

TOWER BUILDING

DESCRIPTION: The objective of this event is to design and build the lightest tower capable of supporting a 15kg load at least 500mm above a testing platform. Each team shall enter only one tower that they have built prior to the competition. All devices must be impounded before the start of the competition and will be released one hour after the last team has competed unless there are appeals pending. No alterations to the tower will be allowed once it has been impounded. This is an engineering event, so failure to adhere to the specifications below will cause towers to be ranked after those that do.

THE COMPETITION: A TEAM OF UP TO: 2 **IMPOUND:** YES **TIME:** 10 Minutes

1. Materials

- a) The tower is to be a single structure constructed of wood bonded by glue. No other materials shall be used. Bamboo is a grass and shall not be used.
- b) Particleboard, wood products, or commercially laminated wood may not be used.
- c) The entire tower must be constructed from wood pieces 1/4inch x 1/4inch or less in cross-section. They may be any length. If dowels are used, they cannot have a diameter greater than 1/4inch.
- d) Any type of glue may be used.

2. Construction

- a) All construction must be completed prior to the tournament.
- b) Sound engineering construction practices such as trusses, mitered joints, lamination and mitered corners are encouraged.
- c) Unlimited lamination (bonding together layers of wood) by the students is allowed, however commercially laminated wood is not allowed.
- d) The tower shall not be coated with any material such as paint, stain, or glue.
- e) The base of the tower must be constructed so that it spans an opening 200mm x 200mm square in the testing platform.
- f) The testing platform will be made from a piece of 3/4inch thick plywood, or similar material, approximately 24inches x 24inches square with a 200mm x 200mm square hole cut in its center.
- g) The tower must be designed to support a 50mm x 50mm square x 20mm thick loading block at its top. All parts of the loading block must be a minimum of 500mm above the testing platform before the load is applied.
- h) The tower must be a minimum of 500mm high. There is no maximum height.
- i) The portion of the tower more than 300mm above the testing platform must pass through an 80mm diameter hole.

3. Testing

- a) The event supervisor will supply all equipment used for testing, except for eye protection, which must be brought by the students.
- b) All towers will be assessed prior to testing for construction requirements and dimensions.

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- c) Students must bring and wear safety goggles during loading and testing.
- d) The students will place the tower on the testing foundation so that it spans the 200mm square opening and the 1/4inch diameter rod/chain used to connect the bucket to the loading block is within a radius of 25mm of the center of the opening.
- e) The loading block will be placed on top of the tower by the team.
- f) The team will suspend a 5-gallon bucket, approximately 300mm diameter, below the testing platform using a rod or chain to attach it to the loading block.
- g) The students will add sand to the bucket until failure occurs or the maximum load of 15kg is supported.
- h) The tower must support a 15kg load. The mass of the loading block, eyebolt, washer, wing nut, bucket, and sand are included in the 15kg. Event supervisors must verify that the combined mass of the loading block, attaching hardware, bucket and sand supplied is at least 15 kg prior to loading each tower.
- i) The time allowed for loading will be ten minutes. If time expires before the loading is completed, the tower will be ranked with those that could not hold the entire 15kg load.
- j) Sand added after failure will be removed by the event supervisor.

4. SCORING:

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

$$\text{Load Supported (grams)/Mass of Tower (grams)}$$

Towers that hold more than 15kg will be scored using 15kg as the load supported.

- b) Towers will be scored in 5 tiers. Towers in each of the first 4 tiers will be ranked by their structural efficiency.
 - i) Towers that meet all specifications and support the entire load will be ranked in the first tier.
 - ii) Towers that meet all specifications but do not support the entire load will be ranked in the second tier.
 - iii) Towers that DO NOT meet the specifications will be ranked in tiers three and four in the same manner as in "b)i" and "b)ii" above.
 - iv) Towers that cannot be tested for any reason (e.g. cannot accommodate the loading block or teams do not have safety goggles) will be ranked in the last tier by the tower's lighter mass.



Check <http://www.soinc.org/tower.htm> for additional information.