2017 Specifications
Maryland Wood Bridge Challenge
February 04, 2017

These rules have been developed for the **2017 Maryland Wood Bridge Challenge** on **February 04, 2017** at the **Baltimore Museum of Industry**. Questions about the competition and rules should be directed to Jeff Krummel, Competition Chair, at MD.woodbridgechallenge@gmail.com.

The object of this competition is to design, construct, and test the **most efficient** bridge within the specifications. Model bridges are intended to be simplified versions of real-world bridges, which are designed to support a load at any position and permit the load to travel across the entire bridge. In order to simplify the model design process, the number of loading positions has been reduced to two, and, in the interest of time, only one position will be tested. Official bridges must still be designed to support a load at all loading positions without optimizing at one position. Bridges determined by the judges to not meet this requirement must be modified or tested as unofficial bridges.

NOTE: Maryland does permit team entries. However, the International Contest only recognizes individual entries. Therefore, we encourage discussions between students in the interest of mutual learning, but ask that you consider International Contest stipulations in your team constitutions.

ITEM #1: The Wood Bridge Challenge will again offer students the option to submit a technical report. The report will not affect final standings nor International qualification; both will be solely determined by structural efficiency. Even so, writing skills are vital to college and professional success, and the students who write the winning reports, as determined by the Challenge Committee, will earn scholarships for their efforts.

Technical report guidelines are published on the website. Barring delays from inclement weather, reports will be due on **Sunday, January 22, 2017**.

ITEM #2: The Maryland Wood Bridge Challenge will continue to recognize with an award and a $200 prize an outstanding teacher or mentor for their commitment, encouragement, and mentorship leading to the competition. Students are encouraged to nominate their teachers for the award, with a brief explanation as to how they positively impacted their participation.

2017 SPECIFICATIONS BEGIN ON P. 2

1. Materials

a. The bridge must be constructed only from 3/32 inch square cross-section basswood and any common adhesive.

b. The basswood may be *physically* modified in any manner but must still be identifiable as basswood.

c. No other materials may be used. The bridge may not be stained, painted, or coated with any foreign substance.

2. Construction

a. The bridge mass shall be no greater than 25.00 grams.

b. The bridge (see **Figure 1**) must span a 300. mm gap (S), be no longer (L) than 400. mm, have a maximum width (W) of 80. mm, and be no taller (H) than 150. mm above the support surfaces.

c. The bridge must be constructed with a minimum 20. mm clearance (C) measured from the support surfaces at the midpoint of the span (i.e. 150. mm from each wall of the support surface). No portion of the bridge may project below the top of the support surfaces.

d. The loading plane shall be horizontal and constructed at a height (P) measured vertically above the support surfaces, such that 30. mm ≤ P ≤ 40. mm.

e. Load will be applied on the bridge's longitudinal axis, with the center of the plate at one of two (2) locations: 60. mm left of center, 20. mm right of center.

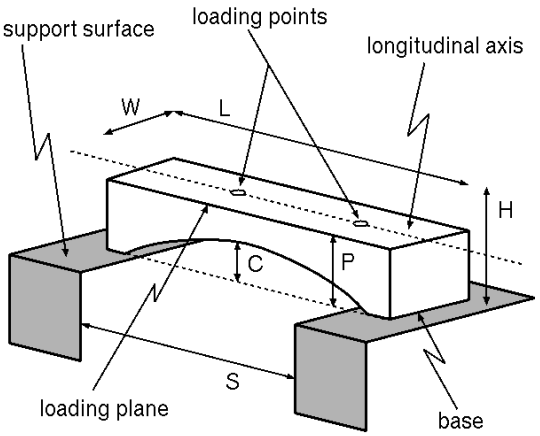

Figure 1. Bridge schematic (not drawn to scale)

- In general, the bridge must be constructed to provide for the placement of the 40. mm square loading plate at both loading points, and any portion of the structure above and below the loading plane must provide clearance for the loading rod at the two loading point locations.
- Vertical clearance must be provided at both loading points for a 10. mm loading rod to be threaded into the center of the loading plate from below (as explained in **3a**) up to 70. mm above the support surface.
- The loading plane must have horizontal clearance for the 40. mm square loading plate at each loading point. Optimizing a specific loading point will NOT be permitted.

3. Qualification

a. All construction and material requirements will be checked prior to testing. Bridges failing to meet these requirements may be modified until they meet them or tested as unofficial bridges if physically possible.

b. If, during or after testing, a condition becomes apparent (such as, but not limited to, use of ineligible materials, inability to support the loading plate, bridge optimized for a single loading point, etc.) which is a violation of the rules or prevents testing as described in **Section 4**, that bridge shall be declared unofficial. If the bridge can accommodate loading, it may still be tested as an unofficial bridge as stated above.

It is ultimately the responsibility of the student to know the rules, as some conditions may not be immediately apparent until testing. If a student wishes to modify their bridge after check-in (i.e. a condition becomes apparent prior to testing, inability to optimally test the bridge, etc.), they must (a) withdraw their bridge as official with approval from the Head Judge and a stated reason for withdraw, and (b) re-check the bridge as official for specifications and mass, after making the necessary modifications.

c. Judges' decisions are final; these rules may be revised. Please check our website, www.mdwoodbridge.org, to find if any changes have been made. Please also see the Frequently Asked Questions on the website, and e-mail MD.woodbridgechallenge@gmail.com if your questions are unresolved.

4. Testing

a. On the day of testing, the Head Judge will decide which one of the two positions described in **2e** will be used; it will be the same location for all bridges. No bridge may be visibly optimized for a single load position.

b. The bridge will be centered on the support surfaces.

c. The 40. mm square metal plate (between 1/4 inch and 1/2 inch thick) will be positioned to rest horizontally on the loading plane described in **2d**, centered at the position selected in **3a**, with two edges of the plate parallel to the bridge's longitudinal axis.

d. A 10. mm diameter rod will be threaded into the plate's center from below. The plate will not pivot on the rod.

e. Load will be continuously applied by a calibrated test machine pulling downward on the plate until the bridge experiences failure (defined as a bridge's inability to carry additional load, deflection at or exceeding 25. mm, or any deflection below the support surfaces, whichever occurs first). The bridge must continuously provide stable support for the plate.

f. The bridge with the highest structural efficiency, E, will be declared the winner. Bridges failing above 50. kg (approximately 110 lbs) will be considered to have held 50. kg for the efficiency calculation.

E = Load supported in grams (50,000g maximum) / Mass of bridge in grams

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Last update: November 29, 2016