

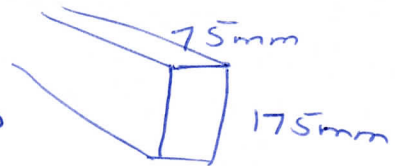
①

Timber Beam

About the beam.

75mm wide by 175mm deep

Strength Class C16 - Use same as sheet

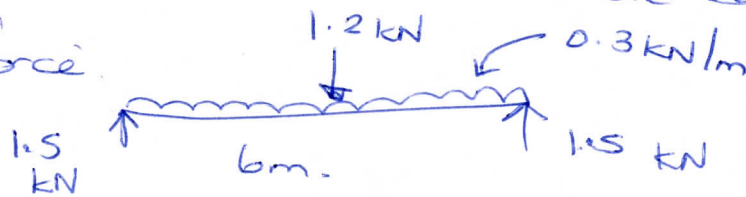


About loads, forces and moments

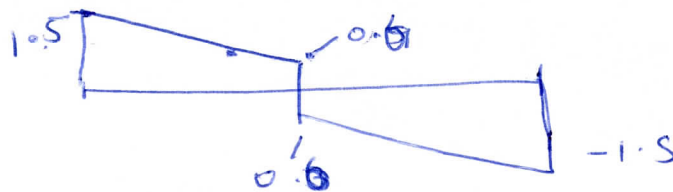
Bending moment = 58.5 Nm or 5850000 Nmm

Taken from concrete calculations:

Shear force



$$0.3 \times 6 = 1.8 \text{ kN} \div 2 = 0.9$$



$$0.6 - 1.2 = -0.6$$

Shear force of interest as it is just zero

is 1.2 kN.

From Design Standards

Use these figures in calculations.

Table

- ① Section modulus of the beam $W = \frac{75 \text{ mm} \times (175 \text{ mm})^2}{6}$
 $= 382812.5 \text{ mm}^3$
- ② Bending moment applied $M = 5850000 \text{ Nmm}$
- ③ Therefore the bending stress applied $\sigma_m = \frac{\text{Bending moment applied}}{\text{Section modulus of the beam}}$ from concrete calcs.
 $= \frac{5850000}{382812.5}$
 $= 15.281632653061 \frac{\text{N}}{\text{mm}^2}$

(2)

- ④ Given bending strength of Q6 timber from table 1 = 16 N/mm^2
- ⑤ The k_{mod} Value from table 2
Permanent action Service class 2
 $k_{mod} = \text{0.60}$

- ⑥ Material partial safety factor

$$\gamma_M = 1.3$$

- ⑦ Bending strength therefore =

$$\frac{\text{Given strength}}{\gamma_M} \times k_{mod} = \frac{16 \text{ N/mm}^2}{1.3} \times 0.6$$

$$= 7.385 \frac{\text{N}}{\text{mm}^2}$$

- ⑧ Shear force applied $F = 1.2 \text{ kN} = 1200 \text{ N}$

- ⑨ Stress applied (7.385) is greater than (7.385)
so for bending this beam is NOT OK

- ⑩ Gross sectional area $A = 75 \text{ mm} \times 175 \text{ mm} = 13125 \text{ mm}^2$

- ⑪ Therefore the Shear Stress applied $\tau = \frac{F}{A} \times 1.5$
 $= \frac{1200 \text{ N}}{13125 \text{ mm}^2} \times 1.5 = 0.13714285 \frac{\text{N}}{\text{mm}^2}$

- ⑫ Shear strength given in table 1 = $3.2 \frac{\text{N}}{\text{mm}^2}$

- ⑬ Shear strength therefore = $\frac{\text{Given strength}}{\gamma_M} \times k_{mod}$
 $= \frac{3.2 \text{ N/mm}^2 \times 0.6}{1.3} = 1.477 \frac{\text{N}}{\text{mm}^2}$

- ⑭ Stress applied (0.137) is less than the
Shear strength (1.477) & beam
is OK