# Taking Control of Building Systems

***District officials improved air quality by helping the buildings to "talk" to each other.***

By Matt Conrad

As in many public schools, officials at Vernon Hills High School in Vernon Hills, Illinois, were faced with the challenge of balancing financial constraints against the charge to keep students performing at high levels.

With an enrollment of more than 1,300 students, it was important for the school leaders to find ways to optimize building performance and comfort, given the proven link between comfort and indoor air quality issues and student learning.

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When Vernon Hills High School was built in 1998, the building's control systems were split among four different lowest-bid vendors. The result was four disparate systems that were not optimized to work together.

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resulted in a multitude of performance and comfort issues that school facility managers and staff could not keep up with. The facility staff members spent hours manually overriding settings in an effort to address comfort, performance, and efficiency problems—taking staff time away from other tasks around the school that needed attention.

To gain better control over the building, school administrators looked for solutions that would help reduce energy costs, free up facility staff time, and contribute to an optimal learning environment for students and teachers.

## Gaining Control

The inefficiency of the four different systems—one to manage the thermal ice storage chiller plant, one to manage the pump, one to manage the boiler, and one for the entire building—was causing a variety of maintenance and control issues.

"The systems were trying to talk to each other, but couldn't," recalls Mark Koopman, the district director of buildings and grounds. "We weren't able to make ice in our thermal storage plant, and the building was way out of balance."

In an effort to meet goals that included improving comfort issues, saving energy, and providing greater building control, school officials ultimately turned to one equipment and service provider as their partner for the project. The partnership allowed Vernon Hills to use cooperative procurement to mitigate costs and implement a faster, easier solution.

With cooperative procurement, contracts are bid competitively, evaluated, and awarded to vendors that have been selected on the basis of quality, proven performance, customer satisfaction, and pricing. By choosing to work with a preapproved network vendor, the district was able to streamline the procurement process.

With the installation crew working after hours and on weekends to limit disruption to school operations, the first step in the project was to consolidate the four control systems into a single platform using a web-based systems integration solution. This solution allows school facility managers to gain an enterprise-wide view of all buildings and systems from most any web-enabled device. Staff members can easily perform daily operations, such as centralized scheduling, alarm management, and remote troubleshooting.

The system also supports long-term data storage, allowing school staff to document and monitor system performance for making more informed decisions on efficient building management. Because the system

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is fully customizable, facility staff members can easily see the exact information they want regarding performance. The school's new unified control system also uses wireless communication technology, eliminating the need to run wires between controllers and devices, allowing for faster and easier installation.

With the added functionality of the consolidated controls system, Vernon Hills was able to restore operation of its thermal ice storage plant. Thermal storage allows the school to shift electrical consumption to off-peak nighttime hours to control peak demand, resulting in significantly lower utility bills. Ice generated overnight, when energy demand and costs are lowest, is stored and then used to cool the building during the day. Using a chiller plant control application, school facility managers can monitor equipment and decide whether to melt, make, or preserve ice to enable efficient cooling.

Continuing to monitor building systems to ensure that they stay optimized and perform as they should down the road was another priority of the project. To meet this goal, Vernon Hills entered into a service agreement with scheduled maintenance and a 24-7 remote monitoring program that allows building professionals to track and analyze incoming alarms at the school; building managers can resolve issues remotely or initiate any necessary action quickly to help maintenance performance and efficiency and to save time and money.

"We no longer have a negative pressure in the building, and we're able to properly manage the air flow," says Koopman. "The building is now properly balanced, which is helping us create the right learning environment for our students."

## Significant Impact

The consolidation of the building control systems into one platform greatly improved efficiency and allowed the school to achieve the streamlined control it had wanted for nearly 15 years.

The controls upgrade also helped lower energy costs, with a 641,000-kilowatt-hour reduction in the first year after the project—a year-over-year energy savings forecast of $51,000 and a project payback of 4.8 years. The school also received a $193,000 financial incentive for the energy-saving project.

"We can use our ice storage again, and we're not wasting energy," Koopman says. "The project data and documentation allowed us to receive rebates that covered approximately 44% of the project cost."

With increased functionality that makes it easier for the facility staff to manage the building and just one platform to operate, the high school was able to improve classroom comfort, another key benefit on top of the significant operational and maintenance cost savings.

According to Koopman, the single platform makes it much easier to control the building and saves staff a lot of time. "Plus, we have a single source to go to if we have any issues."

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