TOWER BUILDING

DESCRIPTION: The objective of this event is to design and build the lightest tower, with the highest structural efficiency, capable of supporting a load of up to 15 kg. Each team may bring and enter only one tower. Teams should also **maintain and submit a log (which will be used for breaking ties)** containing the mass of the tower, the mass supported by each tower and the design changes made after previous tests. Contestants must bring and wear approved Safety Spectacles with Side Shields (see description at: http://www.soinc.org/general/protection/ and: http://www.soinc.org/events/tower/ for more information).

A TEAM OF UP TO: 2 **MAXIMUM TIME**: 10 minutes

THE COMPETITION: **IMPOUND:** Yes (One Tower & Log)

1) **Materials:**
   a. The tower is to be a single structure, constructed of wood and bonded by glue. No other materials shall be used.
   b. Particleboard, plywood, beaverboard, and other composite wood products, bamboo or paper may not be used.
   c. The entire tower (including gussets if used) must be constructed from wood pieces no larger than 1/4 inch x 1/4 inch in cross-section .If dowels are used, they may not have a diameter greater than ¼ inch. There is no limit on the length of individual wood pieces.
   d. Any type of glue may be used.

2) **Construction:**
   a. All construction must be completed prior to the tournament.
   b. 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 students is allowed, however, commercially laminated wood is not allowed. Wood laminations may be any size provided the individual pieces used to make them comply with paragraph 1) c. above.
   d. The tower must support a square-loading block, 5.0 cm long x 5.0 cm wide x 2.0 cm thick, at its top. All parts of the loading block must be a minimum of **50.0 cm** above the testing platform before the load is applied. There is no maximum height.
   e. The loading block must be supported so that a 1/4-inch diameter loading rod/chain, suspended from its center, is within 2.5 cm of the center of the opening in the testing platform. The loading rod/chain may not contact the tower at any point.
   f. The portion of the tower more than **15.0** cm above the testing platform must be able to pass through an 8.0 cm diameter round hole.
   g. No portion of the tower may extend below the top surface of the testing platform.
   h. Before it is impounded, the tower must be marked in such a way that the event supervisor can easily identify to which team it belongs.

3) **Testing:**
   a. All towers **and logs** must be impounded before the start of the **event. and will be released from impound when the team has finished competing.** No alterations to the tower will be allowed once it has been impounded. **Appeals by teams will not be processed after they remove their device from impound unless it has been released by the appeals committee.**
   b. 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

and judges will be allowed event area while teams are competing. Teams violating this rule will be disqualified.
   c. All towers will be assessed prior to testing to determine if they meet the specifications under Materials and Construction.
   d. The event supervisor will provide all equipment, except for eye protection, used for testing.
   e. The testing platform will be a flat surface with a 20.0 cm x 20.0 cm square opening in its center.
   f. The students will place the tower on the testing platform so that the loading rod/chain will pass within 2.5 cm of the center of the opening in the test platform.
   g. The loading block will be placed on top of the tower by the students.
   h. Students will use the rod/chain to suspend a 5-gallon bucket, approximately 30 cm in diameter, below the testing platform.
   i. The students will add sand to the bucket until failure occurs or the maximum load of 15kg is supported. If the loading rod/chain comes into contact with the tower, loading will stop at that point and the Load Supported at that time will be used to calculate the Structural Efficiency.
   j. The mass of the loading block, eyebolt, washer, wing nut, bucket, and sand are included in the Load Supported. 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.
   k. The time allowed for loading will be ten minutes. If time expires before the loading is completed, the tower will be ranked using the Load Supported at the moment when time expired.
   l. Sand added after failure will be removed by the event supervisor.

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

Structural Efficiency = Load Supported (grams) / Mass of Tower (grams)

   b. Towers that hold more than 15 kg will be scored using 15 kg as the Load Supported.
   c. Towers will be scored in 3 tiers. Towers in the first 2 tiers will be ranked by their structural efficiency.
      i) Towers that meet all specifications under Materials and Construction will be ranked in the first tier.
      ii) Towers that DO NOT meet all of the specifications under Materials and Construction will be ranked in the second tier.
      iii) Towers 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 tower's lighter mass.
   d. **Ties will be broken using the team's log.**