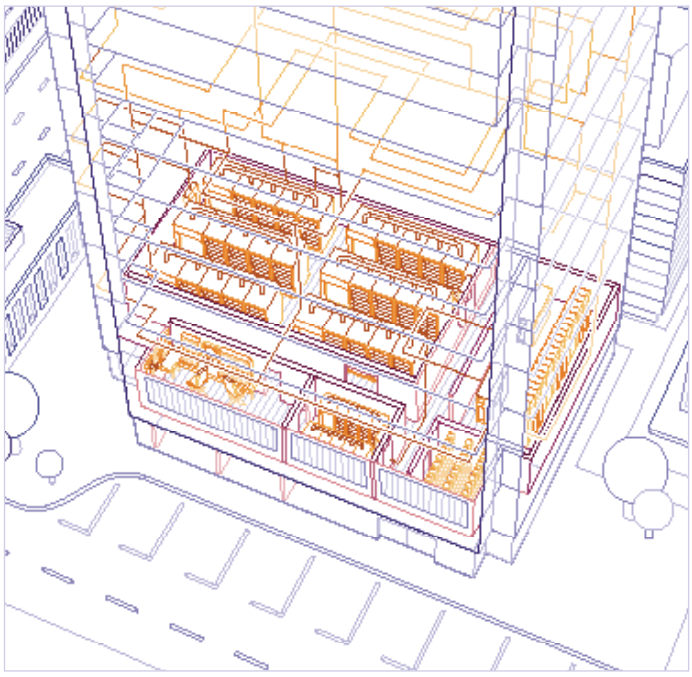
Why cooling optimization isn't complete without variable frequency drives

Cooling can account for 44% of a data center's energy consumption, according to a recent report in *The Data Center Journal.*



That's why implementation of DCIM (Data Center Infrastructure Management) or cooling management systems to optimize the efficiency of the cooling system has become a top agenda item throughout the industry.

But, according to Caroline Barón, Commercial Key Accounts Manager for Low Voltage Drives at ABB, if these implementations don't include a corresponding upgrade to certain mechanical components of the cooling system, the result can be disappointing and chronic underperformance. Here's why:

One goal of an optimized system is to minimize energy losses associated with controlling and distributing cooling throughout the data center. Traditional methods of controlling the cooling process have relied on constant-speed motors to run fans, pumps and other related equipment. Automatically controlled dampers and valves are then used to restrict the amount of cooling actually delivered to maintain the desired temperature in the racks.

Clearly, a significant amount of energy is wasted by running cooling fans and pumps at full speed while adding restrictions to the flow they produce.

So energy consumption can be reduced by minimizing the need for these restrictions. This can be accomplished by instead controlling the speed of the motors – using only as much energy as is required to produce the required flow at any time. That's the role of Variable Frequency Drives (VFDs).

VFDs replace the function of a standard on/off motor starter, and provide precise control of motor speed. They efficiently accomplish this by accurately adjusting the frequency and voltage of AC provided to the motor.

VFDs are designed to control standard AC induction motors, allowing existing data centers to be retrofitted with modern, efficient temperature control systems.

Another goal of an optimized cooling system is to reduce costs by allowing the data center to maintain a higher operating temperature. “Studies have demonstrated that each degree Celsius of increase in the center’s operating temperature can provide a 4 percent reduction in cooling costs,” Barón says.

But raising the operating temperature to capture these efficiencies leaves little room for error. So careful monitoring and a high level of system intelligence, communication and control are required to maintain to ensure temperatures don’t reach levels that can damage of IT equipment.

“Whenever a data center implements a cooling management or DCIM system, a VFD is an essential,” Barón says. “VFDs are controlled electronically, which means they can be integrated into automated control systems, allowing faster reaction time and more precise control than a mechanical HVAC control system can provide.”

Retrofitting a cooling system with VFDs reduces energy costs by increasing the efficiency of delivering the cooling, and by allowing the data center to operate at a higher ambient temperature. The smooth acceleration and deceleration provided by VFDs also minimizes mechanical stress in the system, thus reducing maintenance costs.

The most common reason why VFDs get overlooked during a cooling management or DCIM implementation is cost. As a result, in an effort to reduce short-term capital investment, the system’s ability to work as promised is compromised.

This is an expensive mistake. Barón indicates that the retrofit of VFDs into a data center’s cooling system typically pays for itself within two years; less in regions with high electric costs.

Barón emphasizes the importance of working with an experienced partner, not just to install and integrate the VFDs into the control system, but also to identify and qualify for available tax credits that increase ROI.

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