Lec19

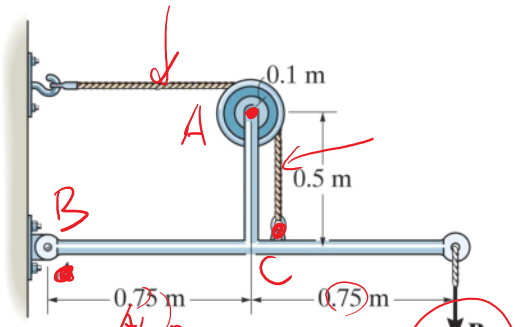
Wednesday, November 4, 2020 7:53 AM

Lecture Objectives

Frames and Machines

Internal Forces

1



Find the force in the cable fastening the frame to the wall.

Which FBD would be the most useful?

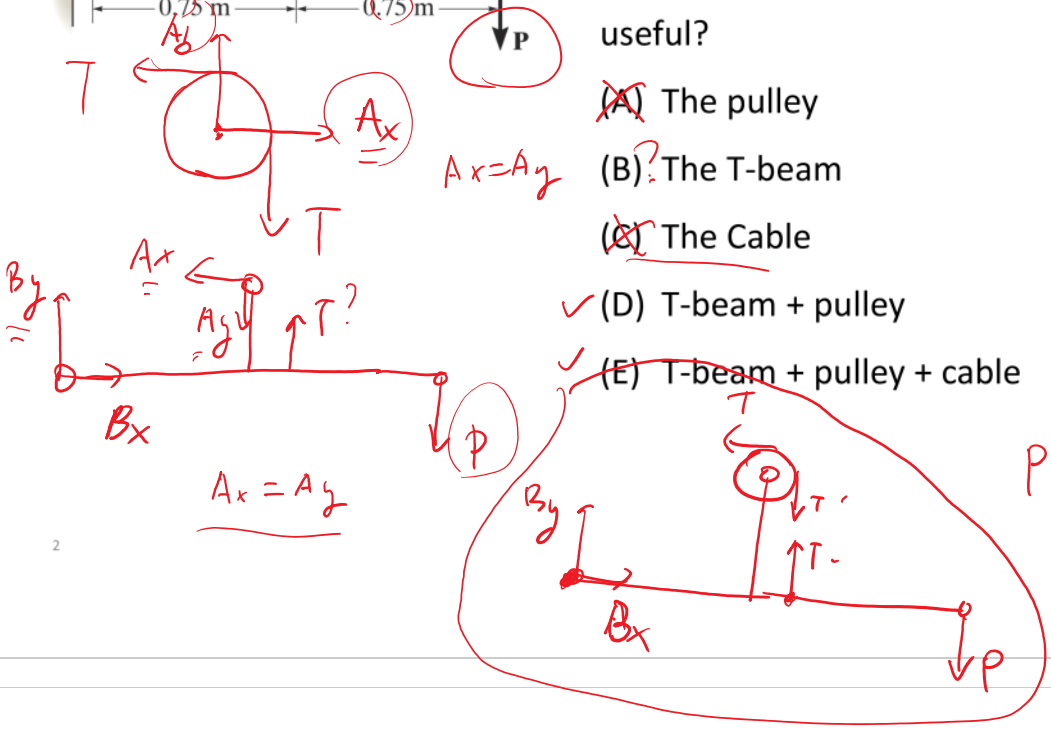
(A) The pulley

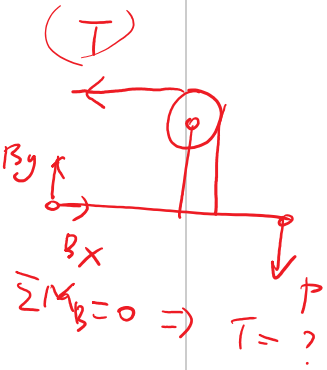
(B) The T-beam

(C) The Cable

(D) T-beam + pulley

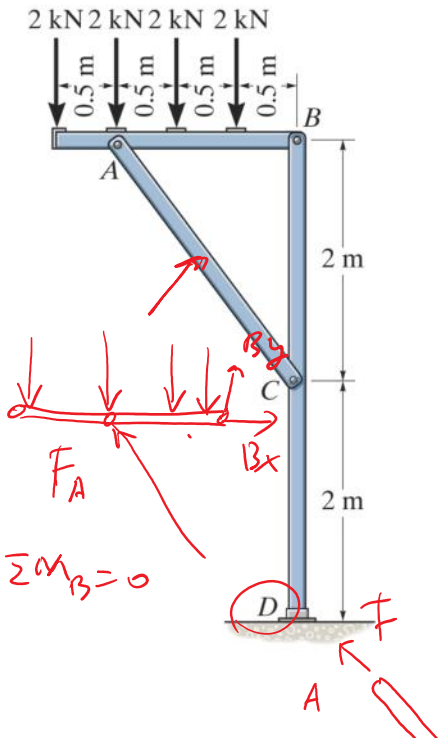
(E) T-beam + pulley + cable





P · 2 · 0.75 = T · 0.5

T =



Find the force in member *AC*.

Which FBD would be the most useful?

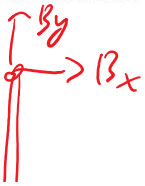
(A) Beam *AB*

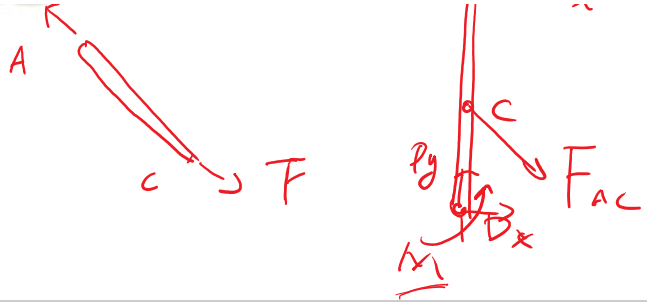
(B) Beam *AC*

(C) Beam *CD*

(D) The whole assembly

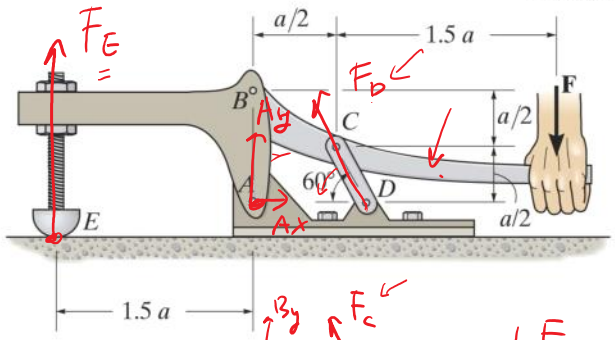
(E) None of the above





3

Find the clamping force at *E*.



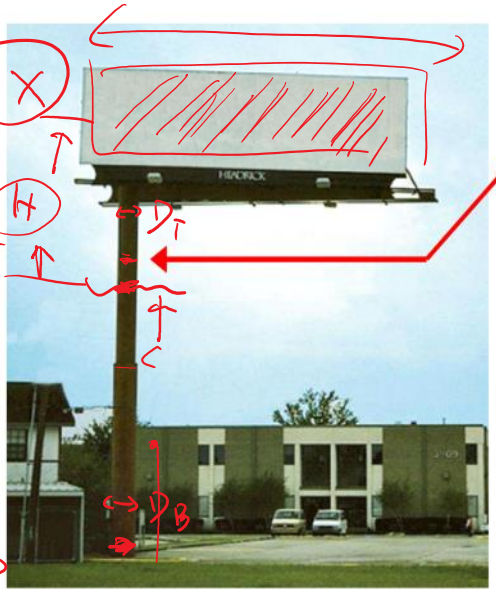
$F_D = F_C$

$\Rightarrow F_E$

$\Sigma M_B = 0 \Rightarrow F_C = ?$

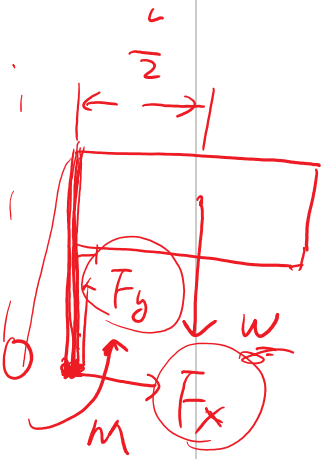
4

Internal loadings developed in structural members



A fixed column supports these rectangular billboards.

Usually such columns are wider/thicker at the bottom than at the top. Why?



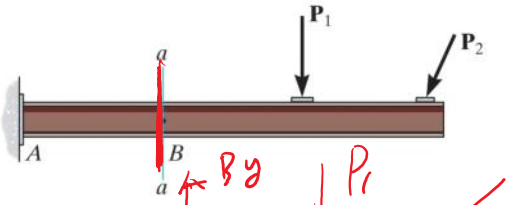
$\Sigma M_O = 0$

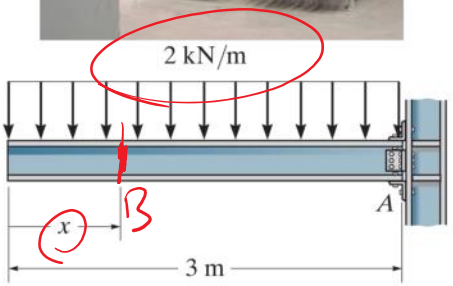
$M_y = W \cdot \frac{L}{2}$

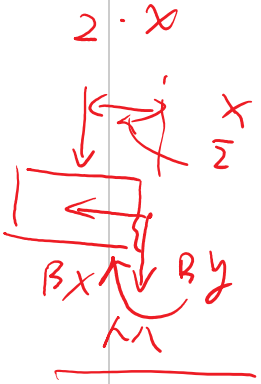
$D_B > D_T$

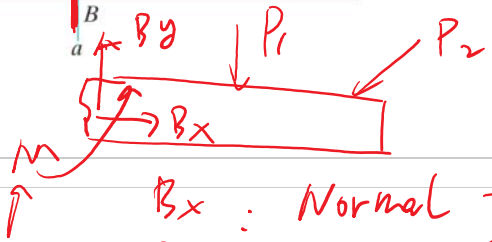
$M_x = F \cdot H$

Internal loadings developed in structural members









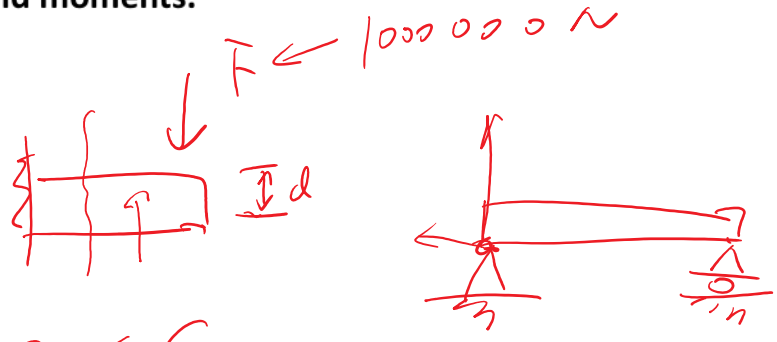
Bx : Normal force M : Bending moment

By : Shear force .

Internal loadings developed in structural members

Structural Design: need to know the loading acting within the member in order to be sure the material can resist this loading

Cutting members at internal points reveal **internal forces and moments.**



$\sigma_1 < \sigma_a$

$$\begin{cases} \sigma_i < \sigma_a \\ \varepsilon < \varepsilon_a \end{cases}$$