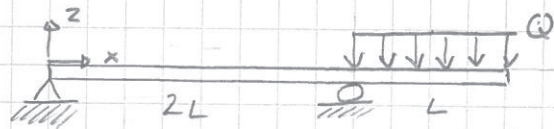


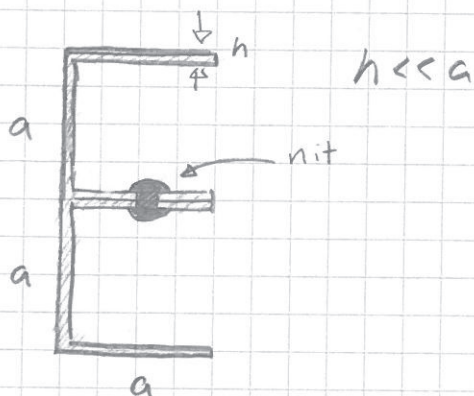
2.4.88 Balk

Givet



x Tunnväggiga U-profiler som i hopnitats på jämfördelningsavstånd  $\Delta L$

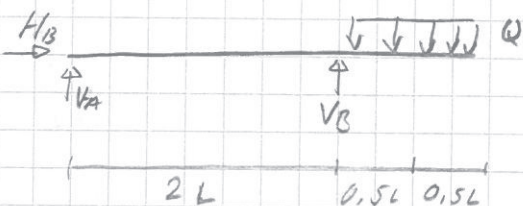
x Nitarna skall ta alla  $F_{nit}$



Sökt Hur stort för Q vara?

Lösning

1. Frilägg



2. Jmv

$$\uparrow: V_A + V_B - Q = 0$$

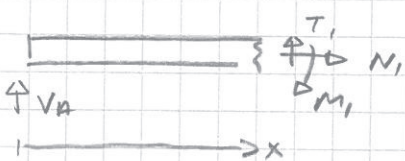
$$\rightarrow: H_B = 0$$

$$\overset{\curvearrowright}{\sum} M: V_B \cdot 2L - 2,5L \cdot Q = 0$$

$$\Rightarrow V_B = \frac{5}{4}Q \quad \Rightarrow V_A = -\frac{Q}{4}$$

3. Snitt

Del 1  $0 \leq x \leq 2L$

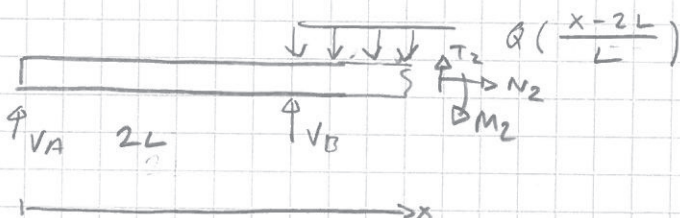


4. Jmv

$$\uparrow: V_A + T_1 = 0 \Rightarrow T_1 = -V_A$$

$$\overset{\curvearrowright}{\sum} M: -M_1 - V_A \cdot x = 0 \Rightarrow M_1(x) = \frac{Q}{4} \cdot x$$

Del 2  $2L \leq x \leq 3L$



$$\uparrow: V_A + V_B + T_2 = 0 \Rightarrow T_2 = -Q$$

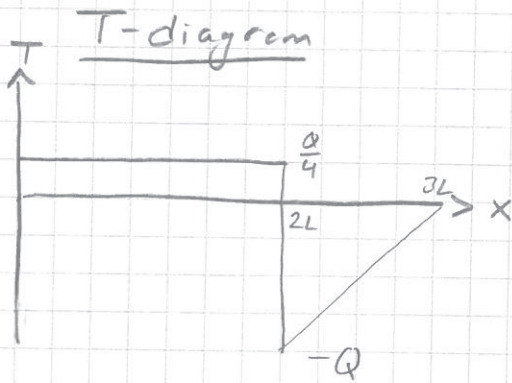
$$\overset{\curvearrowright}{\sum} M: -V_A \cdot x - V_B \cdot x + Q \left(\frac{x-2L}{L}\right) \cdot \left(\frac{x-2L}{2}\right) - M_2 = 0$$

$$\Rightarrow M_2(x) = Q \left(\frac{x-2L}{L}\right) \left(\frac{x-2L}{2}\right) - x \cdot Q$$

= ...

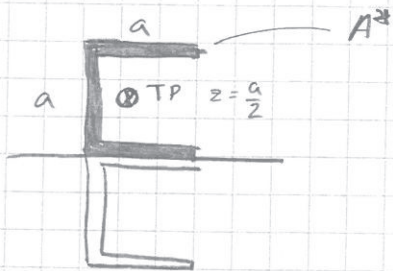
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fortb. 1



drs  $|T|$  är  $Q$

Vi snitter i mitten/längs ihopfästningen...



$\Rightarrow$  Statiskt moment:

$$S_{A^*} = \int \text{Area} \cdot \text{tyngdpunkt}$$

$$S_{A^*} = 3 \cdot (a \cdot h) \cdot \frac{a}{2} = \frac{3a^2h}{2}$$

Tröghetsmoment:

$$I_y = \left\{ \int_A z^2 dA \right\} = \left\{ 2 \int z^2 dA \right\} \quad \text{drs } \left. \begin{array}{l} z_1 \approx a \\ z_3 \approx 0 \end{array} \right\} =$$

$$= \int_{A_1} z_1^2 dA + \int_{A_2} z_2^2 dA + \int_{A_3} z_3^2 dA =$$

$$= \int_{A_1} a^2 dA + \int_{A_2} z^2 \cdot h \cdot dz + \int_{A_3} 0^2 \cdot dA$$

$$= a^2 \cdot a \cdot h + \left[ \frac{z^3 h}{3} \right]_0^a + 0 = \frac{4}{3} a^3 h$$

Obs vi räknade ut för övre halvan...

drs hela profilen har  $I_y = 2 \cdot \frac{4}{3} a^3 h = \frac{8}{3} a^3 h$

$$\left[ \tau = \frac{T \cdot S_{A^*}}{I_y \cdot b} \right] \Rightarrow \tau = \frac{Q \cdot \left( \frac{3}{2} a^2 h \right)}{\frac{8}{3} a^3 h \cdot a} = \frac{9}{16} \frac{Q}{a^2}$$

$$F_{nit} = \tau \cdot A = \tau \cdot 4L \cdot a \Rightarrow Q = \frac{16}{9} \cdot \frac{a \cdot F_{nit}}{4L}$$