MAE 159 Midterm Aircraft Sizing Report

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1 Introduction

This report consists of a study on the cost and performance optimization for two subsoinc commercial transport aircraft. Herein, the reader will find a summary of the methods used and the data generated from an itterative python script which uses standard, well-defined aircraft deisgn methods to exactly meet the design specifications. Various parameters, including ... , were systematically varied to determine the optimum design parameters.

2 Design Specifications

As mentioned prior, two aircraft with distinct given design requirements, were considered in this design study. Both aircraft are requried to carry 225 passangers adn complete a 7400 nautical mile journey. The first larger aircraft must compelte the journey without any stops. The second smaller aircraft must complete the journey with one-stop, giving the airplane a required range of 3700 nautical miles. The complete set of given design specifications are listed in tables 1 and 2 below. For both aircraft, takeoff conditions were assumed to be at sea level on a hot day with an air temperature of $84°F$.

Non-stop Aircraft	
Design Specification:	**Parameter Value:**
Number of Passangers	225
Weight of Cargo	6,000 lbs
Still Air Range	7,400 nmi
Takeoff Field Length	10,500 ft
Landing Approach Speed	140 kts
Fuel Destination Payload	35%
Cruise Mach Number	0.85
Initial Cruise Altitude	35,000 ft

One-stop Aircraft	
Design Specification:	**Parameter Value:**
Number of Passangers	225
Weight of Cargo	3,000 lbs
Still Air Range	3,700 nmi
Takeoff Field Length	6,000 ft
Landing Approach Speed	130 kts
Fuel Destination Payload	0%
Cruise Mach Number	0.80
Initial Cruise Altitude	35,000 ft