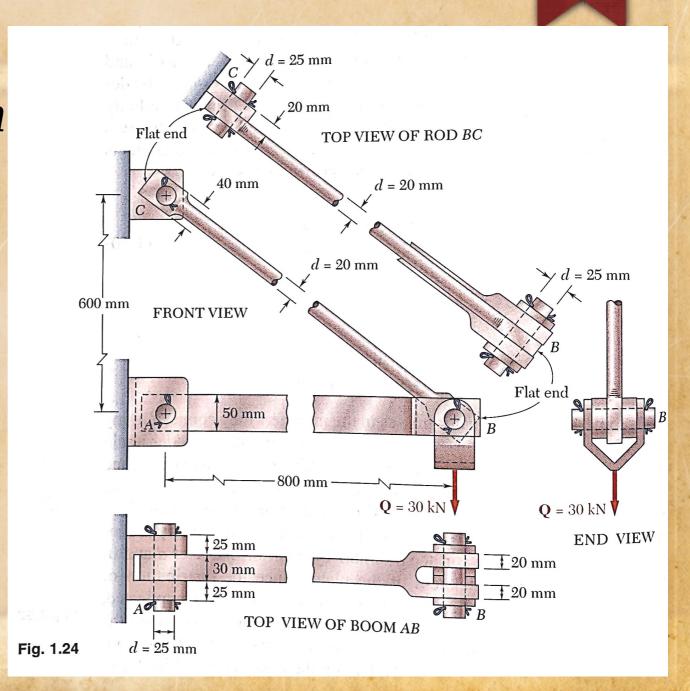
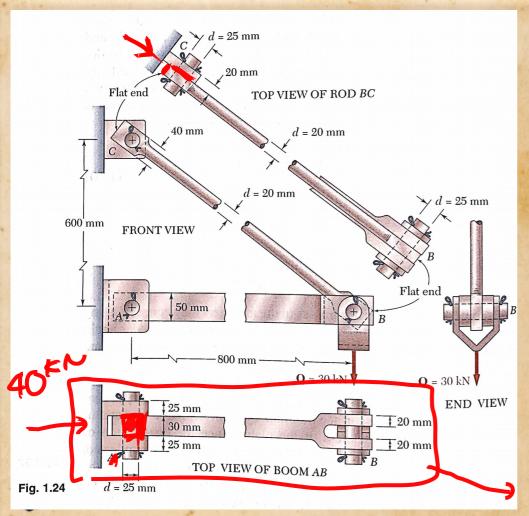
Introduction into design engineering week 67

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Question C:

Determination of the bearing Stresses.







 To determine the norminal bearing stress at a in member AB,

$$\sigma_b = \underbrace{\frac{P}{A}}_{A} = \underbrace{\frac{P}{td}}_{D}$$

this equation should be used.

• Here t = 30 mm, d = 25 mm, and $F = F_{AB} = 40 \text{ kN}$,

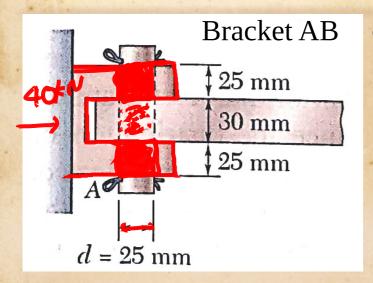
therefor σ_b is;

$$\sigma_b = \frac{P}{td} = \frac{40 \text{ kN}}{(30 \text{ mm})(25 \text{ mm})} = 53.3 \text{ MPa}$$









• To obtain the bearing stress in the bracket at A, it should be used that

$$t = 2(25mm) = 50 mm$$

$$d = 25 \text{ mm}$$
: thus



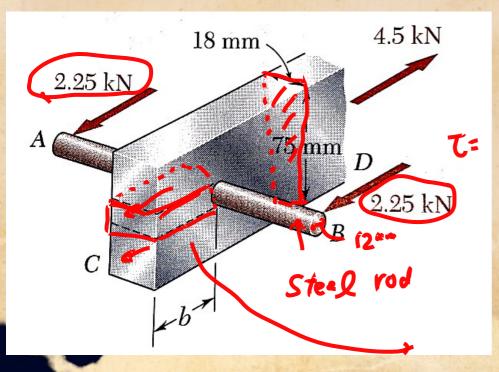
$$\sigma_b = \frac{P}{td} = \frac{40 \text{ kN}}{(50 \text{ mm})(25 \text{ mm})} = 32.0 \text{ MPa}$$

• The bearing stress in member *AB*, at *B* and *C* in member *BC*, and in the bracket at *C* are found in a similar way.

Example question 1

A 12-mm-diameter steel rod AB is fitted to round hole near end C of the wooden member CD. For the loading shown, determine

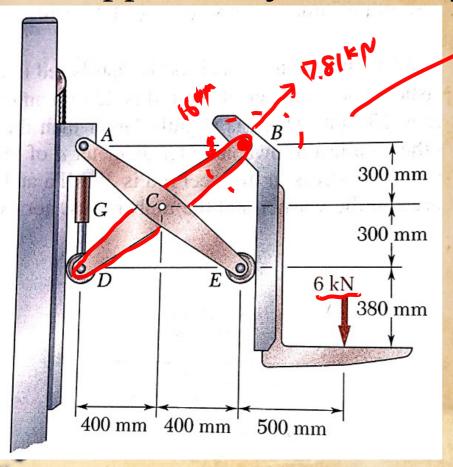
(a) the maximum average normal stress in the wood



(b) the distance b for which the average shearing stress is 620 kPa on the surfaces indicated by the dashed lines (c) the average bearing stress on the wood.

Example question 2

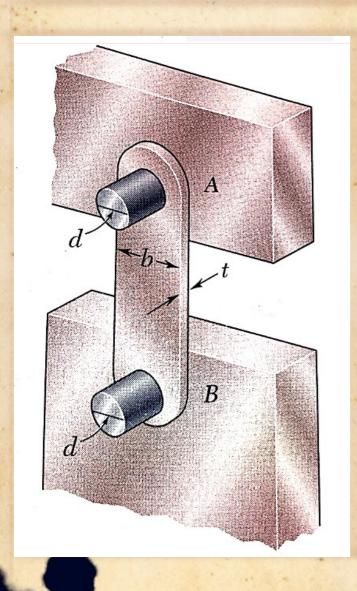
Two identical linkage-and-hydraulic-cylinder systems control the position of the forks of a fort-lift truck. The load supported by the one system shown is 6 kN.



Knowing that the thickness of member BD is 16mm, determine $A = \begin{pmatrix} 1/2 \\ 2 \end{pmatrix}$

- (a) the average shearing stress in the 12-mm- diameter pin at B
- (b) the bearing stress at B in member BD.

Example question 3



Link AB, of width b=50 mm and thickness t=6mm, is used to support the end of a horizontal beam. Knowing that the average normal stress in the link is -140MPa, and that the average shearing stress in each of two pins is 80 Mpa.

Determine

- (a) the diameter d of the pins,
- (b) the average bearing stress in the link