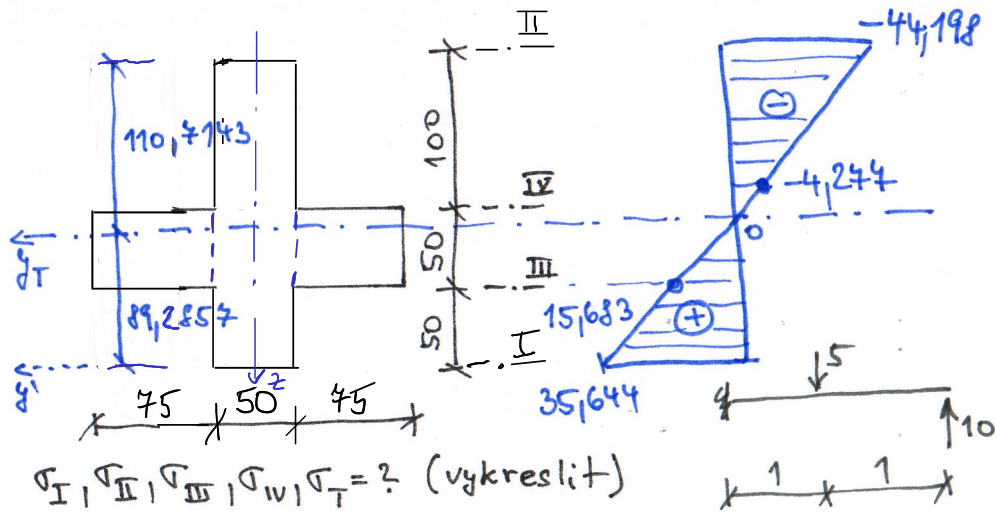




$$\sigma_I, \sigma_{II}, \sigma_{III}, \sigma_{IV}, \sigma_T = ? \text{ (vykreslit)}$$

$$z_T = \frac{150 \cdot 50 \cdot 75 + 200 \cdot 50 \cdot 100}{150 \cdot 50 + 200 \cdot 50} = 89,2857 \text{ mm}$$

$$I_y = \frac{1}{12} \cdot 150 \cdot 50^3 + 150 \cdot 50 \cdot (89,2857 - 75)^2 + \frac{1}{12} \cdot 50 \cdot 200^3 + 50 \cdot 200 \cdot (100 - 89,2857)^2 = 37,5744 \cdot 10^6 \text{ mm}^4$$

$$M_{max} = 10 \cdot 2 - 5 \cdot 1 = 15 \text{ kNm}$$

$$\sigma_I = \frac{15 \cdot 10^3}{37,5744 \cdot 10^6} \cdot 89,2857 \cdot 10^{-3} = 35,644 \text{ MPa}$$

$$\sigma_T = 0$$

$$\sigma_{II} = \frac{15 \cdot 10^3}{37,5744 \cdot 10^6} \cdot (-110,4143 \cdot 10^{-3}) = -44,198 \text{ MPa}$$

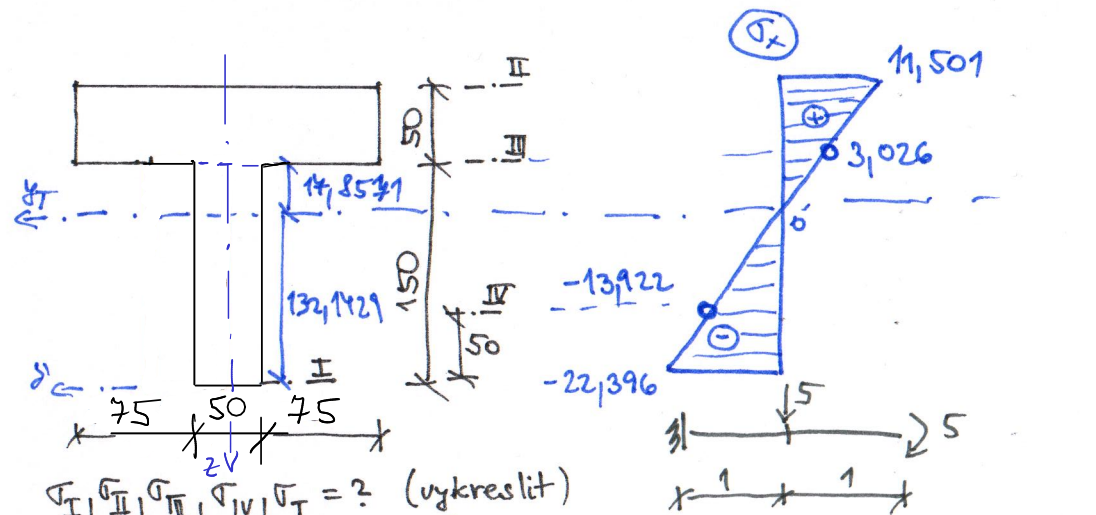
$$\frac{35,644}{89,2857} = \frac{\sigma_{II}}{110,4143} \Rightarrow \sigma_{II} = -44,198 \text{ MPa}$$

$$\sigma_{III} = \frac{15 \cdot 10^3}{37,5744 \cdot 10^6} \cdot (39,2857 \cdot 10^{-3}) = 15,683 \text{ MPa}$$

$$\frac{35,644}{89,2857} = \frac{\sigma_{III}}{39,2857} \Rightarrow \sigma_{III} = 15,683 \text{ MPa}$$

$$\sigma_{IV} = \frac{15 \cdot 10^3}{37,5744 \cdot 10^6} \cdot (-10,4143 \cdot 10^{-3}) = 4,277 \text{ MPa}$$

(10 min)



$$\sigma_I, \sigma_{II}, \sigma_{III}, \sigma_{IV}, \sigma_T = ? \text{ (vykreslit)}$$

$$z_T = \frac{150 \cdot 50 \cdot 75 + 50 \cdot 200 \cdot 175}{150 \cdot 50 + 200 \cdot 50} = 132,1429 \text{ mm}$$

$$I_y = \frac{1}{12} \cdot 150 \cdot 50^3 + 150 \cdot 50 \cdot (132,1429 - 75)^2 + \frac{1}{12} \cdot 200 \cdot 50^3 + 200 \cdot 50 \cdot (42,8571)^2 = 59,00297618 \cdot 10^6 \text{ mm}^4$$

$$M_{max} = -5 - 5 \cdot 1 = -10 \text{ kNm}$$

$$\sigma_I = \frac{M_y}{I_y} \cdot z = \frac{-10 \cdot 10^3}{59,00297618 \cdot 10^6} \cdot 132,1429 \cdot 10^{-3} = -22,396 \text{ MPa}$$

$$\sigma_T = 0$$

$$\sigma_{II} = \frac{-10 \cdot 10^3}{59,00297618 \cdot 10^6} \cdot (-67,8571 \cdot 10^{-3}) = 11,501 \text{ MPa}$$

$$\frac{22,396}{132,1429} = \frac{11,501}{67,8571} \Rightarrow \sigma_{II} = 11,501 \text{ MPa}$$

$$\sigma_{III} = \frac{-10 \cdot 10^3}{59,00297618 \cdot 10^6} \cdot (14,8571 \cdot 10^{-3}) = 3,026 \text{ MPa}$$

$$\frac{22,396}{132,1429} = \frac{3,026}{14,8571} \Rightarrow \sigma_{III} = 3,026 \text{ MPa}$$

$$\sigma_{IV} = \frac{-10 \cdot 10^3}{59,00297618 \cdot 10^6} \cdot 82,1429 \cdot 10^{-3} = -13,922 \text{ MPa}$$

$$\frac{22,396}{132,1429} = \frac{-13,922}{82,1429} \Rightarrow \sigma_{IV} = -13,922 \text{ MPa}$$