

## MYSTERY DESIGN - “Hogwarts”



1. **DESCRIPTION:** Teams will design, build, test and evaluate an item that demonstrates understanding and proficiency of engineering design principles related to a Buckbeak plush toy.

**A TEAM OF UP TO:** 2      **EYE PROTECTION:** No      **IMPOUND:** Yes      **APPROX. TIME:** 50 Minutes

### 2. **EVENT PARAMETERS:**

- Students must bring a Buckbeak plush toy for on-site testing of their structure. This plush toy can be found at: [https://www.universalorlando.com/Merchandise/Gift/Plush\\_Doll/Harry\\_Potter/Toys/Buckbeak\\_Plush.html](https://www.universalorlando.com/Merchandise/Gift/Plush_Doll/Harry_Potter/Toys/Buckbeak_Plush.html)
- Event Supervisors will share at least two weeks prior to a competition the structure design parameters and materials that will be provided on-site. The design parameter could include adding up to a 2 kg mass to the plush toy.
- 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.
- 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.

- 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.
- 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 (40): including rationale, clarity of thought regarding improvements, ability to share ideas in oral and written formats