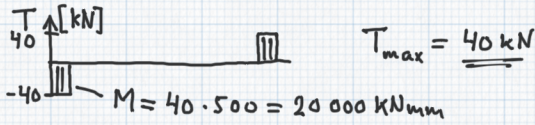
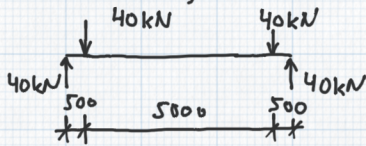


Dimensionera HEB, S275R,  $\gamma_m = 1,0$ ,  $\gamma_n = 1,2$   
 Undvik kvarstående deformation  $\Rightarrow$  sträckgräns  
 Nedböjning?



Ur tabell

$\sigma = 229 \text{ N/mm}^2$      $\tau = 0,6\sigma = 0,6 \cdot 229 = 137,4 \text{ N/mm}^2$

Dimensionera för böjande moment

$\sigma = \frac{M}{W} \Rightarrow W = \frac{M}{\sigma} = \frac{20\,000\,000}{229} = 87\,336,2...$

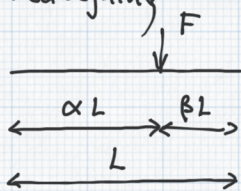
Tabell  $\Rightarrow$  HEB100     $W = 89\,900 > 87\,336$  ok

Dimensionera för tvärkraft

$\tau = \frac{T}{A_{liv}} \Rightarrow A_{liv} = \frac{T}{\tau} = \frac{40\,000}{137,4} \approx 291$

Tabell  $\Rightarrow$  HEB100     $A_{liv} = 480 > 291$  ok

Nedböjning



$\alpha = \frac{5500}{6000} = 0,916...$

$\beta = 1 - \alpha = 0,0833...$

nedböjning under last

$\delta_F = \frac{F \cdot L^3}{3EI} \alpha^2 \beta^2$

$L = 6000$

$E = 210\,000 \text{ N/mm}^2$  ur tabell

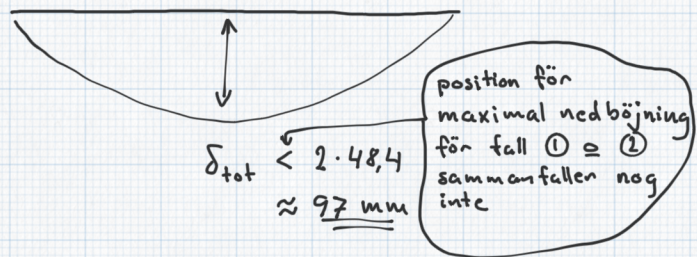
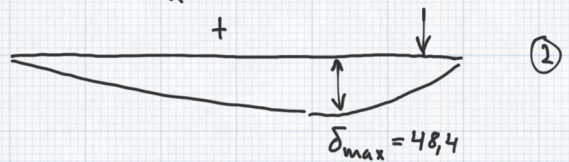
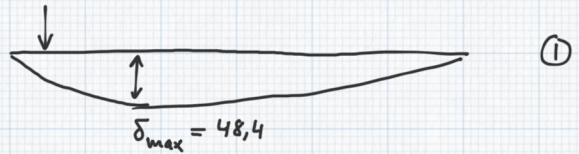
$I = 4\,495\,000 \text{ mm}^4$  ur tabell HEB100

$\Rightarrow \delta_F = \frac{40\,000 \cdot 6000^3}{3 \cdot 210\,000 \cdot 4\,495\,000} \cdot 0,916...^2 \cdot 0,0833...^2$

$\approx 17,8$

$\delta_{max} = \delta_F \cdot \frac{1+\beta}{3\beta} \cdot \sqrt{\frac{1+\beta}{3\alpha}} \approx 17,8 \cdot 4,33... \cdot 0,627...$   
 $\approx 48,4$

Superposition



SVAR: HEB100

$\delta_{tot} < 97 \text{ mm}$

Trä

Dimensionera för böjande moment

$\sigma = 50 \text{ N/mm}^2$  ur tabell

$\sigma = \frac{M}{W} \Rightarrow W = \frac{M}{\sigma} = \frac{2 \cdot 10^7}{50} = 400\,000$

$W = \frac{b \cdot h^2}{6}$      $b = h = x$     kvadrat

$W = \frac{x^3}{6} \Rightarrow \frac{x^3}{6} = 400\,000 \Rightarrow x = \sqrt[3]{6 \cdot 400\,000}$

$x = 133,8... < 140 \text{ mm}$

Dimensionera för tvärkraft

$\tau = 5 \text{ N/mm}^2$  ur tabell, skjuvning tvärs fiberriktning

$\tau = \frac{T}{A_{liv}} \Rightarrow A_{liv} = \frac{T}{\tau} = \frac{40\,000}{5} = 8000$

$A_{liv} = x^2 \Rightarrow x^2 = 8000 \Rightarrow x = 89,4 < 90$

Välj  $x = 140 \text{ mm}$

