Sacramento State/UC Davis MESA Center
Academic Rigor = College Success

MESA DAY CONTEST RULES 2008-2009

Manila Mechanics: File Folder Structures

LEVEL: **Grades 9-10**

TYPE OF CONTEST: Team

COMPOSITION OF TEAMS: 1-2 students per team

NUMBER OF TEAMS: 3 teams per Center
(Strength to weight winners only advance)

SPONSOR: Larry Lim, USC

OVERVIEW: Students will design and construct a model bridge from two manila file folders that will carry a maximum load while using as little materials as possible. Efficient design, neatness and craftsmanship are essential elements of this engineering activity.

MATERIALS: Two standard, single-ply, letter-size manila file folders and any type of glue.

RULES FOR SIZE: Bridge Dimensions

1. Maximum length: 45 cm
2. Minimum length: 42 cm
3. Maximum width: 10 cm
4. Maximum height: 15 cm
5. Maximum mass: 70 g

RULES FOR CONSTRUCTION:

1. File folder structures must be labeled with team member's names, school and MESA Center. There will be a 10% penalty in the strength to weight score for improper labeling.

2. No kits are allowed.

3. Colored, two-ply, legal-size, and press board file folders are not permitted. Only standard, non-plastic, letter-size manila folders are acceptable.

4. No part of the bridge shall extend below the support surface. (See diagram)

5. The load will be applied on the top of the bridge. The bridge therefore will not need a roadbed, since the test load will be placed on top of the bridge.

6. The top of the bridge must support a 10 cm x 10 cm plate which will bear the load for testing.

7. No material (e.g. paint, glue, varnish, hairspray, etc.) may be applied to the surface of the bridge to strengthen it. Ink or pencil to label the bridges is OK.

8. Completed bridge must have a mass of not more than 70 g.

JUDGING:

1. Prior to load testing, the bridge receives a specifications check to determine whether it conforms to the weight, dimension, and construction rules.

2. The bridge is weighed and its mass recorded.

3. Bridges are judged for innovative design and craftsmanship by a team selected by the Host Center prior to testing. An award for innovative design will be determined at that time.

4. Disqualified bridges may be tested in private, time permitting.

AWARDS:

Awards are given in two categories:

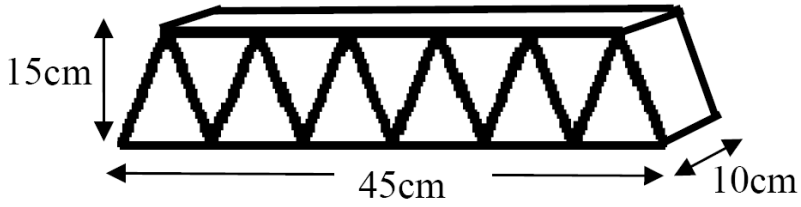
1. Strength to Weight Ratio: Determined by dividing the maximum load by the weight of the bridge. The bridge with the greatest load bearing capacity compared to its weight wins.

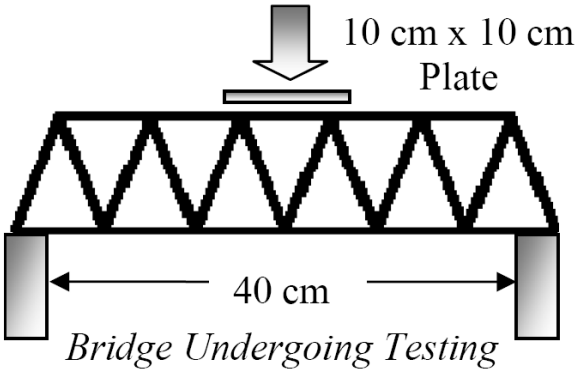
   Example: Maximum load = 60 lbs
   Bridge weight = 55 g
   Strength to weight Ratio = (60 lbs x (454 g/lb)) / 55 g = 495.27*

   Three awards will be given to the first, second and third ranked bridges based upon the strength/weight ratio. These award winners will advance to MESA Day Finals.

2. Innovative Design: Bridges that display superior craftsmanship and design elements can win a first, second or third place award in innovative design. Winners in this category will NOT advance to MESA Day Finals.

   * subtract 10% if structure is improperly labeled:
   e.g. 495.27 – (495.27 x 0.10) = 495.27 – 49.527 =445.743





Bridge Undergoing Testing

Manila Mechanics Checklist

- ☐ 2008-2009 rules used
- ☐ Bridge is properly labeled
- ☐ Two standard, letter-sized manila file folders
- ☐ No part of bridge extends below the support surface
- ☐ Any type of glue is OK
- ☐ No surface coatings to bridge (e.g. varnish, paint, glue, etc.)
- ☐ Glue restricted to bounding surfaces only
- ☐ Mass restricted to 70 grams or less