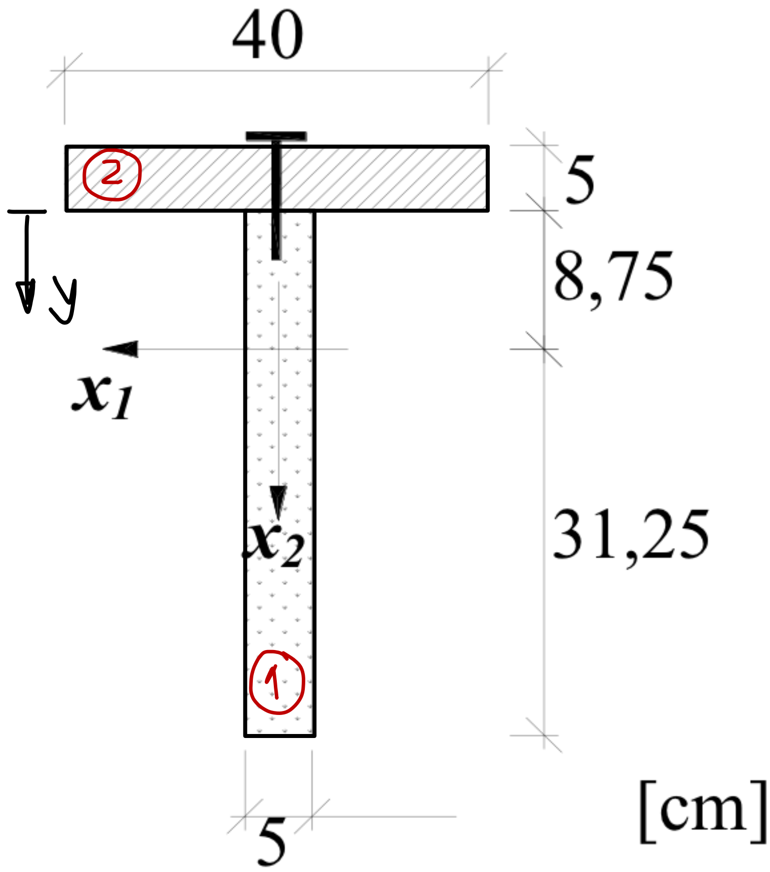
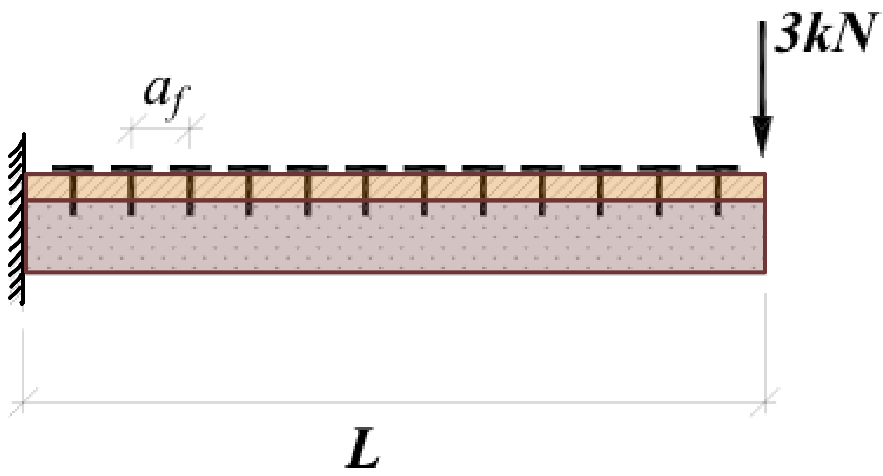




	y_G [cm]	A [cm²]	I_G [cm⁴]	I_1 [cm⁴]
1	$-40/2$	200	$26,67 \times 10^3$	$51,98 \times 10^3$
2	$5/2$	$40 \times 5 = 200$	416,7	$25,73 \times 10^3$
T	$-8,75$	400	—	$77,71 \times 10^3$

(i) considerando a ligação

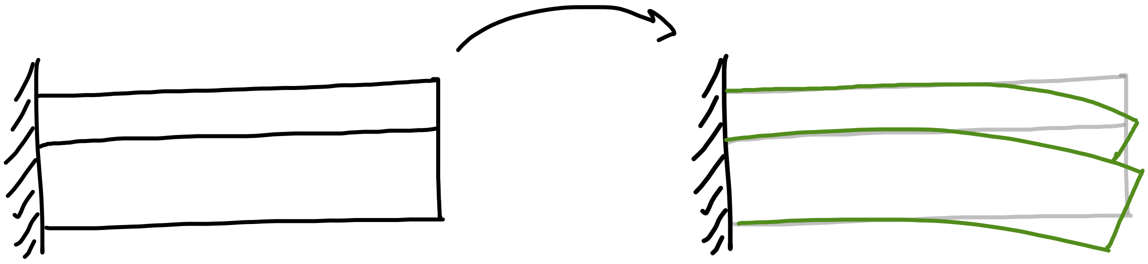
$$M^{max} = 3L \qquad \sigma^{max} = \frac{M^{max}}{77,71 \times 10^3} \times 0,3125 \Rightarrow M^{max} = \frac{10 \times 10^3 \times 77,71 \times 10^5}{0,3125}$$

$$= 24,87 \text{ kN}$$

$$\Downarrow$$

$$3L = 24,87 \Rightarrow L = \underline{\underline{8,289 \text{ m}}}$$

(ii) sem ligação



⚠ Se têm mesmo deslocamento vertical têm a mesma curvatura

$$\frac{M_1}{EI_1} = \frac{M_2}{EI_2} \Rightarrow M_2 = M_1 \frac{I_2}{I_1}$$

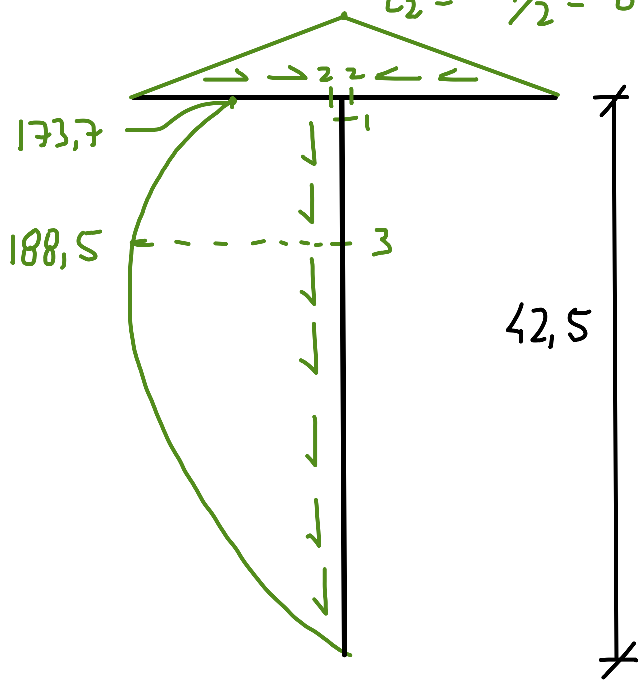
$$\boxed{M = \frac{\sigma I}{x}}$$

$$M_1 + M_2 = 3L \Rightarrow M_1\left(1 + \frac{I_2}{I_1}\right) = 3L$$

$$M_1^{max} = \frac{10\times10^3 \times 26{,}67\times10^{-5}}{0{,}2} = 13{,}34 \Rightarrow \left| \begin{array}{l} M_2 \simeq 0{,}21 \\ L = \frac{13{,}34}{3}\left(1 + \frac{416{,}7}{26{,}67\times10^3}\right) = 4{,}516\ m \end{array}\right.$$

$$M_2^{max} = \frac{10\times10^3 \times 416{,}7\times10^{-8}}{0{,}05} = 0{,}83 > 0{,}21 \quad (\text{verifica})$$

$$\tau_2 = \tau_1/2 = 86{,}85\ kN/m^2$$



$$\tau_1 = 3 \times \frac{0{,}4 \times \cancel{0{,}05} \times (0{,}0875 + 0{,}025)}{77{,}71\times10^{-5} \times \cancel{0{,}05}} = 173{,}7$$

$$\tau_3 = \tau_{max} = 3\times \frac{31{,}25 \times e \times \frac{31{,}25}{2}}{77{,}71\times10^5 \times e} = 188{,}5\ kN/m^2$$

b. Se cada prego pode resistir a um esforço de corte de *0,6 kN*, qual o afastamento máximo entre pregos?

$$0{,}6 = \underset{\substack{\parallel \\ 0{,}5}}{e} \cdot a_f \cdot \underset{\substack{\parallel \\ 173{,}7}}{\tau_1} \Rightarrow a_f = \frac{0{,}6}{5\times10^{-2}\times173{,}7} = 6{,}9\ cm$$