

Spørge 1

$$M_{\text{ed}} = -(p+q)L \cdot L/2 - F \cdot L$$

$$= -(4+5) \cdot 6 \cdot 6/2 - 20 \cdot 6 = -\underline{\underline{282,0 \text{ kNm}}}$$

$$V_{\text{ed}} = (p+q) \cdot L + F = (4+5) \cdot 6 + 20 = \underline{\underline{74,0 \text{ kN}}}$$

$$T_{\text{ed}} = F \cdot \frac{300 \cdot 10^{-3}}{2} = 20 \cdot \frac{0,3}{2} = \underline{\underline{3,0 \text{ kNm}}}$$

(p og q virker over trykdepunkt
og giver derfor ikke vridning)

Spørge 2

Vi antager, at tværsnittet er normalt-armeret, og at det er nok med armeringen i trækk, dvs vi ignorerer tryk armeringen

$$f_{\text{td}} = 35 / 1,45 = 24,1 \text{ MPa}$$

$$f_{\text{yd}} = 500 / 1,2 = 416,7 \text{ MPa}$$

$$E_{\text{cu3}} = 3,5 \%$$

$$E_{\text{yd}} = 416,7 / 2 \cdot 10^5 = 2,08 \%$$

$$E_{\text{cu4}} = 5 \%$$

$$\eta = \frac{A_s \cdot f_{\text{yd}}}{b \cdot f_{\text{td}}} = \frac{277 (28/2)^2 \cdot 416,7}{300 \cdot 24,1} = \underline{\underline{70,98 \text{ mm}}}$$

$$x = \eta / 2 = 70,98 / 2 = \underline{\underline{88,72 \text{ mm}}}$$

$$\epsilon_s = \frac{E_{\text{cu3}}}{x} (d - x)$$

$$d = 600 - 15 - 6 - 28/2 = \underline{\underline{565 \text{ mm}}}$$

$$\epsilon_s = \frac{3,5 \%}{88,72} (565 - 88,72) = \underline{\underline{18,79 \%}}$$

$$E_{\text{yd}} \leq \epsilon_s \leq E_{\text{cu4}} \Rightarrow \text{Normalarmert}$$

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2/2

$$M_{ed} = A_s f_{yd} (d - y/2)$$

$$= 2\pi (28/2)^2 \cdot 4/67 \cdot (565 - 88,72/2)$$

$$= 267,2 \cdot 10^6$$

$$= \underline{267,2 \text{ kNm}}$$

Bjelken kan holde

Spm 3

$$V_{ed,w} = A_{sr} f_{ywd} \frac{z \cot \theta}{s}$$

$$z = d - y/2 = 565 - 79,98/2 = 529,5 \text{ mm}$$

$$\Rightarrow V_{ed,w} = 2\pi (6/2)^2 \cdot 4/67 \cdot \frac{529,5 \cdot 2,5}{150}$$

$$= 208,0 \cdot 10^3 \text{ N}$$

$$=$$

$$\underline{208,0 \text{ kN}}$$

Bjelkens bølger er
til strekkveleg

Spm 4

$$T_{rd,w} = 2 A_{sr} f_{ywd} \cdot A_k \cdot \frac{\cot \theta}{s}$$

$$t_{ef} = \max \left\{ \begin{array}{l} A/v = \frac{300 \cdot 600}{2(300 + 600)} = \underline{100 \text{ mm}} \\ 2(c + \phi_w + \phi/2) \end{array} \right.$$

$$= 2 \cdot (15 + 6 + 28/2) = \underline{70 \text{ mm}}$$

$$\Rightarrow A_k = (300 - \frac{100}{2} \cdot 2) (600 - \frac{100}{2} \cdot 2) = 100,0 \cdot 10^3 \text{ mm}^2$$

$\Rightarrow$

$$T_{rd,w} = 2 \cdot \pi \left(\frac{6}{2}\right)^2 \cdot 4/67 \cdot 100 \cdot 10^3 \cdot \frac{2,5}{150}$$

$$= 39,27 \cdot 10^6 \text{ Nmm}$$

$$= \underline{39,27 \text{ kNm}}$$

Bjelkenes styrke er til strekkveleg