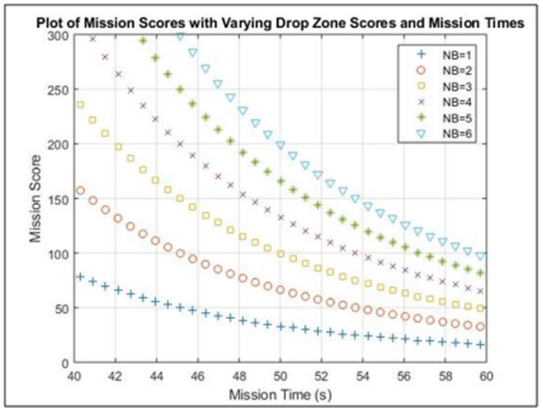
Team Strategy in this Design

The competition mission score is determined based on both how long it takes the aircraft to fly all 5 laps as well as the number of tennis balls that land in the target zone. Greater weight, however, is given to this mission time.

With this in mind, the team has chosen to develop an aircraft that possess a smaller payload but can fly extremely quickly. Doing so will net a greater score than an aircraft that has a large payload but moves slowly.

The use of an EDF was decided over a traditional propeller to meet this high-speed requirement, and the structures of the design were such that, once the payload is released, the vehicle will experience little/no shift in CG, which becomes increasingly critical during high-speed flight.



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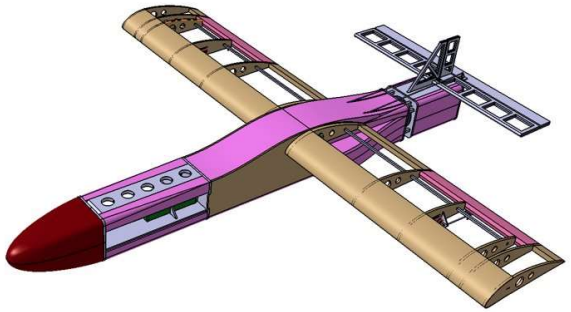
EDF EARL

"For once you have tasted flight you will walk the earth with your eyes turned skyward; for there you have been, and there you long to return." – Leonardo da Vinci



Contestant for the Boeing Bronze Propeller Competition, hosted at Wichita State University

BOEING

WSU

MISSION REVIEW

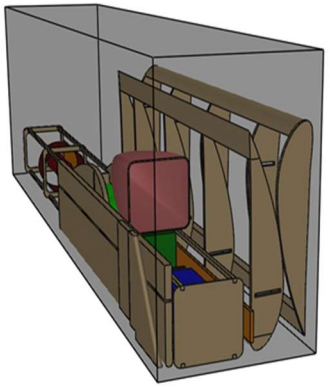
The Boeing Bronze Propeller competition consists of creating a semi-autonomous drone that is capable of flying a 5 lap mission, dropping a payload into a target zone, and landing safely. Scores are derived for each run based on the amount of the payload that lands in the target zone, and the time required to complete the mission.

EDF Earl has a tennis ball (payload) capacity of 3, and will utilize the Arduino GPS system to autonomously release the aforementioned payload. An EDF (Electric Ducted Fan) was selected as the propulsion mechanism beased on their high speed flight characteristics, and to reduce the probability of engine and/or impeller damage on landing.

The EDF shown above will be the power source for Earl, with 14 rotor blades and 8 stator blades it is capable of generating up to 6.5 lbf of static thrust.

(Image: turbines-rc.com)

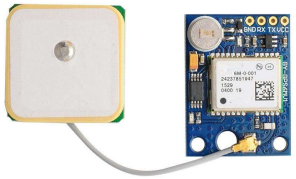
In addition to flying the five laps and autonomoulsy dropping the tennis balls, the aircraft and payload must also be stored in a 11''x7''x36'' and trasported to the site. This means that, unless the aircraft is very small, is must be able to be taken apart and put back together repeatedly.



Images:

Top: Depiction of Earl as she will be stowed in carrying box

Bottom: Arduino GPS system to be used for autonomous dropping mechanism (Image: Amazon.com)



UNIQUE ASPECTS

Unique aspects of the EDF Earl design include:

- ~140 mph Maximum Flight Speed
- +10 G/-6 G load factor
- 70 mm carbon EDF capable of 6.5 lbf of static thrust
- 3 tennis ball capacity
- Wings, tail, and nose cone detach for stowing
  Arduino w/ GPS for autonomous payload dropping