

MYSTERY DESIGN

1. **DESCRIPTION:** Teams will design, build, test and evaluate a structure that demonstrates understanding and proficiency of engineering design principles.

A TEAM OF UP TO: 2 EYE PROTECTION: B IMPOUND: Yes APPROX. TIME: 50 Min.

2. **EVENT PARAMETERS:**

- a. Supervisors will provide a plush toy and announce, at least two weeks prior to a competition, its approximate dimensions along with the structure design parameters and materials that will be provided on-site for the on-site testing of team structures. Event Supervisors are encouraged to utilize a human or animal-like object to interact with a proposed structure. The design parameter could include adding up to 2 kg in mass to the object.
- b. Examples of common materials that could be utilized include office supplies: paper, paper clips, rubber bands, binder clips, and tape; common household items: straws, paper or Styrofoam plastic cups, plates, bowls, toothpicks, spaghetti, wire, string, aluminum foil, cling and wrap; and computer supplies: CD/DVD disks. Items are not limited to this list but should be readily available.
- c. Example structures that teams may be asked to design may include but are not limited to: a bed, hammock, chair, swing, stool, wagon, umbrella, boat, parachute, neck or leg brace.

3. **THE COMPETITION:** This event consists of the following two components: a pre-competition structure design and an on-site build, test and evaluation.

- a. **Part 1 Pre-competition Structure Design and Drawing:** Students will design a structure that meets the design parameters and utilize the materials described by the Event Supervisor. A hard-copy drawing will be **IMPOUNDED** for scoring that meets objectives of the scoring rubric. The drawing can be hand-drawn, computer generated, 3D or 2D. The drawing must be on one side of one piece of paper and is to be no larger than 24 in. x 36 in.
- b. **Part 2 On-site Structure Build, Test and Evaluation:** Students will utilize the provided materials to build and test a structure that meets the parameters provided by the Event Supervisor. The test will be evaluated on a pass/fail basis. Once the test is completed, students will complete an evaluation based on the performance to indicate ideas for improvement of the structure regardless of whether the structure passed or failed the test.

4. **SCORING:** The scores will be compiled utilizing the attached scoring rubric. Ties will first be broken by performance of test then by score of the Structure Design and Drawing rubric.

5. **RESOURCES:** <http://www.teachengineering.org/engrdesignprocess.php>

Scoring Rubric:

The numbers in parentheses represent the points possible for each category.

Part 1: Structure Design and Drawing

- ___ Presence of Title (4)
- ___ Presence of Team Name (4)
- ___ Presence of Student(s) Name(s) (4)
- ___ Scale Accurately Defined and Consistently Applied (8)
- ___ Each Side View up to 4 sides (10 total points available)
- ___ Accurate and Complete Materials List (10)
- ___ Materials Use Rationale (20): includes material structural considerations such as tension, compression, moment of inertia, stiffness, elasticity, etc.
- ___ Accurate and Complete Cost of Materials list (6)
- ___ Aesthetics Consideration (6)

Part 2: On-site Structure Build, Test and Evaluation

- ___ Ease of Use/Assembly- time to completion (10)
- ___ Structure Testable (20)
- ___ Structure Passes Test (80)
- ___ Quality of Performance Evaluation (20): including rationale, clarity of thought regarding improvements, ability to share ideas in oral and written formats