Combustion Potential

Behavior of Fire in an Engine Nacelle

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Federal Aviation Administration

Objective

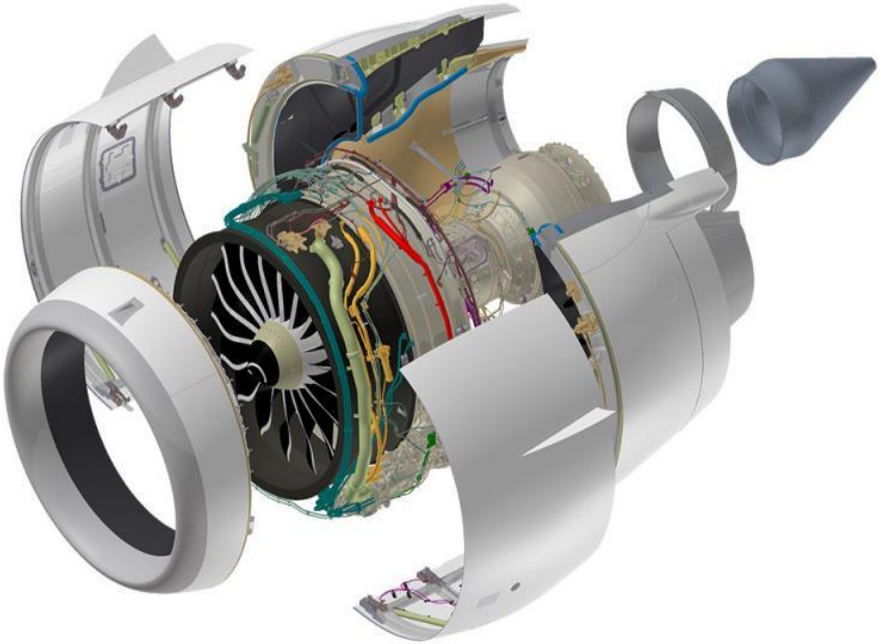
- **To understand the effects that dimensions, fuel flow and air flow have on combustion inside of an engine nacelle type compartment.**

- **The data acquired from this project will be used to provide an expeditious and small-scale validation method for CFD fire modeling.**

Background

- Fire tests are an integral part of the process of designing a fire safe environment

- Fire modeling allows the analysis of specific fire dynamics at a significantly reduced cost



View Of Engine Components

Left Cowl

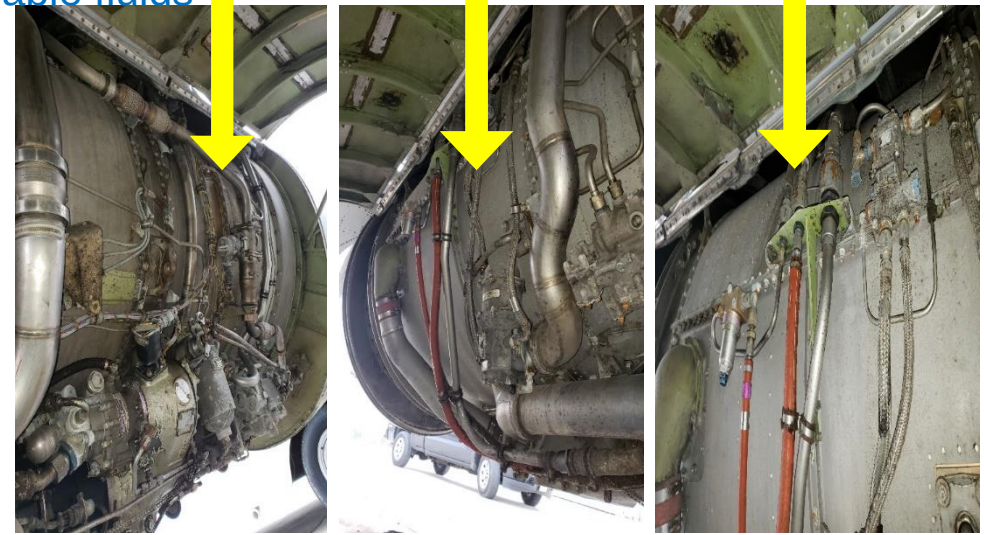
Left side of engine

lines carrying flammable fluids

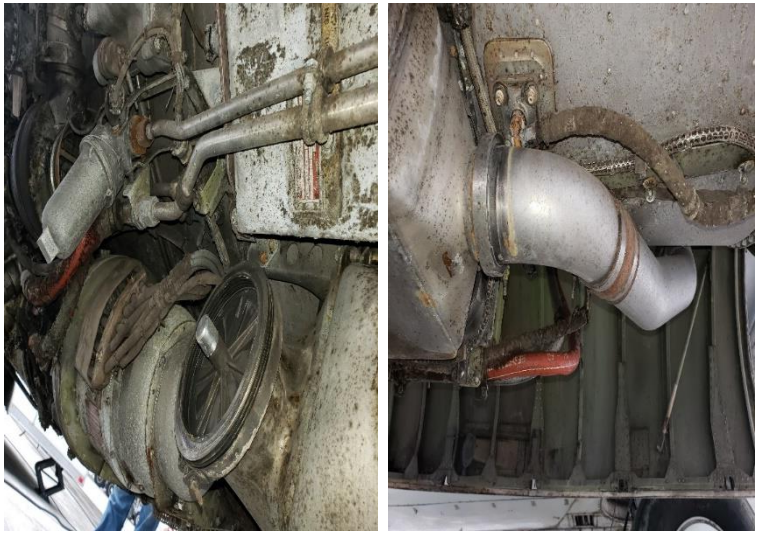
View Of Engine Components

Right side of engine

lines carrying flammable fluids



Bottom of engine

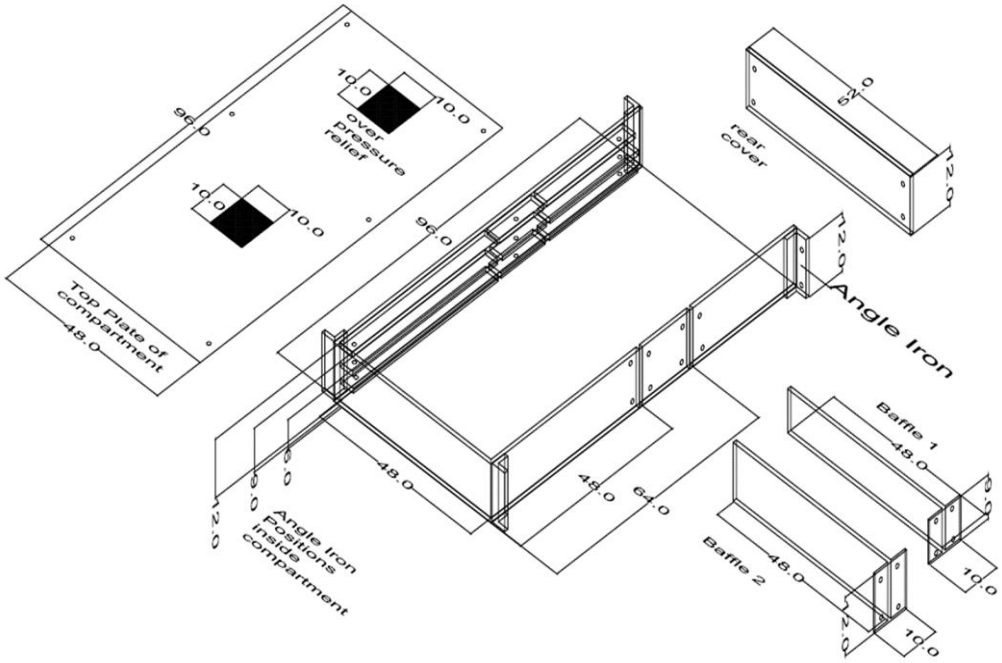


Method

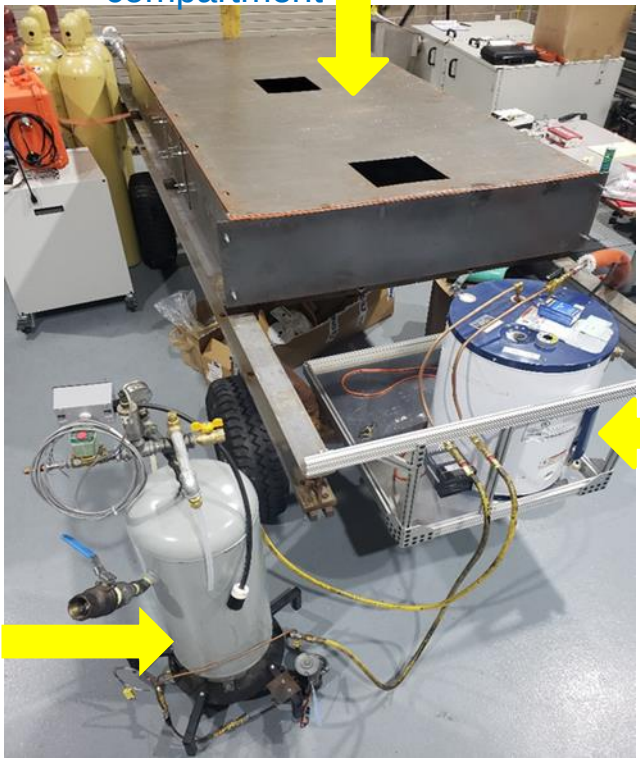
- Fabricate a compartment
- Assess the effect of fuel (JP-8) delivery
- Assess the effect of air flow
- Assess the effects of the compartment dimensions

Compartment Design

- Adjustable rectangular compartment to simulate the variable space in the engine's nacelle
- Maximum dimensions of 96" x 48" X 12"
- Minimum dimension of 48"X 48" X 6"
- Pressure release panels at the top of the compartment

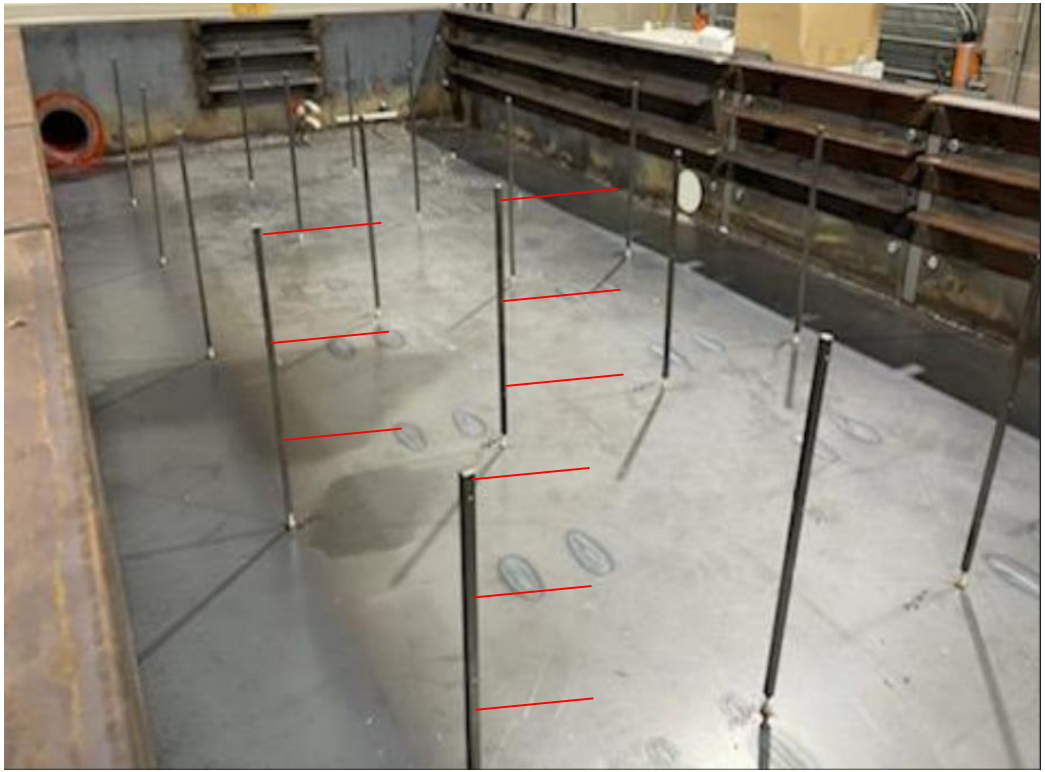


Compartment Design

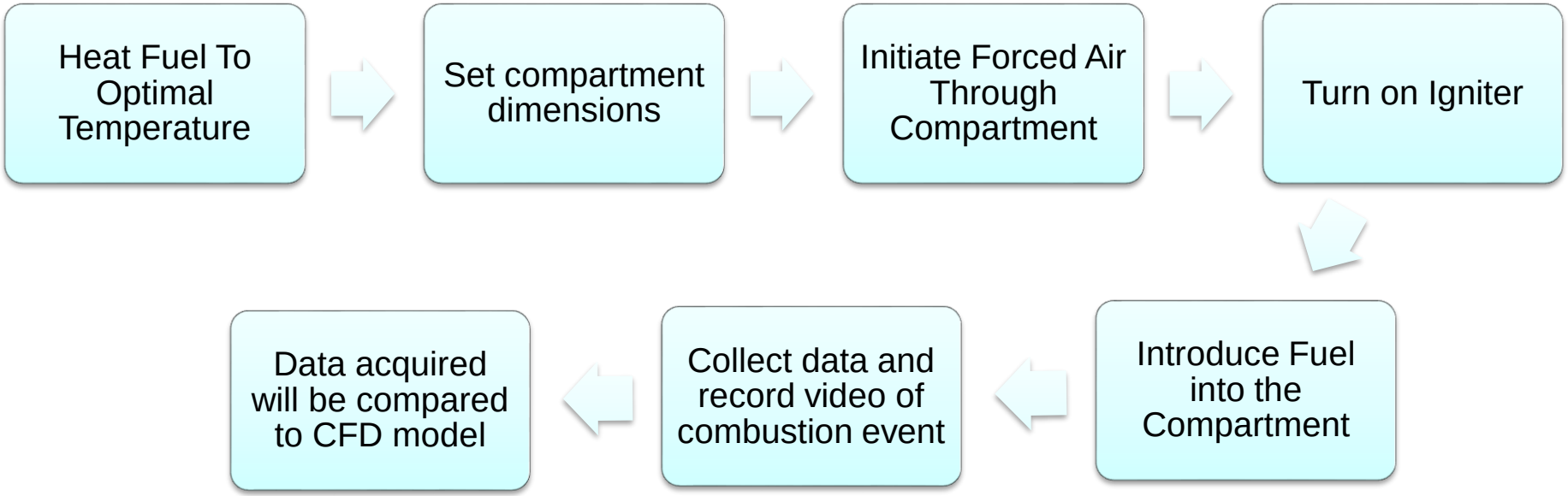


Recordable Data

- Fuel flow GPM
- Fuel temperature °F
- Air flow CFM
- Oxygen levels %
- Thermal mapping
- Flame self extinguishment time



Test Path



Summary

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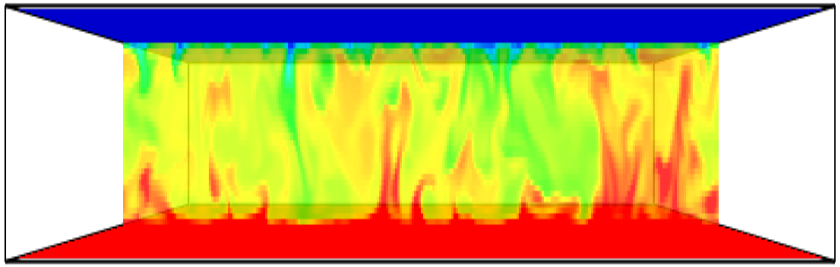

This research should provide small-scale test validation for CFD modeling of fire in a engine nacelle compartment

Acknowledgements

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Questions?

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