BOEING IIT NATIONAL AEROMODELLING COMPETITION

Aim

The competition requires the participants to design and fabricate a RC plane (no Readymade Planes are allowed) and perform a set of maneuvers.

Scope

Evaluation will be carried out in two rounds for the Zonals; a qualifier round and a maneuver round. The evaluation criteria and the constraints are listed in the Problem statement. Teams qualifying to the Maneuver round in the Zonals will be reimbursed a limited amount for the costs incurred towards the expenses for procuring materials for their models.

Problem Statement

Rules on Team structure:

1. Maximum of 4 members in a team.
2. Members of a team may be from same college or different (UG or PG).
3. Any number of teams can participate from one college.
4. Professionals are not allowed (Only students can participate).

Design Constraints:

1. T/W =0.75 (if excess thrust is found, it will be neutralized by adding weight below the plane at center of gravity).
2. Propeller diameter should not be greater than 10 inches.
3. Battery weight should not be more than 120 gm.
4. Only electrical motors are allowed. The use of IC engines or any other means of providing thrust is prohibited.
5. Use of gyroscopes (gyros) and programming assistance in receivers is prohibited.
6. One of the team members should fly the aircraft and another should call the stunts as they are performed (just before).

Abstract Submission

1. All the participants need to submit an abstract on their aircraft, which should be no longer than 15 pages (A4 size 1.5 line spacing) with standard formatting. The

Abstract must document the basic design of the aircraft (dimensions, wing areas, velocity, etc.) and should also explain how their design is suitable for given problem.

2. Along with the abstract, Participants also have to send a zip file containing at-least 5 and no more than 10 photographs of the aircraft while it is being built.
3. The Abstract has to be submitted as per the standard format.
4. The Abstract has to be submitted to the respective Zonal competition 20 days in advance of the Zonal event date. For a Zonal happening on the 16th-17th of December, 2016 at Techfest, IIT Bombay, the Abstract submission deadline is the 25th of November, 2016.
5. The Abstract and the zip file containing the photographs for teams participating in IIT-Bombay Zonal round have to be sent by email to boeing@techfest.org with the team details clearly mentioned in the email. The Team ID should be explicitly mentioned in the email subject as well as the filename for both Abstract and zip file.

Format of the Competition

1. Qualifier Round
2. Maneuver Round

A. Qualifier Round

The best measure of the design of an aircraft can be done by climb and gliding time. In this round, participants are required to make their aircraft to climb for 20 seconds. After this, they need to perform a dead stick flight (throttle=0 or Gliding) and land at a specified location. The plane however can be maneuvered while it is gliding.

The teams will be graded based on:

1. Smooth Climb (35%).
2. Glide Time (65%).

Qualifier round score = smooth climb (out of 35) + 0.65*2*glide time (in sec).

Scores for Smooth climb will be decided by the judges.

Top 30 teams from the qualifier round will qualify to Maneuver Round. Along with qualification to next round, qualifying teams will get a reimbursement of INR 5000 per team towards material costs for their models.

The qualifier round is to select the top 30 teams that will participate in the Maneuver Round. The final winners will be based on scores in the Maneuver round.

B. Maneuver Round

Arena:

The Arena consists of 3 gates - "entry gate", "middle gate" and "exit gate" and 4 concentric circles between the “middle gate” and “exit gate”. Entry gate has a horizontal bar at 4 meters height from ground and middle and exit gates have horizontal bars at 5 meters height from ground. Each gate would have enough space for planes to pass through, yet only the skills of the pilot can guarantee a swift maneuver. The “entry gate” will be at 30 meters from the Take Off / Landing Zone. (For better understanding of the arena - look into the arena diagram (Figure 1)).

Maneuvers to be performed:

There are 2 types of maneuvers that are to be performed by the participants in this round.

1. Object Dropping
2. Pass the gates

Guidelines for this round are mentioned below:

Performing Maneuver (i):

1. Plane will be carrying a dead mass of dimension 2cm X 2cm X 2cm weighing less than 50 gram.
2. The Pilot will try to drop the dead weight in innermost circle of 4 concentric circles drawn on the ground.
3. The aircraft has to enter through the entry gate, pass above the middle gate, drop the object in the target zone and pass above the exit gate to gain points in this round.
4. The location of the dropping area w.r.t take off zone is shown in fig. 1.
5. Points will be awarded according to the following table.

a	Innermost circle of diameter 1.5m	400 points
b	Second circle of diameter 3m	300 points

c	Third circle of diameter 5m	200 points
d	Fourth circle of diameter 7m	100 points
e	Outside fourth circle of diameter 7m	0 points

6. Upon completing Maneuver (i), the pilot should attempt Maneuver (ii) given below immediately without landing.

Performing Maneuver (ii):

1. The aircraft has to enter through the entry gate, pass above the middle gate and exit through the exit gate in a single attempt.
2. Maneuver (ii) is considered a success when all 3 passes (Through the entry gate, above the middle gate and through the exit gate) happen consecutively in a single attempt.
3. Each successful attempt of Maneuver (ii) would give the participant a score of 100 points.
4. The participant can repeat Maneuver (ii) any number of times within the time limit to score additional points. (Only after completing Maneuver (i)).
5. The participant can earn an additional 50 points by landing in the specified zone within the time limit.

A maximum time of 4 minutes will be given to take off, complete the maneuver-set and land. Any further instructions would be given before the competition, on the spot.

Total points: Score from Maneuver (i) + 100 x no of successful Maneuver (ii) completions + Landing Score (if landed in the zone within time limit).

If there is a tie, winner will be decided by a separate round framed by the Judges on the spot. Judges' decisions would be considered final in all cases.

Arena Diagram:

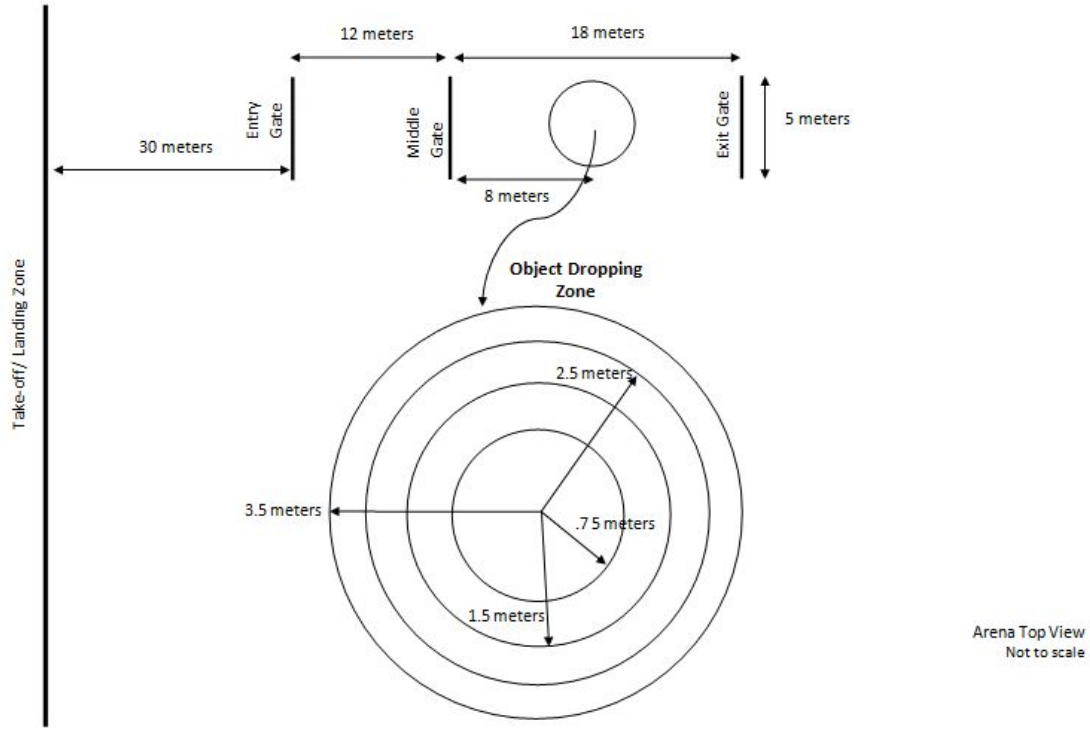


Fig. 1.

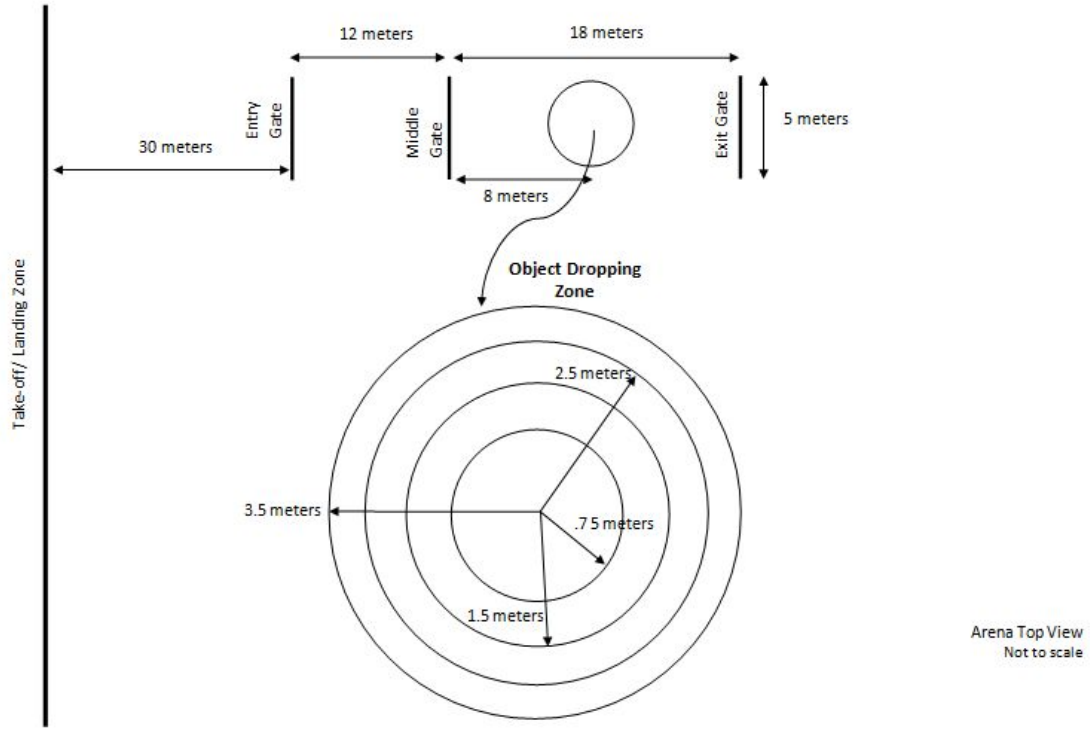


Fig. 2.

Rules:

1. Each team would be given 2 chances for each of the rounds and the best score is considered as per the scoring procedure mentioned above for each round.
2. The timer will start from the moment the aircraft is in the air for both the rounds.
3. Awards will be announced based on the performance of the teams in the Maneuver Round.

Revisions

Any revisions to the Scope of the Competition would be intimated to all the participants via registered email and on the website of Techfest, IIT Bombay.

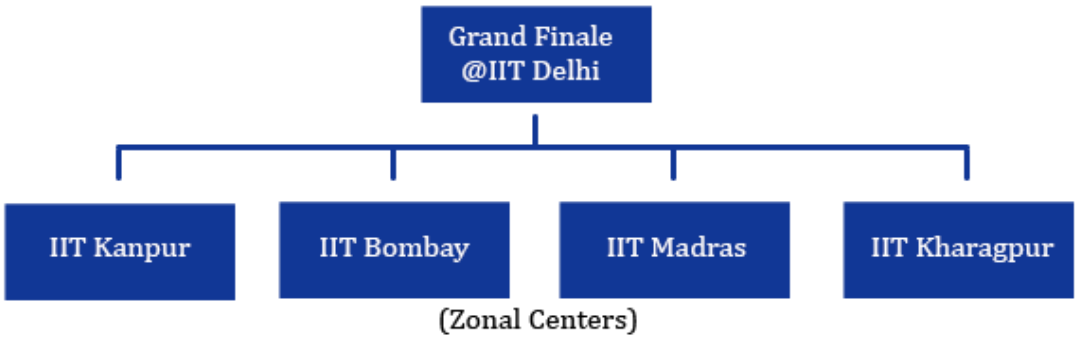
General Guidelines

1. The use of 2.4 GHz radio is required for all aircraft competing in the competition. If the participants want to use any other frequency, they will have to inform the organizers in advance.
2. A limited number of 2.4 GHz radios will be available with the organizers for use by the teams. Teams who do not have access to radios can inform the organizers in advance to request use of these radios.

3. Receivers installed in the aircraft have to be in 'receiver mode only'.
4. All the systems (Servos, motor, etc.) will be checked by organizers for functionality before the competition. If found not working, teams will be dismissed from the competition.
5. Pilot can position himself at any point in the arena to fly the aircraft during the rounds.
6. Metal propellers are not allowed.
7. The models can have powered take-off with a landing gear or can be launched manually by a person standing at ground level.
8. Plane should be built from scratch and not purchased models.
9. A team member can't be a part of more than one team.
10. Teams can participate in more than one zonal event if they are not qualified for the finals already.
11. Teams that claimed reimbursement in one zonal event cannot claim in any other zonal event in case they are participating in more than one zonal event.
12. New members cannot be added to the teams who have been selected at Zonals to reach the Final Round.
13. Bring your college/student I-Card at the time of competition.
14. Any of the above mentioned rules, if found violated, teams would not be allowed to participate in the competition.

Techfest in collaboration with Boeing company presents National Level Aeromodelling Competition . Use your all whacky ideas, design and fly aircraft and change the vision of human flight.

The competition is launched with the vision to provide a unified national platform for students interested in aerospace and related engineering disciplines - to demonstrate their aero-modeling expertise.



This would be a two-staged pan India Competition:

- Zonal Level: The Zonals would be held in conjunction with the Techfest, IIT Bombay,. IIT Kanpur, IIT Kharagpur and IIT Madras. The First three teams from each of the Zonal competitions, a total of 12 teams from the Zonal competitions, will participate in the National level.
- National Level: The National Level Competition will be held at IIT Delhi for all the toppers from the Zonal Round to decide the champion.