MINOR DESIGN PROJECT
FETTUCCINE BRIDGE
Due Thursday, October 14

REQUEST FOR PROPOSALS (RFPs)
In lieu of recent bridge failures, specifically the Interstate 35W bridge collapse in Minneapolis in 2007 that killed 13 people and injured 145 more, proposals for innovative, high strength-to-weight ratio bridge designs are being sought to replace America’s aging and deteriorating bridges. In order to properly evaluate structural design techniques, scale models made from fettuccine pasta and household glue are being sought to simulate steel structural members and welded, riveted or bolted joints, respectively. These scale models will be subjected to increased static loads to determine their failure strength through destructive testing (i.e. let’s break them!).

OBJECTIVE
Design and build a bridge made of fettuccine (uncooked pasta), glue and one empty soda cup to support a large static load, without failing, using a minimum of materials. Demonstrate your bridge design in class on Thursday, October 14 during a friendly competition in which your bridge will be subjected to failure.

SPECIFICATIONS
- Your bridge by itself (including fettuccine, glue and empty cup) must be less than 227 grams (0.5 pounds). The cup will be provided and will be a consistent size and weight for all teams.
- You may use any brand of fettuccine that you wish (other pasta types such as lasagna are not allowed).
- You may use any type of glue that you wish as long as it is non-toxic and non-flammable. The glue may only be used to join the fettuccine together, not as a coating or hardening material.
- You are responsible for purchasing your own materials, except for the support structure, the empty cup and test weights.
- Your bridge must support its own free-standing weight and may not be attached or glued to the support structure during testing.
• Your bridge must span 300 millimeters between the end supports of an existing aluminum/wood support structure at a minimum height of 50 mm.

• Your bridge may not encroach upon the minimum clearance zone shown in the illustration by the dashed rectangle (296 mm × 42 mm) during testing. If it sags down or breaks into this area, then the bridge attempt fails to support the load successfully.

• You may form 3 – 4 person teams on your own or ask to be assigned to a group.

**DESIGN CONSTRAINTS**

• Safety of all participants and observers is most important. Your design shall not have any sharp edges, broken parts or be made from hazardous materials.

• University property must not be damaged during design demonstrations.

• The empty soda cup will be used to contain the load (in the form of small measurement weights) that is subjected to the bridge. The measurement weights will be provided and announced prior to the competition.

**GRADING CRITERIA**

• Design Proposal – 20% ..................................................due October 7

• Bridge Design (strength/weight ratio, aesthetics) – 40% ....................... due October 14

• Written Report – 40% ..........................................................due October 21
**WRITTEN REPORT – DUE THURSDAY, OCTOBER 21 IN CLASS**

Please submit one 5-10 page typewritten report per design team, written in third person point of view (1st person point of view is not appropriate for technical reports). Refer to the Voland textbook, Chapter 1, pages 12 – 18. Your report should include the following with these section headings:

**Cover Letter**
Must be business style (refer to pages 16-18) and signed in ink by all team members.

**Abstract**
A brief summary of project and results, limit to one paragraph. Write the abstract after you have finished writing the entire report.

**Introduction**
Identify the need(s), the problem statement and goals that correspond to the need(s).

**Background**
Who are the users? What is the environment in which the product will be used (indoor, outdoor)? Declare any assumptions. List and describe the design specifications or constraints (some given by Professor Love, others formulated by your team) that guided your design process. Discuss any prior art in the field (patented designs? existing similar products?).

**Methodology**
Describe your design process: the steps that were followed to generate alternate and the final solution, who did what, the tasks that provided more information to guide your decisions (calculations? research? data collection? pilot testing?), the decisions that were made, how your team made those decisions and why those decisions were made.

**Alternative Solutions**
Summarize any alternative solution that was considered and why it was not pursued. You should have at least one (1) alternative solution.

**Final Design Solution & Results**
Discuss your final design solution: its features (include sketches, AutoCAD drawings, photographs), functions, strengths, weaknesses, performance (did it work? If so, how well?), itemized costs, and limitations. Justify your bridge’s structural design using free body diagrams and engineering equations for trusses or structural members. This can be a lengthy section of the report.

**Conclusions & Recommendations**
Did the final solution satisfy the original design goals? Identify the risks associated with the implementation of your bridge design in real-life. Discuss what was learned during this project and what recommendations you would make to improve your solution’s effectiveness.