ME 473 - Senior Design 1
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Group 7, AIAA

RC Aircraft + Mission requirements

Aircraft Requirements

- Wingspan cannot exceed 5 feet
- Airplane in the parking configuration, while on its landing gear in the upright orientation, must fit inside a parking spot 2 ½ feet wide
    - If wingspan exceeds parking spot width, then the airplane must be configured to fit without any components removed from the airplane
- All energy for take-off must come from on-board propulsion battery pack(s) (no external assistance
- Must be propeller driven and electrically powered
- Motors must be any commercial brushed or brushless electric motor
- Propeller (diameter and pitch) may be changed for each flight attempt
- Airplane and pilot(s) must be Academy of Model Aeronautics (AMA) legal.
    - Airplane TOGW (take-off gross weight with payload) must be less than 55 pounds
    - Pilot must be a member of the AMA, who must sign in and verify AMA membership
- Must submit proof that the airplane being presented at Tech Inspection has been flown prior to the contest date.
    - Proof of flight is a video showing controlled straight and level flight and will be presented to the inspector when called to Tech Inspection. NO exceptions.
- Airplane must have an accessible external switch to turn on the radio control system. Cannot be internal or under a panel or hatch. Arming plug is NOT considered an acceptable switch.
    - Radio control system switch must be separate from the propulsion system fuse and arming system

Battery Requirements

- Maximum one battery pack connected to a propulsion system.
    - A propulsion system consists of one battery, one externally accessible arming fuse, one or more electronic speed controllers (ESC), and one or more motors.
    - If the ESC has a Battery Eliminator Circuit (BEC), it must be disabled.
- If more than one battery pack is implemented for a single purpose such as propulsion, the following rules apply

    - All commercial battery packs must be identical (same manufacturer, part number, size, voltage, power, rating, etc).
    - Each battery pack must be independently connected to its own propulsion system. Batteries cannot be connected in series or parallel
    - Each battery/propulsion system is required to have its own Arming Fuse
- Batteries may be NiCad/NiMH OR Lithium based, following provisions:
    - Teams may only use one battery type for propulsion
    - After Tech Inspection with specific battery type, team must use that battery type for the rest of the competition
    - A separate battery is required for the Rx/Servo battery on the airplane. There is no restriction on the Rx/Servo and Transmitter battery type regardless of the propulsion battery type
    - Individual battery packs cannot exceed the FAA limits for hand carry on commercial air flights of 100 Watt-hours (rated capacity * rated voltage) per battery pack
    - Propulsion power total stored energy cannot exceed 100 Watt-hours
    - Battery packs must be properly labeled indicating cell chemistry
    - All battery disconnects must be “fully insulated” style connectors
    - All battery packs must be un-altered and commercially procured as Commercial-Off-The-Shelf (COTS) battery packs. Custom battery packs will not be allowed.
    - The Manufacturer's Label stating the Battery Capacity (mAh), Voltage (V), and C-Rating must be clearly visible.
    - The maximum current rating for the Arming Fuse is 100 amps.
        - If using lithium-based batteries, the maximum current rating for the fuse is the maximum continuous discharge current rating of the lithium battery pack (battery capacity X C-rating) up to 100 amps.
    - Lithium batteries must be stored and charged in a commercially available, unaltered Lithium battery charging sack – the only time they can be out of the sack is for tech inspection or while in the airplane.

Payload Requirements

- Mission 1 - Crew Only
- Mission 2 - Crew, EMTs Patient, gurney, and Medical Supply Cabinet
    - Gurney must be at least the same width and height as the Patient with a minimum height of 1.5 inches
    - The Medical Supply Cabinet shall have a minimum width and length of 3 inches and a minimum height of 3.5 inches. Maximum weight is decided

by our team, and can be changed for each mission attempt but cannot exceed max weight declared in technical inspection

- Mission 3 - Crew and Passengers.
- Crew, EMTs, Patients, and Passengers will be provided at the competition.
    - Crew, EMTs, and Passengers are 3 ½ inch tall jumbo angel wood dolls
    - Patient is 5 ½ tall jumbo man wooden doll

Technical Report requirements

Proposal Requirements

- Proposals must be in PDF format. Proposals that are not in PDF format will not be accepted.
- Proposals 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 proposals will be assessed for format and readability at the judges' discretion.
- Proposals must have the University name on the first page.
- Absolute maximum page count for the proposal is 5 pages, the PDF reader "pages" value will be used as the official page count. Proposals exceeding the maximum page count will not be accepted.
- Proposal PDF must be formatted as 8.5" x 11" pages.
- Electronic proposal must be named: "2024DBF_[university name]_PROPOSAL.pdf" .
    - University name should not be an acronym.
    - Universities with multiple campuses should specify which campus in the university name.
- Electronic proposal must be a single file with all figures/drawings included in the proper sequence in PDF format.
- Electronic proposals should have all figures compressed to print resolution to minimize file size.
- Electronic proposals must be less than 20 MB in size.
- Should have these sections:
    - Executive Summary
    - Management Summary
    - Conceptual Design
    - Manufacturing Plan
    - Test Planning
- Submission opens October 15th 2023, 8AM and closes October 31st 2023, 5PM
    - **Team Roster must be submitted as well. All team members must have a valid AIAA membership**

Design Report

- 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 University name on the cover page.
- Absolute maximum page count for the report is 60 pages, the PDF reader "pages" value will be used as the official page count. Reports exceeding the maximum page count will incur a 10-point penalty for each additional page.
- Report PDF must be formatted as 8.5" x 11" pages.
    - May use 11" x 17" pages for the drawing package.
- An additional stand-alone configuration drawing must be submitted along with the report file.
- Electronic report files must be named: "2024DBF_[university name]_DESIGN_REPORT.pdf".
- Electronic report must be a single file with all figures/drawings included in the proper report sequence in PDF format.
- Electronic reports should have all figures compressed to print resolution to minimize file size.
- Electronic reports must be less than 20 MB in size.
- Submission opens February 1st 2024, 8AM and closes February 23rd 2024, 5PM