NDIA First Coast Chapter

NDIA First Coast Drone Challenge

Governing Document

Event Date: February 24, 2026

Event Location: UNF Adam W. Herbert University Center (Hosted in partnership with the NDIA First Coast Chapter SOAR/STEM Expo)

1. Overview

The NDIA First Coast Drone Challenge is a STEM-focused competition designed to engage high school students from the Northeast Florida region (Duval, St. Johns, and Clay Counties) in a hands-on engineering experience. Teams will apply principles of design, aerodynamics, electronics, and manufacturing to reverse engineer and optimize a standardized drone kit provided by the competition organizers.

The event promotes creativity, teamwork, and critical thinking while fostering interest in aerospace and defense technology careers.

The teams will be scored in three categories: Technical Data Package, Obstacle Course, and Head-to-Head Race, with winners in each category and an overall winner.

2. Objectives

- Introduce students to real-world engineering practices through drone design and optimization.
- Encourage understanding of reverse engineering, design iteration, and prototyping.
- Foster collaboration between local high schools, universities, and industry partners.
- Inspire students to pursue STEM-related education and career paths.
- Design a propeller guard that will prevent propeller edge impact with surrounding environment during normal flight.

3. Eligibility

Open to high school students (grades 9–12) enrolled in schools within Duval, St. Johns, or Clay Counties.

Each team must have:

- A faculty advisor or mentor from the school.
- A minimum of 3 students and a maximum of 7 students.

Schools may enter a maximum of two teams each.

4. Drone Kit

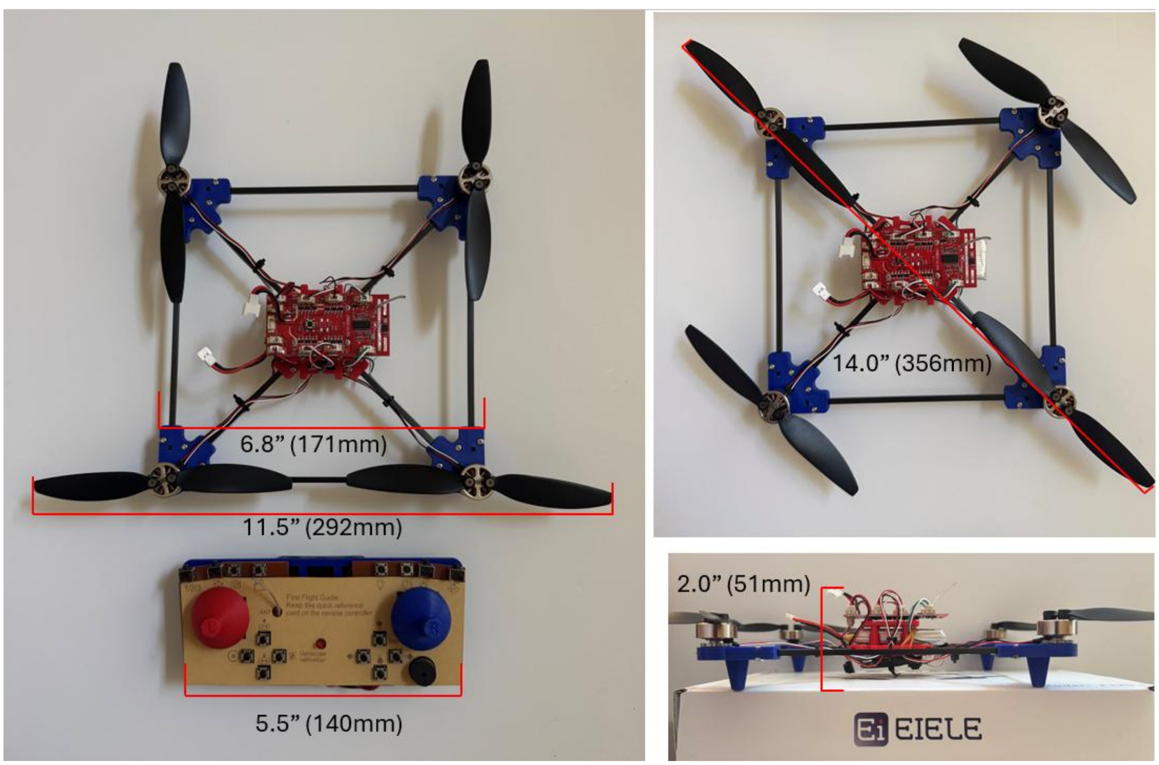
Each participating school will receive an identical standardized micro drone kit.

- Drone frame (reference model for reverse engineering)
- Control board
- Battery
- Motors and propellers
- Replacement parts
- Basic flight controller interface

Teams will:

- Reverse engineer the supplied 3D printed parts using CAD tools (exclude remote control).
- Design propeller guards and redesign/optimize the airframe for performance, durability, and/or innovation.
- Manufacture all new 3D printed components using their own school's fabrication resources.
- Reassemble the drone using the provided electronics, motors, and batteries.

5. Design Rules



- **Required Components**
  - Teams must use the provided electronics, including the control board, battery, motors, and propellers.

- All 3D printed structural components (frame, guards, landing feet, housings, etc.) must be fully reverse engineered and 3D-printed by the team.

- **Physical Constraints**
  To ensure fairness, safety, and compatibility with provided components:
  - **Maximum diagonal span:**
    - ≤ 360 mm measured from propeller tip to tip across the longest diagonal.
  - **Maximum width and height (horizontal & vertical span):**
    - ≤ 255 mm measured across any axis (front-to-back or side-to-side).
  - **Maximum takeoff weight:**
    - ≤ 250 g including battery and all team-designed components.
  - **Maximum overall height:**
    - No height requirement for the drone design.
    - See obstacle drawings to ensure drone will meet constraints.
- **Flight Requirements**
  - Drone must be capable of **stable manual flight** using the supplied handheld controller.
  - No GPS, no optical flow modules, no additional sensors beyond what is provided.
  - No autonomous flight modes.
- **Design Intent**
  - Teams are expected to **reverse-engineer** the provided base drone and **optimize** the frame for performance, durability, and manufacturability.
  - Designs should demonstrate **STEM principles** such as structural reinforcement, weight optimization, center-of-gravity control, vibration damping, etc.
  - Teams must develop a complete Technical Data Package (TDP) that includes, at minimum:
    - Fully dimensioned manufacturing drawings for all 3D-printed components.
    - A Bill of Materials (BOM) listing all parts used (provided and team-made)
    - Assembly instructions or an exploded-view diagram
    - Any additional documentation needed to communicate design optimization intent and manufacturability
  - Teams are expected to **design propeller guards** as part of the challenge. The propeller guard must meet the following requirements.
    - Protect spectators, participants, judges, and operators from contact with rotating propellers, including hands, fingers, and eyes.
    - Reduce the likelihood of propeller entanglement with the drone cage netting.

        - Maintain a safe separation distance between any rotating propeller and external objects.
        - Remain securely attached to the aircraft during all phases of operation, including collisions with safety personnel, netting, pylons or other drones.
    - The propeller guard design should:
        - Fully or partially enclose the propeller arc without interfering with motor rotation. The propeller guard can exceed the dimensional limits of the drone as specified in Section 5.
        - Prevent propeller edge impact with surrounding environment during normal flight.
        - Avoid sharp edges or exposed fasteners that could create additional hazards.
        - Be structurally capable of withstanding:
            - Minor impacts with the drone cage netting
            - Light contact with other drones or course obstacles
        - Minimize aerodynamic penalties, including excessive drag or turbulence affecting stability.
        - Minimize added mass and avoid significantly degrading flight time or maneuverability.

6. Competition Format

The event will consist of three scored elements:

- **Technical Data Package (TDP)**
  Teams will create a technical poster/trifold summarizing their engineering work
  Poster should highlight:
    - Concept overview & design intent
    - 3D models, diagrams, and exploded views
    - Key engineering decisions (materials, weight savings, test iterations)
    - BOM summary
    - Manufacturing drawings and tolerances
    - Design improvements
    - Electronic TDP files to be submitted one week prior to the event (February 17, 2026)
- **Obstacle Course Performance**
  Each team flies the course individually to earn points per obstacle completed.
    - Each team will be allowed 3.5 minutes to navigate through the obstacle course.
    - The course will include gates, hoops, altitude changes, and precision landing pads.
    - Each obstacle will have a different point value based on difficulty.

  - Teams earn points for successfully flown elements.
  - Same obstacle cannot be attempted two times in a row.
  - Penalties apply for crashes.
  - Team must return to the landing zone and successfully land the drone before the 3.5 minutes mark.
  - Penalty points will be imposed for not landing within the allotted time.
- **Head-to-Head Race**
  All teams will race together on a defined circuit, completing three laps. The team that crosses the finish line first or in the event that no one finishes the event, points will be awarded on percentage completion of laps and a winner will be declared. During the race there will be no assistance for potential crashes.

7. Safety & Compliance

- Drones will fly inside a drone cage, the dimensions of the cage are 15’x30’x10’.
- Drones must be operated indoors within a controlled environment.
- Pilots must follow all FAA Part 107 educational exception guidelines.
- Teams must follow safe handling practices for lithium batteries and propellers.
- Each team mentor and pilot must have completed the TRUST test. (https://trust.pilotinstitute.com/login/signup.php)

8. Awards

- Best Overall Team (Trophy)
- Best Flight Performance
- Best Design

9. Timeline

- Kits distributed: January 2026
- Design submissions due: February 17, 2026
- Final competition event: February 24, 2026

NDIA First Coast Chapter

APPENDIX A

Comprehensive Scoring and Regulations Guide

Executive Summary

The NDIA First Coast Drone Challenge is a comprehensive engineering and flight competition designed to evaluate students and teams across multiple competency areas. This guide provides detailed rules, scoring criteria, obstacle specifications, and regulatory requirements to ensure fair, safe, and consistent competition.

Competition comprises two major components:

1. Flight Challenge Course (obstacle navigation and landing)
2. Technical Data Package (engineering documentation and design)

Your success depends on careful planning, adherence to all regulations, and strategic execution during your single flight run.

Part 1: Flight Challenge Overview and Fundamental Rules

1.1 Competition Format and Time Allocation

Basic Parameters

The flight challenge is structured as a single, continuous competitive flight during which your team will navigate an obstacle course and complete various technical challenges.

Flight Duration: 3.5 minutes (210 seconds) per team

- This includes all obstacle attempts, maneuvers, and final landing
- The 3.5-minute window is absolute; no extensions are granted
- Time begins when your drone leaves the Lily Pad Landing Zone
- Time ends when 3.5 minutes elapse, regardless of drone position

Flight Run Structure: One continuous attempt

- Teams receive exactly one flight run during the competition
- There are no practice runs during the day of the event
- Once your flight run begins, you must complete all activities within the 3.5-minute window

- No "do-overs" or second chances if your first run is unsuccessful

Start and End Location: Lily Pad Landing Zone

- Your drone must originate from the Lily Pad Landing Zone at the start of your flight
- Your drone must return to and land on the Lily Pad Landing Zone before time expires

Time Countdown Notification

- At 10 seconds remaining in your 3.5-minute window, a countdown will be announced
- This countdown serves as your warning to begin final approach to the landing zone
- You should plan to have your drone in final landing approach by this 10-second mark
- The teams will face a point penalty due to failure to land on the Lily Pad Landing Zone within the 3.5-minute window

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1.2 Obstacle Completion Rules – Critical Regulations

General Obstacle Completion Policy

Definition of "Completing an Obstacle": An obstacle is successfully completed when your drone passes through, under, over, or around the obstacle in accordance with the specific rules for that obstacle.

Obstacle Attempt Limits:

The following rules govern how many times you may attempt each obstacle:

1. **Sequential Obstacle Requirement:** After completing (or attempting) an obstacle, you **must complete a different obstacle** before returning to a previously attempted obstacle. A maximum of 3 successful attempts per obstacle is allowed. Any additional successful attempt beyond the 3rd will not be counted.
    - **Example of ALLOWED pattern:** Ring → Ladder → Ring (you can return to Ring because you completed Ladder in between)
    - **Example of NOT ALLOWED pattern:** Arch → Arch (you cannot immediately re-attempt the same obstacle)

Scoring Method: Points, Not Time

CRITICAL PRINCIPLE: Your score is based **entirely on successful obstacle completions**. Time does NOT factor into your score.

- All teams have identical 3.5-minute flight windows
- Completing an obstacle in 30 seconds or 2 minutes earns the same points

Score Calculation:

$$\text{Flight Score} = \sum (\text{Points from completed obstacles}) - (\text{Penalties})$$

1.3 Safety Rules and Safety Reset Penalties

Safety Reset Procedures

The safety crew is present during your flight run to maintain a safe environment for all participants, spectators, and equipment.

What Triggers a Safety Reset:

A safety reset is required when:

- Your drone lands or comes to rest in an unsafe location (outside designated areas)
- Your drone poses a hazard to spectators or personnel
- Your drone's flight path creates an unsafe condition
- A judge or safety officer determines intervention is necessary for safety

When a Safety Reset Occurs:

1. A safety crew member will ground your drone
2. Your drone will be returned to a safe location (typically the Lily Pad Landing Zone)
3. You will be notified when the reset is complete and you may resume flying
4. **Penalty: –1 point per reset**

Impact on Your Flight:

- Safety resets does not stop your 3.5-minute time window (you keep flying)
- However, each reset costs you 1 point, which can significantly impact your final score
- Multiple resets are cumulative (three resets = –3 points total)

1.4 Landing Requirements and Penalties

The landing requirement is one of the most important regulations:

Your drone **MUST attempt to land on the Lily Pad Landing Zone** before your 3.5 minutes elapse. This is not optional.

What "Attempt to Land" Means:

- Your drone must be on a clear descent trajectory toward the Lily Pad
- You must be executing maneuvers intended to reduce altitude and land
- Passive descent due to low battery does not count as an attempt
- You must make a deliberate, intentional landing approach

Landing Outcome Scenarios and Penalties

Scenario A: Successful Clean Landing

- Drone lands smoothly on the Lily Pad Landing Zone
- No crash, no damage observed
- **Penalty: 0 points** (no penalty; you've met the requirement)
- You may earn bonus points if you land on a higher-value Lily Pad platform (see Lily Pad Landing Zone section)

Scenario B: Attempted Landing – Crash Inside Zone Boundary

- You initiate a landing attempt
- Your drone crashes while landing (hard impact, loss of control)
- The drone comes to rest **within the designated zone boundary** (marked with tape)
- **Penalty: –1 point** (you lose the landing points for that pad, but avoid the major penalty)
- **Rationale:** You made a good faith effort and your drone remained in the designated area, so the penalty is minimal

Scenario C: Attempted Landing – Crash Outside Zone Boundary

- You initiate a landing attempt
- Your drone crashes while landing

- The drone comes to rest **outside the designated zone boundary**
- **Penalty: –5 points** for the crash PLUS loss of any landing points

Scenario D: NO Landing Attempt Made

- Your 3.5-minute window expires
- Your drone is still in the air
- You did not land on the Lily Pad
- **Penalty: –20 points** (MAJOR PENALTY – this is the most severe penalty in the competition)
- **Rationale:** Failing to attempt landing indicates a fundamental misunderstanding of competition requirements or severe time mismanagement

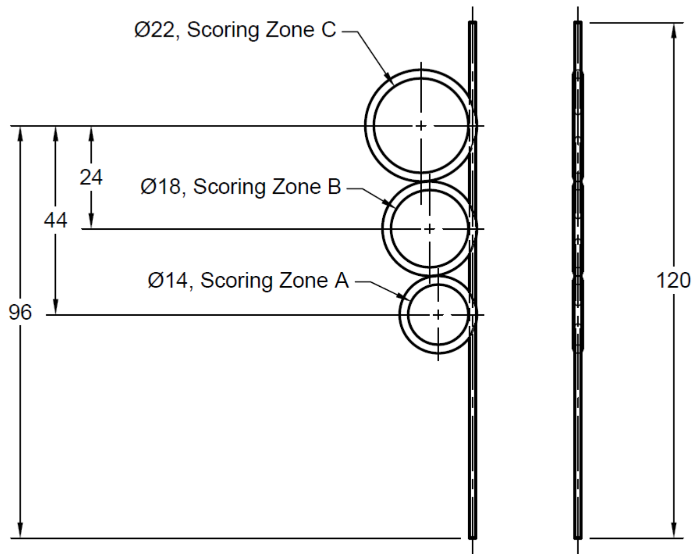
Strategic Landing Considerations

Given the significance of landing, your strategy should include:

1. **Time Budget:** Allocate at least 30–45 seconds for your final landing approach
2. **Pad Selection:** Choose a landing pad appropriate to your skill level and remaining battery charge
3. **Approach Planning:** Know which pad you'll target before beginning your flight
4. **Backup Plan:** If you're running low on battery mid-flight, abandon other obstacles and return to land
5. **Clean Over Difficult:** A clean landing on an easy pad (4 points) beats an attempted landing on a hard pad that crashes outside the zone (–1 or -5 points)

Part 2: Detailed Obstacle Specifications and Scoring

2.1 Obstacle 1: Rings (Horizontal Flight Through Rings)



Physical Description

The Rings obstacle consists of **three pool-noodle-constructed rings** suspended horizontally at different heights. The ring set is an independent obstacle.

Ring Construction:

- Material: Pool noodles (foam tubing), approximately 4–5 inches in diameter
- Mounting: Suspended from a frame structure at fixed heights
- Ring A (Hardest): Lowest height, smallest effective clearance
- Ring B (Medium): Mid-height, moderate clearance
- Ring C (Easiest): Highest height, largest clearance space

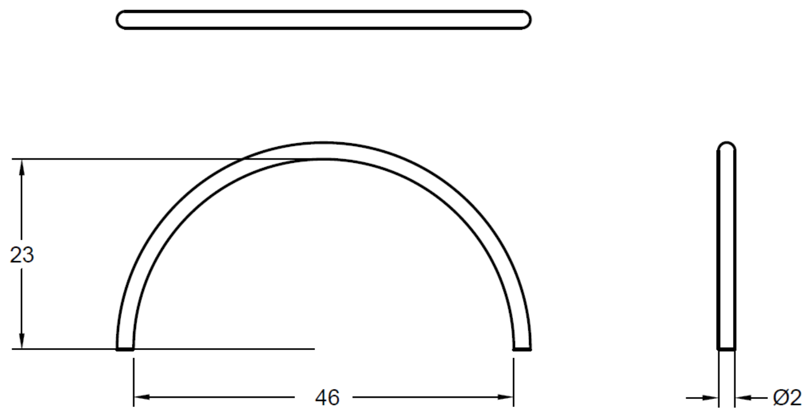
Clearance Specifications:

- Minimum clearance around each ring: Approximately 18–24 inches (varies by frame design)
- Ring orientation: Vertical plane (rings face forward, perpendicular to flight direction)
- Your drone must pass completely through ring opening

Scoring Breakdown

Ring	Difficulty	Points	Notes
Ring A	Hardest	10 points	Smallest clearance, highest risk
Ring B	Medium	6 points	Moderate difficulty, requires precision
Ring C	Easiest	4 points	Largest clearance

2.2 Obstacle 2: Arch (Fly Under/Through Arch)



Physical Description

The Arch obstacle is a single arched structure (similar to a rainbow shape) spanning across the course.

Arch Construction:

- Material: Irrigation Hose with pool noodle
- Height: Approximately 23 inches tall at the apex

Flight Options:

- Must fly **under the arch in either direction**

Scoring

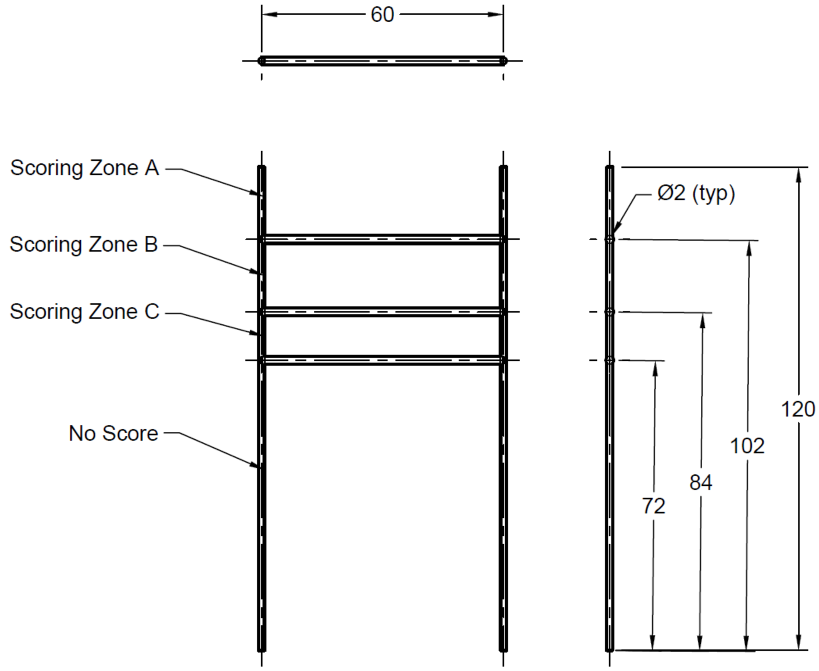
Successful Pass: 2 points

- Only one score possible: 2 points for successful completion

No Contact Rule:

- Even light contact with the arch disqualifies that pass
- Plan your approach with sufficient altitude/clearance margin

2.3 Obstacle 3: Ladder (Fly Through Ladder Openings)



Physical Description

The Ladder obstacle simulates a traditional ladder shape with three horizontal rungs at different heights.

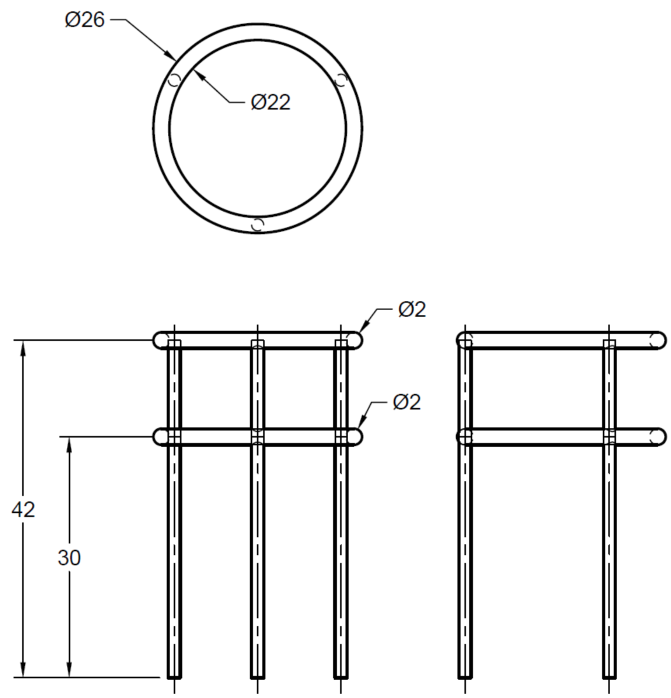
Ladder Construction:

- Material: PVC Frame with Pool Noodles
- Configuration: Three horizontal members suspended vertically (like a ladder standing upright)
- Spacing: Varying spacing between rungs (typically 12–18 inches)
- Netting: Highest zone will have some netting sagging and therefore higher scoring points
- Total Height: Approximately 10 feet

Scoring Breakdown

Rung Level	Points	Difficulty	Notes
Top Opening	6 points	Medium	Moderate clearance, netting sag
Middle Opening	4 points	Easiest	Moderate clearance
Bottom Opening	8 points	Hardest	Smallest clearance

2.4 Obstacle 4: Vertical Rings (Fly Through 2 Vertically-Aligned Rings)



Physical Description

The Vertical Rings obstacle features three pool-noodle rings arranged in a vertical column.

Ring Configuration:

- Material: Pool noodles (foam tubing), 22 inches inner diameter
- Arrangement: Two rings aligned vertically in a column
- Spacing: Rings are positioned 12 inches apart vertically and 30 inches from the ground as shown in the drawing
- Positioning: Ring columns are arranged 120 degrees apart on a circle (triangular configuration when viewed from above)
- Entry/Exit: Can enter from the top or the bottom, can exit through top or bottom, and in between rings for extra points

Flight Path Requirements:

- Your drone must enter at one end (top or bottom) and exit either at the other end or between rings (Extra points)

Scoring Breakdown

Standard Complete Pass:

- **Successful Navigation (Bottom to Top or Top to Bottom):** 10 points
- Definition: Your drone enters one ring, navigates vertically through both rings cleanly, and exits the other ring

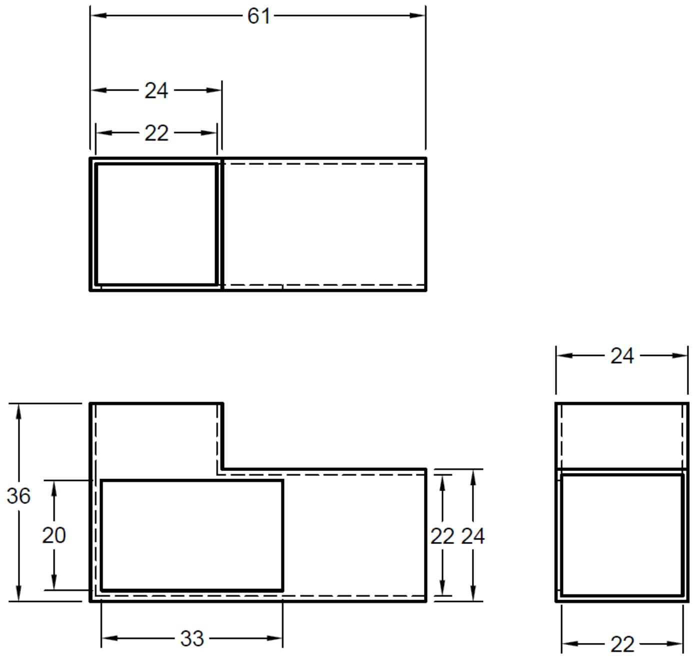
Advanced Pass – Exit Between Rings:

- **Exiting Between Rings:** 15 points (bonus for advanced flying)
- Definition: Your drone navigates through the first ring (Either top or bottom), then exits the ring configuration between the rings horizontally (rather than passing through vertically)
- If you exit between rings, you earn 15 points total for this obstacle (not 10 + 15 = 25)

No Partial Credit:

- Entering the rings but not fully exiting: 0 points
- Grazing a ring but maintaining passage: Judges assess if passage is still complete

2.5 Obstacle 5: Hidden Box (Fly Through Enclosed Box)



Physical Description

The Hidden Box obstacle is an enclosed structure with entry and exit openings.

Box Construction:

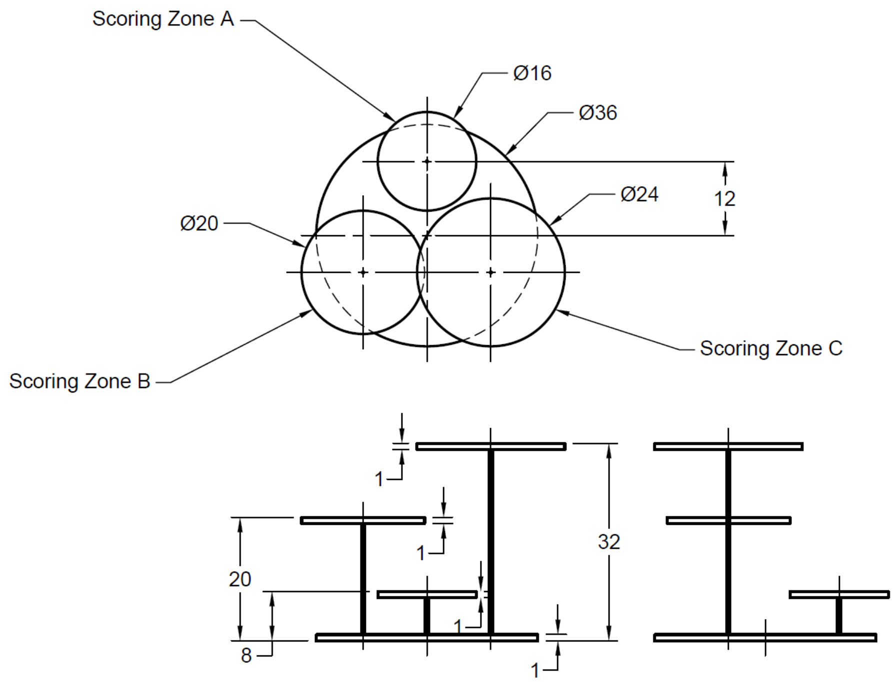
- Material: Plywood
- Shape: Rectangular or cubic enclosure
- Openings: 2 openings
- Internal Obstacles: Primarily a navigation challenge through confined space
- Recommend a team spotter be positioned outside the cage at the obstacle to assist the pilot in navigation.

Scoring

Successful Pass (Any Direction): 10 points

- Only one score possible: 10 points for complete passage
- Entry direction does NOT affect scoring

2.6 Obstacle 6: Lily Pad Landing Zone (Final Landing and Bonus Points)



Physical Description

The Lily Pad Landing Zone is the final obstacle and the landing area for your drone.

Landing Zone Structure:

- Location: Starting and ending point for all flights
- Components: Multiple landing pads at different heights and distances
- Pad Design: Flat surfaces with clear identification/marking
- Designation: The entire landing zone is marked with a tape ring on the ground defining the boundary

Landing Pads – Three Options:

Pad	Height	Difficulty	Points
Highest Pad	Highest elevation	Easiest	4 Points
Middle Pad	Mid-elevation	Medium	6 points
Lowest Pad	Lowest	Hardest	10 points

Landing Requirements and Scoring

Mandatory Landing Requirement:

- Your landing attempt is mandatory; this is non-negotiable
- You must attempt to land on one of the three pads before time expires
- Failure to attempt landing results in a –20 point penalty (explained below)

Clean Landing Scoring:

- Land cleanly (smooth touchdown, no hard impact) on any of the three pads
- Earn the corresponding points for that pad (10, 6, or 4)

Crash Landing – In Zone Boundary:

- You attempt to land (initiating descent toward a pad)
- Your drone crashes (hard landing, loss of control)
- The drone comes to rest **within the tape ring boundary** of the landing zone
- **Result: –1 point** (you lose landing points, but minimal penalty)
- You may not score landing points (no 10, 6, or 4), but you avoid the major penalty

Crash Landing – Outside Zone Boundary:

- You attempt to land
- Your drone crashes
- The drone comes to rest **outside the tape ring boundary**
- **Result: –5 points** for the crash PLUS loss of landing opportunity

No Landing Attempt:

- Your 3.5-minute window expires
- Your drone is still airborne or not on an official pad
- You did not attempt a landing maneuver
- **Result: –20 points** (MAJOR PENALTY – this is the most severe penalty in the entire competition)

2.7 Race Scoring System

Scoring system for the race is as follows:

- 1st place: 35 points
- 2nd place: 30 points
- 3rd place: 25 points
- 4th place: 20 points
- 5th place: 15 points
- 6th place: 10 points
- 7th place: 5 points

Part 3: Engineering and Technical Data Package (TDP) Requirements

TDP Submission Overview

Purpose and Objectives

The Technical Data Package (TDP) submission evaluates your team's **engineering thought process, design decisions, and documentation quality**. This component is separate from and equal in importance to your flight performance.

Evaluation Focus:

- How well did you design the prop guard?
- Can you justify your design choices?
- Did you demonstrate engineering analysis?
- Did you iterate or refine your design based on testing?
- Did you produce professional, clear documentation?

Submission Timeline and Format

Submission Deadline: One Week Before the Event

- Deadline: February 17, 2026
- Submission Method: Email to the competition organizers
- Format Options: PowerPoint slide deck OR PDF document
- **CRITICAL:** Late submissions may not be scored; submit early

Physical Poster Display:

- Bring a printed poster board (typically 36" × 48") to the event
- Poster will be displayed during the competition for judges and spectators
- Poster should summarize your TDP key points visually

What to Include in Your TDP

Your submission must include ALL of the following components:

3.1. Project Summary and Design Intent (Section Required)

Provide a clear narrative explaining:

- **Problem Statement:** What problem does your prop guard solve?
  - Example: "Standard prop guards are heavy and reduce flight time; our design reduces weight by 30% while maintaining full protection."
- **Design Objectives:** What are your primary goals for this design?
  - Weight reduction
  - Enhanced durability
  - Improved aerodynamics
  - Better visibility/aesthetics
  - Lower cost
  - Combination of above
- **Target Specifications:** What specific requirements did you aim for?
  - Weight target (e.g., "under 50 grams")
  - Strength requirement (e.g., "withstand 5 mph crash without propeller damage")

Why This Matters:

- Judges want to understand your thought process from the beginning
- A clear design intent demonstrates purposeful engineering (not random design choices)
- Professional engineers always start with a clear problem statement and objectives

3.2. 3D Model Diagrams and Exploded Views (Visual Component Required)

Include images of your CAD model:

- **Overall Assembly View:** Full view of the complete prop guard
- **Exploded View:** Diagram showing all components separated and their assembly relationship
    - Example: Shows how the frame, clips, and fasteners connect
- **Multiple Angle Views:** At least three perspectives
    - Front view
    - Side view
    - Isometric (3D) view
- **Detail Views:** Close-ups of critical features (joints, attachment points, reinforcements)

Quality Standards:

- Label key components and dimensions
- Use consistent color/material representation
- If multiple iterations exist, show "before and after"

Why This Matters:

- Judges can visualize your design without holding the part
- Exploded views demonstrate how components fit together (assembly understanding)
- Multiple views show design completeness

3.3. Key Engineering Decisions (Technical Justification Required)

Document the critical decisions you made and your rationale:

Material Selection:

- Which filament type did you choose? (e.g., PLA, PETG, TPU, carbon fiber-filled)
- Why is this material appropriate for a prop guard?
    - Strength characteristics
    - Flexibility (to absorb impact)
    - Ease of printing

  - Cost
  - Availability
- How does your material compare to alternatives?

Design Features:

- What specific features improve performance or durability?
  - Reinforcing ribs or structures
  - Flexibility zones (to absorb impact)
  - Ergonomic attachment points
  - Cable routing or wire management
  - Ventilation or airflow considerations
- Why does each feature matter?
- What trade-offs did you consider? (e.g., "Added ribs increase strength but add weight")

Example Engineering Decisions to Document:

Decision	Your Choice	Justification
Material	PETG	Higher impact resistance than PLA; better for crashes
Infill %	20%	Balances weight and strength; 100% infill adds 40% more weight for minimal gain
Wall Thickness	2mm	Thin enough to be light; thick enough to resist flex under impact
Attachment Method	Silicone straps	Softer than rigid clips; absorbs shock; easier to adjust

3.4. Manufacturing Drawings and Tolerances (Technical Documentation Required)

Provide dimensioned drawings of your design:

- **Main Assembly Drawing:** Overall dimensions showing the full prop guard
- **Component Drawings:** Detailed drawing of each separate component if multi-part

- **Key Dimensions:** All critical measurements (length, width, height, openings, attachment points)
- **Tolerances:** Where precision matters, call out tolerances
  - Example: "Attachment hole: Ø 5mm ± 0.2mm"
  - Tolerances indicate you understand manufacturing precision requirements

3D Printing Parameters:

- Document the manufacturing parameters you used:
  - Layer Height: (e.g., 0.2mm – standard; 0.1mm – finer quality)
  - Infill Percentage: (e.g., 15%, 20%, 30%)
  - Print Orientation: Which direction was the part oriented on the build plate?
    - "Horizontal" for maximum strength along the flight path
    - "Vertical" for surface quality
    - "45-degree angle" for balanced properties
  - Nozzle Temperature, Bed Temperature (if relevant)
  - Print Speed (e.g., 50 mm/s)
  - Support Material: Did you use support structures? Where?

Why This Matters:

- Manufacturing drawings show your design is documented and reproducible
- Tolerance callouts show you understand precision requirements
- 3D printing parameters show you optimized your process (not just printed at default settings)
- This information allows judges to assess the quality of your manufacturing process

3.5. Design Improvements and Lessons Learned (Iterative Design Process Required)

Demonstrate that you refined your design through testing and iteration:

What Worked Well:

- Which design features performed as expected?

- What surprised you positively?
- Example: "The soft TPU bumpers absorbed impact better than expected; no damage in 10+ test drops"

Challenges Encountered:

- What design issues did you identify during testing or assembly?
- How did you resolve them?
- Example: "Initial design was too heavy (85g); we reduced infill from 30% to 15%, reducing weight to 48g"

What You Would Change:

- If you redesigned this prop guard today, what would you improve?
- What constraints prevented you from implementing this?
- Example: "We'd add a latch mechanism for tool-free removal, but time constraints prevented implementation"

Evidence of Iteration:

- Show CAD files or photos from Version 1 → Version 2 → Final Version
- Document what changed between versions
- Explain performance improvements (weight, durability, etc.)

Why This Matters:

- Iterative design is the hallmark of engineering (not just one-shot design)
- Judges value teams that identify and address problems
- Showing "lessons learned" demonstrates maturity and self-reflection
- Many high-scoring designs will show clear iteration

3.6. Build Material and Manufacturing Process (Specifications and Comparison Required)

Document the physical characteristics of your final design:

- **Material Specification:** Exact material used
  - Example: "MatterHackers MatterMax PLA, White, 1.75mm filament"

    - Include color if relevant to identification

- **Weight of Final Component:**
    - Measure your assembled prop guard on a scale
    - Record weight in grams
    - This demonstrates optimization effort
- **Print Time:**
    - How long did your design take to print?
    - Example: "12 hours 45 minutes at 0.2mm layer height"

Why This Matters:

- Specifications show your design is quantifiable and measurable
- Weight comparison demonstrates optimization; judges value efficiency
- Print time indicates design complexity and feasibility

Part 4: Technical Data Package (TDP) Judging Criteria

Judging Criteria for TDP

Your TDP is scored on a **0–30 point scale** across five categories.

Scoring Rubric (30 Points Maximum)

Criteria	Max Points	Scoring Guidelines
Design Intent & Problem Statement	10 pts	8-10 pts: Clear, specific problem statement; well-articulated design intent 5–7 pts: Problem statement present and mostly clear; intent is understandable, but some objectives are vague or only partially linked to the design. 2–4 pts: Vague or missing objectives 0 pts: No statement or completely unclear

Technical Documentation Quality	5 pts	5 pts: Professional drawings, diagrams, CAD images; complete, clear, labeled 3–4 pts: Good documentation; minor clarity issues 1–2 pts: Basic documentation; unclear in places 0 pts: Missing or unprofessional documentation
Engineering Analysis & Decision Making	5 pts	5 pts: Thoughtful analysis; considers alternatives/trade-offs; justified decisions 3–4 pts: Good reasoning; some alternatives considered 1–2 pts: Basic justification; limited analysis 0 pts: No justification; appears arbitrary
Manufacturing Quality & Optimization	5 pts	5 pts: Excellent print quality; clear optimization efforts (weight, strength) 3–4 pts: Good quality; some optimization evident 1–2 pts: Acceptable quality; limited optimization 0 pts: Poor quality; no optimization
Innovation & Creativity	5 pts	5 pts: Novel or uniquely effective approach; standout design concept 3–4 pts: Good design; some creative elements 1–2 pts: Standard approach; minimally creative 0 pts: Derivative; no original thinking

How Judges Evaluate Your Submission

Evaluation Process:

1. Judges receive your submitted TDP package (PowerPoint/PDF)
2. Judges review your documentation against the rubric above
3. Each judge scores independently on the 0–30 scale
4. Scores are averaged to produce your final TDP score
5. **Your TDP score is confidential until awards are announced**

What Judges Look For:

- **Completeness:** All six required components included?
- **Professionalism:** Formatting, clarity, organization, grammar/spelling?
- **Technical Depth:** Shows engineering knowledge and careful thinking?
- **Evidence of Iteration:** Shows refinement and testing, not just first attempt?
- **Realistic Assessment:** Team understands strengths/weaknesses of their design?

Common Mistakes to Avoid:

- Incomplete documentation (missing sections)
- Vague or missing justification for design choices
- Unprofessional presentation (poor formatting, spelling errors, unclear images)
- No evidence of iteration or refinement
- Overstating performance claims without supporting evidence
- Generic descriptions (not specific to their design)

Part 5: Total Score Calculation and Awards

5.1 Final Score Formula

Your **Final Score** combines the three competition components:

Score Component Summary

Component	Determined By	Timing	Scoring Weight
Flight Challenge	Obstacle completions and penalties	During live flight run (Feb 24)	40%
Race	First to cross finish line after 3 laps	During live flight run (Feb 24)	20%
TDP (Engineering)	Documentation quality and design analysis	Before event (submission deadline)	40%
TOTAL	Weighted score, each component is evenly weighted	Complete by end of event	100%

Maximum Score

The highest score will be a perfect 10.000 point

Scoring Components

$$Flight\ Score = \frac{Flight\ Score_{Team}}{Flight\ Score_{Max}} \times 10 \times 40\%$$

$$Race\ Score = \frac{Race\ Score_{Team}}{35} \times 10 \times 20\%$$

$$TDP\ Score = \frac{TDP\ Score_{Team}}{30} \times 10 \times 40\%$$

Final Score

$$\text{Final Score} = Flight\ Score + \text{Race Score} + \text{TDP Score}$$

5.2 Judging Panel and Awards

Judges

Your competition is judged by a panel of **aerospace and engineering professionals**:

- Judges for **Flight Challenge:** Observed by flight judges during your 3.5-minute run
- Judges for **TDP:** Reviewed by engineering/design judges before the event

Judge Qualifications:

- Professional engineers from aerospace, defense, or mechanical fields
- Experience in project management and technical evaluation
- Familiarity with competition standards and scoring criteria

Awards Ceremony

Timing: At the NDIA STEM/SOAR event on February 24, 2026. Timing TBA.

Award Categories:

1. **Overall Champion**
    - Awarded to the team with the **highest combined score** (Flight + Race + TDP)
    - Highest honor of the competition

2. **Best Flight Performance**
   - Awarded to the team with the **highest obstacle course points** (Flight Challenge component only)
   - Recognizes excellent drone piloting and obstacle navigation
3. **Best Design**
   - Awarded to the team with the **highest TDP score** (Engineering/Design component only)
   - Recognizes superior engineering design and documentation
   - Often goes to a team with creative, novel approach or outstanding documentation

How Winners Are Determined

Scoring:

- Judges tabulate scores and rankings
- All categories are based on objective score calculations (except Best Teamwork)
- Ties are resolved by judges' consensus

Announcement:

- Results are announced at the awards ceremony
- Teams are called up to receive awards
- Photos and media coverage during awards

Part 6: Frequently Asked Questions (FAQ)

Flight Challenge Questions

Q: Can I practice on the actual course before my flight run?
A: No formal practice runs are allowed during the live event. However, teams may request a walkthrough or detailed explanation of obstacle layouts the day before or during setup. Arrive early to familiarize yourself with the course.

Q: If my drone runs out of battery mid-flight, what happens?
A: Your flight ends immediately. Battery is your responsibility. Ensure your drone has sufficient

battery for a full 3.5-minute run plus landing. Most drones have 5–7 minute flight times, so this should be achievable.

Q: What if the drone's prop guard partially detaches during flight?
A: Judges will assess if the guard is still functional and attached enough to count as your prop guard. If it's loose or hanging, you may receive a safety reset penalty. Ensure your guards are securely fastened before flight.

Q: How much clearance do I need in prop guards for obstacles?
A: Sufficient to pass through without contact. Refer to obstacle dimensions. Your prop guard must fit through these openings.

Q: If my drone lands outside the Lily Pad zone but is still within the competition area, do I get a penalty?
A: Yes. The Lily Pad zone is specifically marked with a tape ring. Landing anywhere else (even nearby) is outside the zone and results in –1 point penalty.

Q: Can I request a second flight run if I perform poorly the first time?
A: No. You receive one flight run only. Make your 3.5 minutes count.

TDP Questions

Q: Can I submit my TDP as a PDF instead of PowerPoint?
A: Yes. The guidelines state "PowerPoint slide deck or PDF document." Both are acceptable. Choose the format that best presents your work.

Q: What if I don't have professional CAD software to create my drawings?
A: You can use free tools like Fusion 360 (free for students), Tinkercad, or even detailed sketches photographed clearly. Judges value clear communication over software sophistication.

Q: How many pages/slides should my TDP be?
A: No strict page limit. Include all six required components; don't feel obligated to pad with empty slides.

Q: Can I submit photos of my physical prop guard instead of CAD drawings?
A: CAD or detailed hand drawings are required for clarity and professionalism.

Q: If I design an iteration but don't build it, can I include it in my TDP?
A: Yes. Showing multiple CAD iterations demonstrates your design process and thinking. Include the final version you actually built, but showing previous versions adds credibility.

Q: What if I made changes to my design after submitting but before the event?
A: Your TDP score is based on the submitted version. Plan ahead to avoid this situation.

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Part 7: Contact Information and Conclusion

Event Coordinators

NDIA First Coast Chapter

- Contact organizers for event email and phone information
- Website: https://ndiafirstcoast.org/

Key Takeaways

The NDIA First Coast Drone Challenge is a comprehensive competition designed to develop your skills in aerospace engineering, flight operations, and technical documentation. Success requires:

1. **Strategic Flight Planning:** Navigate obstacles efficiently within your 3.5-minute window
2. **Strong Engineering Documentation:** Clearly explain your design decisions and iteration process
3. **Quality Hardware:** Design and build a prop guard that protects and performs
4. **Team Collaboration:** Work together effectively to prepare and execute

Remember:

- **One flight run:** Make your 3.5 minutes count
- **Documentation matters:** Equal weight to flight performance
- **Safety first:** Follow all crew and judge directions
- **Continuous improvement:** Iterate and learn from testing

Your success is measured objectively by your final combined score. Focus on clear objectives, thoughtful engineering, and strategic execution.

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For questions or clarifications, contact the NDIA First Coast Chapter or event organizers.