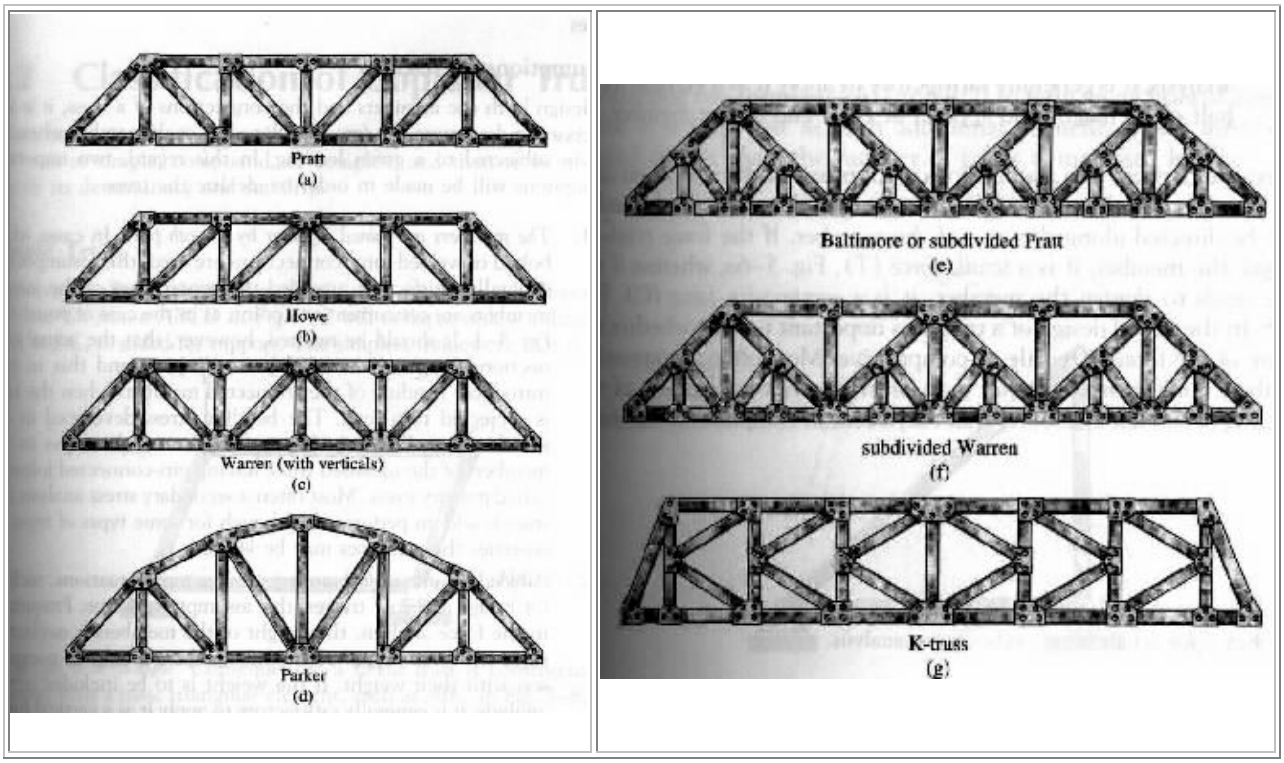
Bridge Design Virtual Lab Question (Complete in lab)

Section 3 (Dr. Schafer's Class) of 500.101 What is Engineering?, Consider the following trusses:



Remember, with the given software you may only analyze statically determinate bridge types so b (number of bars) + r (number of reaction) = 2 * j (number of joints).

(1) For the same length, height, and load– what is the difference between the internal forces developed in the Pratt, Howe, and Warren trusses?

(2) Select one of the trusses from (1), keep the length and load constant, but change the height – what happens to the internal forces?

(3) Select one of the trusses from (1), keep the height and total load constant, but change the length what happens to the internal forces?

(4) Design a bridge that spans 15 "length grids", and carries an evenly distributed load (vertical) of ~100 "force units". Print out your bridge design.

(5) For your bridge design in (4) for one tension member and one compression member explain how you would use the internal forces that you predict to estimate a required area for the tension member, and a required moment of inertia for the compression member.

Some help:

$T = Af$ says tension capacity = cross-sectional area * failure stress

$P = \pi^2 EI/(L^2)$ says comp. capacity = pi^2 * Young's modulus * moment of inertia / (length^2)

note! as L goes to 0, P goes to infinity, but P can never be greater than |T|!