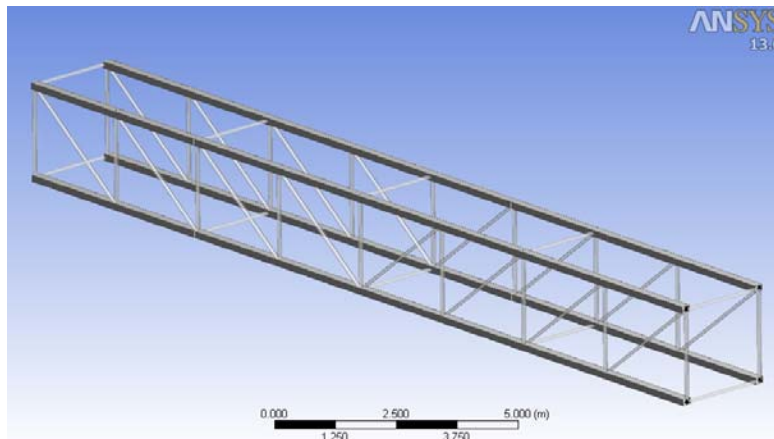
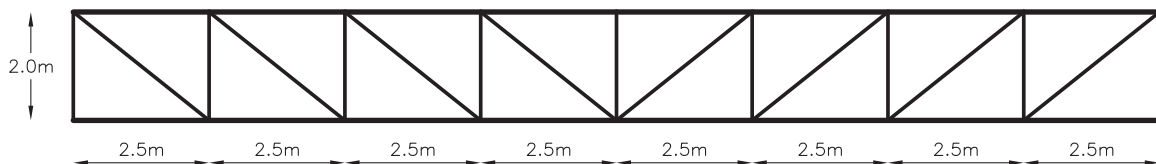


Assignment 02 – Solution of BEAM structures

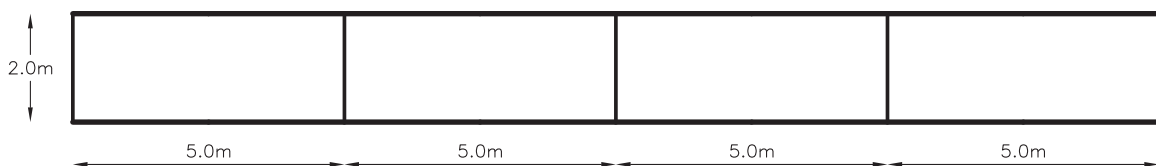
In the following figures is described the geometry of a 20m structural beam which is formed by several beam elements.



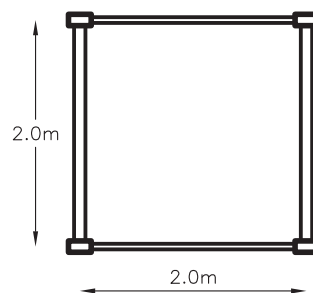
General 3D view



Lateral view

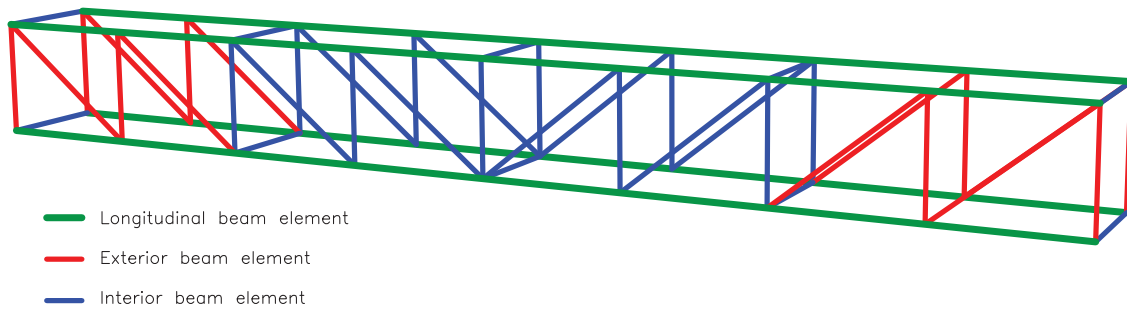


Top view

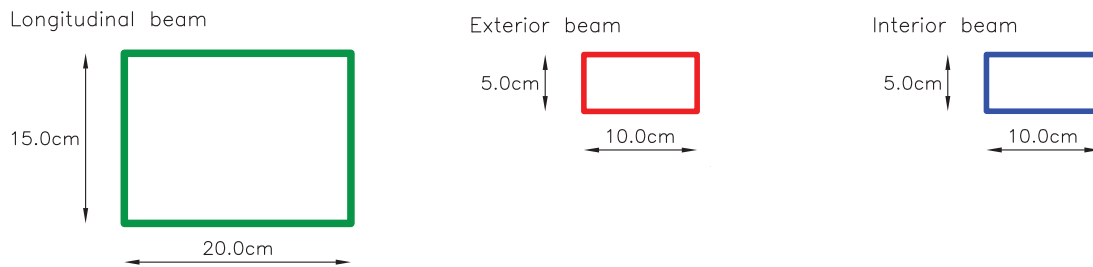


Cross section

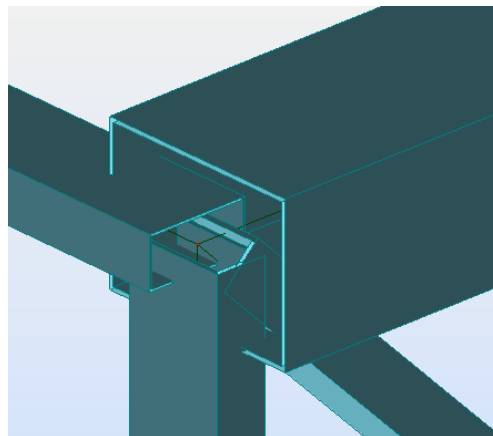
The beam is constructed with three different elements, as it is shown in the following figure, where each one is drawn in a different color. The width and high of each element cross section are known, but the section thickness is unknown.



The cross sections dimensions are:



The orientations of these elements in the beam are the ones shown in the following figure, in which is displayed a node of the structure that joins all bar elements.

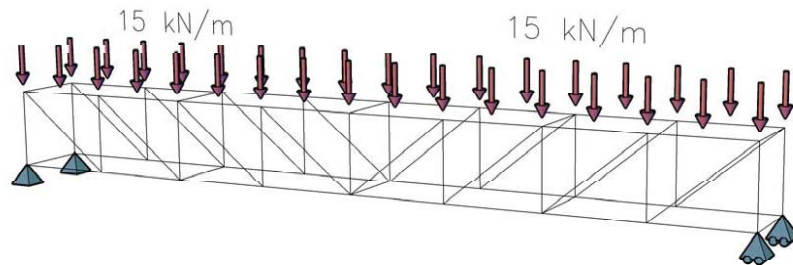


The beam is made with structural steel. This material is characterized with the following properties:

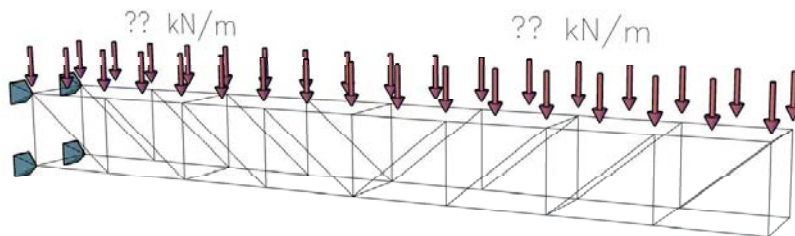
Density = 7850 kg/m^3
E (Young modulus) = $2.1 \cdot 10^5 \text{ MPa}$
 ν (Poisson modulus) = 0.3
Yield stress = 275 MPa

The week assignment consists in:

1. Find the thickness of each beam element in order to have stress values lower than the 80% of the yield stress. The structural beam is used as a simple supported beam and has to sustain the following loads:
 - a. Self-weight
 - b. A uniform distributed load of 15 kN/m applied over each one of the two upper longitudinal beams.



2. Find the maximum distributed load that can be applied to structural beam defined for the previous load and boundary conditions, if it is used as a clamped beam:



You will have to present a report describing the models developed and the results obtained.

This assignment is due on Thursday July 26, 2012. You can hand me a paper copy after class or you can submit it as a pdf at x.martinez@upc.edu