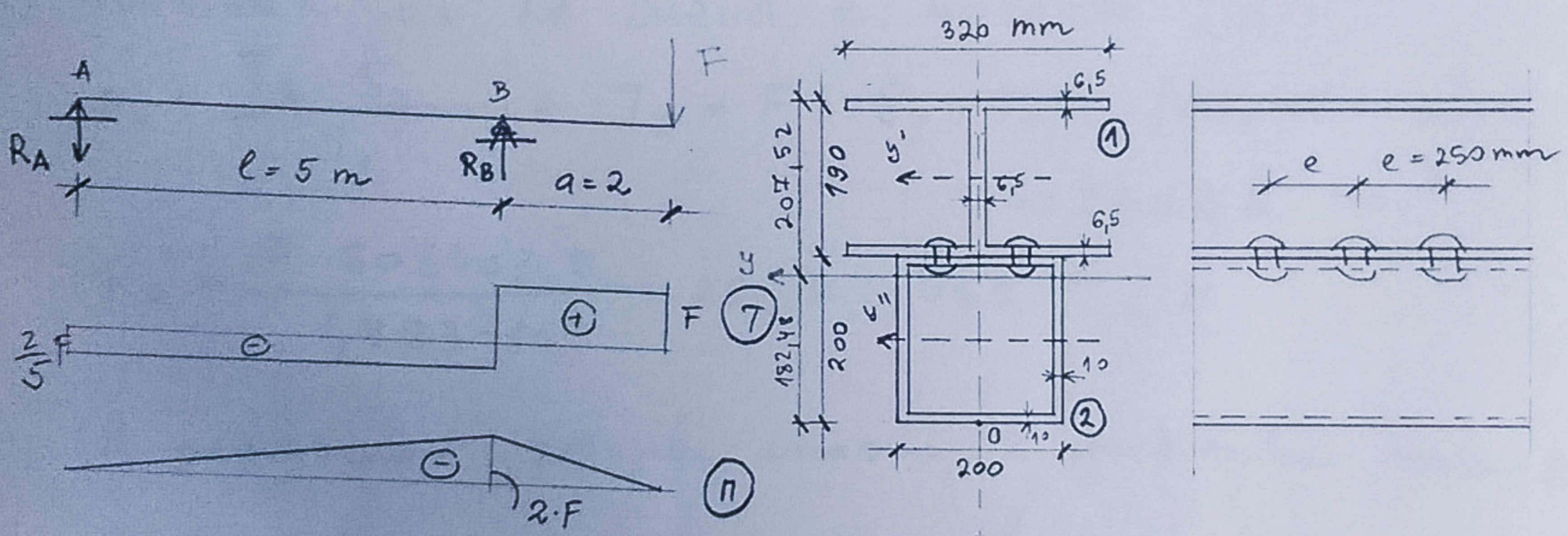


Sastavljeni delični nosač spojen je zahovicama promijera $d = 25 \text{ mm}$ na razmaku $e = 250 \text{ mm}$.

Treba odrediti dopušteno opterećenje F , ako je zadano: $\tau_{dop} = 120 \text{ MPa}$, $\sigma_{o,dop} = 240 \text{ MPa}$ i $\sigma_{dop} = 160 \text{ MPa}$.

$$J_{y'} = 3,69 \cdot 10^7 \text{ mm}^4, \quad A_1 = 5380 \text{ mm}^2$$

$$J_{zy''} = 4,34 \cdot 10^7 \text{ mm}^4, \quad A_2 = 7340 \text{ mm}^2$$



$$\sum M_A = 0$$

$$F \cdot 7 - R_B \cdot 5 = 0 \quad R_B = \frac{7}{5} F$$

$$\sum M_B = 0$$

$$F \cdot 2 - R_A \cdot 5 = 0 \quad R_A = \frac{2}{5} F$$

TEŽIŠTE SLOŽENOG PRESJECA

$$z_T = \frac{5380 \left(200 + \frac{190}{2} \right) + 7340 \cdot 100}{5380 + 7340} = 182,48 \text{ mm}$$

$$J_y = J_{y'} + A_1 \cdot z_1^2 + J_{zy''} + A_2 \cdot z_2^2$$

$$= 3,69 \cdot 10^7 + 5380 \left(207,52 - \frac{190}{2} \right)^2 + 4,34 \cdot 10^7 + 7340 (182,48 - 100)^2$$

$$= 1,983 \cdot 10^8 \text{ mm}^4$$

$$S_{yb}^I = A_1 \cdot \left(207,52 - \frac{190}{2} \right) = 605357,6 \text{ mm}^3$$

$$\text{ili } S_{yb}^{II} = 7340 \cdot (182,48 - 100) = 605403,2$$

NORMALNO NAPREZANJE

$$\sigma_{\max} = \frac{|M_{\max}|}{J_y} \cdot z_{\max} \leq \sigma_{\text{dop}} \quad M_{\max} = -F \cdot a \quad [\text{Nm}]$$

$$|M_{\max}| = F \cdot a \leq \frac{\sigma_{\text{dop}} \cdot J_y}{z_{\max}}$$

$$F_1 \leq \frac{\sigma_{\text{dop}} \cdot J_y}{z_{\max} \cdot a} = \frac{160 \cdot 1,983 \cdot 10^8}{207,52 \cdot 2000} = 76\,446 \text{ N} \\ = 76,45 \text{ kN}$$

② POSMIČNA SILA NA DUŽINI E NOSAČA

$$R_x = \frac{T_z \cdot S_y}{J_y} \cdot e \quad T_z = F \quad S_y = 7340 \cdot (182,48 - 100) = \\ = 605403,2 \text{ mm}^3$$

$$R_x = \frac{F \cdot 605403,2}{1,983 \cdot 10^8} \cdot 250 = 0,763 F \quad [\text{N}]$$

U promatranom presjeku imamo 2 vertikalne zalovice.

UVJET ČVRSTOĆE NA POSMIK

$$\gamma = \frac{\frac{1}{2} R_x}{\frac{d^2 \pi}{4}} \leq \tau_{\text{dop}} \quad F \leq \frac{120}{0,763} \cdot \frac{25^2 \pi}{2}$$

$$F_2 \leq 154,4 \text{ kN}$$

→ ako zalovice zadovoljavaju na posmik onda zadovoljavaju i presjek

UVJET ČVRSTOĆE ZA OBOJNI PRITISAK

$$\sigma_0 = \frac{\frac{1}{2} R_x}{d \cdot t_{\min}} \leq \sigma_{0,\text{dop}} \quad F \leq \frac{240}{0,763} \cdot 2 \cdot 25 \cdot 6,5$$

$$F_3 \leq 102,23 \text{ kN}$$

POSMIČNO NAPREŽANJE U NEUTRALNOJ OSI

$$\tau = \frac{T_z \cdot S_{y \max}}{J_y \cdot 2t_2} \leq \tau_{dop} \quad T_z = F$$

$$S_{y \max} = 200 \cdot 10 \cdot (182,48 - 5) + 2 \cdot 10 \cdot 172,48 \cdot \frac{182,48 - 10}{2}$$
$$= 6,525 \cdot 10^5 \text{ mm}^3$$

$$F_4 \leq \frac{120 \cdot 1,983 \cdot 10^8 \cdot 20}{6,525 \cdot 10^5}$$

$$F_4 \leq 729,43 \text{ kN}$$

④ POSMIČNO NAPREŽANJE NA DNU HRPTA I PROFILA

$$\tau = \frac{T_z \cdot S_y}{J_y \cdot t_1} \leq \tau_{dop}$$

$$T_z \leq \frac{\tau_{dop} \cdot J_y \cdot t_1}{S_y}$$

$$S_y = 320 \cdot 6,5 \cdot \left(207,52 - \frac{6,5}{2}\right) + 6,5 \cdot 177 \cdot \left(207,52 - \frac{190}{2}\right)$$
$$= 554336 \text{ mm}^3$$

$$F \leq \frac{120 \cdot 1,983 \cdot 10^8 \cdot 6,5}{554336}$$

$$F \leq 279 \text{ kN}$$

→ mjerodavna su normalna naprežanja