SKY-DIVE

SUMMARY

Team Challengers of Sahyadri College of Engineering and Management, Mangalore invites all university students to participate in Aerophilia '22. The contest will provide a real-world aircraft design experience for engineering students by allowing them to validate their analytical skills.

Student teams will design, fabricate, and demonstrate the flight capabilities of an unmanned, electric-powered, radio-controlled aircraft that can best meet the specified mission profile. The goal is a balanced design possessing good demonstrated flight handling qualities, and practical and affordable manufacturing requirements.

Check the rules package carefully as items and approaches that were legal in past years may not be legal for this contest year. Only the contents of this year's Rules package along with the current FAQ and Q&A documents hold bearing on the requirements and/or allowances for the current contest year.

It is the responsibility of the teams to know and follow all provided rules, the FAQ and Q&A, and all contest day briefings. Winning teams will receive prizes worth ₹70,000. The team with the best Report Score will receive a prize of ₹5,000.

GENERAL INFORMATION

REGISTRATION

Click Here to Register!
Further, while submitting the design report, every team must pay the registration fee of ₹2,500/- and confirm participation for the event. (www.aerophilia.in).

TEAM REQUIREMENTS

- All the team members (including the pilot) must be full-time students at an accredited University or College. There is no set requirement for the number of students who can attend the fly-off.
- Students who have graduated from university in the last 6 months are allowed to participate as team members or a pilot.
- All the participants are required to produce a College ID during the fly-off.

COMMUNICATIONS

The contest administration will maintain a website (www.aerophilia.in) containing the latest information regarding the contest schedules, and the rule book.

Questions regarding the contest, schedules, or rules interpretation may be sent by email (info.aerophilia@gmail.com)

FLIGHT LINE COURSE

The orientation (direction) of the flight course will be adjusted based on the prevailing winds as determined by the Flight Line Judge. The flight course will be positioned to maintain the greatest possible safety for personnel and facilities. The nominal flight course will be uploaded on the official Aerophilia website.
Note: The final flight course may vary depending on the weather and other physical aspects.

SCHEDULE

DESIGN REPORT

Design Reports will be submitted online via email to submission@aerophilia.in The design report submission period OPENS on 15th September at 12:00 Indian Standard Time. The design report must be submitted by 23:59 Indian Standard Time on 15th October.

Reports will be judged “as received”. No corrections/additions/changes will be allowed by the organizers so check your reports carefully before submitting them. Once a Report is submitted, no changes are allowed. Submission of Reports is electronic only (no hard copy required). The details for the electronic format and submission are at the end of the report section in this rules document.

MISSION AND VEHICLE DESIGN

GENERAL

- Payloads
    - Mission 1 – no payload
    - Mission 2 – internal payload
    - Mission 3 – internal payload + external payload
- Both Internal and External payloads will be provided at the competition fly-off.
- The dimensions of the Internal payload (*figure 1*) are as follows.

NOTE: The internal payload must be placed inside the airplane in the given orientation only (*figure 1*). This will be strictly implemented.

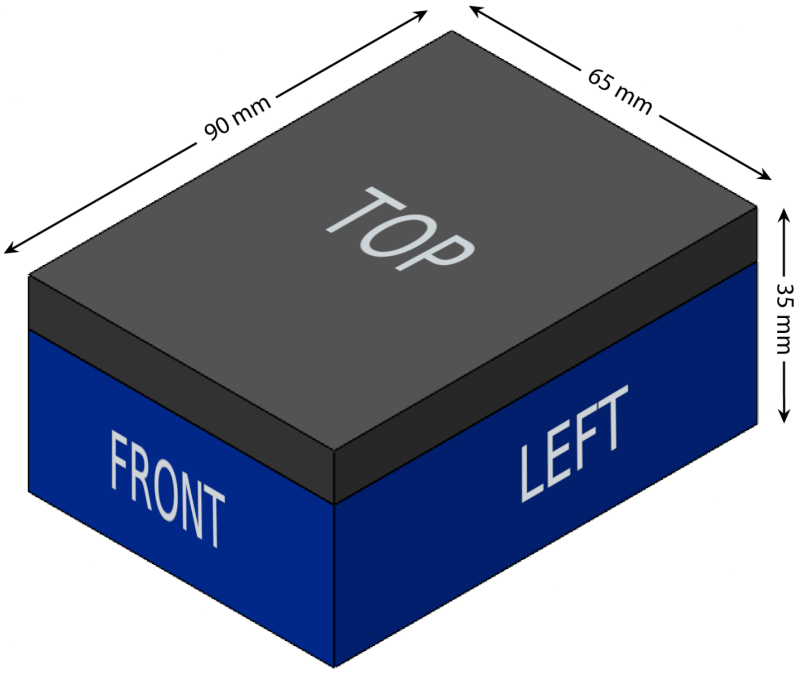

Figure 1 - Internal Payload

- The dimensions of the External payload (*figure 2*) are as follows.

Figure 2 - External Payload

MISSION SEQUENCE

- Aircraft must be capable of performing all required missions.
- The Missions must be flown in order.
- A new mission cannot be flown until the team has obtained a successful score for the preceding mission.
- The aircraft must be flown in the same configuration for all three missions, including all structure and deployment mechanisms required for any or all missions. For example, if any pod is carried under the wing, then that pod must be flown in all three missions.
- The aircraft must complete a successful landing at the end of each mission. If the aircraft takes any serious damage during the landing, it would be considered a crash landing.

MISSIONS

Mission 1 :

- There is no payload for Mission 1.
- The pilot is allowed to move anywhere in the arena during Mission 1.
- Teams must complete 2 laps within the flight window.
- There will be a 5-minute flight window for this mission.
- Time starts when the aircraft throttle is advanced in the first attempt.
- Teams must complete a successful landing to obtain a score and successfully complete mission 1.
- Scoring:
  M1= 1.0 for successful mission

Mission 2 :

- Internal payload has to be carried.
- The airplane must manoeuvre through a series of hoops.
- The pilot is not allowed to move around and must stay in a fixed spot in the arena.
- A time window of 5 minutes will be provided, during which the teams can complete any number of laps of the set course.
- The scoring will take place depending on the number of laps completed.
- In mission 2, a lap will be considered successful only when the airpalne passes through all the hoops in the given chronological order.
- Teams must complete a successful landing to obtain a score and successfully complete mission 2.
- Scoring:
  M2= 1.0 * number_of_Successful_laps

Mission 3 :

- Both the payloads (External and Internal) must be carried at the same time.
- The pilot is not allowed to move around and must stay on a fixed spot in the arena.
- The airplane must dive from the top of the target and release the external payload aiming at the target.
- Deployment of the external payload is mandatory.
- The mission would be considered successful even if the teams fail to successfully hit the target area. But the team will lose points for the same.
- The mission's score would be a function of the following factors:
  - Pitch angle of the airplane during the dive.
    (best_dive_angle)
  - The duration of the airplane stayed below 30 degrees during the dive.
    (dive_duration)
  - The time taken (in seconds) to land after the payload hits the ground.(time_taken_to_land_after_hit)

- The dive angle (best_dive_angle) will be defined by the value closest to the ground normal, which the aircraft manages to maintain during its dive for more than 4 seconds.

- Scoring:
  - If the target is hit:
    M3= (dive_duration) * (best_dive_angle) / (time_taken_to_land_after_hit)

  - If the target is missed:
    M3= [(dive_duration) * (best_dive_angle) / (time_taken_to_land_after_hit)] * 0.5

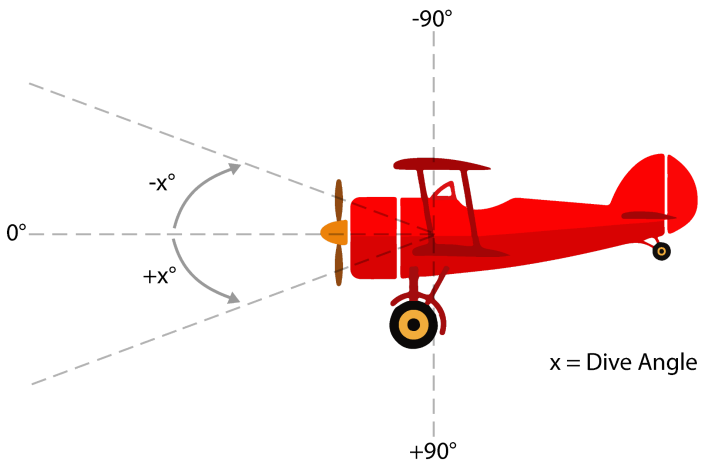

Figure 3 - Dive angle

AIRCRAFT REQUIREMENTS

GENERAL

- The maximum wingspan allowed is 1.4 meters.

- The airplane must have a specific bay area for housing the internal payload.

- The internal payload must be secured in such a way that it must not be able to move and should stay perfectly in place.

- The Internal payload must be placed only in the given orientation, as mentioned in the Mission and Vehicle Design section of the problem statement.

- If it is found that the airplane is not able to secure the internal payload as mentioned above, then the team will be disqualified.

- The external payload must be housed outside the aircraft only, and the airplane must have a release mechanism for the same, to release it during mission 3.

- If it is found that the airplane is not able to secure the external payload in a manner which is not convincing enough for the organizers, then the team will be disqualified for human safety purposes.

TECHNICAL INSPECTION

All vehicles will undergo a technical inspection by a designated contest tech inspector before being allowed to make any competition flight. All the decisions taken by the Tech inspector will be considered final.

DESIGN REPORT

All material contained within all design reports must be the original work of the teams or appropriately cited in the bibliography section of the report. Any material that is found to be uncited and nonoriginal work will be subject to a penalty. Based on the severity, penalties can include points deducted from the report score up to a 100% reduction or full disqualification

Formatting Requirements:

- Reports must be in PDF format. Reports that are not in PDF format will not be accepted.
- Reports must be one and one half line spacing with a 10-pt Arial font recommended. Text, tables and figures should be clear and readable for the judges. The reports will be assessed for format and readability at the judges' discretion.
- Reports must have the College name and event name on the cover page.
- Absolute maximum page count for the report is 10 pages, the PDF reader "pages" value will be used as the official page count.

Submission Requirements:

Each team must email an electronic copy of their design report as outlined below to submission@aerophilia.in.

- Electronic report files must be named:
  "Aerophilia22_Skydive_[college name]_DESIGN_REPORT.pdf".
- Reports that do not meet the file naming convention above will incur a 10-point penalty.
- The electronic report must be a single file with all figures/drawings included in the proper report sequence in PDF format.
- The electronic report must not be greater than 5MB in size.

Scoring:

Reports will be scored on a 50-point basis following the guidelines outlined below.

ALL items requested below should be present, easy to locate and identify, well documented and in the correct section for full scoring. Reports will be assessed on how well they communicate the required information given the size and length constraints.

The design report must include the following:

- Executive Summary (5 points)
- Management Summary (5 points)
- Conceptual Design Approach (10 points)
- Preliminary Design (10 points)
- Detail Design (10 points)
- Manufacturing Plan (5 points)
- Bibliography (5 points)

FINAL SCORING

Each team's overall score will be computed from their Design Report Score and Total Mission Score using the following formula:

SCORE = Design Report Score * Total Mission Score

The Total Mission Score will be computed using the following formula:

Total Mission Score = M1 + M2 + M3

NOTE: Rules are subject to change. All updates will be posted on the official Aerophilia website (www.aerophilia.in)