Visionary Engineer Improves Patient Comfort with Wireless Pneumatic Thermostats

By Jana J. Madsen

Operating and maintaining one of the nation’s top hospitals requires knowledge and experience; Walt Dubois has both. He has spent the last 13 years working at St. Joseph’s Hospital and Medical Center, a 673-bed, not-for-profit teaching hospital in Phoenix, AZ, that is comprised of nine interconnected facilities and six additional onsite buildings totaling more than 2.7 million square feet. Holding both a Principal Engineer (PE) and Certified Healthcare Facility Manager (CHFM) designation, Dubois has been an invaluable asset. “This is a dynamic environment,” the Facility Manager says. “There is no room for complacency here.”

The standards are high and pressure to provide a positive patient experience at St. Joseph’s is great. The facility is among the 17,000 healthcare organizations accredited by the Joint Commission and is part of Catholic Healthcare West, the eighth largest hospital provider in the nation. Additionally, St. Joseph’s has been ranked No. 8 for neurology and neurosurgery by U.S. News & World Report in its 2010-2011 report of the best hospitals in the United States.

Typical of older hospitals, the facilities at St. Joseph’s contained layers of legacy systems. The original hospital was built in the 1950s with subsequent additions and modifications constructed in the 1960s, late 1970s, mid-1990s and 2006. The buildings have a combination of pneumatic controls in the older facilities and DDC controls in the newer buildings.

Old Pneumatic Thermostats are Problematic

In 2006, the hospital completed a 420,000-square-foot addition and conducted $500,000 in DDC upgrades to existing thermostats on five floors of two separate buildings as functions were relocated into the new facility. When the recession hit, the DDC upgrades were halted. “When you try to convert to DDC on a floor that is still operating, it is very cumbersome. It adds another 30 percent in cost,” says Dubois of the additional expense required due to infection control risks. Without the funding or ability to close off areas to conduct a DDC retrofit, old legacy pneumatic thermostats continue to control temperatures on three floors of the Nursing Tower.

The successful installation of the Wireless Pneumatic Thermostats at the hospital’s Nursing Tower is the first of several WPT projects at St. Joseph’s. Dubois will finally get the opportunity to complete the remaining floors of the Nursing Tower. He will then move on to the PepperTree Building, which houses some administrative offices. Because this facility is only open daytime hours during the work week, Dubois will be able to take advantage of some of the energy strategies that are not feasible in patient rooms, such as automatic setpoint changes based on time-of-day schedule and nighttime setbacks. Zone control will enable temperatures in patient rooms to be maintained while offices are dialed back, resulting in significant savings. Dubois sounded satisfied when he said, “We can finally afford to complete our retrofits to have the visibility and control that we need in all our zones.”

Jana J. Madsen is a Cedar Rapids, IA-based freelance writer with ten years of experience in writing about the commercial buildings industry.
When temperatures in Phoenix spiked last summer, the hospital’s chillers were strained to supply the chilled water necessary to condition the campus. Dubois knew that he would have to address the facility’s remaining pneumatic thermostats. “It was apparent that the current pneumatic thermostats were not providing the service and control that is expected from a facility known to provide world-class service in healthcare,” says Dubois.

These thermostats are problematic because they:
1. Can cause discomfort for patients. Because they are not connected to a centralized building automation system, the facilities team is often unaware when malfunctions occur; and, at times, the information regarding the need to adjust room temperature does not make it to the Facilities Maintenance team.
2. Waste energy because of limited functionality. The legacy pneumatic thermostats supply heating and air-conditioning to unoccupied areas because they require manual setpoint control and calibration. They also preclude other energy-saving strategies enabled by DDC thermostats, such as temperature resets, duct static pressure, etc.
3. Burden maintenance technicians. Occupants experiencing discomfort often take matters in their own hands and adjust the thermostat and, in extreme cases, remove the cover if they feel the temperature isn’t changing, rendering the thermostat defective. “These are fine-tuned mechanical devices, the moment you open it up and start fiddling with it, they’re no longer calibrated,” says Dubois. Maintenance routinely finds it a challenge to access the patient rooms for a number of reasons. A lot of time is lost trying to get to the thermostats and it is problematic to perform troubleshooting, as this can be very disruptive to the patients.

New Technology Provides an Economical Solution
Recognizing that a large-scale conversion to DDC was impossible, Dubois went in search of a solution that was less expensive and less disruptive to install. Wireless Pneumatic Thermostats (WPTs) by Silicon Valley-based Cypress Envirosystems addressed both of the criteria. This new technology provides virtually the same functionality as DDCs, but without the need to change out pneumatic tubing, run wires, replace actuators or disturb building occupants. It even integrates with existing building automation systems and is 80% less expensive than a traditional DDC retrofit.

Dubois is no stranger to cutting-edge technology. He is also very methodical and thorough. This facility manager wasn’t going to install the WPTs on an entire floor until he did a test to verify the ease of installation, how the thermostats work, the output and the accuracies. He also needed to gauge the severity of the problem with the existing pneumatic controls. To do this, he and his team monitored temperatures in five rooms for two weeks.

“They are almost dead on in terms of percentage,” says Dubois. “The WPTs are programmed to the exact degree of temperature control and, as a result, improved patient comfort. We were satisfied and emphasized, “The temperature swings were readily corrected when we brought the WPTs online.”

The Advantages of Wireless Pneumatic Thermostats
The benefits of installing WPTs at St. Joseph’s are significant, especially when you consider the project costs. To replace the 31 old legacy pneumatic thermostats with traditional DDC on a 30,000-square-foot patient care floor with 30 to 40 patient rooms would have a price tag of approximately $80,000 to $100,000. At an average installed cost of $500 to $600 per WPT, the cost to retrofit one floor of the Nursing Tower was a mere $15,000. The DDC retrofit would have cost six times more. “A tremendous amount of money is saved in labor that doesn’t have to be spent pulling wire, terminations, etc.,” explains Vigh.

Instead of waiting years until a major renovation is possible, the retrofit can happen now. Because WPTs can be installed in 10 minutes or less, entire floors do not need to be closed off to patients to conduct the work. Dubois can begin saving energy immediately, instead of years from now, and be reassured that patients are comfortable.

Parker Design & Construction did the initial setup of St. Joseph’s graphical user interface, installed eight Wireless Pneumatic Thermostats and brought the system online. They also provided training for in-house technicians to complete the installation in the remaining rooms as they became open between patients.

Parker Design & Construction, the Goodyear, AZ-based general contractor who won the project over a bigger competitor that proposed DDC, began installing the Wireless Pneumatic Thermostats on the top floor of the Nursing Tower in April 2010. The installation is very quick and simple. “Basically, you remove the old stat, put the new one in its place, give it its unique address, find it on the system, and then, at that point, it’s very easy to set up zone control and name these stats however you’d like to name them (by room number or zone number),” says John Vigh, vice president of Parker Design & Construction. The site survey to identify the location of the repeaters for reliable communications was also fast and simple. “Once you have done the first one and the second one, then all of sudden you don’t have to look at the manual anymore; you can do it by heart,” says Dubois. “It’s not rocket science.” With installation taking so little time, it is even possible to install the WPTs in occupied rooms with minimal disruption. “We were in and out of a room in seven minutes,” adds Vigh.

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The WPTs will help patients focus on their recovery, instead of whether the room is too hot or too cold. Nurses and maintenance technicians can monitor and adjust temperatures remotely to ensure that patients remain comfortable.

“Patient satisfaction from better environmental/comfort controls has a positive effect on the overall experience that our customers perceive from their stay at St. Joseph’s,” emphasizes Dubois.