



MESA DAY CONTEST RULES

2011 – 2012

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: 45cm
- 2) Minimum length: 42cm
- 3) Maximum Width: 10cm
- 4) Maximum height: 15cm
- 5) Maximum mass: 70 g

RULES FOR CONSTRUCTION

- 1) File Folder structures must be labeled with team members' 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 file 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 10cm x 10cm 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 70g.
- 9) Project must be the original work of student(s). Judges may ask questions to confirm provenance

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

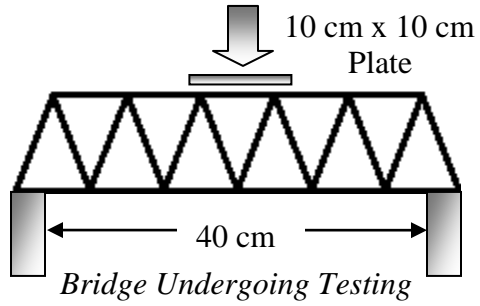
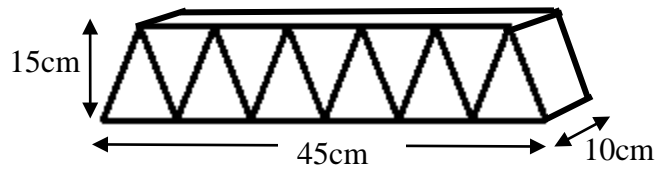
$$60\text{lbs (454 g/pound)} / 55 \text{ g} = 495.27^*$$

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:

$$\text{e.g. } 495.27 - (495.27 \times .10) = 495.27 - 49.527 = 445.743$$



CHECKLIST for Manila Mechanics:

- 2010-2011 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 bonding surfaces only**
- Mass restricted to 70 grams or less**