

SPAGHETTI BRIDGE COMPETITION Spring 2016

The American University of Iraq – Sulaimani

Department of Engineering

SPAGHETTI BRIDGE COMPETITION 2016

Overview

You will work in groups to design a bridge out of spaghetti. When designing any structure there are three main points to consider: cost, weight, and strength.

Members:

Groups of **(three or four)**

Grading Criteria:

Bridges will be evaluated on the following criteria:

1. Design and execution
2. Weight of your bridge
3. Loading Capacity

Guidelines:

1. The bridge is to be built from spaghetti (cylindrical form of pasta) and glue, either **epoxy** or **Hot Glue gun**. The usage of glue is restricted to element bindings at the joints. **Strengthening the pasta by glue coating or gluing together the neighboring parallel threads is prohibited.**
2. The bridge shall be free-standing and must span two level surfaces which are a **60 cm** apart. The **maximum length of the bridge must be less than 80 cm.** (see “Bridge Dimensions” figure below)
3. The support for the bridge shall be from the top of the level surfaces (of the platform). **The edges of the level surfaces cannot be used in any way for support. In other words,** the bridge cannot be supported by the edges or sides of the platform.
4. The bridge must include a decking of spaghetti to provide a suitable road surface at least **10 cm wide** across the full span of the bridge. Three conditions must be met:
 - a) Gaps in the bridge deck are not to exceed 2 mm (see “Bridge Deck” figure below).
 - b) A block of wood 5 cm x 5 cm x 10 cm (Depth x Width x Length) representing a car must be able to move along the length of the decking unobstructed from end to end.
 - c) The deck of the bridge must be uniform in width.
5. Loads will be attached using an S-hook. Your bridge must have an opening for a 10 mm (1 cm) diameter metal rod extension. If during loading, the bridge twists in such a way as to cause the bridge to touch the rod at any point other than the eye-bolt, thus lending additional support, the bridge will be disqualified. (see “Loading Plate” figure below)

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6. The minimum vertical depth of the bridge, from the highest point in its structure to the lowest **must be at least 25 cm.** (see “Bridge Dimensions” figure below)
7. The maximum weight of the bridge including the loading platform must **not exceed 2.5 kilograms.**
8. Supports can be used for holding vertical load forces only. Horizontal support is unacceptable; **meaning the sides of the platform cannot be used to support the bridge.**
9. The load is applied to the bridge by loading the bridge with various weights in the vertical direction.
10. Only Ankara brand cylinder spaghetti can be used for the bridge.

Materials:

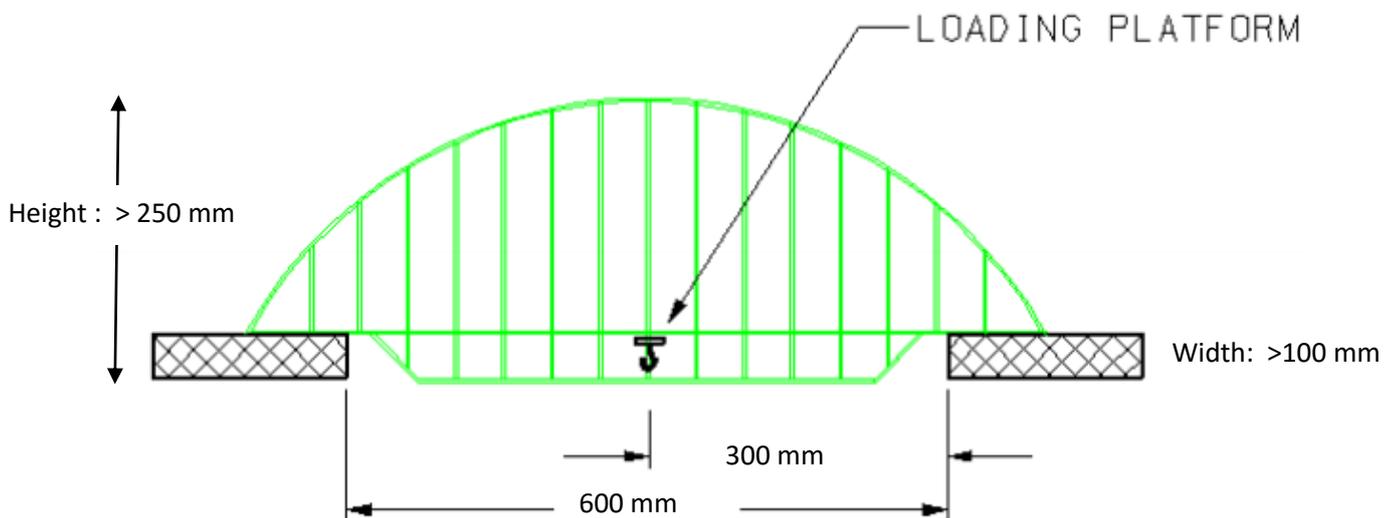
Only the following materials can be used to construct your bridge:

- Spaghetti (Brand:Ankara)
- Epoxy or Hot glue gun

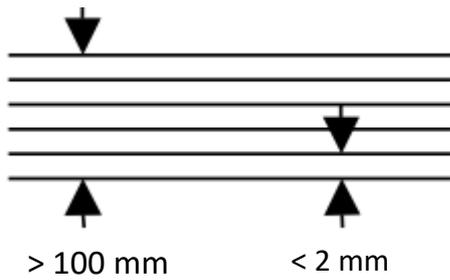
Dimensions:

The maximum length, width and height of your bridge are limited to the following dimensions:

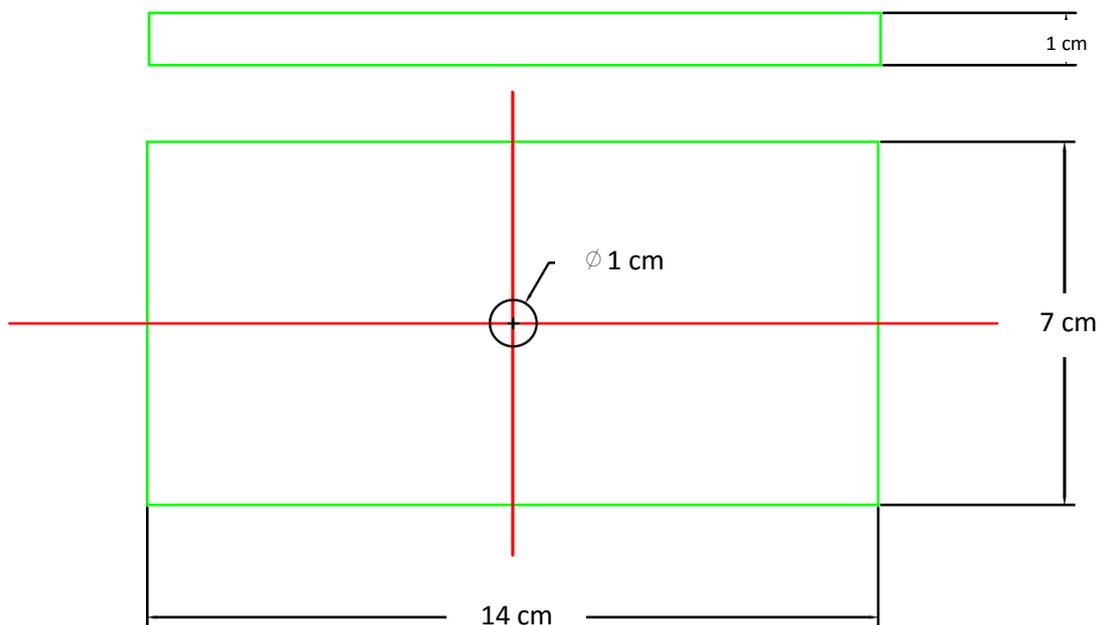
Bridge Dimensions



Bridge Deck



Loading plate



Evaluation of the structure:

The structures will be evaluated on the basis of their performance under loading as well as on the basis of aesthetics.

- a) Evaluation on the basis of aesthetics will be done by judges and will include the following criteria:
 - i. Innovation in design
 - ii. Cleanliness of work
 - iii. Functionality
 - iv. How well plan was executed
- b) The efficiency (e) of each structure will be calculated according to the following formula:

$$e = \frac{\text{Maximum Load (kg)}}{\text{Weight of Bridge (kg)}}$$

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Scoring:

The final score of each structure will be calculated according to the following.

a) Aesthetics (30%)

Each structure will be graded by the judges on a scale of 0 – 30

b) Efficiency (70%)

Maximum efficiency by any structure will be takes as a constant, E , and points will be calculated according to the formula

$$X = \frac{e}{E} * 70$$

Penalties:

Penalties below will be imposed if the structure violates the dimensional or weight specifications:

- **Weight exceeds the limit**
(Penalty of 15% of the total score)
- **Dimensional specifications are not met**
(Penalty of 10% of the total score)
- **Use of any material other than that provided**
(Penalty of 50% of the total score or can lead to disqualification as decided by the judges)

In case of discrepancies, the decision taken by the judges and the coordinators will be final and bounding.

Awards

All participants will receive a Certificate of Participation.

First, Second and Third place winners will be awarded a trophy.

Registration:

To register for the competition, email Mohammed Badeea

(mohammed.badeea@auis.edu.krd) the *names of the group members* and the *team name*.

Deadline for registering: March 19, 2016

Submission

To be considered for the competition, the following must be submitted by April 14, 2016 at 5:00 PM:

1. Detailed sketches of the bridge design done in AutoCAD.
 - a. Sketches have to be printed on A3 paper with a proper titleblock.

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- b. A titleblock template will be emailed out later; all teams must use this titleblock template.
2. Pictures of the team members working on the bridge.
 - a. Pictures must be saved on a CD with the names of the team member and team name written on the front of the CD.
3. Bridges will be submitted to :

Ms. Raguez Taha

Office: B-F2-17

raguez.taha@auis.edu.krd

Useful Links:

<http://spagettibridge.blogspot.com/>

<http://www.okanagan.bc.ca/assets/departments+%28administration%29/public+affairs/spagheti+bridge/spaghetti+bridge+heavyweight+rules+2010.pdf>

<https://sites.google.com/a/bcsemail.org/wdstem/bridges/how-to-build-a-bridge>

http://civil.camosun.bc.ca/spaghetti_bridge/Tips.htm