Function Means Tree: An Introduction

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1 Introduction

A Function Means Tree (F/M tree) is a structured and systematic approach to break down the functions and means within a system or project. It provides a hierarchical representation of how a system's main function is achieved through various alternative means. Each function within the tree is formulated to be solution-agnostic, allowing for flexibility in selecting the appropriate means to achieve it.

2 Example: Aircraft System

In this section, we will illustrate the concept of a Function Means Tree using an example of an Aircraft System.

2.1 Main Function

The main function of an aircraft system is to **Achieve Flight**.

2.2 High-Level Means

- **Airplane**: This represents the primary means to achieve flight in the aircraft system.

2.2.1 Aircraft Subsystems

- **Aircraft Propulsion**: Responsible for generating thrust for flight.
- **Aircraft Control**: Handles flight control and navigation.
- **Aircraft Structure**: Comprises the fuselage, wings, and landing gear.
- **Aircraft Systems**: Includes avionics, hydraulics, and fuel systems.

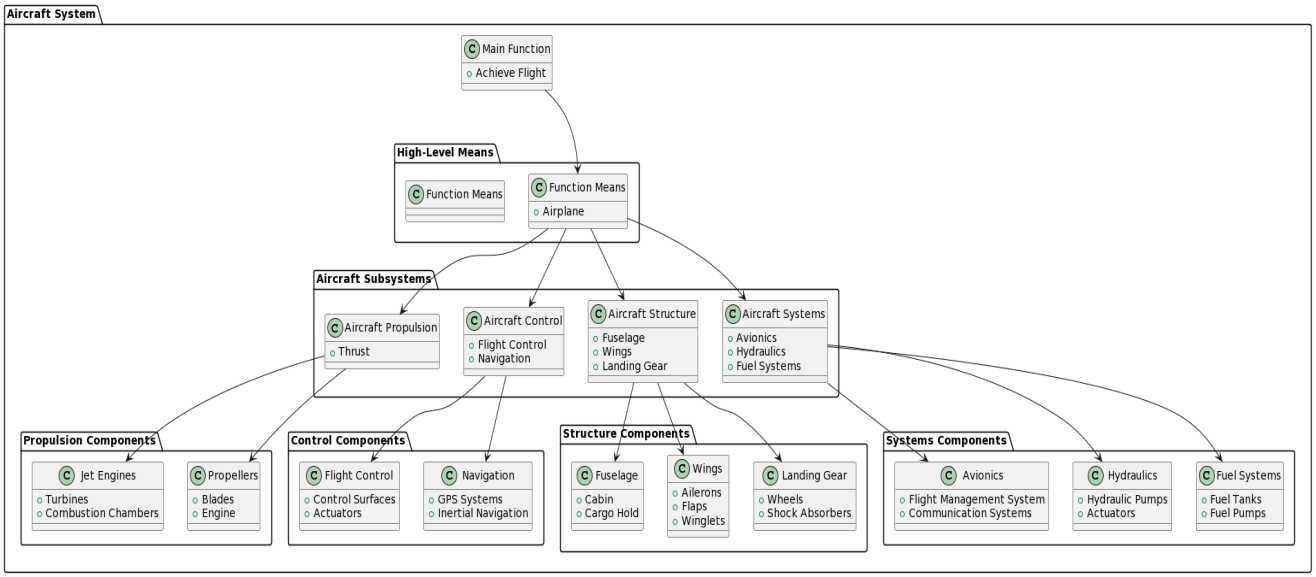

Figure 1: Function Means Tree for the Aircraft System

3 Morphological Matrix for Aircraft Components

In this section, we present a simplified Morphological Matrix for the components of an aircraft. The Morphological Matrix is a structured method for systematically generating and analyzing various combinations of components or features in the design of an aircraft.

Propulsion	**Control**	**Structure**	**Systems**
Jet Engines	Manual Control	Aluminum Fuselage	Avionics
Propellers	Autopilot	Composite Fuselage	Electrical Systems
Turboprops	Fly-by-Wire Control	Titanium Fuselage	Hydraulic Systems
Electric Motors	Hydraulic Control	Carbon Fiber Fuselage	Fuel Systems
		Steel Fuselage	Oxygen Systems
		...	...

Table 1: Simplified Morphological Matrix for Aircraft Components.

This matrix allows you to explore various combinations of components for different aircraft designs. You can expand and customize this matrix to include more components and features for a detailed system analysis.

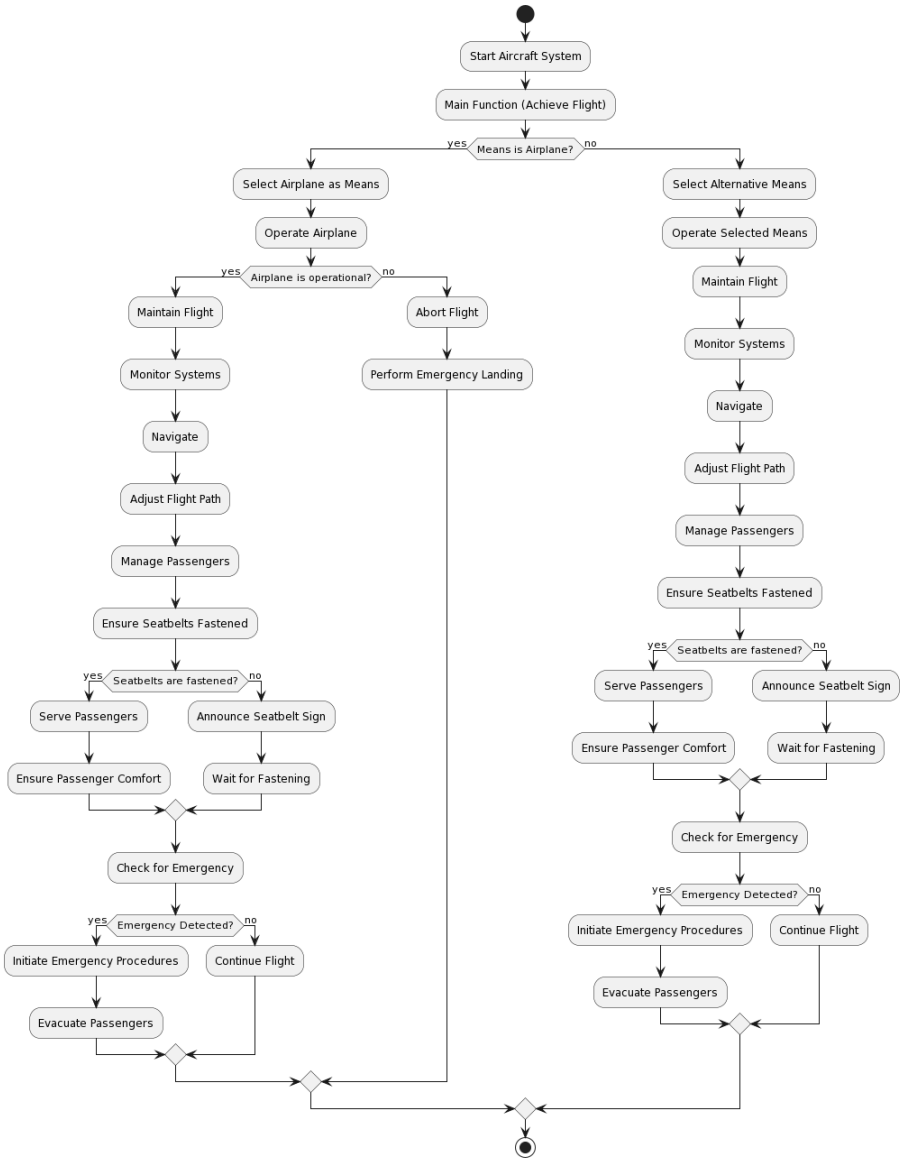

Figure 2: Activity Diagram for the Aircraft System

4 Conclusion

A Function Means Tree is a valuable tool for system analysis and design. It allows for a clear and structured representation of how the main function of a system is achieved through various alternative means, making it an essential tool in system engineering and project planning.