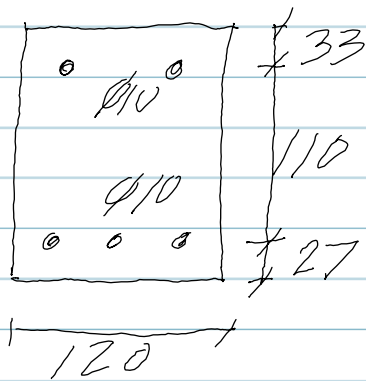


DTV. Betonkonstruktionen



$$f_{cm} = 31 \text{ MPa} \Rightarrow$$

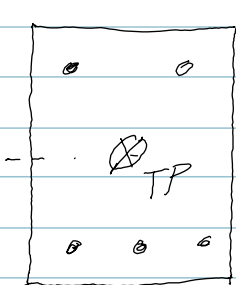
$$E_{cm} = 22000 \left(\frac{f_{cm}}{10} \right)^{1.3}$$

$$= 22000 \left(\frac{31}{10} \right)^{1.3} = 30891 \text{ MPa}$$

$$E_s = 2 \cdot 10^5 \text{ MPa}$$

$$\Rightarrow \alpha = E_s / E_{cm} = 2 \cdot 10^5 / 30891 = 6.5$$

UREVNET



$$\eta = S'_t / A_t$$

$$\begin{aligned} A_t &= A_c + (\alpha - 1) A_s = b h + (\alpha - 1) A_s \\ &= 120 \cdot 170 + (6.5 - 1) 5\pi (10/2)^2 \\ &= 22550 \text{ mm}^2 \end{aligned}$$

$$\begin{aligned} S'_t &= b h (h/2) + (\alpha - 1) A_{sc} \cdot d_{sc} + A_s d \\ &= 120 \cdot 170 (170/2) + (6.5 - 1) (2\pi (10/2)^2 \cdot 33 + 3\pi (10/2)^2 \cdot 143) \\ &= 1946829 \text{ mm}^3 \Rightarrow \end{aligned}$$

$$\eta = S'_t / A_t = 1946829 / 22550 = 86.33 \text{ mm}$$

$$\begin{aligned} I_t &= \frac{1}{12} b h^3 + b h (\eta - h/2)^2 + A_{sc} (\alpha - 1) (\eta - d_{sc})^2 + A_s (\alpha - 1) (d - \eta)^2 \\ &= \frac{1}{12} \cdot 120 \cdot 170^3 + 120 \cdot 170 (86.33 - 170/2)^2 \\ &\quad + 2\pi (10/2)^2 (6.5 - 1) (86.33 - 33)^2 \\ &\quad + 3\pi (10/2)^2 (6.5 - 1) (143 - 86.33)^2 = 55.75 \cdot 10^6 \text{ mm}^4 \end{aligned}$$

$\Rightarrow$

$$EI_{\text{vermüt}} = 30891 \cdot 55.75 \cdot 10^6 = 1.722 \cdot 10^{12} \text{ N/mm}^2$$