NEW IN 2020!

AIAA/IEEE EATS Students Design Challenge 2020

CALL FOR PROPOSALS

INTRODUCTION

The aeronautics industry has been experiencing deep evolutions since the last decade. From one side, an ecological awareness is pushing strongly in order to reduce pollution emission and environmental footprint. From the other side, new trends and needs in mobility are rising towards more autonomous vehicles. The reduction of weight, fuel consumption and noise has been a continuous concern for many years, in order to improve A/C performances. Linked to these challenges, new concepts have been rising and, in particular, what is named as Urban Air Mobility.

The "dream" of a electrically propelled flying car is now starting to become reality, and several demonstrators have been proposed worldwide. However, autonomy and performances are still limited, and one main question is to know how far we can go in the performances, taking into account the technology evolution. This is the spirit of the following Challenge.

CHALLENGE

QUESTION = What is the max payload (in kg) that can be achieved for a eVTOL, with no CO_2 emission by the vehicle, according to the specifications below?

SPECIFICATION

- range: 100km (54nm) + 25km (13nm) of backup;
- cruise speed: 135 kts;
- height with respect to ground: 500 ft, and maximum altitude above sea level: 3500 ft QNH;
- maximum take-off weight MTOW: 2.5 metric tons;
- as a guideline, A/C size should fit into a 15 meters diameter circle;
- Entry into Service 2025

GLOSSARY

- A/C: aircraft
- FDC: flight deck crew (e.g. pilot)
- MTOW: Maximum Take Off Weight
- QNH: referring to altitude above sea level;
- PAX: passengers (not including FDC);
- UAM: Urban Air Mobility;
- E-VTOL: Electric Vertical Take Off and Landing

EXPECTATIONS

Students should provide following data:

- general description and architecture of the aircraft:
- length, span, shape, number of wings (if any);
- type and number of propulsors? (e.g. fans, propellers with or without pitch control, rotor with collective and cyclic control, ...)? Pls provide maximum thrust level of each propulsor.

For all components, please provide mass and volume.

Concepts of operation (conops):

- Passengers (number of people: FDC, PAX and handling) and / or cargo (mass and handling)?
- Energy refill strategy;
- How the A/C is operated from operational point of view?
- Operating limitations;

Propulsive Chain:

- what system for power generation? Provide mass, power, volume, voltage, operating temperature);
- what system for energy storage? Provide mass, energy, volume, operating temperature;
- electrical distribution system: for all components, please provide mass, voltage, operating temperature, volume;
- electrical motor (if any): voltage, torque, mass, volume.

Continued on reverse.

For all presented figures, the following data shall be provided:

- details of the calculations made, hypotheses and justification (example: energy density of batteries);
- details of aerodynamics calculation per flight phase: take-off, cruise, transition, landing;
- detailed mass breakdown: structure, seats, propulsive chain, electrical distribution, etc...

Keep in mind that the answer to the question is not unique, and creativity is very important in your proposal. Moreover, what is important is to clearly explain:

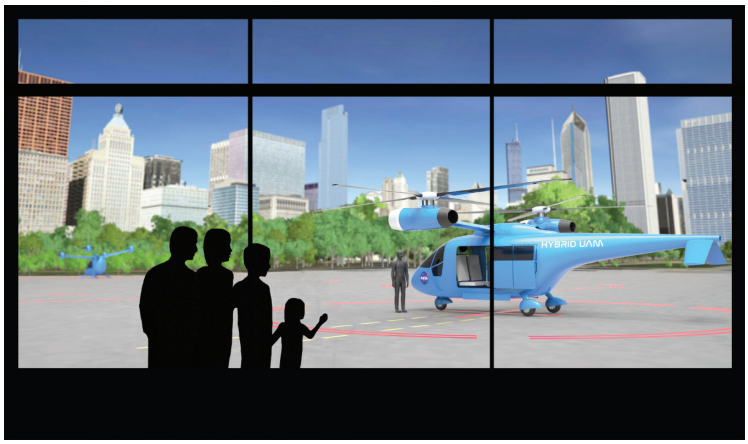
- the hypotheses and assumptions that you are taking,
- their justification (literature survey is strongly recommended),
- the methodology and tools that you are adopting for solving the problem,
- the limits of validity of some hypotheses or calculation.

SUBMISSION AND RANKING

The Proposal shall be a written report in English of **30 pages maximum**. It is not mandatory to have a hardware demonstrator. A video with a maximum of 5 minute duration can be submitted with the proposal.

Every proposal will be evaluated by a jury panel, according to the following ranking:

- Originality (25 points), Technical content (25 points), Feasibility (25 points), Report quality and clarity (25 points).



ELIGIBILITY

More than one design may be submitted from students at any one school.

Teams can consist of the following:

- Undergraduate students
- Graduate students
- Combine Undergrad and Graduate students

SCHEDULE

- **January 20, 2020** – Submission opens
- **June 1, 2020** – Submission deadline
- **July 1, 2020** – Winner announcement
- **August 26, 2020** – Awards at EATS

To Submit Your Proposal:
http://bit.ly/EATSStudentDesign

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CONFLICT OF INTEREST

It should be noted that it shall be considered a conflict of interest for a design professor to write or assist in writing RFPs and/or judging proposals submitted if (s)he will have students participating in, or that can be expected to participate in those competitions. A design professor with such a conflict must refrain from participating in the development of such competition RFPs and/or judging any proposals submitted in such competitions.

CONTACT

All information including any updates will be posted on the EATS website. **propulsionenergy.aiaa.org/EATS**

All questions related to this RFP should be addressed to:
Jean.Rivenc@airbus.com and **Hyun.D.Kim@nasa.gov**

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