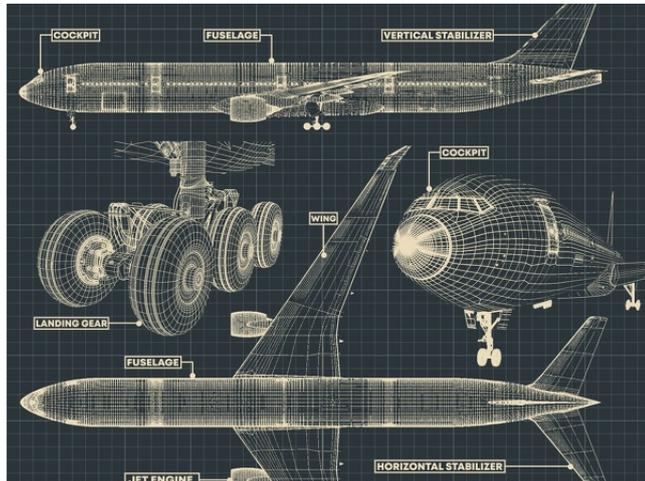# Alternative Propulsion Aircraft Design

TECHNOLOGY NUMBER: 2024-317

Technology ID

2024-317

Category

Software
Software & Content
MOSS - Michigan Open Source
Support

Inventor

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View online

OVERVIEW

Versatile software for designing and evaluating aircraft with alternative propulsion systems

- Enables rapid, physics-based comparison of various propulsion architectures within a unified environment
- Aircraft design, electric aviation, green propulsion development, industry prototyping, and fleet performance analysis

BACKGROUND

The aerospace industry has traditionally relied on fossil fuel-powered engines for aircraft propulsion, with incremental advances in performance, efficiency, and emissions reduction. Conventional sizing and synthesis tools have been tailored to these legacy architectures, often lacking flexibility to account for non-traditional powertrains like electric or hydrogen propulsion. As environmental concerns grow and emerging regulations target aviation emissions, designers face mounting pressure to develop cleaner, more efficient aircraft concepts. However, existing methods are often rigid, time-intensive, and require separate tools for each architecture, impeding the rapid evaluation and comparison of innovative solutions. The need therefore arises for software capable of accommodating a broad spectrum of propulsion types—enabling researchers, engineers, and manufacturers to explore advanced concepts, accelerate development cycles, and optimize future fleets for both sustainability and performance.

INNOVATION

The Alternative Propulsion Aircraft Design software represents a significant advancement in conceptual aircraft synthesis by enabling seamless, parametric modeling of any propulsion type—from conventional jet engines to electrified and hydrogen-powered systems—within a single MATLAB-based framework. Utilizing physics-based models for electric powertrains and a modular, multidisciplinary structure, the tool supports rapid iteration, optimization, and side-by-side comparison of diverse aircraft architectures. Its open-ended and customizable design empowers users to analyze performance trade-offs, explore mission-specific scenarios, and optimize technologies for fuel savings, emissions reduction, or operational cost. Real-world applications span commercial aircraft prototyping, academic research, early-stage feasibility studies for alternative propulsion systems, and policy analysis on green aviation. By supporting rapid, scientifically grounded decision-making, the software helps speed the transition to sustainable flight and fosters the development of next-generation aviation technologies.

ADDITIONAL INFORMATION

PROJECT LINKS:

DEPARTMENT/LAB:

- Gökçin Çınar, Aerospace and Engineering

LICENSE:

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