

**2011 University of Tennessee Engineer's Day
Department of Civil and Environmental Engineering
Balsa Wood Bridge Competition**

Description:

The objective of this event is to design and build the lightest bridge capable of supporting a given load over a given span. The bridge must allow the passage of one *Hot Wheel's Car* along the entire length. **EACH SCHOOL MAY BRING 2 BRIDGES.**

Materials:

The bridge can be constructed only of **BALSA WOOD** and **ELMER'S WOOD GLUE**. No other materials will be accepted.

The balsa wood must be **no larger than ¼" high and ¼" wide**. Any dowels **can not have a diameter greater than ¼"**. Balsa wood comes in various sizes and shapes, such as miniature I-beams, channels, and angles. Hint: Take advantage of these efficient shapes as long as they fit the size criteria. There is not limit to the length of the individual wood pieces used in the construction.

Construction:

All construction must be completed prior to the event.

The bridge may **not be coated** with any material.

Span- Must span the **350 mm opening**. There is no maximum length.

Width- Must be **80 mm minimum inside** dimension at road surface. There is no maximum width.

No portion of the bridge may extend more than **15 mm below** the top surface of the test supports.

The road surface is defined as the surface that will allow a Hot Wheel Car to pass the length. However, the road surface does not need to be solid.

Loading:

The load point will be at the center of the bridge.

The bridge must accommodate a **50mm long x 80mm wide x 20mm high loading block, ¼" eyebolt, washer, and wing nut.**

Testing:

All bridges will be submitted prior to the testing. The bridges will be evaluated to determine if they meet the specifications.

The event supervisors will provide all equipment/materials for testing.

STUDENTS MUST PROVIDE AND WEAR EYE PROTECTION DURING LOADING AND TESTING.

The bridge will be inclined by placing one end on a 50 mm high wooden block. The Hot Wheel's car will be placed on the elevated portion of the bridge and will be allowed to roll down its entire length. If the car gets stuck, the students are allowed two restarts. The event supervisor will provide the Hot Wheel's car.

The bridge will be centered on the testing apparatus, containing a 350 mm opening between the bridge supports.

The loading block will be placed at the load point of the bridge. The eyebolt will be pushed up through the bridge and loading block from below and secured with a wing nut and washer on top of the loading block. A standard 5-gallon plastic bucket (approx. 30 cm diameter) will be suspended from the eyebolt.

The student will add sand to the bucket until failure occurs or the maximum load of 25 kilograms is reached. Two students will be allowed to test. One may pour the sand while the other student steadies the bucket. Hint: It is no advantage to build a bridge that will hold more than 25 kilograms.

Students have a time limit of 10 minutes to add the sand.

The bridge must support a 5kg load for a minimum of 5 seconds to qualify for scoring.

The load used for scoring will be the weight of the bucket and sand only.

Scoring:

The winner will be determined by the largest load/mass ratio with 25kg as the maximum load.