

1.101 Structures Lab.
Fall 2005
Design Review - More Information

At tomorrow's 10 minute design review, in addition to showing a sketch of your structure, you are expected

- to have considered the possibility of failure due to the uniaxial stress in a member exceeding a strength (yield) criterion - including a healthy factor of safety (e.g., 2.0)
- to have considered the possibility of failure due to buckling of any member subject to a compressive load. For this estimate a buckling load using the result we derived for a beam simply-supported at both ends and/or using the result you obtained in last weeks test of a simple truss.
- to have considered the possibility of the vertical deflection at any point exceeding the limit prescribed in the specifications. For this, a rough estimate based upon modeling the truss as a beam with an "I" computed as that due to two equal areas separated by a distance equal to the overall depth of the truss will suffice. Use of Trussworks will also suffice.
- Cost should also be estimated. The way the costs were defined, i.e.,

The cost of the steel stock per unit of length is proportional to the cross-sectional area. The unit cost of a spot welded joint is one tenth (1/10) the cost of a length L (the span length) of the heaviest stock.

means that you can only estimate *relative* costs, of one design compared to another. You can check the sensitivity of cost of your design to a single change - for example, due to a change in member area. To ground your estimates, you might arbitrarily assign a cost per unit length to, say the heaviest stock - e.g., 10 lira, or 1 dollar, whatever.

NB: With regard to the use of Trussworks: To remain in control, its best that you do a much as you can "by hand", then turn to the computer to do the matrix analysis. This means you best start with a equilibrium determinant design.