DESIGN CASE STUDY

# AUGEMENTED REALITY GLASSES

## PROJECT DETAILS

*Customer:* **Osterhout Design Group**

*Application:* **Augmented Reality**

*Technology:* **Materials & Assembly**

*Industry:* **Wearables**

*Location:* **San Francisco, California, USA**

## THE DESIGN CHALLENGE

Osterhout Design Group (ODG) out of California has paved the way for wearable technology in America. Recently ODG has developed the world's most advanced head worn computing system: augmented reality smart glasses. The wearable device involves an array of PCB and electronics with multiple antennas which were initially sealed into a plastic housing.

Thermal testing of the device revealed high temperature issues on the internal components and the exterior surfaces that touch the body. ODG had initially designed a small heat sink for the CPU but its effectiveness in solving thermal issues was unclear.

The challenges of creating a safe and comfortable exterior temperature, facilitating signals to the antennas, and keeping the inside devices cool were presented to the team of Aavid, Thermal division of Boyd Corporation. Within a stipulated time, we were to predict and improve the thermal performance of the glasses in a natural convection environment with plastic casing material over the antenna area.

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## THE AAVID SOLUTION

Aavid created a CFD model of the existing device and fine-tuned the model parameters to match thermal testing data that was provided. The top aluminum spreader was modified to enhance radiative and convective heat transfer by increasing its effective surface area. Next the conductive heat transfer throughout the device was optimized to reduce temperature gradients between the hot spots and exterior surfaces. Strategically placed graphite sheets were added to spread the heat while insulating material was used to isolate heat from surfaces that will be in contact with the skin of the user.

To improve the aesthetics of the device, the aluminum spreader was mounted to the PCB suing bosses and numerous locations. The PCB itself was used as a part of the thermal system which enhanced performance. Additionally, the gap between aluminum spreader and critical devices on the PCB were filled using thermal interface material.

The baseline simulation results closely met the prototypes thermal test data. The top aluminum spreader was effective in removing heat from the systems. There was significant improvement to the aesthetics and usability by introducing other conductive and insulating materials such as pourable thermal interface material, graphite, foam, and the PCB itself.

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