



Activity: Balsa Wood Bridge (ABC-style)

Introduction

Bridges come in many different shapes and sizes, and can be made out of an assortment of materials. A sample of some of the different types of bridges is shown below. The type of bridge and material used is

Arch



Garabit Viaduct
By Gustave Eiffel

Suspension / Cable Stayed



Brooklyn Bridge
By John Roebling

Girder



Walnut Lane Memorial Bridge
By Gustave Magnel

Truss



Francis Scott Key Bridge
J.E. Greiner Co., Inc.

Suspension



George Washington Bridge
By Othmar Amman

Cable Stayed



Puente del Alamillo
By Santiago Calatrava

dependent on many different factors: location, span length, type of traffic, etc. While types and materials may differ, bridges always have the same purpose: to transport people or things over an obstacle from one location to another.

A typical bridge project will occur over several years, affecting traffic in some way during the duration of construction. Accelerate Bridge Construction (ABC) is a design and construction practice that focuses on

Prefabrication



Lateral Slides



SPMTs





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shortening the time of construction to a few months to even as short as a few days. Some of the methods of ABC are:

1. *Prefabrication*: where portions of the bridge are constructed offsite and then assembled onsite (like Legos); bridge designs can best utilize prefabrication if they use repeatable parts
2. *Lateral Slides*: where the full bridge is constructed next to the existing bridge and then slid into place at one time
3. *Using SPMTs*: where full bridge segments are constructed offsite and then driven into place using large truck-like machines called self-propelled modular transporters (SPMTs)

The purpose of this activity will be to explore different types of bridges and use Accelerated Bridge Construction to speed up the construction of the bridge.



Competition

The mission of this competition is to provide creative problem solving opportunities for the participants by incorporating concepts of mechanics, construction (ABC), materials durability, and project planning all in a series of events. By working in teams, participants will also learn teamwork, the appreciation and understanding of others, and that a group is a more powerful thinking force than an individual.

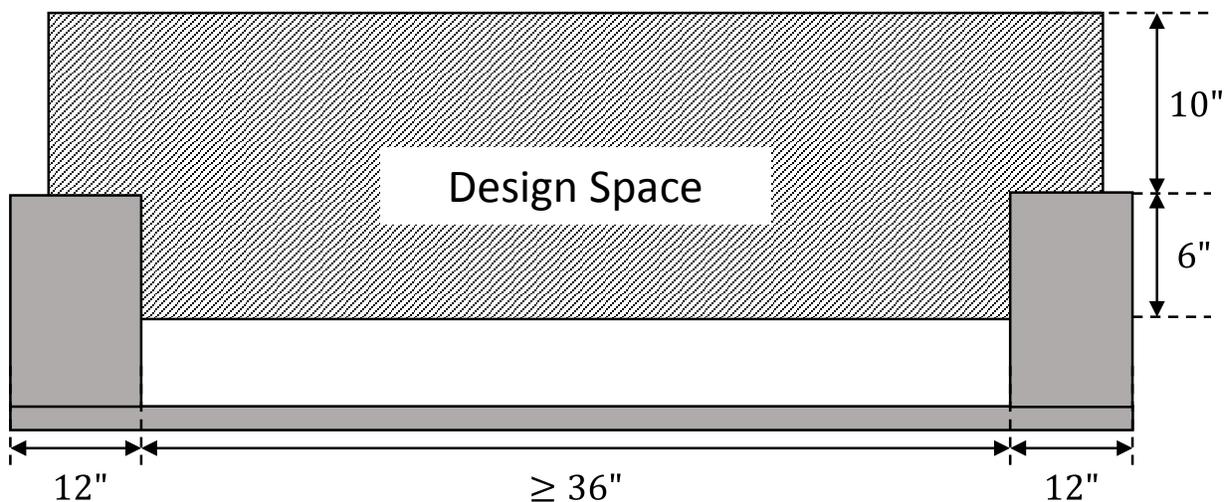
For this competition each group must construct a balsa wood bridge with multiple components that need to be erected prior to loading. They also have to present a skit about a story of their bridge, its construction, and uses.

Provided Materials:

1. Balsa Wood (1/8" square rods, 1/16" x 3" sheets)
2. Hot glue gun and hot glue sticks
3. Scissors
4. Rulers

Competition Rule:

1. Teams are responsible for constructing the superstructure for their bridge. The foundation for the bridge shall be provided at the testing site.
2. The bridge must be positioned in the below design space with a six inch wide space envelope.



3. The bridge must have 6" of clearance from the base.
4. Only the materials provided above may be used in the competition.
5. Rods may not be bundled.
6. 3" wide sheets can only be used for gusset plates (i.e. points where different rods intersect) and roadway.
7. The bridge must be constructed into three separate parts maximum length of 18 inch.



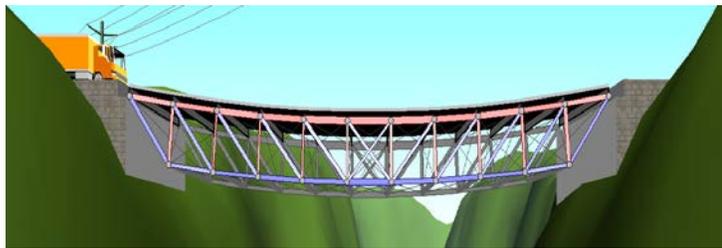
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8. Bridge pieces will need to be transportable to the job site (in the provided box) for final assembly and must be connected by truss members not by bridge deck. Each team will have **20 minutes** to complete the final assembly of their bridge.
9. The bridge must be able to hold a moving car load of 0.5 lbs.

Competition Outline

Step 1: Preliminary bridge design

Bridge Design: Teams use given shapes and Bridge Design Software to design their bridge and then should sketch their bridge to scale on a piece of poster board to be used as a guide for constructing the bridge.



Step 2: Initial construction of bridge sections

Initial Construction: Each team will construct the three segments of the bridge (each family will construct one piece of the bridge). Teams should make sure that design will lead to bridge that will fit together.

Step 3: Accelerated construction of full bridge

Accelerated Construction: Each team will have 20 minutes to put together their full bridge from the three pieces they constructed.

Step 4: Initial load testing

Initial Loading: Each team will need to drive a load of 0.5 lbs. across their bridge. Each team will have only three tries to drive the load across their bridge. The bridge must sustain the load and the car must cross the bridge for the passing of this round.

Step 5: Final loading.

Final Loading: The final bridge will then be loaded to failure (or 10 lbs.) starting at the 0.5 lb. loading. The load will be applied as a static load on the bridge.



Layout of space and Sample Bridge:

