

Optional Extra Credit Project Opportunities

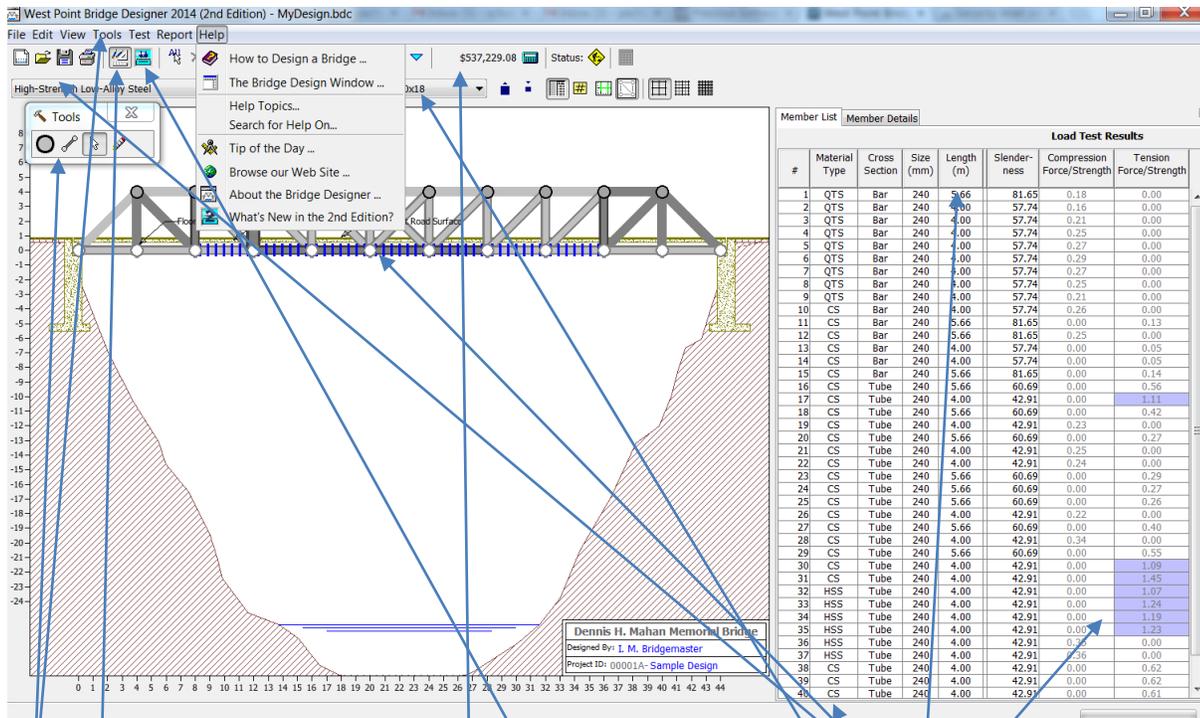
Credit will be based on the quality of the work compared to **earlier** assessments. The credit earned depends both upon an objective evaluation of the project and the earlier baseline assessments. Each person can make their own assessment as to the upside potential. Your report should include full narrative discussion of your analysis, screen shots, and conclusions. All work is individual, no consultations, and is due by January 12. (I will not be contactable from 12/23 until near the end of the break).

1. The purpose of the **ENGINEERING ENCOUNTERS Bridge Design**

Contest (<https://bridgecontest.org/about/purpose/>) is to provide students with a realistic, engaging introduction to engineering. In this project, you design a bridge to cross a river. **There are many variables (span width, types of building materials, truss design, additional piers).** After the design is completed, there is an **animated load test**. The test identifies failed members and design can then be revised. All of the design options carry an associated cost. The challenge is to design a bridge that can hold the load at a minimum cost.

Use the West Point Bridge Designer (a free program) to construct one or two bridges at the minimum cost. The first bridge follows a template and gets you into the program. The second bridge may use all of the features of the full program. Link to Download: <https://bridgecontest.org/resources/previous-versions-of-the-software/>

To get started: File: New Design Project. This will introduce the design problem. The wizard will take you through the set-up conditions. Use all of the default conditions for the first bridge: (span length 24 m, standard abutments, no piers, no cables, medium strength concrete, standard 2 lane road, and through truss Pratt.) The wizard takes you to Step 7 and the screen below. Good luck. If you do a second bridge, you can use any settings. I'm not a gamer, but it did not take long to figure it out. There is an annotated screen shot below to help get you started.



Tools (same as JMU)

Drawing Board

Undo/Previous versions

Test (Animation)

Cost

Material of Construction

Failed Members identified after load test

Optional Credit -Evaluation of Other Bridge Design Simulators

We used the Johns Hopkins Bridge Designer for the initial evaluations of trusses. There are at least 2 others that might be appropriate. All three of these simulators work on the same principle as demonstrated above. However, there approaches are different and the information from the model comes in a different form. The documentation of both leaves something to be desired.

Evaluate one of both of the Simulators:

Learn how to use it. (The notation is different, but with a little patience and the ability to leverage your knowledge, you can see that the concepts are the same.)

Design or evaluate at least two truss bridges.

Show screen shots or printout of the data in your report.

Write instructions for a student to construct or evaluate a truss bridge.

Compare/Contrast the new Simulator with the JHU designer. Comment on which of the simulators you have evaluated you would recommend to a future class. State the reasons for your recommendation.

Credit will be given for resourcefulness in mastering the programs, application to truss bridges, analysis of the results, clarity of the instructions and overall quality of the work. There is no minimum or maximum length, but you can probably get the key points covered in a couple of focused pages. A lengthy, verbose report is not a plus.

Harvard: Bridge Simulation

<http://mo-www.harvard.edu/Java/Bridge.html>

(Search Harvard bridge simulation)

Comments: This model looks more complicated than it is. Use only secure pins (to match your model). Run Java as indicated at the tab at the top of the page, use the Open button to view sample bridges. Once you do this, the concept becomes clear.

Cornell: Find Force Reactions and Bar Forces in a Truss Bridge

<https://courses.cit.cornell.edu/arch264/calculators/example1.6/index.html>

(Search: Find reactions and bar forces for truss)

Comments: 4 different types of truss bridges can be modeled. "Bar Force" refers to the force on a member (compression or tension). Note that the forces can be calculated for different numbers of members. More detailed instructions at: [How to Calculate Truss Design | eHow.com http://www.ehow.com/how_8108180_calculate-truss-design.html#ixzz2FR43mVBZ](http://www.ehow.com/how_8108180_calculate-truss-design.html#ixzz2FR43mVBZ)

