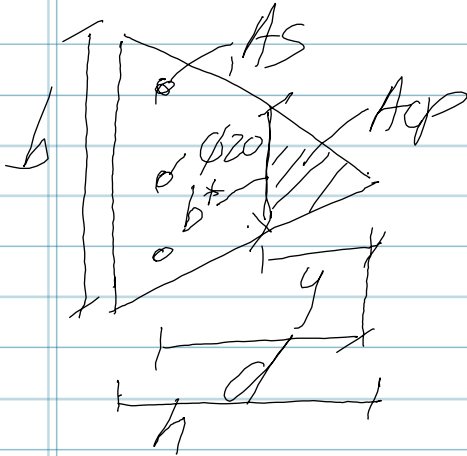


# DTU Betonkonstruktionen

2/2



$$N = A_{cp} \cdot f_{cd}(1/\gamma) - A_s f_{yd} = A_{cp} f_{cd}$$

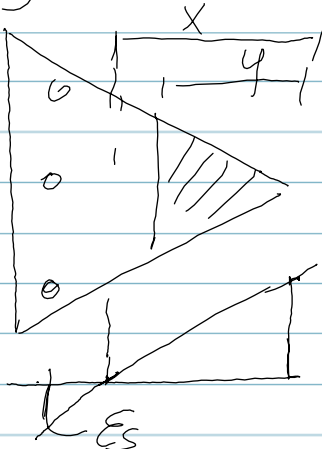
$$\Rightarrow A_{cp} = \frac{N_{Ed} + A_s f_{yd}}{f_{cd}}$$

$$= \frac{200 \cdot 10^3 + 317(20/2)^2 \cdot 4/7}{24,1}$$

$$= 24606 \text{ mm}^2$$

$$A_{cp} = \frac{1}{2} \cdot b^* \cdot y = \frac{1}{2} \left( b \cdot \frac{y}{h} \right) y \Rightarrow$$

$$y = \sqrt{2 A_{cp} \cdot h/b} = \sqrt{2 \cdot 24606 \cdot 500/575} = 206,8 \text{ mm}$$



$$x = y/1 = 206,8/0,8 = 258,6 \text{ mm}$$

$$\epsilon_c = \epsilon_{cu3} = 3,5\%$$

$$\epsilon_s = \frac{\epsilon_{cu3}(d-x)}{x} = \frac{3,5\%}{258,6} (455 - 258,6)$$

$$= 2,66\% > \epsilon_{yd} = f_{yd}/E_s$$

$$= 417/2 \cdot 10^5 = 2,085\%$$

$$< \epsilon_{u1} = 5\% = 50\%$$

$$M_{rd} = A_s f_{yd} (d - h/2) + A_{cp} f_{cd} (h/2 - \frac{2}{3} y)$$

$$= 317(20/2)^2 \cdot 4/7 (455 - 500/2)$$

$$+ 24606 \cdot 24,1 (500/2 - \frac{2}{3} \cdot 206,8)$$

$$= 174,1 \cdot 10^6 \text{ Nmm} = 174,1 \text{ kNm}$$

$$> M_{Ed} = 131,8 \text{ kNm} \quad \text{OK!}$$