

# Simulation Helps Keep One of the World's Top Data Centers Cool

MECHANICAL ANALYSIS  
HVAC

## Design Challenge

CCG Facilities Integration Incorporated of Baltimore, Maryland, a leading consulting engineering firm specializing in mission critical facilities, used FloVENT to optimize the design of Dupont Fabros Technology's (DFT's) ACC4 data center in Ashburn, Virginia. The challenge was to design a system to cool the extremely powerful and hot computing and communications equipment occupying the data center while maintaining a Tier 4 level of functionality – the highest possible.

## Solution and Benefits

ACC4 is situated on 17 acres of land at the Ashburn Corporate Center in Loudoun County, Virginia. DFT considers ACC4 to be its prototype for future ground-up development projects and says that its flexible design and enhanced power and cooling capacity make it one of the leading data center facilities in the world. CCG began modeling the facility in the early stages of the design process so that they could provide feedback to DFT on the cooling efficiency of various cooling system configurations.

"We selected FloVENT as our modeling tool because FloVENT accurately models airflow through the fans and the raised floor so you can be sure that the simulation is accurate," said Margaret Sam Sheehan, Director of Mechanical Engineering at CCG.

CCG mechanical engineers have validated FloVENT models with multiple types of air handlers and obstructions above and below the raised floor and obtained measurements that matched CFD predictions within 1°F.

CCG used the FloVENT model first to evaluate different aspect ratios for the room. CCG engineers worked with the architects and the building owner to come up with layouts for the building that optimize the cooling efficiency while meeting the needs of the building's occupants. Another critical consideration was the height of the raised floor. The objective was to move the volume of air required to cool the facility while keeping the height of the raised floor as low as possible in order to minimize the cost of floor stands and concrete in the building. CCG specified a 48 inch raised floor in the ACC4 data center. Soon after completing this project, CCG designed the ACC5 data center which has a very similar design but was able to reduce the raised floor height to 42 inches.

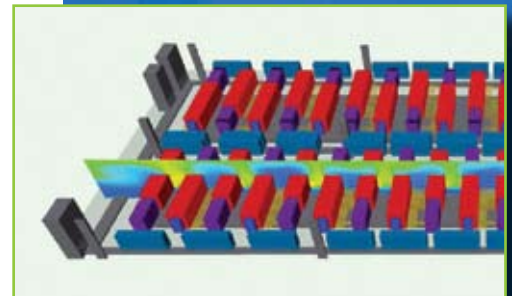
CCG evaluated a number of different computer room air handlers in both ACC4 and ACC5 with different building configurations. The most difficult performance challenge came in maintaining the IT equipment air inlets at safe temperatures in scenarios where some of the air handlers failed. CCG engineers validated the ability of the facility to operate safely (per recommended ASHRAE guidelines) with multiple air handlers shut down. This, in addition to other measures, such as providing thirty-two (32) 2.25 Megawatt diesel generators that will run the facility during a power outage, helped the building establish its Tier 4 functionality.

"ACC4 is now fully operational and all of the feedback has been very positive," Sheehan concluded. "The cooling system has performed without any hiccups."

## Customer Testimonial

*"FloVENT provided the ideal tool for optimizing the performance of ACC4 because of its ability to accurately model the room, the IT equipment and complete cooling system."*

Margaret Sam Sheehan  
Director of Mechanical Engineering  
CCG



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