

Junior Design Competition

Thank you to our judges:

**Introduction**

**Context**

Electricity can be easily produced and transported in a clean way. For this reason, the government has decided to encourage the production of this energy. Although rural electrification is done in different parts of the world, there are still some isolated parts that have not been able to do the same. At fortiori, some regions have natural obstacles that make it even more difficult to be electrified.

**The challenge**

Two electrical lines must cross a river that has prevented the power distribution in an isolated area. The challenge will be to build two towers capable of withstanding electrical cables without the cables coming into contact with each other. To do this, a distance of 10 cm between the two cables is required at their point of attachment to the towers. They cables must also avoid coming into contact with water: they must, maintain a minimum distance of 10 cm with the ground level. Because this region is not economically favoured, the cost of the work is of paramount importance and the cost will be calculated by taking into consideration the total weight of the two towers. To conclude, as the region is conducive to the formation of hail, an additional weight of 4.5 kg (10 lbs.) will be added to each line. The two towers will necessarily have to bear this burden by keeping in mind the minimum distance of 10 cm. Before applying this load, the first test will be performed with half the load (5 lbs.) only. Each tower can be attached to the board at the 4 bolts on the 12 holes available.

**General Constraints**

**Team**

Each team can be composed of maximum of 4 undergraduate students in engineering, each having completed fewer than 60 credits of their major program.

**Duration**

Teams will have 4 hours before final tests to conceptualize/build their towers. Two practice trials are allowed during this the competition. Teams are responsible for measuring out the length of the region traversed by the electrical cables. The course will remain fully open to everyone during the entire 4 hours.

**Equipment List**

**Material**

* Wooden sticks
* Hot glue
* Wood glue
* String
* Elastics
* Wooden base with premade holes

**Tools**

* Hot glue gun
* Scissors
* Ruler

**Questions and Adjustments**

**Questions**

For all questions on the challenge and competition, participants should refer to the organizers following the given protocol. It is the responsibility of the organizers to make all questions and answers available to all participants.

**Rule Adjustments**

Inevitably this rule document will prove to be incomplete. Participants are encouraged to point out ambiguities and inconsistencies to the organizers, as we will promptly evaluate the situation and update the rules accordingly. Any such on-the-fly rule updates will be written down on a central message board and announced to everyone, such that all teams are kept informed, as is only fair. Situations may also arise where the rules are very clear and unambiguous, but team members notice ways of circumventing the intended spirit of the competition. In such cases, you are encouraged to make full use of your creativity in exploiting such loopholes and technicalities.

**Evaluation**

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| --- | --- |
| Evaluation Criteria | Weight |
| Presentation  | **/35%**  |
| Quality of the presentation  | 5%  |
| Method for design  | 5%  |
| Considered concepts  | 10%  |
| Final solution  | 10%  |
| Design of Prototype  | 5%  |
| Course\*  | **/65%**  |
| Test with half of the weight or the full weight | 25% |
| Respecting Distance between Cables at point of attachment with towers | 10% |
| Respecting Distance from ground without any weights | 10% |
| Combined weight of the 2 towers (in grams) | 10% |
| Combined weight of waste materials (in grams) | 10% |
| Total  | **100%**  |

**\*Detailed Course Evaluation**

**1. Successful Test with half of the weight worth 10%, successful test with the full weight worth additional 15%, making up the total score of 25%**

**2. Respecting Distance between cables at point of attachment with towers worth 10%, failure to meet the requirement of minimum distance of 10 cm results in a score of 0%.**

**3. Respecting Distance from ground without any weights worth 10%, failure to meet the requirement of minimum distance of 10 cm results in a score of 0%, distance larger or equal to 10 cm results in score of 10%**

**4. Combined weight of the 2 towers. The weight of towers is measured in grams, and the total score would be calculated based on number of teams and the ranking of the team. The team with the lightest weight has a score of 10%, and the team with the heaviest material would receive a score of 0%, the rest of the teams will receive scores calculated from the equation below.**

$$Score=\frac{10}{N}× Number of Ranking, N=number of teams$$

**5. Combined weight of waste materials. The weight of waste materials is measure in grams, and the total score would be calculated based on number of teams and the ranking of the team. The team with the smallest amount of waste has a score of 10%, and the team with the most waste would receive a score of 0%, the rest of the teams will receive scores calculated the equation below.**

$$Score=\frac{10}{N}× Number of Ranking, N=number of teams$$