CUSTOMER:
Trex Enterprises

INDUSTRY:
Defense Electronics

PROJECT NAME:
Design and Analysis of an Optical Imaging Platform

CUSTOMER LOCATION:
San Diego, California

OVERVIEW

Trex Enterprises was contracted to develop a prototype generic Laser Hazard Detection System (gLHDS) for use on a UH-1 Huey helicopter under a very tight schedule. The system is designed to detect small cross-section hazards, including power lines, from a distance of more than 200 yards away. Image clarity at the detectors is highly dependent upon the beam path length, the spot tolerances of the beam, and the amount of jitter induced during operation. Trex requested ATA's support in the design of a cooling system to maintain the temperatures of all sensitive electronics in the detector enclosure below allowable limits, and in the design of an isolation system to mount the detector to the helicopter. Trex was required to deliver a prototype less than 14 weeks after contracting ATA's support. ATA used an innovative combination of analysis tools and leveraged its strong expertise in both thermal and structural dynamic design and analysis to help Trex meet all requirements and schedule goals. The prototype design was validated through successful testing mounted on a helicopter.

ATA SUPPORT INCLUDED:

▷ Internal and external coupled fluid/thermal analysis of the gLHDS—greatly simplified the problem by decoupling the internal and external fluid/thermal analyses to speed up design iterations.

▷ Designed flow baffles to maximize flow over hot components.

▷ Carried out thermal testing of critical components to determine thermal properties (conductivity) and to correlate thermal analysis results.

▷ Completed analysis of four major cooling system configuration designs in four weeks, including minor iterations on each design.

▷ Carried out isolation system design trade study (isolator type, number of isolators, isolator locations) using Excel and MATLAB.

▷ Carried out dynamic transient analysis of full system under MIL-STD-810F helicopter vibration environment and validated display clarity (jitter) based upon dynamic response.

▼ Cooling system design was optimized through coupled fluid/thermal analysis

"ATA's ability to work in a highly integrated environment, where design concepts could be quickly evaluated against all requirements, was critical to the success of this fast-paced program."

George Houghton
Senior Engineer
Trex Enterprises

▲ Dynamic transient analysis of full system used to assess jitter

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