

National Engineers' Week Student Competitions

UAA Campus, Anchorage, AK

2018 Tower of Power Strength Competition

Objective

Design and build a column (affectionately dubbed a “tower”) using wood and glue that supports the greatest compression force while meeting the required specifications.

Rules

1.0 Dimensions

- 1.1 Height: The structure must be a minimum of 17.0 inches (432 mm) tall, but no taller than 20.0 inches (508 mm). Penalty for exceeding these limits is disqualification.
- 1.2 Width: The structure must be able to pass through a cylinder with an inside diameter of 4.0 inches (102 mm). The tower must have a hole in the center (parallel to its height) that a dowel with an outside diameter of 1.0 inch (25mm) can pass through (see figure below). Penalty for exceeding these limits is disqualification.
- 1.3 Mass: The assembly should be less than or equal to 90 grams. Structures that have a mass greater than 90 grams will be penalized by adjusting the recorded force by $F^{(90g/mass)}$ where F is the peak load the structure withstands. Structure with a mass greater than 150 grams will not be tested.

2.0 Materials

- 2.1 Structural members shall be made of any commercially available raw wood. Structures that include members made from wood products (such as paper, particle board, etc), plastics, or metals (other than fasteners) will be disqualified.
- 2.2 Connections: Wood members may be connected with any commercially available glue, or with brass fasteners. Fasteners (such as screws, nails, and bolts) must be used to connect two or more structural members and cannot be used as structural members themselves.

3.0 Loading

- 3.1 Load Application: The compression load will be applied to your column at each end by smooth square steel plates that are 4.0 inches x 4.0 inches (100 mm x 100mm). The plates are perpendicular to the height of the structure. The plates may swivel some to apply force to all parts of the end of the structure, but every effort shall be made to make the end of the tower square and perpendicular to its height. Your structure must be free standing to facilitate loading.
- 3.2 Load Score: Applied force (load) will be measured using a 3,000 lbf (13.3 kN) sensor with an accuracy of approximately +/-1.0 lbf (4.45 N). The peak load will be taken as the maximum load supported by the structure within the displacement range of the machine, which is approximately 6.0 inches (150mm). Testing will be stopped when a structure, in the opinion of the judges, has reached its peak load. Testing will be stopped if any part of the structure touches the side of the loading apparatus.

