DBC

Demand Based Cooling™

Harvard Pilgrim HealthCare

Cooling Efficiency Case Study

Engineered Cooling Infrastructure Management for Increased Cooling Capacity & Energy Savings

AdaptivCOOL®

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Project Summary

Harvard Pilgrim Health Care installed AdaptivCOOL's Demand Based Cooling Solution to maximize data center energy and cooling efficiency. Through AdaptivCOOL's patented redistribution and control of airflow, two of the data center's CRAC(computer room air conditioner) units were able to be put in hot standby for added redundancy. This was accomplished while keeping all equipment at ASHRAE(American Society of Heating, Refrigerating and Air-Conditioning Engineers) recommended specifications.

Requirements for the project:

- Add cooling availability and redundancy
- Reduce operating costs
- All equipment to be run within ASHRAE recommendations
- Install with no IT downtime or rack movement

Data Center Quick Facts:

- 3,870 Sq. Ft
- 110 Tons of Cooling Capacity
- 6 CRAC Units
- 11" Floor Depth

Harvard Pilgrim's data center in Quincy, MA is split between a raised floor area of approximately 2,500 sq. ft. and a solid floor area of around 1,500 sq. ft. AdaptivCOOL performed several upgrades to make the air distribution and control in the room as efficient as possible.

Phase 1: Thermal Study

AdaptivCOOL sent its team of engineers to collect highly detailed information on server specs, cooling infrastructure, and thermal variables. Inspection of the under floor and return paths were noted and reported to AdaptivCOOL's computational fluid dynamics(CFD) engineering team for analysis. Multiple CFD analyses found the best implementation of the Demand Based Cooling system as well as other best practices. In addition, a multitude of failure scenarios were tested and engineered into the DBC system logic.

Phase 2: Improve Site Cooling Dynamics

Elimination of cold and hot air streams mixing together was solved by the installation of blanking panels and air dams. Since the control room of the data center was also situated above the same raised floor plenum that is used for cold air supply, it was walled off to increase the pressure and thermal efficiency under the floor.

AdaptivCOOL then repositioned existing perforated tiles and installed a network of high efficiency variable speed air movers, temperature sensors, sensor hubs and controllers.

The under floor air mover's eight fans respond to four temperature sensors mounted to the racks and provide as much cooling as needed for that particular zone's thermal needs.

A return air duct system with thermostatically controlled air movers were also installed to pull air from the hot aisles directly to the CRACs. In the solid floor room, thermostatically controlled overhead air movers were installed to pull cold air to different parts of the room as needed.

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Phase 3: Commissioning

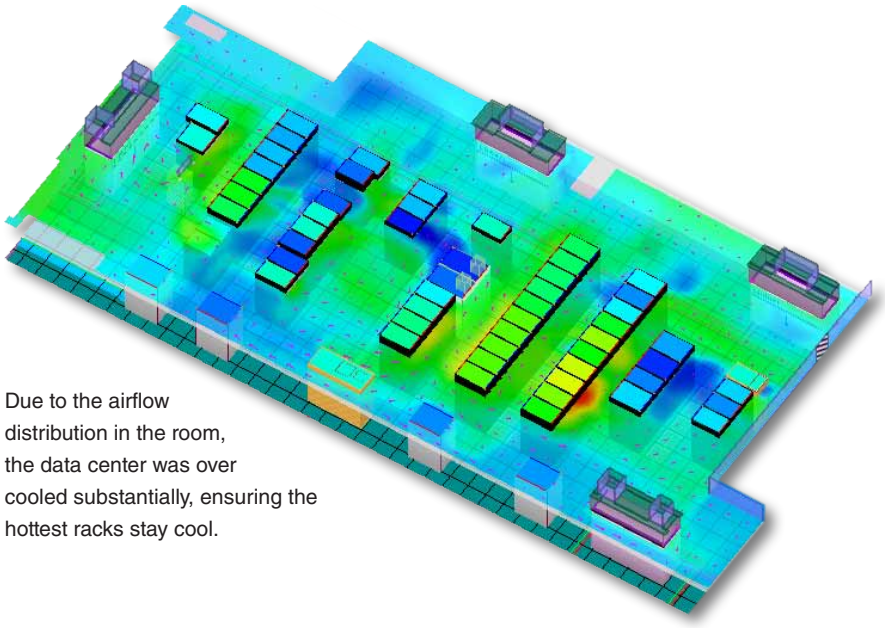
The Demand Based Cooling solution includes the installation of a central control system(Cooling Resource Manager) to manage the CRAC units, temperature sensors, under floor and overhead air movers. In addition to communicating with popular BMS systems, the Cooling Resource Manager (CRM) allows data center managers visibility of real-time data, including rack temperatures, fan speeds, and status of equipment. The CRM continually responds to temperature changes in the room including CRAC failures by automatically adjusting the speed of the networked airmovers to help the particular zone in trouble and turn on CRACs if needed. Once installed a battery of tests are performed and CRAC failure logic verified. In addition, the CRM has an alert system that will notify Harvard Pilgrim's staff via email or text of any thermal issues in the room

Results

Demand Based Cooling by AdaptivCOOL was able to provide Harvard Pilgrim with two CRACs of cooling redundancy while keeping all equipment within ASHRAE recommended standards. This led to over $80,000 a year in data center energy savings, and qualified Harvard Pilgrim for over $90,000 in utility incentives.

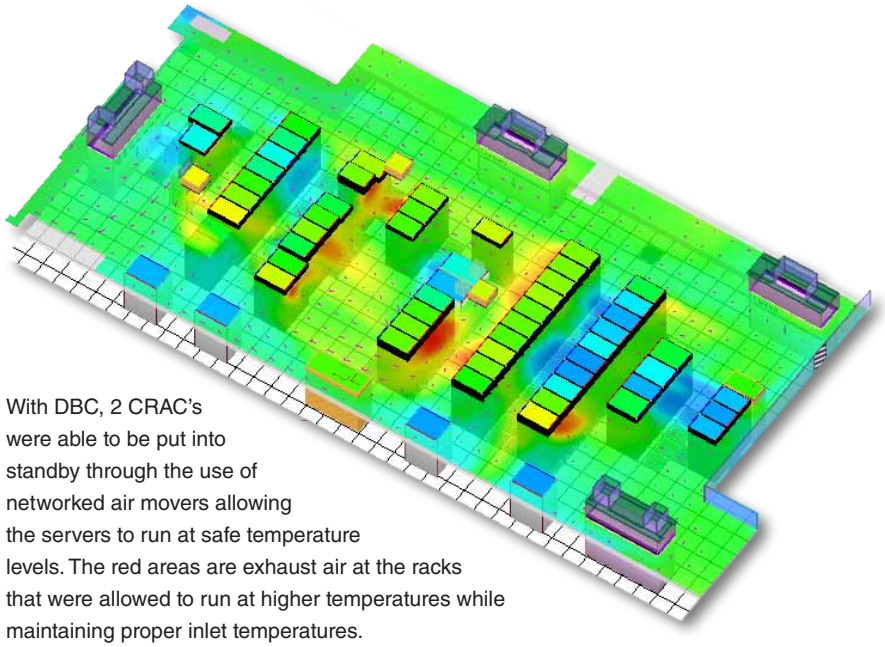
- 35 Tons of Redundancy (2 CRACs)
- 505,715 kWh Annual Savings
- $80,000+ saved a year in energy
- $92,711 in utility incentives
- All Racks Operating at ASHRAE Standards
- Simple Payback of 1.3 Years

Before:



Due to the airflow distribution in the room, the data center was over cooled substantially, ensuring the hottest racks stay cool.

With Demand Based Cooling:



With DBC, 2 CRAC's were able to be put into standby through the use of networked air movers allowing the servers to run at safe temperature levels. The red areas are exhaust air at the racks that were allowed to run at higher temperatures while maintaining proper inlet temperatures.

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