

Main Event: Bridge Building

Event Description:

In this event, teams of 2-4 students will design a bridge, virtually test it, and then print it on a 3D printer. Teams will then bring their bridges to the tournament to see which will have the highest structural efficiency. Teams will also submit a Design Document outlining some of the key aspects of the process. Design Documents must be converted to a PDF file before uploading to the 3D Derby Design Document Submission Portal on Teams.

Common Core Standards and 4 C's:

Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently. Creativity, Collaboration, Communication and Critical Thinking.

Designing and Creating your Project:

The process of creating your project should take on the following steps:

- Research different bridge structures to help design your bridge.
- Use [West Point Bridge Design](#) program to design and virtually test your bridge.
- Use a 3D program such as [SketchupMake](#) to create a 3D model of your bridge.
- Print your bridge on a 3D printer.
- Test your bridge, make adjustments and reprint (may repeat multiple times).
- Bring your bridge to the tournament to see which is the best.

Technical Requirements and Specifications:

- The bridge must be completely drafted by the students. Bridges will be designed and printed prior to the competition, using West Point Bridge Design, 3D modeling software and the MakerBot 3D Printers.
- The bridge must weigh no more than 30 grams.
- The bridge must be able to span a distance of 5.75 inches (146mm), from the center of the pier to the center of the next pier. [\(See load test diagram here\)](#)
- The load plate will be 2" x 2" (50.8mm x 50.8mm) and will be placed on the top of the bridge.
- The bridge can be printed in one piece, or in components that may be glued together, but NO other materials may be used.
- Each team must also submit a Design Document by 11:59 pm March 17, 2019 to the [TOT App Submission Portal](#).

Reward Points:

Teams will test their bridges on the day of the tournament. Each bridge will be loaded with weights until it fails. Its structural efficiency will be calculated by dividing the total load supported by the mass of the bridge. Then the bridges will be ranked by structural efficiency and final points will be as follows:

3D Bridge Scoring Breakdown		
	Max Points	Formula
Points from Rank	35	$35 - 3 (\text{Your Rank} - 1)$
Points from Structural Efficiency	35	$\text{First Place Efficiency} / \text{Team's Efficiency} \times 35$ $= \text{Team's Total Efficiency}$
Points from Design Document	30	See Design Document Rubric