Popsicle Bridge Design Report

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Problem Statement

The task at hand was to construct the strongest bridge as possible to hold as much under-slung mass as possible. This must be completed using the materials given as well as using designs and engineering techniques to avoid major factors such as tension and compression.

Design Criteria

Constraints

A. The maximum width of the bridge is 1 popsicle stick (110 mm) wide
B. The maximum height of the bridge is 1 popsicle stick (110 mm) high
C. The weight of the bridge itself should not exceed 250 g
D. The only sole fastening agent can be the wood glue

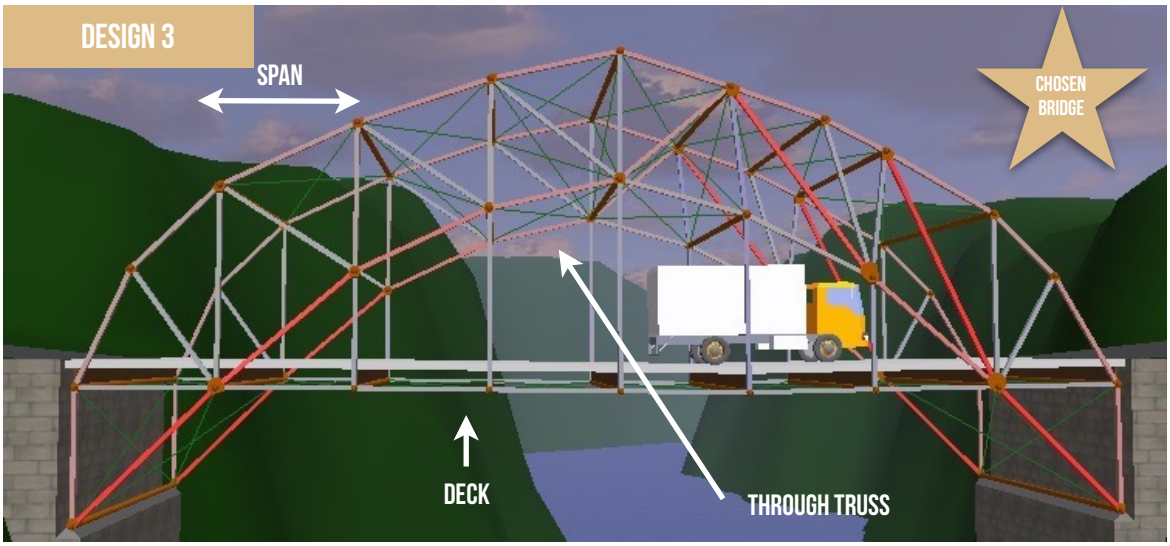
Specifications

A. The popsicle sticks may be cut into any shape of form
B. Popsicle sticks used must have the following measurements: 114 x 9.5 x 1.5
C. The load will be placed on the top of decking during bridge testing
D. Design of the bridge should be strong and include efficient techniques (truss designs, sturdy base etc.)

Choose and Create

	Design A	Design B	Design C
Contrait A	2	2	2
Contrait B	2	2	2
Contrait C	2	2	2
Contrait D	1	1	2
Specification A	1	1	2
Specification B	1	2	2
Specification C	1	2	2
Specification D	1	1	2
TOTAL	12	13	16

Drawings/Illustrations



Procedure Notes

- Sturdy design with trusses equal spans
- The beams have to be placed vertically
- Limit of 120 popsicle sticks
- Weight has to be distributed equally to other parts of the bridge
- The bridge has to be a popsicle high and one popsicle stick wide
- Failure is deemed if the weight touches the bottom
- Research was conducted during the pre era of the bridge design
- Research included reading and reviewing the powerpoint on bridges on D2L
- Ideas were modelled and tested virtually on WestPoint Bridge Designer 2013

Materials

The following materials were used to design and construct the bridge:

- Popsicle Sticks
- Wood Glue
- Metal Cutters
- Sanders
- Clamps

Conclusion

On the final testing day, our bridge held up an immense weight, achieving 209 pounds of weight in the bucket without failing, unfortunately there was no space left in the bucket for any more weights. Also the Loading Capacity was 696.67 pound per pound. This was a great feat to accomplish exhibiting the bridge's sturdiness and balanced trusses that had capabilities of holding up immense weights. Overall, the bridge's trusses, along with the strong deck, supported the weights with relative ease. Each and every bridge design criteria were met, including the max height and max length, as well as meeting the material requirements. There are extremely few, and minor improvements possible to the bridge, since it held up the max weight. Our bridge was not the most appealing to the eye, and possibly decorating it with glitter, to make it look better. Other than that, there is not much to change. Other users may benefit from our research since we used many techniques to support our bridge. For example, using many trusses was very beneficial as well as using layers of popsicle sticks to strengthen any weak spots. Overall, our bridge was very successful, and held the most weight possible, making it a very triumphant victory on the group's part.

References (Internet Sources)

- http://pghbridges.com/basics.htm
- "Bridge Basics - A Spotter's Guide to Bridge Design." Bridge Basics - A Spotter's Guide to Bridge Design. Web. 29 Oct. 2015.

- http://www.popularmechanics.com/technology/design/g248/4335705/
- "The World's 18 Strangest Bridges: Gallery." Popular Mechanics. 1 July 2011. Web. 29 Oct. 2015.

- http://www.designboom.com/architecture/top-10-bridges-of-2013-12-31-2013/
- "TOP 10 Bridges of 2013." Designboom Architecture Design Magazine TOP 10 Bridges of 2013 Comments. 31 Dec. 2013. Web. 29 Oct. 2015.

Log Sheet

DAY	ACTIVITY COMPLETED
Day 1-3	Created bridge designs on West Point Bridge Design, then presenting one final design
Day 4	Placed two beams at the sides of the bridge and put Popsicles on top of the beams
Day 5	Built the supports up for the arch of the bridge
Day 6	Double layered the beam with popsicles for more support and strength
Day 7-8	Built the first arc of the bridge
Day 8-10	Built the second arc of the bridge
Day 10-12	Put support under the first and second arc of the bridge on both sides
Day 13	Placed trusses in between the two arcs
Day 14	Placed trusses between the first arc and the base
Day 15-17	Double layered the second arc with three layers of popsicle sticks on both sides
Day 17	Built trusses at the bottom of the bridge to support the roadway deck
Day 17	Built the road in the middle of the bridge
Day 17	Built trusses and beams on the top of the bridge
Day 18-20	Finishing touches, Adjustments and sanding any smooth areas
Day 21	**Test Day**