

# Trial/Pilot Event

Contact the organizers of your tournament to find out what trial/pilot events will be held.

## BOOMILEVER

1. **DESCRIPTION:** The objective of this event is to design and build the lightest cantilevered wooden structure which, when attached to a vertical Testing Wall at one end, will support a load up to 15 Kg at the distal end. Teams should maintain and submit a log **at check-in** containing information about the structures they have built that can be used to improve future designs. **Logs will be used only for breaking ties.**

**A TEAM OF UP TO:** 2

**IMPOUND:** No

**MAXIMUM TIME:** 10 minutes

2. **Materials:**

- a. The Boomilever is to be a single structure constructed only of wood and bonded by glue. No other materials shall be used. Particleboard, plywood, beaverboard, other composite wood products, bamboo or paper may not be used except for the Attachment Base. Any type of glue may be used.
- b. The entire Boomilever (except for the Attachment Base), including gussets, must be constructed of pieces of wood no larger than  $\frac{1}{4}$  inch high and  $\frac{1}{4}$  inch wide in cross-section. If dowels are used, they may not have a diameter greater than  $\frac{1}{4}$  inch. There is no limit on the length of individual wood pieces used in the construction.
- c. The Boomilever may have an Attachment Base for attaching it to the Testing Wall. The Attachment Base must be in one or two parts made from any type and size of wood or wood product(s). The entire Attachment Base may not exceed 30 cm x 20 cm x  $\frac{1}{2}$  inch thick, must be permanently attached to the Boomilever and is included in the mass of the Boomilever. When mounted to the Testing Wall, no part of the Attachment Base may extend farther than  $\frac{1}{2}$  inch from the wall. All pieces of the Boomilever that extend farther than  $\frac{1}{2}$  inch from the wall must meet the requirements of paragraph 2.b).

3. **Construction:**

- a. All construction must be completed prior to the tournament.
- b. Any Boomilever design that meets the specifications below may be constructed. Sound engineering and construction practices such as trusses, mitered joints/corners, gussets, and lamination (layers of wood glued together) are encouraged.
- c. Unlimited lamination by the contestants is allowed however; commercially laminated wood (except for the Attachment Base) is not. Wood laminations may be any size provided the individual pieces used to make them comply with paragraph 2.b) above.
- d. The Boomilever must meet the following specifications:
  - i. It must be designed so that it can be attached to a vertical-Testing Wall, made from  $\frac{3}{4}$  inch thick plywood or other suitable material. The wall will be approximately 45 cm wide and 30 cm high with two  $\frac{1}{4}$  inch diameter holes spaced 20.0 cm apart on center horizontally, 5 cm below the top of the wall.
  - ii. The Boomilever must be attached to the Testing Wall using one or two  $\frac{1}{4}$  inch diameter x 2-inch long bolts with washers (no larger than  $\frac{3}{4}$  inch in diameter) and wing nuts.
  - iii. The Boomilever must accommodate a Loading Block 5.0 cm x 5.0 cm square x 2.0 cm high with a  $\frac{1}{4}$  inch diameter hole in the center. A  $\frac{1}{4}$  inch eyebolt will be secured in the hole with a washer and nut on top and an s-hook for suspending a plastic bucket (approximately 5-gallons/30 cm diameter) from the eyebolt.
  - iv. When placed on the Boomilever, the center of the hole in the Loading Block must be a minimum of 40 cm from the Testing Wall.
  - v. No part of the Boomilever may touch the Testing Wall farther than **15.0** cm below the center of the attachment holes.
  - vi. Before **check-in** the Boomilever must be marked in such a way that the event supervisor can easily identify the team it belongs to.



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## 4. Testing:

- a. Once teams enter the event area to compete, they may not leave the area or receive outside assistance, materials or communication until they are finished competing. Only contestants being judged will be allowed in the event area while teams are competing. Teams violating these two rules will be disqualified.
- b. All Boomilevers will be assessed prior to testing to determine if they meet the specifications under Materials and Construction above.
- c. The judges will provide all equipment used for testing except for the contestant's eye protection. This includes the Testing Wall, Loading Block, eyebolt with washer and nut, bolts with wing nuts and washers, plastic bucket and sand.
- d. Contestants who fail to bring and wear approved Safety Spectacles with Side Shields will not be allowed to compete (See: <http://www.soinc.org/general/protection/>).
- e. The contestants will attach the Boomilever to the Testing Wall using the bolts, wing nuts and washers provided by the judges. The bolts may be inserted from either side of the wall and Boomilever.
- f. The contestants will place the Loading Block at the student determined load point of the Boomilever and insert the eyebolt through the Loading Block and secure it with a washer and wing nut on top of the Loading Block. They will use the s-hook to suspend the bucket from the eyebolt. **Students may adjust their Boomilever until they begin loading sand.**
- g. The students will be given 10 minutes to load sand into the bucket. Loading must stop when failure of the Boomilever occurs, when the maximum load of 15 kg is supported or when the time expires. Failure is defined as the inability of the Boomilever to support an additional load. Sand added after any of these conditions occurs will be removed by the event supervisor. The Load Supported at that time will be used to calculate the Structural Efficiency. The mass of the Loading Block, eyebolt, washer, wing nut, bucket, and sand are included in the 15 kg Load Supported (judges must verify prior to loading each Boomilever that this combined mass is provided to each team).
- h. Boomilevers will be released when the team has finished competing and appeals have been satisfied. However, appeals by teams will not be processed after they remove their device unless it has been inspected and released by the appeals committee. Logs will be released **after** all competition is completed.

## 5. SCORING:

- a. The Score will be determined by the Structural Efficiency equation:

$$\text{Structural Efficiency} = \text{Load Supported (grams)} / \text{Mass of Boomilever (grams)}$$

- b. Boomilevers that hold more than 15 kg will be scored using 15 kg as the Load Supported.
- c. Boomilevers will be scored in 3 tiers. Boomilevers in the first 2 tiers will be ranked by their Structural Efficiency.
  - i. Boomilevers that meet all specifications under Materials and Construction will be ranked in the first tier.
  - ii. Boomilevers that DO NOT meet all of the specifications under Materials and Construction but can be tested will be ranked in the second tier.
  - iii. Boomilevers that cannot be tested for any reason (e.g., cannot accommodate the Loading Block or team does not have proper eye protection) will be ranked in the last tier by the Boomilever's lighter mass.
- d. Ties will be broken in favor of the team with the lightest boomilever. Remaining ties will be broken using the team's log. For more information see: <http://www.soinc.org/events/boomilever/>.



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