Senior Design Project in Electrical & Computer Engineering

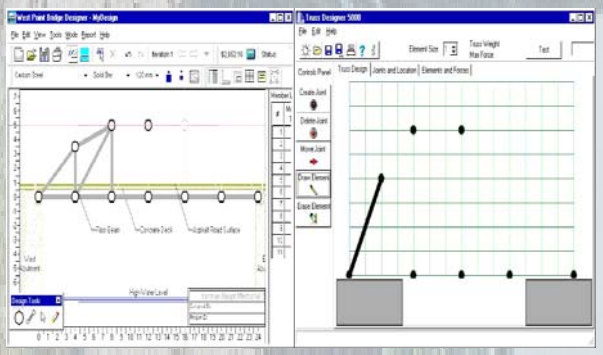
Simple Truss Design Software

Cadet: 1/C Mike Darrah

Advisors: Prof. Holland & LT Staier **Sponsor: USCGA Civil Engineering Section**

Project Background

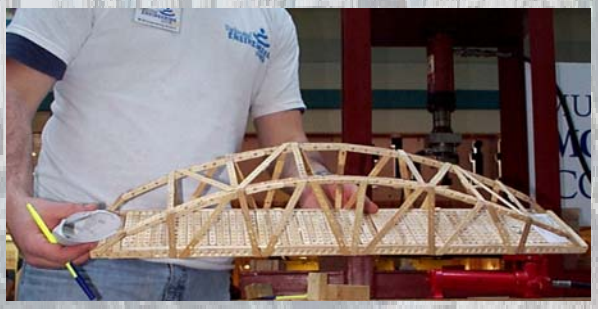
As part of Statics and Engineering Design (SED), a required course for fourth class cadets, students must first design and construct a model bridge made of Popsicle sticks and then test the efficiency of that model in a class-wide competition. To demonstrate how computers are used to facilitate modern designs and reduce both time and costs, students first design the bridge by computer. While the current software, The West Point Bridge Designer, has been valuable in the past, it does not accurately simulate the materials or methods used in this course. This project is creating new truss design software to allow cadets to more accurately test their ideas on the computer before any construction begins.



Prototypes of Simple Truss Bridge Design Software

Project Plan

The software that we develop will give the cadets a program that allows them to model a bridge design before actual building ever takes place. The program will simulate a load being placed at one or more locations as determined by the instructor. The instructor will also supply information about the strength of the material being used to design the bridge. This information will be uploaded into the software, which will use the method of joints to analyze the truss that the cadet designs. Since cadets learn to perform these calculations by hand in SED, they will be able to understand the basic method the program is using. The software will contain a user-friendly interface along with adequate testing and analysis features.



Completed Popsicle Bridge

Project Status

- Program design and class definitions created.
- Graphic interface prototype modified to interact with actual objects and data.
- Previously developed method of joints analysis software integrated into the new design software.

Major goals

- Coincide with what SED students learn in Statics and Engineering Design (SED) class.
- Allow a Cadet to create a truss design with required class specifications, simulating the properties of material that they will actually be building (ie. Popsicle sticks, tongue depressors, etc).
- Apply various loads and test joints and members using Method of Joints algorithm.
- The program will be able to Output a list of the joints and members and whether they successfully passed the test.

Bridge Testing Examples