DESIGN CASE STUDY

DRONE DELIVERS WI-FI ACCESS

PROJECT DETAILS

Customer: **Undisclosed**

Application: **Wi-Fi Delivery**

Technology: **Flow Analysis**

Industry: **Robotics**

Location: **California**

THE DESIGN CHALLENGE

Drones are becoming increasingly useful to large corporations, military, and every day consumers across the globe. As technology advances these flying robots are utilized for a number of functions such as search and rescue missions, security surveillance, medical analysis, and in this case, internet access to remote areas. Drones pose their own set of thermal challenges. These are compounded when additional devices are added to supply internet capabilities to underdeveloped countries, often in rugged environments.

The company working to provide this access developed drones with internal components that include an array of power supplies, motors, and modems which dissipate heat inside an attached dome. On the underside of its circuit board an antenna is attached with a protective dome around it. Because the environment would be high in velocity, temperature, and altitude, there was some doubt as to whether that product design would succeed. This doubt caused the company to reach out to the Aavid, Thermal division of Boyd Corporation, to perform a thermal and flow analysis of the drone.

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THE AAVID SOLUTION

Although there are many components needed for mounting the electronics, these play no role in thermal and flow analysis and would only create mesh issues and make the computational time much bigger.

There were significant challenges to performing a flow only analysis of the entire fuselage such as high velocity and the change in fluid properties due to altitude. Additionally, turbulence solvers needed to be run and evaluated to ensure the success of the CFD analysis.

Upon completion of the CFD, the turbulence model was applied. In order for all pieces of the drone to be cooled properly, the model required a complex mesh – mostly due to the unbalanced ratio of fuselage size and thickness to the miniscule electronic parts. To further reduce the mesh count, hollow blocks were modeled for the components that contributed only to the flow obstruction.

From this juncture, Aavid was able to work with the customer to redesign the drone to accommodate the finding. On this project, flow analysis was actually more critical to evaluating and redesigning the device than thermal analysis. Both flow and thermal analyses are often crucial to design success and are recommended for any electronics that are being used in new and innovative ways in nonstandard environments, such as these drones.