

Senior Design Project in Electrical & Computer Engineering



Graphical Truss Design Software

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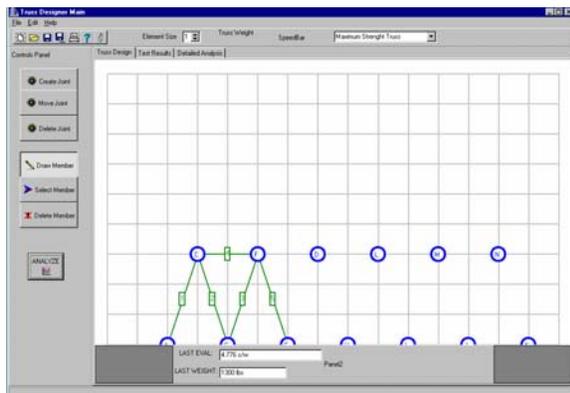
Sponsors: USCGA Civil Engineering Section (dec)

Project Background

As a part of Statics and Engineering Design (SED), a required course for 4th 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.

Project Work

- Complete program on current Bridge Design Software
- Integrate methods of joints software with Graphic Interface
- Integrate properties of materials with Simple Truss Design Software

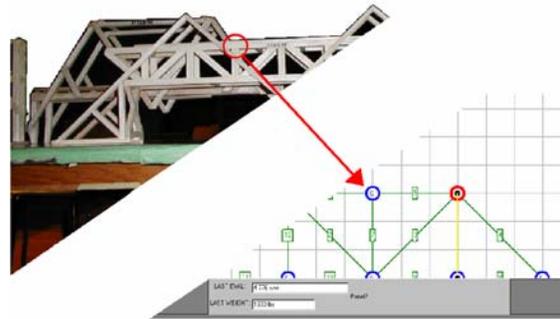
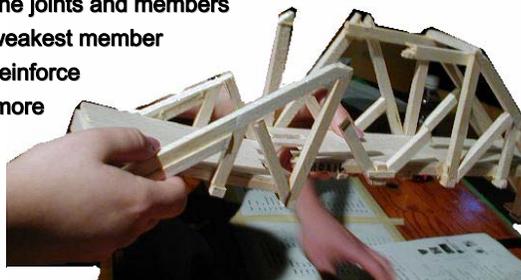


Current Simple Bridge Design Interface

Project Deliverables

- Coincide with what SED students learn in Statics and Engineering Design class
- Allow cadet to create a truss design with required class specifications, simulating the properties of material that they will be building with
- Apply various loads and test joints and members using Method of Joints algorithm
- Output a list of the joints and members strength and the weakest member so the cadet can reinforce the member with more popsicle sticks

Broken Bridge after testing



Successful completion of truss relating to simple truss design software

Project Plan

Simple Truss Design software will give 4th class 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 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.

Project Breakdown

Graphic User Interface:

- Creates Joints and Members
- Moves Joints and Members
- Deletes Joints and Members



Program Calculations:

- Determines weakest member
- Calculates all Forces
- Simulates Material Strength

