

## **RollCage**

### **Task**

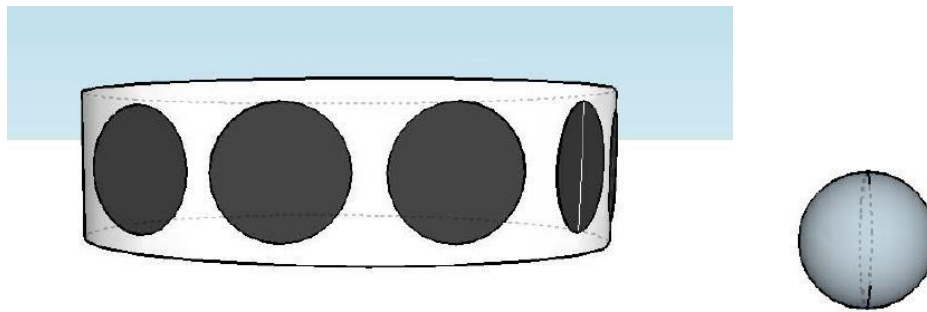
To build a machine that can pass balls through holes in a rotating cylindrical frame without using the same hole for two consecutive balls.

### **Mechanical components involved:**

Cylinder with holes that are uniformly distributed along its circumference and balls.

### **Gameplay:**

1. The objective of the competition is to design a mechanical structure to pass maximum number of balls through the rotating cylindrical cage (fig.1) in a power efficient manner.

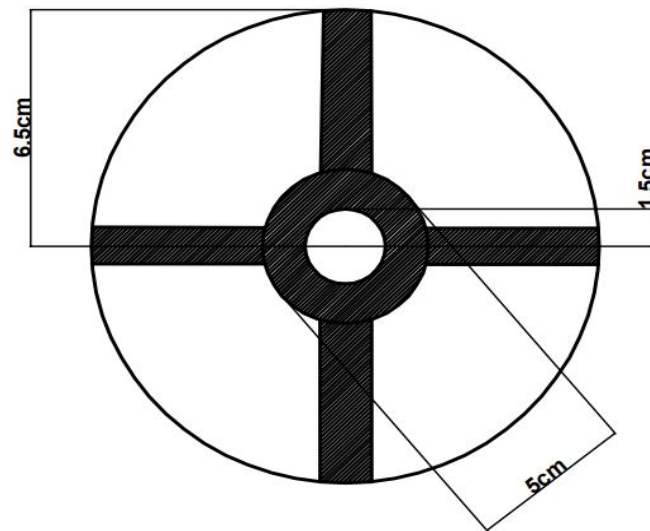


**Fig. 1**

2. A team has to construct a machine that rotates the cylindrical cage and pass balls through it.
3. Balls will be provided, and the dimensions of the ball and cylinder are given below.
4. The process should be seamless and should require least manpower.
5. Team has to synchronize the rotation of cage and the projection time of ball to pass the ball through it.
6. Team has to fix their own cylindrical cage on their machine dimensions of the same are given below.

**Dimensions:**

**Cylinder:**

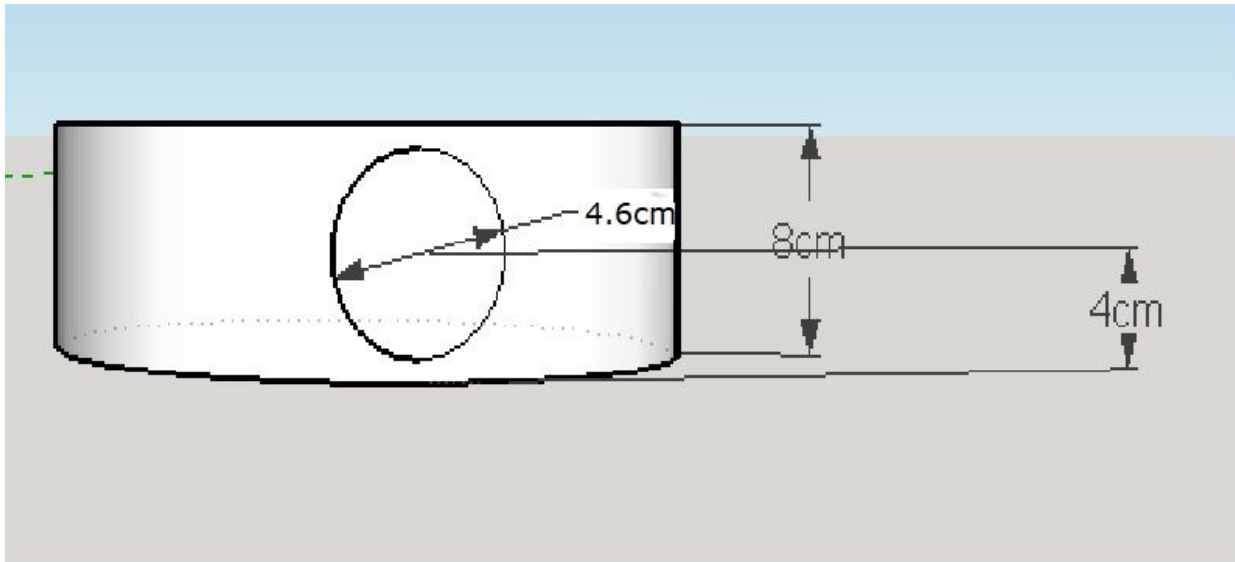


**Top view**

1. Diameter of cylinder: **13 cm**
2. Height of cylinder: **8cm**
3. Diameter of holes on the curved surface (CS) of cylinder: **4.6cm**
4. Separation between 2 consecutive holes (center to center distance) on CS = **6.8cm**  
(there are 6 holes uniformly distributed along CS of cylinder)

**\* Center of holes on CS of cylinder would be at a height of 4 cm.**

**\* Participants have to fix their own cylinder of given dimensions on their machine before coming to the competition.**



**Ball:**

1. Diameter of spherical ball = **4cm** (standard table tennis ball)
2. Weight of the ball would be around that of table tennis ball

**Rules:**

1. Point of projection of the ball should be more than **4 cm** from surface of the cylinder.
2. Team has to also take care of the power consumption. (Separate points will be given for that)
3. Points will also be given if a team is feeding a bulk of balls at a time into their machine or if they are inserting one ball at a time. (Extra points for the former one)
3. The maximum time given for completing the task is 4 minutes. (It may be changed depending on the number of teams taking part.)
4. Teams will be given 2 minutes for installing their machines in the arena after which the timer for 4 min will begin.
5. Only two members will be allowed to stay in the arena.

**Note:** Whole machine has two parts, first is the part in which balls are fed to the machine and the task of projecting ball is accomplished and second part comprises of rotating cylinder.

### **Judging:**

1. Points awarded will depend on the number of balls that passes through the cage in the given amount of time. (2 points per ball)
2.  $10 - [10 * \{(\text{input power}) / (k)\}^2]$  points will be given for the amount of power each team is consuming {**k = max. power consumption among all the teams**}.
3. Out of 10,  $5 + (5 * \{(\text{no. of balls fed at the input side}) / x\})$  points will be allotted if a team is putting a bulk of balls in their machine at a time or if they are feeding the machine one ball at a time. {**x = max. no of balls fed into machine input among all teams**}
4. Appropriate penalty of points will imposed for misbehaving with the judges or any person organizing the event. It may also lead to disqualification of the team.
5. Penalty of 5 points will also be imposed for taking too much time to configure and setting the machine.
6. Not more than two members are allowed in the arena, if so, the team will be penalized with 20 points.
7. In any urgency or exception, final decision will be made by the judges.

### **Final score:**

Final score is simply the summation of all the points earned during the task.

### **Certificate Policy:**

1. Certificate of excellence will be awarded to the top 3 teams.
2. Certificate of participation will be given to all the teams qualified for final except the top 3 teams.
3. Disqualified teams will not be considered for any certificates.

**Note:** Rules announced by the judges during competition will be considered equally important as those announced earlier.