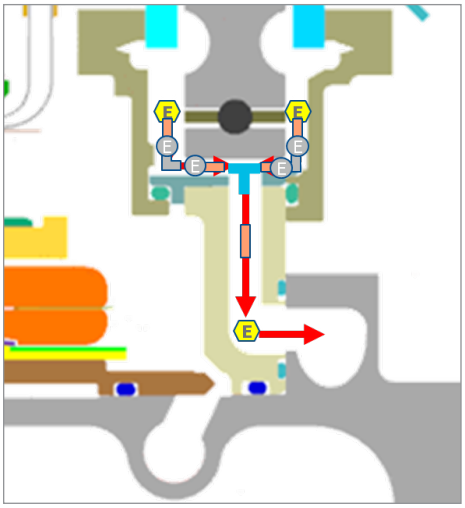
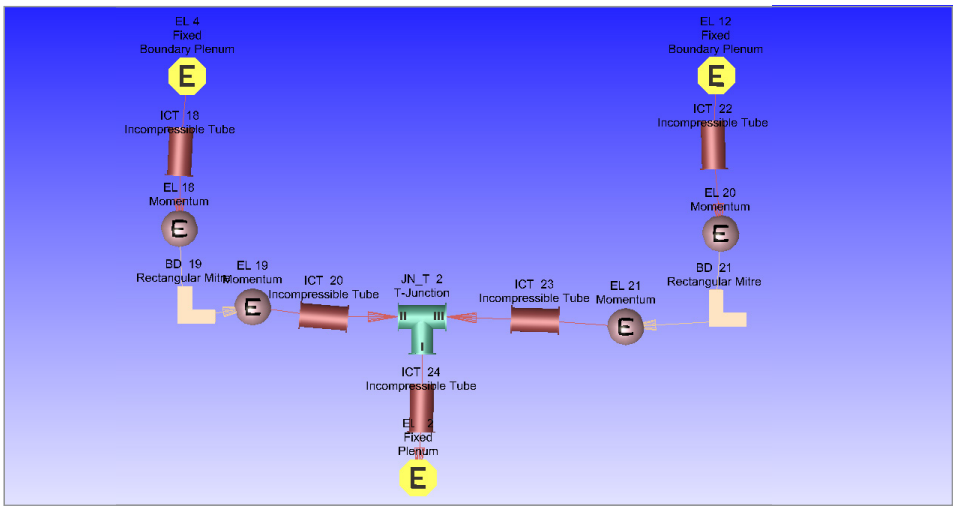
Altair | Partner Alliance

GE Aviation's Systems Business uses GE's Flow Simulator to Model Aircraft Backup Generator





Company Overview

GE Aviation's Systems business designs and produces systems critical to the interface between jet engines and the airframe onto which they are installed. Although Systems works closely with GE Aviation, the products it produces are differentiated enough that many of the typical design tools used for engines are not ideally suited for the accessories produced by Systems. However, by leveraging the experience of GE Aviation and its digital tools team, tools such as Flow Simulator are able to be used by Systems to design and analyze subcomponents that are critical to producing next-gen generators and electrical systems.

Challenge

GE Aviation Systems business has been challenged with providing a backup generator (BUG) to provide electrical power to a new aircraft in the event of multiple failures of other systems. This generator must mount onto a newly designed engine to receive mechanical power, but maintain independence from the engine to ensure functionality. To do so, the BUG has its own oil network, pump, and sump to provide lubrication and cooling to the electromagnetic components and bearings in the generator.

This lubrication system relies on a gravity drain to return the oil from a bearing cavity to the onboard sump where the oil pump is located. After some testing and late-stage redesigns, the team needed to be sure that the drain was adequately sized to allow for passage of the worst-case level of oil flow so that oil does not build up and cause excess heat generation or any other sinister effects within the bearings. Due to the constraints on size and program timing, an analytical approach was desired to determine the capability of the current drainage passage network and the minimum size that will be required.

Solution

A tool with enough flexibility to quickly and accurately model a new system along with redesign iterations was required. Flow Simulator quickly proved to be the correct tool for the job for the following reasons:

1. Its graphical user interface (GUI) allowed for a quick identification and setup of the complex network of tubes, bends, junctions and plenums.
2. The elemental "building block" style setup allows for each element to be linked appropriately and automatically accounts differences in size, shape, pressures, and flows from a number of different branches in one model.
3. Its results were validated with proven excelbased tools used throughout GE Aviation.
4. The system contains features which allowed for evaluation of the geometry using multiple configurations. We were able to test the drain's capability using a pressure difference in the inlet and exit cavity as well as a gravity-fed elevation approach.
5. Once an initial model is built, design iterations could be tested rapidly for a wide range of pressures, temperatures, and geometries.

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Keywords: GE, Altair Partner Alliance, Flow Simulator, GE Aviation, Generator, Aerospace

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