

Electronic Equipment Room Layout and Ventilation



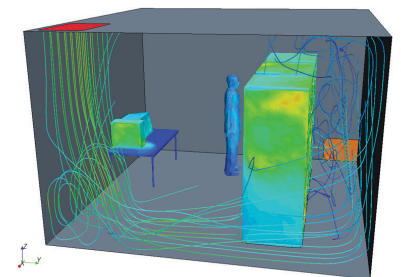
Case Study

PROJECT SUMMARY & KEY OUTCOMES

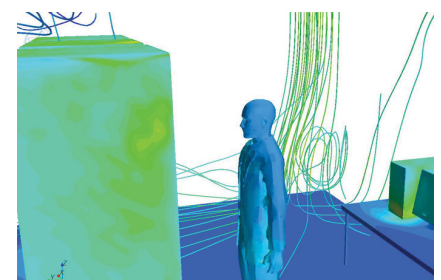
Designing the layout of electronic equipment room interiors and sizing environmental control systems can be complex tasks depending upon the amount of equipment and the demands of the environment. The goal of this project was to size the cooling system needed to maintain the electronic equipment in its cases at the required operating temperature as well as to assess the overall room temperature for human comfort. As the room may be occupied during operation, a single person was included as an additional heat source. The ceiling inlet and the floor outlet were defined as boundary conditions that could be resized easily and relocated if necessary. Known heat sources in the equipment racks were also defined as inputs to the simulation.

STAR-CCM+ analysis software was used to calculate airflow throughout the room and resulting equipment surface temperatures. Streamlines show the airflow and are colored according to velocity; red and blue indicate higher and lower velocity, respectively. Color contours on surfaces show surface temperatures for equipment; red and blue indicate high and low temperatures, respectively.

The simulation verified that there was sufficient space behind and between equipment racks for the selected cooling system to maintain the equipment within its temperature requirements and at a comfortable temperature for the personnel in the room. The streamlines also showed that the selected ventilation fan would not create a draft at the desk and that a diffuser would be beneficial to avoid recirculation of the airflow below the inlet vent and increase the flow across the tops of the cases.



Streamlines show flow from top left vent. Server racks, person, and computer table colored by temperature.



Temperature contours on the exterior of the equipment cases show hot spots caused by the interior electronics.