

Design and Analysis of an Optical Imaging Platform

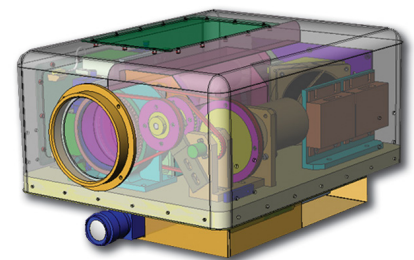


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Case Study

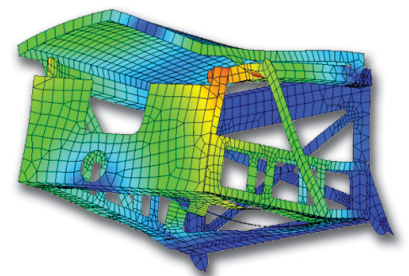
OVERVIEW

Trex Enterprises was contracted to develop a prototype generic Laser Hazard Detection System (gLHDS) for use on a UH-1 Huey helicopter on 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. Image clarity depends on the beam path length, the spot tolerances of the beam, and the amount of jitter induced during operation. Trex requested ATA's support on the design of a cooling system to maintain the temperatures of all sensitive electronics in the detector enclosure below allowable limits and also on the design of a vibration 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. The prototype design was validated through successful testing mounted on a helicopter.



TASKS PERFORMED & KEY OUTCOMES

- Greatly simplified the problem by decoupling the internal and external fluid/thermal analyses to speed up design iterations.
- Designed effective flow baffles to maximize flow over hot components.
- Carried out thermal testing of critical components to determine conductivity and to correlate thermal analysis results.
- Completed analyses of four major cooling system configuration designs in four weeks.
- Carried out isolation system design trade study 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.



Dynamic transient analysis of full system used to assess jitter

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