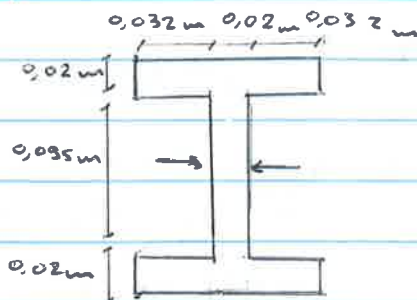
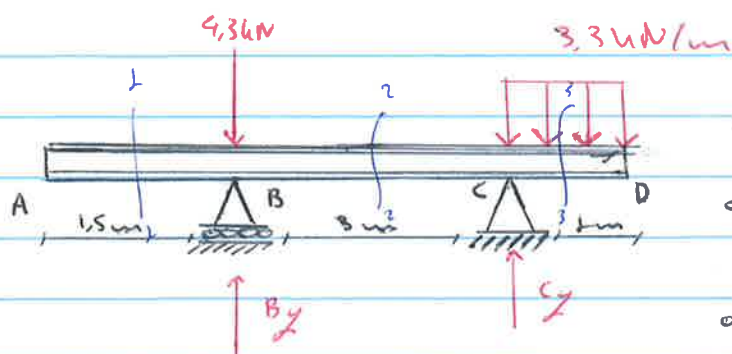


Project 8

(1)

David, Apple - 2018050055



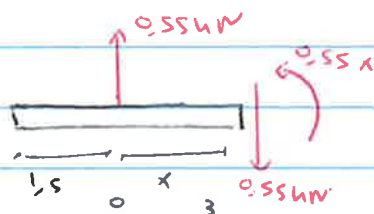
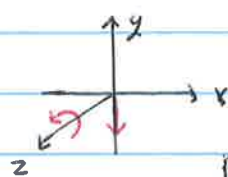
$\sigma_{\text{all}} = 120 \text{ MPa}$
 $\sigma_{\text{all}} = 110 \text{ MPa}$
 $\tau_{\text{all}} = 50 \text{ MPa}$

Equilibrium: $B_y + C_y = 7.6 \text{ kN}$

$(B_y - 4.3) \cdot 3 = \frac{3.3}{2} \Rightarrow B_y = 4.85 \text{ kN} \uparrow$ $C_y = 2.75 \text{ kN} \uparrow$

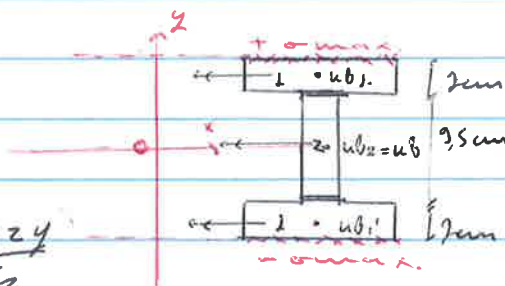
Topic 1-1 → adhesion

Topic 2-2



$M = 0.55x$
 1.65 kNm
 (max)

$\sigma = \frac{My}{I_z}$
 $M_z : \sigma = \frac{M_z y}{I_z}$

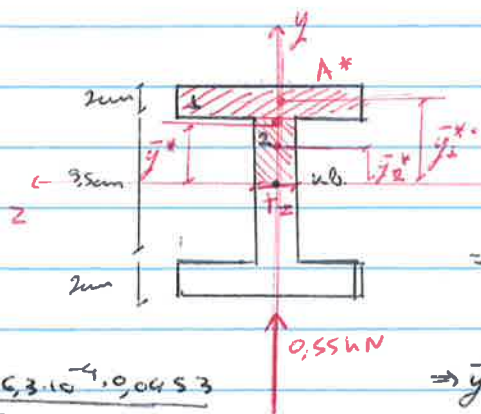


$I_z = 2(I_{z1} + 5.75 \text{ cm}^2 \cdot 8.4 \cdot 2)$
 $+ I_{z2}$

$I_{z1} = \frac{8.4 \cdot 2^3}{12}$
 $I_{z2} = \frac{2 \cdot 9.5^3}{12}$
 $I_z = 1.3 \cdot 10^{-5} \text{ m}^4$

$\sigma_{\text{max}} = \frac{1.65 \cdot 10^3 \cdot (\pm 0.0675)}{1.3 \cdot 10^{-5}} = \pm 8.6 \text{ MPa} < \sigma_{\text{all}} = 110 \text{ MPa}$
OK.

$\tau = \frac{V_y Q_y}{I_z t_z}$
 V_z



$\bar{y}^* = \frac{y_1 A_1 + y_2 A_2}{A_1 + A_2}$

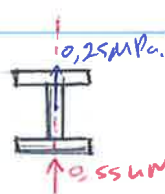
$= \frac{2 \cdot 8.4 \cdot 5.75 + 2 \cdot 3.75 \cdot 2 \cdot 4.75}{2 \cdot 8.4 + 2 \cdot 4.75}$

$\Rightarrow \bar{y}^* = 4.53 \text{ cm}$ 0.0453 m

$A^* = 2 \cdot 8.4 + 2 \cdot 4.75 = 26.3 \text{ cm}^2$

$\bar{y} = 26.3 \cdot 10^{-4} \text{ m}^2$

$= 0.25 \text{ MPa} < \tau_{\text{all}} = 50 \text{ MPa}$
OK.



Project 8 - 2)

Planning, April 2018 050055

$$E_2 = 1, E_3 = 13$$

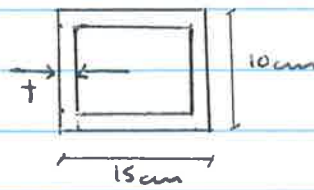
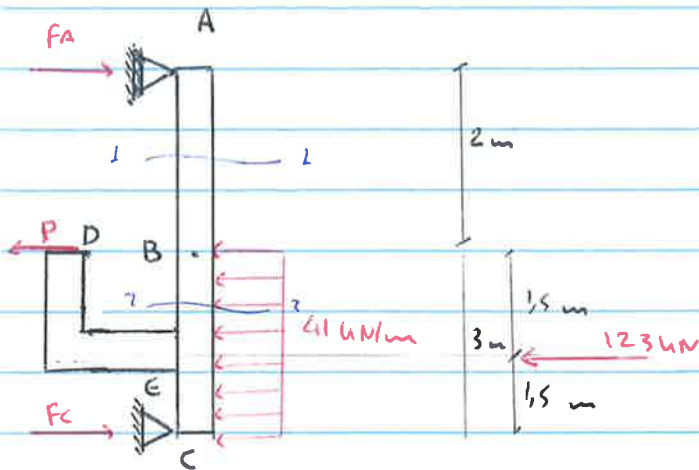
$$t = 4 \text{ cm}$$

$$P = 43 \text{ kN}$$

$$\sigma_{\text{Bj}} = 100 \text{ MPa}$$

$$\sigma_{\text{cr}} = 140 \text{ MPa}$$

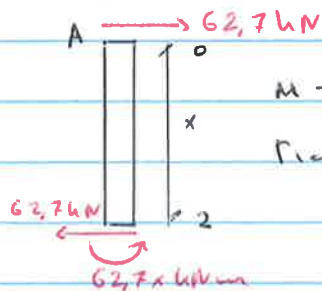
$$\tau_{\text{cr}} = 80 \text{ MPa}$$



$$\sum M_C = 0 \Rightarrow 43 \cdot 3 + 123 \cdot 1,5 = F_A \cdot 5 \Rightarrow F_A = 62,7 \text{ kN} \rightarrow$$

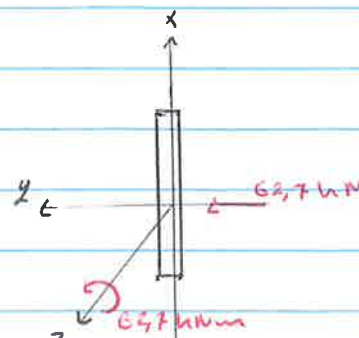
$$F_C = 103,3 \text{ kN} \rightarrow$$

1) Top & L



$$M = 62,7 x$$

$$F_{\text{in A}} = \frac{AB}{2} = 1 \text{ m} \Rightarrow M = 62,7 \text{ kNm}$$



$$\tau = \frac{V_y Q_z}{I_z t_z}$$

$$t_z = 2 \cdot 0,001 \text{ m}$$

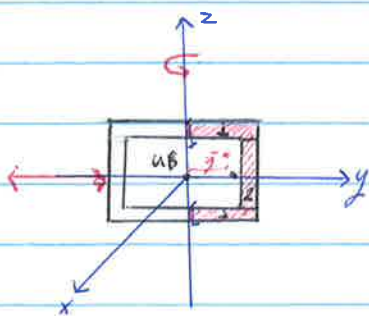
$$I_z = \frac{0,1 \cdot 0,1^3}{12} = \frac{0,02 \cdot 0,007^3}{12} = 2,75 \cdot 10^{-5} \text{ m}^4$$

$$Q_z = A^* \bar{y}^* = 48 \cdot 10^{-5} \text{ m}^3 \Rightarrow \tau = \frac{62,7 \cdot 10^3 \cdot 48 \cdot 10^{-5}}{2,75 \cdot 10^{-5} \cdot 2 \cdot 0,001} = 13,7 \text{ MPa} < \tau_{\text{cr}} = 80 \text{ MPa}$$

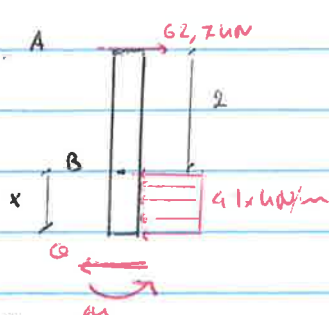
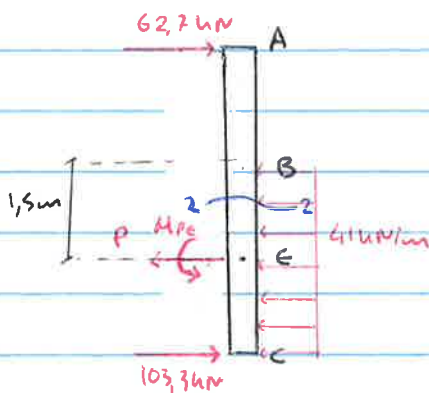
pari:

$$A^* = 0,075 \cdot 2 \cdot 0,001 + 0,02 \cdot 0,001 = 5,8 \cdot 10^{-3} \text{ m}^2$$

$$\bar{y}^* = \frac{2y_1 A_1 + y_2 A_2}{A_1 + A_2} = \frac{2 \cdot 0,0375 \cdot 0,075 \cdot 0,001 + 0,055 \cdot 0,04 \cdot 0,02}{0,075 \cdot 0,001 + 0,04 \cdot 0,02} = 0,07 \text{ m}$$



2)

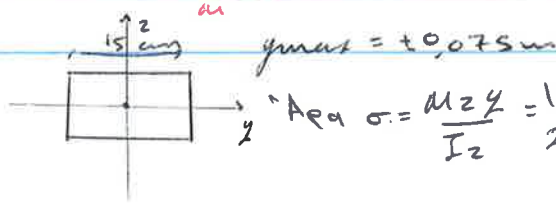


$$N = 0$$

$$Q = 62,7 - 41x \quad x = \frac{B_C}{2} = 0,75 \text{ m} \Rightarrow 32 \text{ kN}$$

$$M = 62,7(x+2) - \frac{41x^2}{2}$$

$$161 \text{ kNm}$$



$$\sigma = \frac{M z y}{I_z} = \frac{161 \cdot 10^3 \cdot 0,075}{2,75 \cdot 10^{-5}} = 440 \text{ MPa} \gg \sigma_{\text{cr}}$$

Aerovia