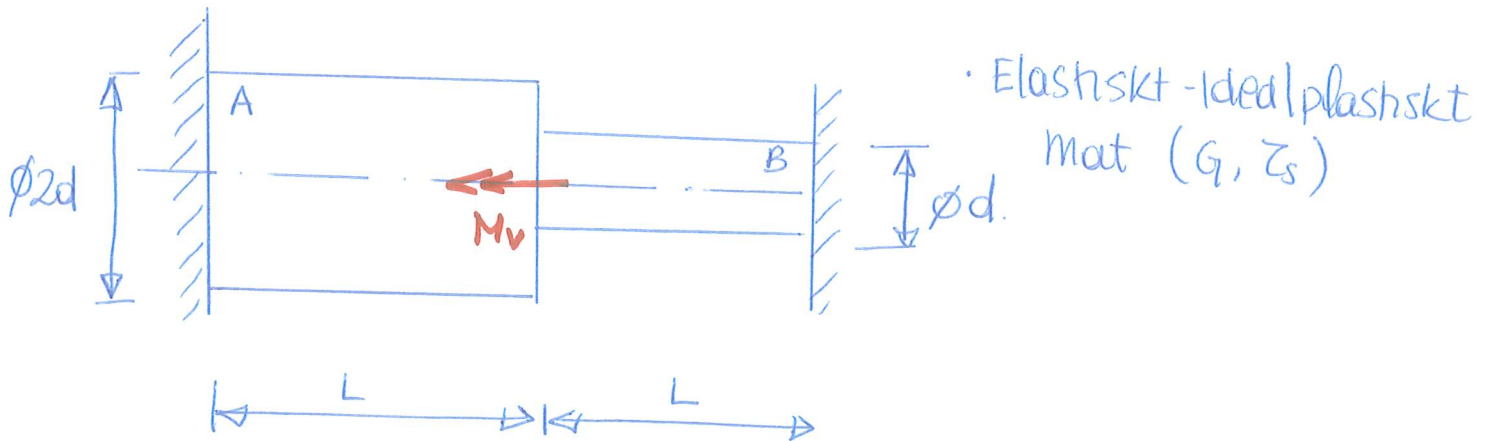


2.6.29

GIVET:

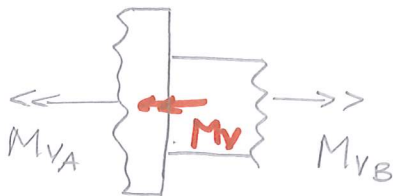


SÖKT: Förhållandet mellan M_p och M_s

LÖSNING:

Hitta M_s . titta på vilken del plastiserar först.

1.- snitta och jmv:



$$\leftarrow : M_{VA} + M_v - M_{VB} = 0$$

$$\underline{\underline{M_{VA} + M_v = M_{VB} \quad (1)}}$$

1 ekv
2 obek \rightarrow

STATISKT
OBESTÄMT.

2.- Deformationssamband.



$$\underline{\underline{\phi_{TOT} = \phi_A + \phi_B = 0 \quad (2)}}$$

3.- Förvridningsvinkeln:

$$\varphi_A = \frac{M_A L_A}{G k_A} = \begin{cases} L_A = L \\ k_A = \frac{\pi}{2} (d)^4 = \frac{\pi d^4}{2} \end{cases}$$

$$\underline{\underline{\varphi_A = \frac{2 M_A L}{\pi d^4}}} \quad (3)$$

$$\varphi_B = \frac{M_B L_B}{G k_B} = \begin{cases} M_{VB} = M_{VA} + M_V & (1) \\ L_B = L \\ k_B = \frac{\pi}{2} \left(\frac{d}{2}\right)^4 = \frac{\pi d^4}{32} \end{cases}$$

$$\underline{\underline{\varphi_B = \frac{32(M_{VA} + M_V)L}{\pi d^4}}} \quad (4)$$

(4) och (3) i (2):

$$\frac{2 M_{VA} L}{\pi d^4} + \frac{16 (M_{VA} + M_V) L}{\pi d^4} = 0$$

$$\begin{cases} \underline{\underline{M_{VA} = -16 M_V / 17}} & \text{i (1)} \\ \underline{\underline{M_{VB} = M_V / 17}} \end{cases}$$

4.- Skjuvspänningar:

$$\tau_{\max B} = \frac{M_{VB}}{W_B} \quad \left\{ \begin{array}{l} M_{VB} = M_V/17 \\ W_B = \frac{\pi}{\left(\frac{2d}{2}\right)} \left(\frac{d}{2}\right)^4 = \frac{\pi d^3}{16} \end{array} \right.$$

$$\tau_{\max B} = \frac{16 M_V}{17 \pi d^3}$$

$$\tau_{\max A} = \frac{M_{VA}}{W_A} \quad \left\{ \begin{array}{l} M_{VA} = -16 M_V/17 \\ W_A = \frac{\pi}{2d} d^4 = \frac{\pi d^3}{2} \end{array} \right.$$

$$\tau_{\max A} = -\frac{32 M_V}{17 \pi d^3}$$

$$|\tau_{\max A}| > |\tau_{\max B}| \Rightarrow \textcircled{A} \text{ PASTICERAR FÖRST!}$$

$$|\tau_{\max A}| = \tau_s \quad \text{eller} \quad \tau_{\max A} = -\tau_s \quad \text{ger}$$

$$M_V = \frac{17 \pi d^3 \tau_s}{32} \quad \text{vid begynnande plast.}$$
$$M_V = M_S \Rightarrow$$

$$\boxed{M_S = \frac{17 \pi d^3 \tau_s}{32}}$$

M_f : fullplasticering



$\oint m_v: M_{vFA} + \overline{M_v} = M_{vFB}$ M_f vid fullplast.

$$\int_0^d (-\zeta_s) 2\pi r^2 dr + M_f = \int_0^{d/2} (\zeta_s) 2\pi r^2 dr$$

eller [FS. 6.84]

$$\begin{cases} M_{vFA} = \frac{2\pi(-\zeta_s)d^3}{3} \\ M_{vFB} = \frac{2\pi\zeta_s d^3}{24} \end{cases}$$

$$M_f = \frac{2\pi\zeta_s d^3}{3} + \frac{2\pi\zeta_s d^3}{24} = \frac{3\pi d^3 \zeta_s}{4}$$

$$\boxed{M_f = \frac{3}{4} \pi d^3 \zeta_s}$$

$$\frac{M_f}{M_s} = \frac{24}{17} \approx 1.4$$