

INCLINATUS

- Civil Engineers can innovate better

Introduction

One of the most famous structures in the world, "THE LEANING TOWER OF PISA" has attained the present fame accidentally due to unfortunate incidents, but not built so by the engineers. Here is your chance to build a similar structure with your own techniques and challenge the world to prove your mettle as a successful engineer.

Task

Effulgence brings you the challenge to design a structure similar to "THE LEANING TOWER OF PISA" using popsicle sticks and adhesive that can sustain the load, satisfying the understated criteria.

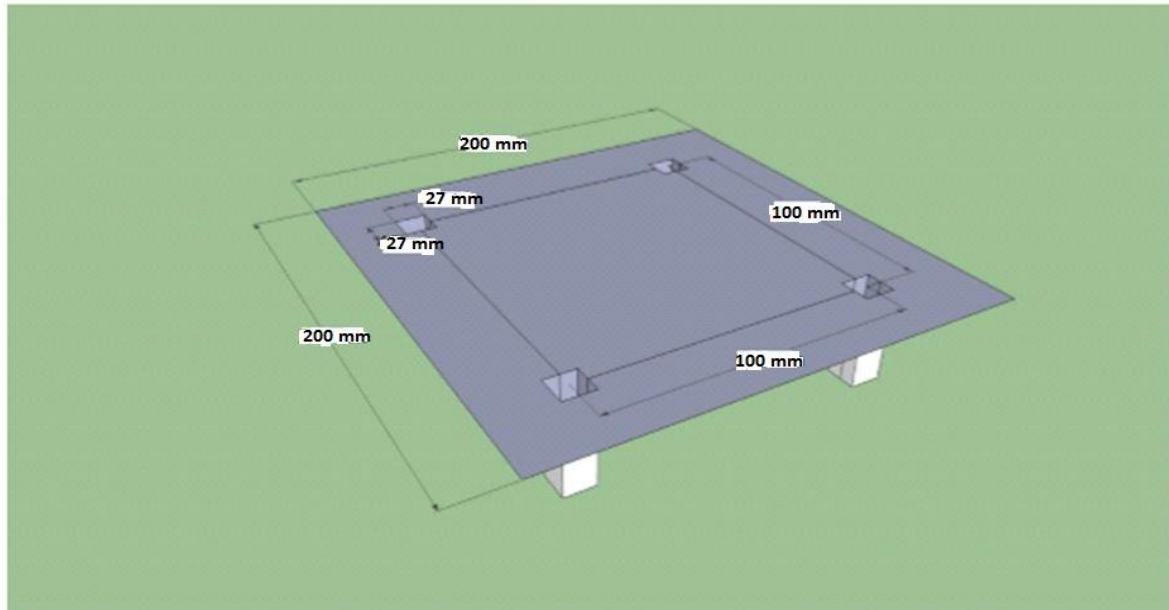
Abstract

Submit the abstract of your design with innovative ideas.

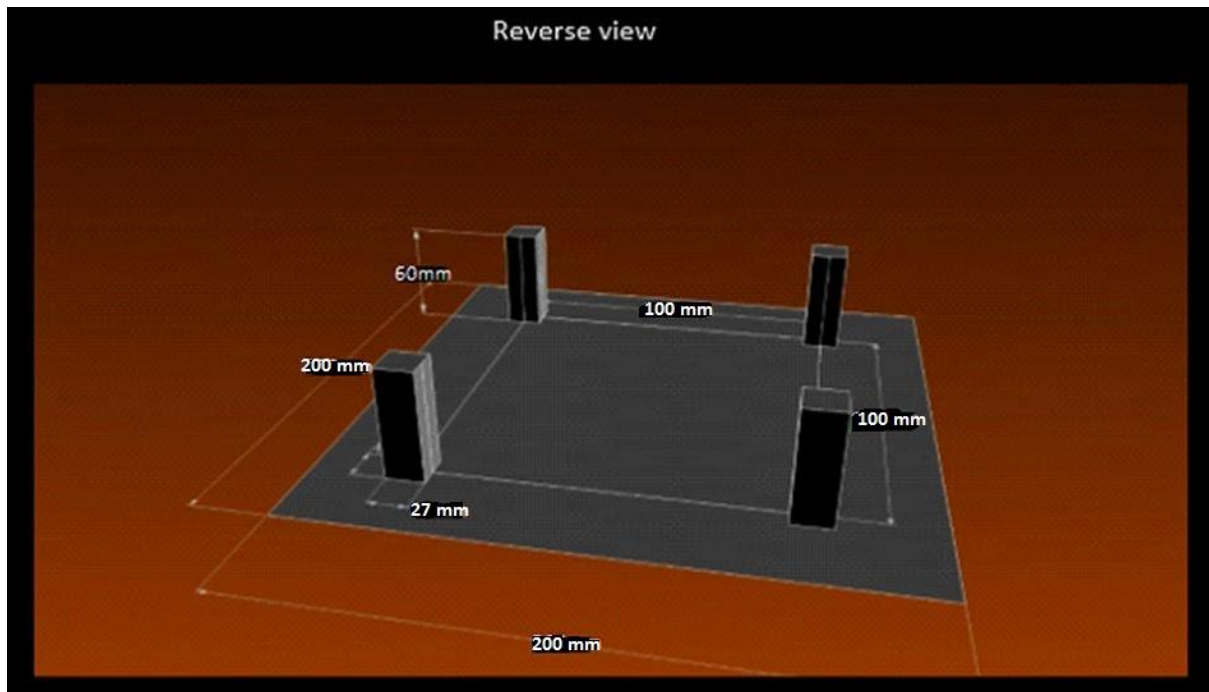
Arena specifications

- There is a 200 mm X 200 mm base on which the tower has to stand.
- There are four grooves with a depth 60 mm and 27 mm X 27 mm cross-section on the four sides of the base.
- The position of the grooves on the board is such that the center of the grooves form a 100 mm X 100 mm square.

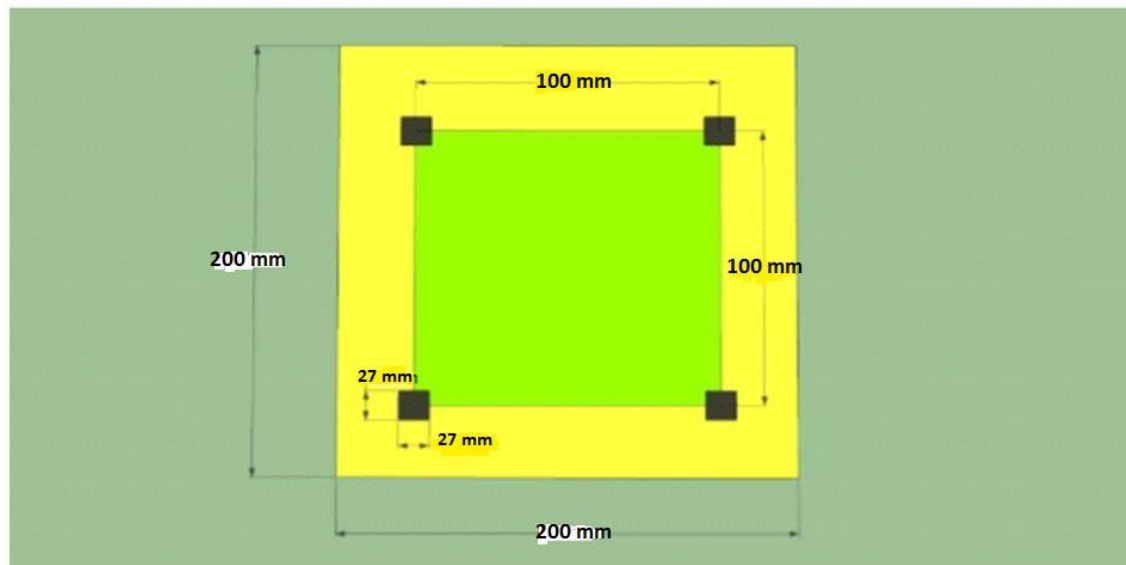
3-D View



Reverse view



Top View



Design Constraints

- Deviation from the abstract submitted may lead to **DISQUALIFICATION**.
- Angle of inclination (A) should be greater than 8° .
- In no case angle of inclination **should not less than 7°** . The penalty of 30 points will be charged if inclination is less than 8° .
- No part of the bottom of the tower should cross the boundary of the base.
Penalty: 20 points for breaking this rule.
- The minimum height of the tower measured along its length should be $L=70\text{ cm}$ above the base.
- The top most surface of the tower must be parallel to the base.
Penalty: 20 points for breaking this rule.
- The top most surface of the tower should be a continuous surface with no gaps in it.
Penalty: 20 points for breaking this rule.
- The area of cross-section at any horizontal section of the tower should not exceed the area of the base.
Penalty: 30 points for not fulfilling this criterion.

Material Constraints

- Popsicle sticks (maximum length 115 mm, width 13 mm and thickness 3 mm) and adhesives (fevicol only) should only be used to build the structure. The popsicle sticks can be cut or trimmed to any shape or size.

- Adhesive can only be used to join Popsicle sticks together; however adhesives cannot be applied on the free surface of a member made of Popsicle sticks to increase its strength (Only fevicol can be used as an adhesive).
- The team will be **DISQUALIFIED** if found using any other material other than those mentioned in any part of the structure.
- All the necessary materials and tools will be provided at the time of event.

Testing

- Teams will be given 5 minutes to make final changes in their structure before the testing, and once the changes are done, the structure will be weighed. After weighing is done no changes can be made in the structure.
- Teams will be allowed to put their structure on the base; once the structure is placed loading procedure will be started by the co-ordinators.
- Loads will be applied on the topmost surface of the roof.
- The angle of inclination will be measured from the corner of the base to the corner of topmost surface with the corners in a straight line along the inclination of the tower.

Definition of failure

The structure is considered failed when any of the following happens:

- The structure fails to satisfy any of the constraints specified above.
- Any member or joint of the structure fails.

Rules

- Shape - structure could be of absolutely any shape satisfying the above constraints.
- Once the structure is weighed, you are not allowed to modify your structure in any way.
- If any of these constraints are not met, point deductions (as mentioned) or disqualification may be imposed at the sole discretion of the organizers.
- If the structure fails to satisfy any of the above constraints, then it will be rejected.
- Any team that is not ready at the time specified will be **DISQUALIFIED** immediately.
- Judges'(Organizers') decision shall be final and binding on all.
- The organizers reserve all rights to change any or all of the above rules as they deem fit.

Change in rules, if any will be highlighted on the website.

Judging Criteria

A = Initial angle of inclination of the tower from vertical.

M= Deadweight of the structure.

W = Maximum load sustained by the tower before failure.

L = Height of the tower measured along its length.

E= efficiency of structure (W/M)

- 120 points will be awarded to the team with the highest value of A, zero points to the team with the lowest value of A, and all others will be awarded points based on linear interpolation between these two extremes.
- 100 points will be awarded to the team with the highest height (L), zero points to the team with the lowest value of L, and all others will be awarded points based on linear interpolation between these two extremes.
- 150 points will be awarded to the team with the highest value of E, zero points to the team with the lowest value of E, and all others will be awarded points based on linear interpolation between these two extremes.

NOTE: Score of a team is the sum of the points based on these criteria minus penalty if any.

Team Specifications

A team may consist of a maximum of 4 members.

Eligibility

All students with a valid identity card of their respective educational institutes are eligible to participate in this competition at Effulgence 2015.

Compliance

During the event, the organizers will evaluate each structure. Structures will be weighed, measured, and reviewed for compliance with rules regarding materials. If a structure does not comply with any of the rules, the team may get **DISQUALIFIED**.

- Structures that are completed but do not meet the construction guidelines will be given a chance to make any necessary alterations.

- No alterations will be allowed unless deemed necessary by the Judges (Organizers). If such alterations are required, the team will be allowed thirty (30) minutes to complete them. The decisions of the organizers are final.

Certificate Policy

- Winner Certificate will be given to 1st, 2nd and 3rd rank holders only.
- Certificate of participation will be awarded to the next 5 teams according to the rank list.
- **DISQUALIFIED** teams will not be considered for any certificates.

NOTE: In case of a tie between teams the architectural and aesthetic beauty will be the tie breaking criteria.