



CRANE-O-MANIA

Rulebooks of Crane_O_Mania:

Task: Design a Tower Crane using popsicle sticks, cotton strings, and Fevicol as adhesive (without using any strengthening coating) that can sustain the maximum possible load with optimum radius and self-weight, satisfying all the understated

(Note: Participants will be disqualified if any of the following parameters are not followed.)

Design Constraints:

1. The Tower Crane should be **stationary** and will not be fixed to the ground by any means. The base area of the crane should not exceed **20cm x 20cm** in the plane.
2. The boom can be flexible in terms of height and operating radius. (This is not compulsory, but this provision will have an advantage in the final rating.)
3. Counterweight provision is allowed in any case; the Base area should not exceed the permissible amount mentioned in point 1. Crane should not be anchored to the ground.
4. A pulley arrangement with a thread should be prepared as shown in **fig. 1** for the application of the load.
5. The crane can be made with a rotation mechanism in plan to allow a 360-degree angle of operation. (This is not compulsory, but this provision will have an advantage in rating.)

(Note: The Designs given below are just examples; you can come up with your own design, given that it follows all the Design constraints.)

A screenshot of the Techfest 2019-20 website. The header features the Techfest logo and the year '2019-20'. On the right, there are buttons for 'ALL COMPETITIONS' and 'SIGN OUT'. The main content area is titled 'Crane-O-Mania'. It includes a sub-section for 'PRIZE MONEY: INR 50,000/-'. Below that is a description: 'Design a Tower Crane using popsicle sticks cotton strings and Fevicol as adhesive (without using any strengthening costing) that can sustain the maximum possible load with optimum radius and self-weight, satisfying all the understated constraints.' A note states 'THERE IS NO REGISTRATION FEES'. At the bottom, a box lists team details: 'Team Leader : Saifuddin Rakib', 'Team ID : CR- 59899197', 'Member1 : Saifuddin Rakib | Member2 : Rubayet Ahmed', and 'Member3 : Mostafizur Rahman Khan | Member4 : Mostahid Ahmed'. A note at the bottom of the page says: 'The competition has only one round to be held at Techfest 2019-20 from 3-5 January, 2020'.

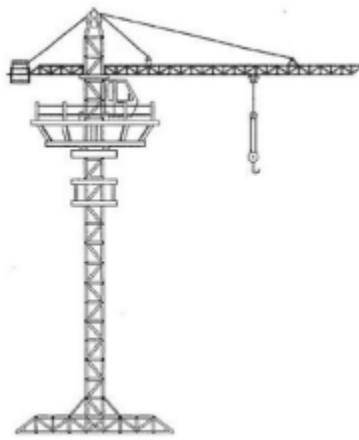


FIG. 1 (The base should not be fixed; use counterweights to balance)

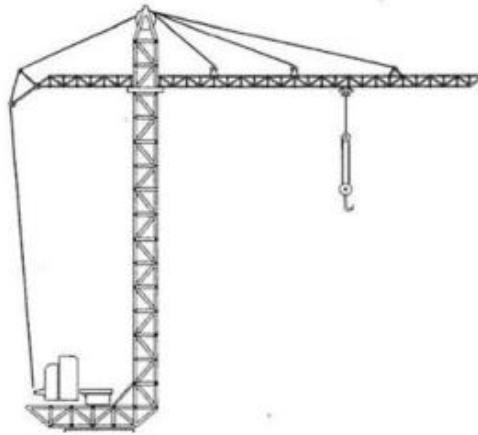
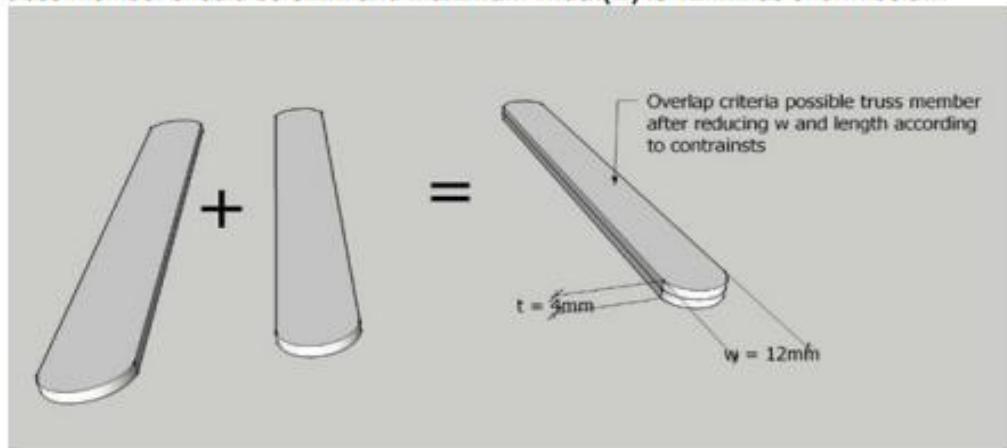
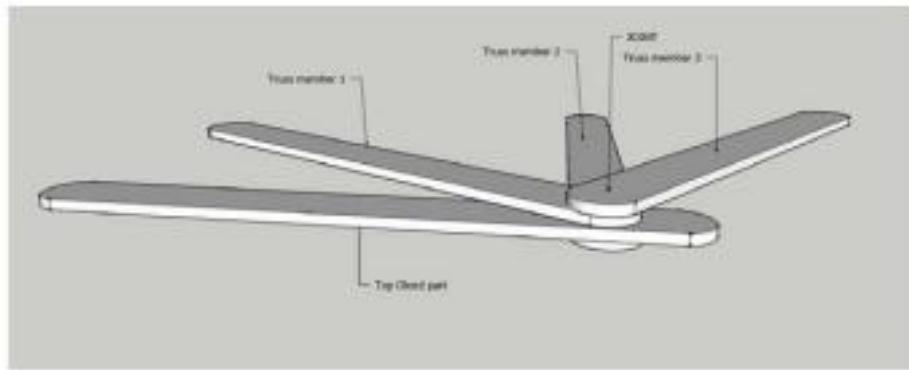


FIG. 2

6. Overlap criteria for truss members - Not more than two Popsicle sticks should be overlapped longitudinally to make a truss member i.e. the **maximum thickness(t)** of a truss member should be **5mm** and **maximum width(w)** is **12mm** as shown below.



Loading will be done at the end point of boom of the crane, so drill a circular hole of 10mm diameter at the center (in the end) for placing the hook.



Materials Used:

Strictly adhere to the following materials:

1. Popsicle sticks (maximum length 120 mm, width 12 mm and thickness 2 mm) and **Fevicol MR White adhesive** should only be used to build the structure . The Popsicle sticks can be cut or trimmed to any shape or size.
2. White colored Cotton threads should be used for the cables.
3. Adhesive can only be used to join Popsicle sticks together; Adhesives cannot be applied on the free surface of a member made of Popsicle sticks to increase its strength
4. If rotation is provided it shall be **created from scratch**. No readymade bearings are allowed for rotation. For e.g. as seen below a CD stack can form an example of a rotation pin wherein metal balls can be added in between the CDS to make a bearing mechanism.
5. Counter-weight can be used anything, but it should not support the structure in any way other than balancing.



Cable:

Each Cable made of a single thick cotton thread or a group of thin cotton threads. The **maximum diameter of the cable should be strictly less than 1mm**. The cable can be attached to the crane by tying it around the Crane directly or by making a hole in the Popsicle sticks carefully while building the crane for assistance in tying as shown. The cable can be attached to the top chord or the top of the truss members again either by tying around the member or by making holes in the popsicle sticks making the top cord of the crane

Gameplay:

Testing:

1. 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.
2. The dimensions of the structure will be measured.
3. All construction and material requirements will be checked prior to testing. **Cranes failing to meet these requirements and constraints will be disqualified or penalized accordingly.**
4. Loading will be done using a hook at the end of the Crane. The loading would be done on the crane using a 5cm x 10cm loading plate-connecting hook system. For this the bridge should have a **10 mm diameter circular hole**.

(Note: The loading mechanism might change according to the circumstances during the competition but the mechanism won't affect the results.)

Definition of failure:

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

1. The loading machine registers maximum load or the structure fails to follow any of the mentioned constraints.
2. Vertical Deflection of the end of the crane exceeds 40mm.

General Rules:

1. Once the structure is weighed, you are not allowed to modify your structure in any way.
2. If any of these constraints are not met, point deductions (as mentioned) or disqualification may be imposed at the sole discretion of the organizers.
3. Any team that is not ready at the time specified will be disqualified immediately.
- 4. Judges' decision shall be final and binding on all.**
- 5. The organizers reserve all rights to change any or all of the above rules as they deem fit.**
6. Change in rules, if any will be highlighted on the website and will be mailed to all the registered participants.

Team Specifications:

A team may consist of a maximum of 4 members. Students from different educational institutes can form a team.

Judging Criteria:

The judging of the structure is based on 3 important criteria:

1. Self-weight of the Crane (SW) in kg
2. Counter-weight used (CW)
3. Radius of boom (R) in mm
4. Load carried by the structure before failure (L)

Judging will be based on the following formulas:

$$1) \ A = \frac{(\text{Load} * \text{Operating radius})}{\text{Total Weight of Crane}}$$

$$2) \ B = \text{Aesthetics}$$

3) P= Penalties (Points to be deducted for same will be decided by the judges)

Total Score = A+ B - P

Eligibility

All students with a valid identity card of their respective educational institutes are eligible to participate in this competition at Techfest 2019-20.

Compliance

At check-in, event organizers will evaluate each structure. Structures will be weighed, measured, and reviewed for compliance with rules regarding materials. If a structure doesn't comply with any of the following rules.

1. Structures that are completed but do not meet the construction guidelines will be given a chance to make any necessary alterations.
2. No alterations will be allowed unless deemed necessary by the Judges. 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

1. Certificate of excellence will be given to the top 3 winners.
2. E-Certificate of participation will be awarded to the top 40 teams other than the top 3 teams.

Prizes:

The Prize money will be awarded to Winners via NEFT and will be processed within 30 working days after receiving the Prize Money from Sponsors.

The Winner have to mail the following information (immediately after the announcement of results) to yibhav@techfest.org.

Subject: Compi Name, team id- your position (example- Crane-o-Mania, CM1003- 3rd Position) Body of mail-

- 1.Account Holder's Name
- 2.Account Number
- 3.Bank name and Branch name.
- 4.IFSC Code



Fig 3. World's biggest crane scale model



Fig 4. judge Panel checking the model



Fig 5. Previous Year Crane in the segment banner



Fig 6. Previous Year Crane in Competition



Fig 7. Team ID: Slot-6 (CR-69899197)

Crane - o - mania competition results ➤ Inbox X ⤒ ⤓ ⤔

Tushar Jindal <tushartechfest19@gmail.com>
to me ▾ Jan 6, 2020, 5:28PM ☆ 😊 ⤒ ⋮

Hello all,
Greetings from Techfest, IIT Bombay
It was awesome hosting you all for the crane-o-mania competition in Techfest 2019-20. It was a good competition and I hope you all enjoyed being here. The results for the top 10 of the Crane-o-Mania competition are -

1st - slot 5
2nd - slot 49
3rd - slot 47
4th - slot 4
5th - slot 13
6th - slot 38
7th - slot 7
8th - slot 6
9th - slot 25
10th - slot 43

Congratulations to all the winners and to all those too who participated in the competition with full enthusiasm.

Regards,
Tushar Jindal
Competitions Coordinator
Techfest, IIT Bombay

Fig 8. Email Verification as a Winner Team

• CERTIFICATE •

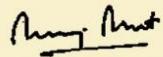
— Winner of Crane Design Competition —

Winner in 8th place out of 54 Teams

THIS CERTIFICATE IS AWARDED TO Mr/Ms

Saifuddin Rakib

for participating in Crane-O-mania competition
conducted by Techfest, IIT Bombay during 3rd-5th Jan, 2020



Prof. R.S Pant
Faculty Advisor
Techfest, IIT Bombay



Himanshu Rathore
Overall Coordinator
Techfest 2019-20

Fig 9. Certificate for Winner of Crane Design Competition