* Mission Definition and Analysis of Requirements:
  + Define the typical mission for the assigned aircraft, including an exhaustive illustration and description of all its segments.
  + Perform a critical analysis of the requirements for the aircraft design, including assumptions and estimations for missing requirements.
  + Identify and discuss the driving or most critical requirements for the design.
* Reference Aircraft Data Collection:
  + Collect and organize reference data of existing aircraft similar to the assigned one, aiming for around 20 reference aircraft.
* Concept Generation and Selection:
* Propose at least three different aircraft configurations with sketches and descriptions5.
* Select the best concept and explain the selection process6.
* Study and Generation of the Complete Fuselage Layout:
* Perform a study of possible fuselage layouts using the inside-out approach, including calculations and dimensions7.
* Make sketches of different possible payload configurations to demonstrate the flexibility of the design8.
* Generation of Technical Drawings:
* Provide technical drawings of the fuselage design, including top, side, front views, and relevant cross and longitudinal sections9.

Introduction

The following report consists of 5 chapters, each guiding the reader through the aircraft design process. This first chapter will provide a definite mission for the aircraft and will analyze its design requirements. The second chapter will analyze reference aircraft similar in specifications to those required by the design mission, as well as including an appendix with the relevant reference material within. Chapter 3 discusses the concept generation for the aircraft design and details the process of selection between the three concepts we had created, and how the selected concept best meets the mission requirements. Chapter 4 will show the complete fuselage layout for the aircraft. And Chapter 5 will contain technical drawings of the concept aircraft design.

1. Mission Definition and analysis of requirements

In the introduction the basic requirements for a Low Altitude High Endurance UAV were given. This list of requirements, however, is insufficient in relaying the totality of the requirements needed for the execution of this design mission. FAA requirements considering low altitude UAV systems, specifications surrounding payload packages, and necessary considerations for the compacted design all will be explored and accounted for within the following chapter.

* 1. The Mission

For the LAHE UAV the mission typical mission profile is one built around observation. Initially the aircraft must be launched by a single operator in a remote environment. Following launches the aircraft must climb to its cruising altitude of 400m where it will maintain a cruise speed of 10 m/s. The mission profile sees very little change once cruising altitude and cruising speed are reached and observation can begin. Since the primary objective of the mission is to employ a microphone sensor package to survey wildfires, the observation stage of the mission profile sees very little deviation from its cruising altitude during this stage of the mission. Observation will continue until aircraft endurance is exhausted to a point of required landing. The craft will then be flown back to its operator where it will descend in a spiral before landing for operator recovery.

* 1. Requirement Analysis

Once the required function of the aircraft is ascertained, a set of requirements must be made to meet the needs for such function. In this section, the given requirements will be critically analyzed to understand how each will affect the aircraft. Additional requirements must also be accounted for to properly configure the design.

1.2.2 Payload Analysis