

WSUMMER INSTITUTE FOR ENGINEERING AND TECHNOLOGY EDUCATION

MECHANICAL ENGINEERING -- GRADES 5-8: MODULE 4

BRIDGE CONSTRUCTION

OBJECTIVES

1. Students will learn how and why structures fail.
2. Students will learn what happens when a structure is subjected to a load.
3. Students will learn the kinds of forces the bridges are subjected to and how this knowledge helps in the selection of materials for construction of bridges.

MATERIALS

For Each Group Of 3 or 4:

- popsicle sticks(Approximately 100)
- Raw spaghetti
- Rubber bands
- Binding materials like Glue, Scotch tape, masking tape.
- 4 Bricks or 2 Shoe boxes or 2 tables placed apart. (to be used to support the ends of the bridge)

THE JOB

Your job is to design a bridge of length 24 inches making use of the materials provided to you.. Your aim is to *design a bridge that will survive the maximum permissible load* which your teacher will provide.

ASSESSMENT

When the experiment is complete each group's bridge will be evaluated by placing weights on the bridge to test which one of the bridges will survive the maximum weight. If time allows, each group will be determine how and why their bridge failed and redesign it to make up for that weakness.

PROCEDURES

When engineers solve problems the first questions they ask themselves are: Why? ,How....?, and What happens.....?.

The problem that you are presented with here is to design a bridge that will survive the maximum weight. The first question to be answered is: why do bridges or any structures fail ? The bridges fail due to a number of reasons, but the most important reason is stress.

For the purposes of this experiment, you should worry about stresses in two different directions. One stress is the vertical stress (up and down), and the second is horizontal stress (side to side). If your team can figure out how to build a bridge (on the first try) from the materials provided to you that can withstand **both vertical and horizontal forces**, you will be a success and probably have a bright future in Mechanical Engineering.. Most teams will not be as successful as they would like, but don't despair because you will have a chance to figure out what was wrong and redesign.

HINT: *Things that are weak by themselves, can become very strong if they are grouped together.* Consider this idea when deciding on your building materials.

What kind of material would you prefer to build a bridge?

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