CyrusOne Case Study

About CyrusOne®

CyrusOne is a world-renowned enterprise data center provider that offers 40 data centers across the U.S., Europe and Asia with a three million-plus square feet of total net rentable space. Since 2001, the company has been designing, building and operating certified, highly secure and reliable multi-tenant data centers for mission-critical IT environments. As a result, over the past 15 years, CyrusOne has grown to become the third largest data center provider in the U.S. with over 925 customers worldwide. Global firms, Fortune 20 corporations and companies of all sizes seeking colocation trust CyrusOne to provide scalable, reliable and secure data centers and connectivity solutions to meet their ever-changing needs.

PANDUIT®

infrastructure for a connected world

Company
CyrusOne

Country
United States

Industry
Data Center Solutions

Business Challenges
To offer customers a more cost-effective, energy efficient data center by implementing a state-of-the art automated monitoring system.

Panduit Solution
The Active Control™ feature of the SynapSense® SynapSoft® Software, a modular cooling platform, is a technology that provides energy savings and increased efficiency by continuously aligning cooling capacity with changes in IT load.

Business Benefits
A data center infrastructure management system that increases cooling and operational efficiencies while providing CyrusOne with the ability to exceed power and cooling standards for its customers.

Creating an Energy-Efficient, Automated Monitoring System for Temperature and Humidity at a World-Class Data Center

Panduit SynapSense® Solution helps CyrusOne improve cooling efficiency while increasing operational effectiveness and decreasing energy costs

Business Challenges

CyrusOne's Austin Data Center II is one of 11 locations in Texas alone: located in the Met Center business park, this 70,000 square-foot facility is the first of an optional four-phase, 288,000 square-foot data center campus. Since it is conveniently located just seven minutes from Austin-Bergstrom International Airport, it is in an ideal location for production and co-production server environments for national, international, and local companies.

To optimize Data Hall 1 within the data center (a 20,000 square-foot facility), CyrusOne needed to monitor temperature and humidity for its customers' SLAs, and to conserve as much energy as possible. Even though the data center had been built only a few years prior, CyrusOne felt that it could make its state-of-the-art facility even better.

"Panduit's SynapSense® helps us improve efficiency and sustainability. It provides our customers with visibility into what's going on with their servers and is a key part of our SLAs. Plus, we recover cooling capacity that helps us to realize additional operational and power efficiencies."

Jason Dingess
Program Manager, Datacenter Systems, CyrusOne

Strategic Objectives

CyrusOne's main goals for Data Hall 1 at the Austin Data Center II site were to provide environmental monitoring and optimize the space by improving operational reliability and energy savings. By doing this, CyrusOne could achieve its end goal, which was to lower its operating costs while exceeding power and cooling standards for its customers.

In addition, the data center was equipped with 13 chilled water cooling units that were not working at their highest efficiency. This needed to be addressed as it was causing the other 11 units to work at a faster rate, therefore burning more energy.

Panduit Solution

CyrusOne chose the SynapSense® Active Control™ feature to help achieve their goals. The Active Control™ feature is a technology that provides energy savings and increased efficiency by continuously aligning cooling capacity with changes in IT load. Its granular deployment of wireless sensors measure server inlet temperature and sub-floor pressure differential to manage computer room air handler (CRAH) return temperature set points and variable fan speeds. This unique approach optimizes cooling capacity and saves a great deal in cooling costs by minimizing the fan energy needed to meet server CFM and ASHRAE requirements.

After conducting a careful and thoughtful assessment of the data center, the Panduit team first turned on the two Stulz units which had not been in use. This helped prevent air leaks in the sub-floor and caused the other units to run at a slower rate. Then they installed and ran all of the 13 chilled water cooling units with the Active Control™ feature and replaced 63 perforated tiles with solid floor tiles, which allowed them to raise the sub-floor pressure and lower the fan speeds.

The Active Control™ feature works alongside the existing Computrols Building Automation System (CBAS). Because CBAS was already wired into the data center's Stulz units, communicating via Modbus, Panduit was able to streamline the process by sending its control set points to CBAS and having CBAS pass the set points to the Stulz units. This setup left all the existing BMS functionality in place while providing another layer of *(continued)*


CyrusOne

Panduit Solution (continued)

redundancy should the Active Control™ feature experience downtime for any reason. Because the Active Control™ does not make any control decisions based on humidity, the humidification and dehumidification settings on the Stulz units were disabled. This ensures that the Stulz units do not override the Active Control™ fan speed set points by going into dehumidification mode. A Stulz representative was onsite to make any necessary changes. At the same time, he also increased the fan speed and valve position limits. Initially, the fan speeds were limited to 60-80% and the valves from 25-100%. Today, the limits are 50-100% and 0-100%, respectively.

The Active Control™ feature uses two redundant control servers, with only one being active and issuing commands. If the primary server fails or loses communication, the second server will take over seamlessly with no interruption to the control system. If the Active Control™ loses communication to CBAS for longer than 15 minutes, CBAS will take control of the Stulz units and hold the last set points received from Active Control™ until communication is restored and an operator issues a command to relinquish control back to Active Control™. If the Stulz units lose communication to both CBAS and the Active Control™, they will default to their own local settings, which are a 70-degree Return Air Temperature (RAT) set point and 80% fan speed.

As for environmental monitoring, Panduit installed a number of sensors throughout the data center's cabinet, including temperature sensors in both the front and back as well as humidity and pressure sensors. Panduit also installed CRAH nodes that measure the supply and return temperatures as well as the return air's relative humidity. The following products represent the solution that Panduit deployed:

- 178 SynapSense® Wireless Mesh ThermaNode™ EZ sensors consisting of one temperature sensor in the front of the cabinet and one sensor in the rear of the cabinet
- 25 SynapSense® Wireless Mesh ThermaNode™ EZ-H sensors which are the same as the above but have an additional humidity sensor in the front of the cabinet
- 44 SynapSense® Wireless Mesh Pressure Nodes measure the static differential pressure in the sub-floor
- 13 CRAH wireless mesh sensors that measure supply and return temperatures as well as return air relative humidity
- 3 SynapSense® Wireless Mesh Gateways

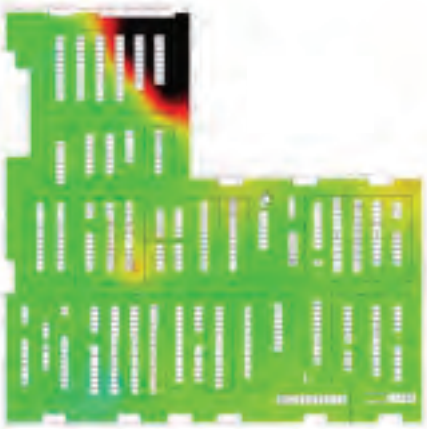
Business Benefits

Before Panduit implemented the Active Control™ feature, there were 11 CRAH units running with an average fan speed of 73%, all with return air temperature set points of 70°F. The two fan units that were turned off were not sealed, and cold air from the sub-floor was blowing back into the return plenum. After implementing the Active Control™ feature, all 13 fans were running with an average speed of 62%, which brought the power used down from 64.3kW to a startling 37.9kW. This is especially impressive since the 64.3kW accounted for 11 out of 13 fans working, while the 37.9kW is representative of Panduit turning on the two fans that were turned off, bringing the fan total to 13.

At the start of the project, the average rack inlet temperature in the data hall was 67°F and the average under-floor pressure was slightly under 0.030 inches of H_2O. Panduit set the target point for the rack inlet temperatures at 78°F and the control system increased the return air temperature (RAT) set point to meet this inlet temperature, since the majority of the rack inlet temperatures were below recommended values. Today, CyrusOne is experiencing a 2-7°F increase in the RAT set points throughout the data hall, with the refrigeration power decreased to 137.4kW from 149.9kW. In addition, the floor pressure is perfectly balanced.

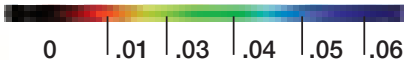
LiveImaging™ Pressure Map, Pre/Post Active Control, Pressure

Before



After

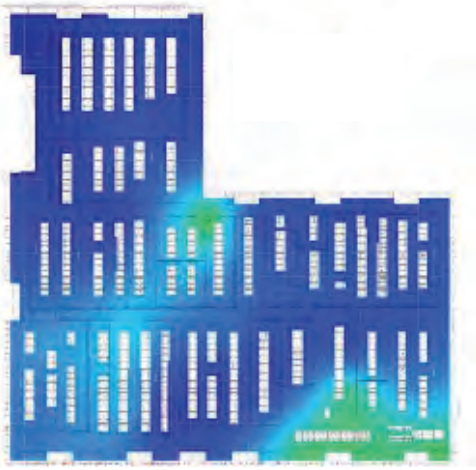
Map Legend of Pressure Differential in Inches of H_20



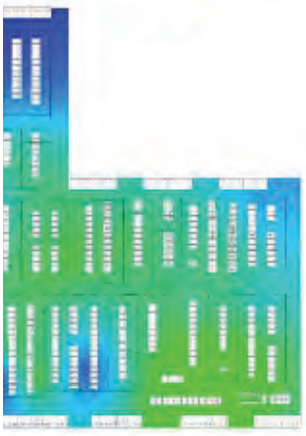
After optimization and implementation of the Active Control™ feature, there was a decrease in fan speeds over all 11 units that were previously on, even though the average floor pressure in the data hall increased (see Figure 1). There was also a 2-7 °F increase in the return air temperature (RAT) set points throughout the data hall.

Sub-Floor Temperatures Before and After the Active Control™ Feature

Before



After



Map Legend

This LiveImaging™ Temperature map illustrates the increase sub-floor temperatures resulting from the increased RAT set points sent by the Active Control™ feature. The upper portion of the data center remains cold due to the dense IT load in that area and corresponding high return temperatures.

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