

NATIONAL AERO-GENIUS COMPETITION

(NAGC — 2026)

ROTORCRAFT UAV CHALLENGE

Official Competition Rulebook



Organized by
Department of Aerospace Engineering
Aviation & Aerospace University, Bangladesh (AAUB)

Competition Date: 30–31 October 2026 | Venue: AAUB Campus, Lalmonirhat, Bangladesh
Registration: event.aaub.edu.bd

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1. Introduction

The National Aero-Genius Competition (NAGC) is Bangladesh's first event of its kind, organized and hosted by the Aviation & Aerospace University, Bangladesh (AAUB). University teams from across the country will compete in the NAGC Rotorcraft UAV Challenge, demonstrating hands-on engineering skills and problem-solving ability.

The competition gives engineering students a real-world rotorcraft UAV design experience, allowing them to validate their analytical work in practice. Student teams will design, build, and fly an electric-powered, remote-controlled rotorcraft UAV that best satisfies the specified mission profile.

SAFETY NOTICE

Items critical to safety and rule compliance appear throughout this document. Every team is responsible for knowing and following all published rules and all fly-off day briefings.

Teams are evaluated on three equally important pillars: a written Technical Design Report, successful passage of a rigorous Technical Inspection, and flight performance at the Competition Fly-off. The team with the highest overall score is declared the winner. This rulebook sets out the complete guidelines for the competition.

2. General Information

2.1 Requirements for Participation

2.1.1 Affiliation

- Open to students affiliated with an academic institution — from high school to university — as well as UAV hobbyists.
- **Industrial and/or military organizations may not participate in this competition.**

2.1.2 Team Composition

- **Maximum team size: six (6) participants.**
- A team may include no more than one graduate student, counted within the team composition.
- Teams may add faculty and/or non-faculty advisors; advisors are not counted within the team composition.
- Teams formed from members of several different institutions are permitted.
- Each team must designate a Team Leader — the primary point of contact — and select a unique team name.

2.1.3 Number of Teams

There is no limit on the number of teams from a single institution. However, an individual participant may not be a member of more than one team.

2.2 General Rules

- The competition consists of three rounds:
 - (i) Design Report Submission
 - (ii) Technical Inspection and
 - (iii) Fly-Off.
- **Each team must submit its rotorcraft's technical report within 18 October 2026.**
- **No modification to the design, structure, or control logic is allowed after the design report is submitted, except minor adjustments (e.g. payload sizing, avionics upgrades) specifically approved by the judges.**
- Judges may request an explanation of any mechanism on the rotorcraft and reserve the right to inspect its code, software, or hardware if deemed necessary.
- Judges' decisions are final and binding; no objections or appeals will be entertained.
- Each team is responsible for its own supporting equipment — laptops, batteries, chargers, converters, multi-plugs, and other necessary tools.
- Teams are solely responsible for the safety of their own equipment, and are accountable for any incident or damage caused by their rotorcraft or team members.
- Organizers reserve the right to amend or modify the competition rules as necessary.
- **Trial runs on the competition track are strictly prohibited.**
- **The rotorcraft may not cross predefined safety boundaries; the pilot must remain within the designated pilot area at all times.**
- **A team may bring one redundant (backup) rotorcraft, but only one may be used in the competition. Sharing a rotorcraft between teams is prohibited.**
- The organizers' official time record is the definitive measure used for scoring.

2.3 Team Pilot

The pilot must be one of the six registered team members. The organizing committee will not provide or arrange a pilot, and teams may not hire or designate an external pilot. The designated pilot must be experienced in manual flight and must sign in with the competition officials through the team leader on the day of the fly-off.

2.4 Sportsmanship and Code of Conduct

All teams and participants must uphold the highest standards of sportsmanship. Intentional rule violations or actions that negatively affect another team's performance will not be tolerated. Penalties may include a warning, loss of mission score, or disqualification from current and future competitions.:

- Disrespect toward judges, volunteers, security personnel, or opposing teams.
- Threats, misbehavior, or any action intended to cause disturbance or conspiracy.
- Failure to arrive at the venue within the designated time slot.
- Damage to AAUB's arena infrastructure or equipment — may also carry financial liability.

3. Schedule and Registration Information

Teams selected for the fly-off following Design Report evaluation are required to pay the fly-off registration fee, as summarized below.

Item	Date / Requirement
Technical Report Submission Deadline	18 October 2026
Notification of Technical Report Result	26 October 2026
Registration Fee	BDT 1,000 per selected team (fly-off)

4. Design Report and Submission Method

Every team must prepare a Technical Report for its rotorcraft in PDF format, following the requirements below.

- Maximum length: 10 pages, submitted before 18 October 2026.
- Line spacing: 1.15; minimum font: 11-pt Arial.
- Page size: 210 × 297 mm (A4).
- The team's name must appear on the report title page.
- File naming convention: "2026_NAGC_Rotorcraft_[Team Name]_[Institution Name].pdf".
- Submission address: nagcrotorcraft@gmail.com (Email subject: "National Aero-Genius Competition (NAGC) 2026 Rotorcraft")

5. Rotorcraft and Mission Requirements

5.1 General Requirements

- The rotorcraft must be manually operated by the participants. **GPS modules are not allowed.**
- Maximum overall dimensions (including propellers): 500 mm × 500 mm × 350 mm.
- Maximum take-off weight (MTOW): 3.2 kg.
- Ready-made, commercially available or pre-built UAVs are strictly prohibited.
- Commercially available components, including motors, ESCs, batteries, flight controllers, propellers and ready-made frames, are permitted.
- Jamming devices are strictly forbidden.
- Battery packs up to 6S are allowed, at a maximum of 4.25 V per cell — i.e. up to 25.5 V for a 6S pack and 8.5 V for a 2S pack.
- FPV (First-Person-View) cameras and FPV goggles are permitted.
- Full-metal propellers are forbidden.
- Only electric motors are permitted.

5.2 Competition Guidelines and Scoring System

Teams are evaluated on technical design, construction quality, operational safety, obstacle-course performance, payload capability, payload-drop accuracy, image capture, flight accuracy, and completion time. The maximum obtainable score is 500 points, comprising 100 points for the Technical Report, 200 points for Payload Drop Performance and 200 points for the Fly-off.

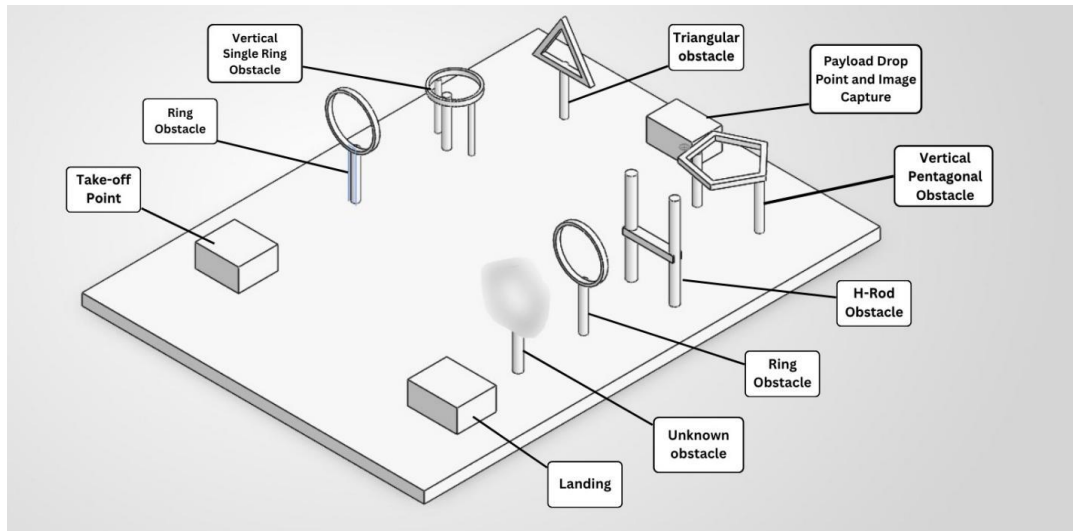


Figure 1 — Demonstration Flight Path

5.2.1 Technical Report — Score: 100

- The Technical Report is worth 100 points.
- It is assessed for compliance, construction quality, and operational safety. A team must satisfy all safety-critical requirements before advancing to the Fly-off.

Format requirements:

- Maximum length: 10 pages.
- Font: Arial, minimum 11-pt, 1.15 line spacing.
- Page size: 210 × 297 mm (A4)
- Team and institution name shown on the title page.

5.2.2 Technical Inspection — (Pass / Fail)

- Conducted by the judges before flight, on a strict Pass/Fail basis.
- Every aircraft must pass Technical Inspection before proceeding to the next stage of the competition.

The inspection covers:

- Frame and dimensional compliance.
- Motor, propeller, ESC and battery installation.
- Structural integrity and workmanship.
- Payload mechanism.
- Flight-control, failsafe and overall safety compliance.

5.2.3 Obstacle Avoidance — Score: 120

- 6–12 obstacles are positioned along the rotorcraft's path (see Figure 1).
- Each obstacle frame measures approximately 1.5–2.5 times the rotorcraft's maximum specified dimension.
- Each obstacle successfully avoided earns 10–20 points.
- **5 points are deducted for every contact with an obstacle.**

5.2.4 Payload Drop Performance — Score: 160

The Payload Performance score evaluates both mechanical delivery accuracy and structural payload-carrying capability. It combines two components:

$$\text{Total Payload Score } (S_{\text{Payload},i}) = S_{\text{Drop},i} + S_{\text{Weight},i} \quad (1)$$

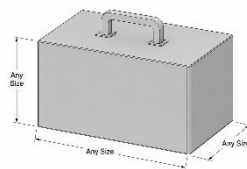
A. Payload Fraction & Weight Performance (S_{Weight} — Maximum 100 Points)

To reward lightweight structural engineering and lifting capacity, scoring uses a relative Payload Fraction (PF) metric.

- Minimum payload requirement ($W_{\text{payload, min}}$): 200 g.
- Maximum Take-Off Weight (MTOW): 3.2 kg (3200 grams).

$$\text{MTOW} = W_{\text{empty}} + W_{\text{payload}}$$

eg: MTOW = 1800 + 450 = 2250 gram ($\leq 3200\text{gram}$)



ANY SHAPE ANY TYPE PAYLOAD

$\geq 200\text{g}$

- Payload scaling: teams may carry as much payload weight as their design safely permits, provided total MTOW stays within 3.2 kg.
- Carry rule: if the rotorcraft takes off and becomes airborne with a valid payload ($\geq 200\text{g}$), the team secures its calculated Weight Score, even if the drop is missed or lands outside the rings.

Payload Fraction (PF):

$$PF_i = \frac{W_{\text{payload},i}}{MTOW_i}$$

Where:

- $W_{\text{payload},i}$ = Weight of payload carried by Team i ($W_{\text{payload},i} \geq 200$ g).
- $MTOW_i$ = Measured total Maximum Take-off Weight of Team i ($MTOW_i \leq 3200$ g)

Weight Score Calculation:

$$S_{\text{Weight},i} = 100 \times \left(\frac{PF_i}{PF_{\text{max}}} \right)$$

- Where PF_{max} is the highest valid payload fraction achieved among all competing teams.

Scoring Reference Table:

Worked example — if the best payload fraction achieved is 0.35:

Team	Payload Fraction	Delivery	Calculation	Score
A	0.35	Successful	$100 \times 0.35 / 0.35$	100
B	0.30	Failed	$100 \times 0.30 / 0.35$	85.7
C	0.26	Successful	$100 \times 0.26 / 0.35$	74.3
D	0.22	Failed	$100 \times 0.22 / 0.35$	62.9

B. Drop Zone Accuracy (S_{Drop} — maximum 60 points)

Score is awarded solely on the final resting position of the dropped payload within a target of three concentric circular zones.

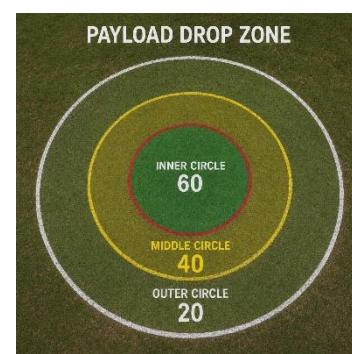
Zone	Diameter	Score
Inner Circle	600mm	60
Middle Circle	1200mm	40
Outer Circle	2000mm	20
Outside Outer Circle / Dropped Prematurely	—	0

C. Payload Release Height

- Standard release height: **5.0 metres**.
- May vary between **3.0 – 8.0 metres**,

(depending on wind/weather conditions on the day of the Fly-off.)

The confirmed height will be announced during the pre-flight briefing and shall apply equally to all teams.



5.2.5 Image Capture — Score: 40

While airborne over the drop zone, the rotorcraft must capture a clear, recognizable aerial image of the ground target area and present it to the judges upon landing.

Image Type	Score
Clear, recognizable target image	40
Failed capture or grounded before capture	0

This score is awarded independently of Payload Drop Performance.

5.2.6 Flight Time — Score: 80

- **Maximum permitted flight time: 8 minutes.**
- **The aircraft must complete its designated flight and land within this time.**
- The team with the shortest completion time receives the full 80 points.
- All other teams are scored by the formula:

$$S_{FT,i} = 80 \times \sqrt{\frac{T_{\min}}{T_i}} \quad (2)$$

where:

$T_{\min}$ = fastest valid flight time

T_i = time taken by the team

$S_{FT,i}$ = flight-time score

Worked example — if the fastest team completes the course in 100 seconds:

Team	Time	Formula	Score
A	100 s	$80 \times \sqrt{(100/100)}$	80
B	110 s	$80 \times \sqrt{(100/110)}$	76.3
C	130 s	$80 \times \sqrt{(100/130)}$	70.2
D	160 s	$80 \times \sqrt{(100/160)}$	63.2

6. Score Summary

Task	Identifier	Maximum Score
Technical Report	T	100
Obstacle Avoidance	O	120
Image Capture	I	40
Payload Drop Accuracy	PA	60
Payload Weight Performance	$S_{Payload,i}$	100
Flight Time	$S_{FT,i}$	80
Overall Score	S	500

$$S = T + O + I + PA + S_{Payload,i} + S_{FT,i} \quad (3)$$

N.B. The maximum allowable score for any team is 500 points.

7. Overall Mission Profile

- The rotorcraft takes off from the designated launch pad carrying the attached payload (≥ 200 g, MTOW ≤ 3.2 kg), navigates the course obstacles, releases the payload at the designated drop zone, hovers to capture a clear aerial image of the target area, and lands safely at the landing spot.
- Obstacle dimensions are 1.5–2.5 times the rotorcraft's maximum specified dimension.
- **The aircraft must be flown by the designated pilot from the official pilot station.**
- The rotorcraft must follow the predefined path and may not proceed to the next obstacle until the current one is completed, unless the team elects to skip it entirely.
- Repeatedly crossing the same obstacle earns no additional points.
- The timer stops as soon as the rotorcraft touches down in the designated landing zone.
- The organizers' official time record is final and authoritative for scoring.
- **Trial runs on the arena are strictly prohibited.**
- A restart may be permitted if the rotorcraft becomes immobile, crashes or requires external assistance. The team is then moved to the end of the queue for a final attempt (subject to slot availability), restarting completely from the initial take-off pad; previous flight time and partial progress are discarded.

Tie-breaking Criteria

In the event of a tie in scores, ranking is determined in the following order:

- Priority to teams that complete the course without skipping any checkpoints.
- If a tie persists, the shortest recorded flight time (T_i) determines the winner.
- If a tie still persists, the better image of the target object is given priority.

8. Disqualification and Code of Conduct

- **Any damage caused to the arena by a team's rotorcraft may result in immediate disqualification.**
- Disrespect toward judges, volunteers, security personnel, or opposing teams leads to disqualification.
- Misbehavior, threats, or actions intended to cause conspiracy or disturbance may result in disqualification.
- Teams that fail to arrive at the venue within the designated time will be disqualified.

9. Scoring Guidelines and Penalties

- Time calculations do not consider millisecond precision.

Penalty Deductions:

- **If the pilot steps outside the designated pilot zone, 20 points are deducted from the fly-off score for each occurrence. Other team members may assist the pilot when necessary.**

10. Prize Money

Position	Prize
1st Prize	BDT 80,000
2nd Prize	BDT 60,000

11. Contact Information

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