Lytro Wireless Camera

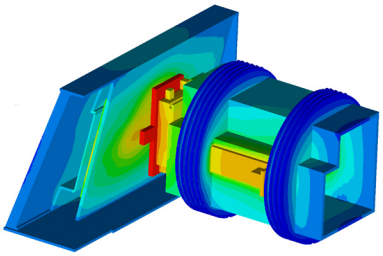
Design Case Study

Introduction

When Lytro wanted to introduce its next generation of wireless camera, they turned to Aavid, Thermal division of Boyd Corporation, for assistance. Aavid's expertise in thermal management, FEA analysis, package layout and design feasibility studies allowed Lytro to launch the new camera in a timely and cost-effective manner.

The Challenge

The camera's feature set - a 4 inch touch screen, image sensor, variable power (depending on operating mode) PCB, solenoid actuated mechanical shutter and a high zoom lens with accompanying motor control board - required a thermal solution that would ensure quality photographs and long product life.

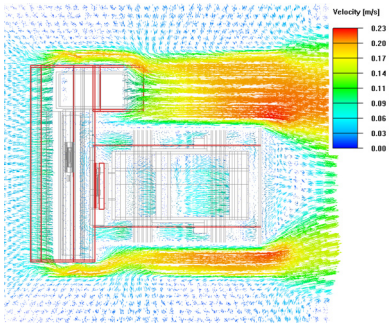


Thermally, the most critical component was the image sensor, as its operating temperature directly affects the quality of the captured photographs. Keeping temperature deviations inside the camera body at or below the image sensor's limit was the primary focus of the thermal solution.

Other PCB components, such as the high capacity battery and chip subcomponents also contributed to internal temperature increases. Exterior surface temperature (touch temperature) had to remain under target limits during all operating states of the camera.

The Solution

The Aavid Team created a highly detailed CFD model of the existing camera concept. This model's parameters were fine-tuned until they reflected the same results from actual lab tests.

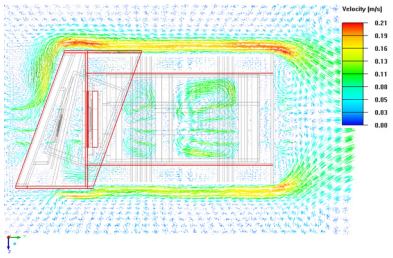


With a verified CFD model established, Aavid was able to suggest various internal layouts that could improve thermal performance. Some methods that were employed were:

- Isolating the high power components from the critical components
- Optimizing the thermal path to transfer heat away from critical components
- Material selection and finish of the camera body to increase radiant heat transfer to the outside environment

The Deliverables/Results

Aavid provided Lytro with reports detailing the expected image sensor junction, chip, battery and touch temperatures for various operating conditions. All fell below specified limits.



By creating a thermal pathway to the rear side of the enclosure (previously dumped elsewhere), overall thermal performance was increased.

Aavid 's Team found that there was significant thermal performance gained by placing certain high power components away from each other and away from critical components on the PCB. An optimized PCB layout based on these discoveries was suggested to the customer.

It was shown that the gravity vector did not significantly alter thermal results; therefore the camera was able to operate in any orientation without negative thermal impact.

Using the data and reports of Aavid's findings, Lytro approved the proposed changes and successfully launched their next generation of wireless cameras.