

Needs Assessment

The primary objective of this design is to provide a new, safe, efficient, and effective means of propelling an Unmanned Aerial Vehicle (UAV) prototype into flight, which will be provided by Eglin Air Force Base.

Project Scope

Problem Statement

Eglin Air Force Base needs a new safe, efficient, and effective method of launching their current UAV prototype into flight.

Justification

Currently at Eglin AFB, the team's sponsor Jeff Wagener, equips UAVs with GPS systems, video cameras, and other electronics to help soldiers in the field. The sizes of the UAVs that Eglin tests range from a foot in length to approximately six feet. Mr. Wagener has informed the team that the UAV that needs to be launched will be eighteen inches long and three and a half pounds. The team visited Eglin and received the opportunity to see where he builds the remote controlled UAVs in his workshop. During the visit, Mr. Wagner showed the team the current launch set up which was severely insufficient. The "launch system" was simply a tank of compressed air that was released through a remote control valve and into the barrel of the launch tube. The materials that were used in this set-up severely limited the performance of the launcher. However, since the UAV was already traveling at a decent speed (by way of a larger UAV), it only needed to be pushed out of the launch tube. It seems fairly wasteful and impractical to have to launch a larger UAV just to test a smaller UAV. Therefore, the team was contracted to produce an alternative but effective means of launching the UAV from ground level.

Project Specifications

Objective

The primary objective of the project is to completely design and fabricate an effective pneumatic UAV launcher capable of efficiently propelling an UAV into flight for Eglin Air force Base no later than the spring 2009 semester while staying within the following parameters set before us more in particular those listed within the specifications section:

- Minimum exit velocity: 18.288 m/sec
- Instantaneous acceleration must not exceed 600g
- Launcher weight limit: 1.134 kg, including all accessories, stand, etc.
- Launch angle estimated between 30-45 degrees
- No energetic methods or accelerants
- Must be repeatable at minimum of 5X
- Maximum tube dimensions .914m L x .114m W x .114m H square, or .914m x .1397m diameter round (if a tube is used)



Figure (1) - Actual UAV Prototype provide by EAFB

Constraints

Though the project is open for multiple designs, the design team is limited to several factors that include but are not limited to the following:

- Physical Fabrication skill
- Capital expenditure (1500 ME Dept + EAFB supplementary funds)
- Various fabrication costs
- No energetic methods or accelerants
- Must be repeatable