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Formerly *Energy User News*

Serving the commercial, industrial and institutional markets

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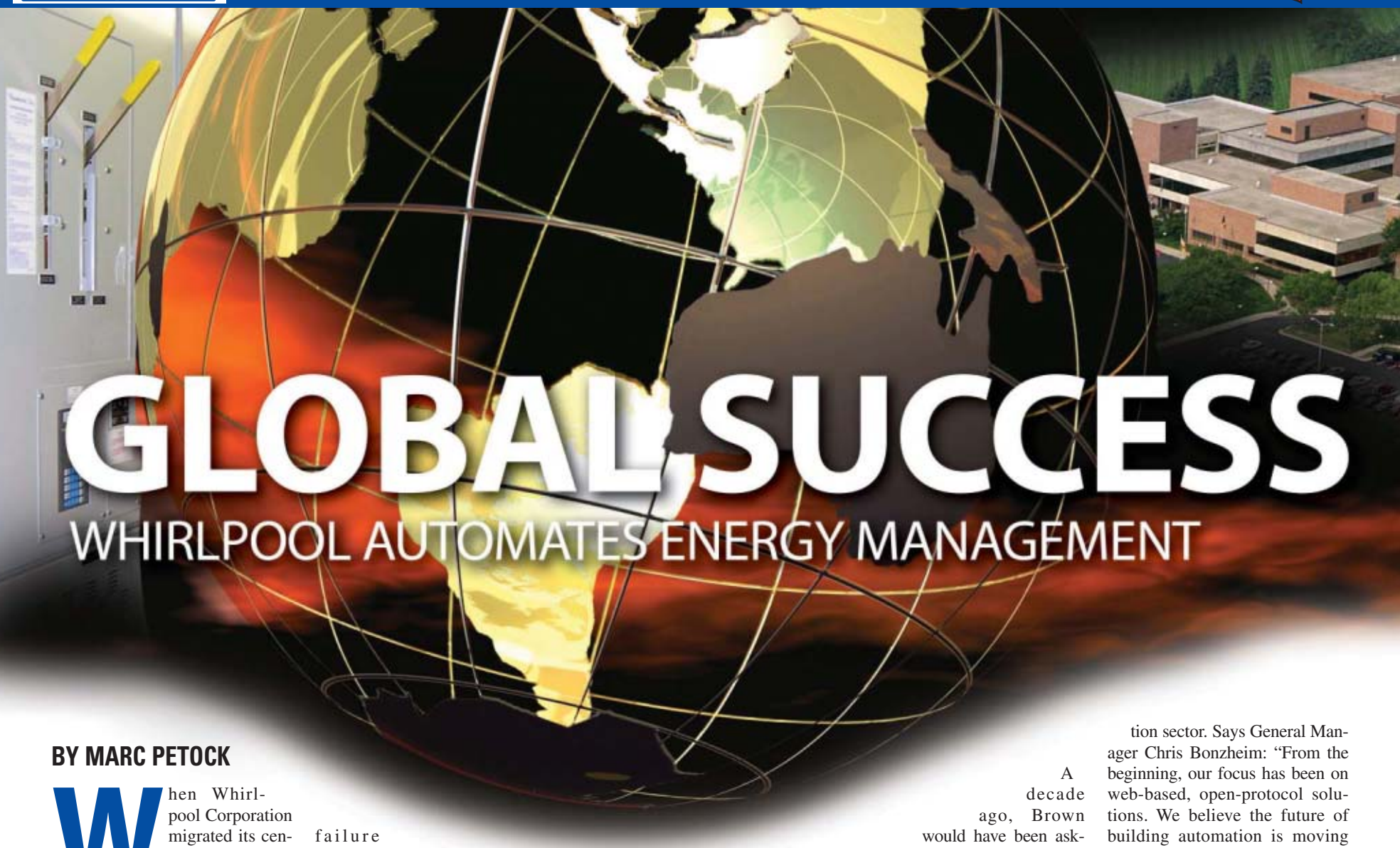


GLOBAL SUCCESS

WHIRLPOOL AUTOMATES ENERGY MANAGEMENT

BY MARC PETOCK

When Whirlpool Corporation migrated its central data center in Benton Harbor, MI, from a mainframe environment to a higher load-density server environment, the company conducted a single point-of-failure study to address facility's needs for the site. A decision was made in 2003 to overhaul the redundant backup systems for power and chilled water to make sure the mission-critical facility never failed.

Whirlpool's system dashboard

Ac chiller equipment details

"The data center supports Whirlpool operations globally. It runs twenty-four/seven," explains Bill Brown, data center engineer for Jones Lang LaSalle, which runs the data center under contract. The $12 billion-a-year, home appliance company conducts manufacturing operations in four continents and markets products in 170 different countries. Allowing the data center to go down, no matter what the circumstances, simply was not an option.

Plans called for upgrading and modernizing the incoming power system—boxcar-sized generators, transfer switches, sub-stations, UPS, and battery systems—as well as the chillers and CRAC units housed within 12,000 square feet of data center space. The project also incorporated traditional building systems like HVAC controls in an adjacent building. Brown wanted integrated controls to ensure better maintenance and enable a rapid emergency response. But it was an unprecedented challenge tying together 15 types of equipment from multiple manufacturers, each of which used proprietary software controls and traditionally required the use of additional integrators to convert the proprietary software.

A decade ago, Brown would have been asking for the impossible. No one had ever integrated so many different building and power systems before. Although equipment manufacturers had begun migrating to open protocol systems by 2003, there were still three different open systems, and they were largely incompatible. Fortunately, Brown found a company that could handle the job: ControlNET.

The $12 billion-a-year, home appliance company conducts manufacturing operations in four continents and markets products in 170 different countries.

The Kalamazoo, MI-based building automation firm has built its business model on the conviction that open protocols represent the future of the building controls industry. With eight engineers plus support staff on board, the firm specializes in developing "best in class" open-protocol, web-based solutions in the building automation sector. Says General Manager Chris Bonzheim: "From the beginning, our focus has been on web-based, open-protocol solutions. We believe the future of building automation is moving steadily towards open-protocol systems and away from proprietary control systems. We do not believe that property owners want to be held captive by proprietary technology."

The underlying technology that made ControlNET's specialty possible is the versatile Honeywell WEBs platform developed by Richmond, VA-based Tridium, Inc. Capable of communicating with any proprietary or open-protocol system, Honeywell WEBs integrates the schematics of complex arrays of equipment in a unified, Web-based graphical interface, and makes it easy to drill down into any component of the system to find critical data.

Instead of implementing software controls for individual pieces of equipment, each of which has to be administered by a dedicated PC, ControlNET can use Tridium's technology to create integrated, enterprise-wide systems that control all the sub-systems from a single location, Bonzheim explains. "This is what a building enterprise system is all about. In our industry, there's a lot of talk about convergence, but it's been slow to happen—until Tridium came along. Tridium has allowed us to move beyond simple temperature control systems and into complete building enterprise systems."

The Implementation

To his knowledge, the Whirlpool project is the most complex building automation job ever undertaken, says Chris Davis, the senior application engineer at ControlNET who led the Whirlpool integration. Upping the ante, Whirlpool was running on a fast-track schedule, so ControlNET had only four months to turn the project around.

"We had done integration before, though not to the extent of this system. But we knew the Tridium technology was capable of handling it," says General Manager Bonzheim. "Chris Davis did his homework. We were confident it could be done."

Pulling off the job required coordination of the property owners, mechanical contractors, electrical contractors, and multiple systems delivered by separate vendors. Says Ed Merwin, Tridium's director of field sales: "ControlNET had to orchestrate not only the technical aspects of the integration but also the organizational aspects. It was not an easy feat."

Bonzheim, Davis and the rest of the ControlNET team deserve kudos for a phenomenal job, says Merwin, who adds that he also sees the project as a validation of Tridium's technology. "Think about it: This is one of the most complex building automation projects ever undertaken. It didn't require any special software to make it happen. ControlNET used a single tool kit and product line to pull it all together."

The State of Building Automation

In three words, the state of building automation is best described as connectivity, interoperability, and web-services-ability (well that might not actually be a word).

Connectivity and interoperability among various field busses is now an everyday reality. Whether it is BACnet, LonTalk, MODBUS, SNMP, or a host of legacy protocols, it is possible to get competitively priced systems that will work with best-of-breed devices from a variety of manufacturers across a variety of communication protocols and connect to most of the legacy system investments that are already in place.

The mythical battle over protocols obscures the big picture and the opportunities to improve operations and financial performance of facilities. The game has moved beyond protocols. There will never be just one. They all have their own benefits and tradeoffs, but none is a solution by itself.

Facility personnel doesn't need to care what field buss is used to communicate to an individual device. And with new technology, a wave of new protocols enters the market.

But connectivity goes well beyond device-level field busses. The new frontline of technology and value creation is in connectivity to the enterprise--the ability to connect and exchange information from building equipment systems to the entire range of business applications, using new web-services technologies. There are some important new technologies and standards here as well. For example, the oBIX (Open Building Information Exchange) standard being implemented through OASIS (Organization for the Advancement of Structured Information Standards) is one that will have a huge impact. It defines a way for devices and equipment systems to communicate in much the same way as the Web.

Another facet of connectivity is connecting information to people. The ability to interact with building systems using a standard Web-browser is widely available and has made a significant impact by streamlining and improving the user experience. Quite simply, it is easier and more intuitive to navigate and interact with a system as a web experience than it is via a proprietary client software application. And, web-enabled systems allow the user to monitor and control their facilities from anywhere at anytime. It's no longer necessary to drive to the building and sit at a console with unique software or to have special software installed on a home PC or laptop. The web makes it a seamless experience from any browser—enabled computer or wireless device.

Convergence of buildings onto IP networks is another important connectivity advancement that is now becoming more widespread. The computer industry leads the development of networking technology—billions are spent advancing the speed, reliability, security, and overall performance of mainstream networking technologies. It simply doesn't make sense for building systems to be based on proprietary networking technologies any longer. It's time to use standard computer industry networking, and the good news is the choice of building systems and devices that utilize IP networks for communications. The more advanced systems have brought IP connectivity all the way down to the unitary controller level.

Networking technology convergence is driving another type of convergence as well, and that is convergence of the management disciplines responsible for operating facilities. Increasingly, new building automation projects directly involve the IT staff of the organization. Systems must conform to IT department policies and are looked at in a new light by a whole new constituency. Building systems and smart devices are now being viewed as parts of a whole business operation, not as individual islands.

Synergy with Energy Management

These advances support and enhance the ability to reduce energy consumption, demand peaks, overall utility costs. With access to real-time data, businesses can know what is actually going on in real time and make better operational and financial decisions.

Scenario

A chain of 200 big box stores located across the United States has a limited budget and faces strong pressure to reduce energy costs. If management can identify the 10 facilities that have the worst energy performance on a per square foot basis, adjusted for weather conditions (degree days), it can better determine where to spend the capital budget.

By producing a report of the 10 best performing facilities to learn what is different about them, management can correlate best practices and make better decisions with the capital budget. In the past, such an analysis might take weeks or even months pouring over monthly bills from a variety of utilities. Today, a few mouse clicks can provide these reports based on simple monitoring equipment, which can be installed very cost effectively. With connectivity to all of the systems in a building, control actions can be executed to better manage energy.

Scenario 2

With the ability to connect automation systems to enterprise software applications, data feeds such as real-time pricing can be used to drive control/response. One successful application involves a small, low-cost controller, interpreting an energy-price data feed to make the decision to select between natural gas and electricity in a process-heating application. The company sees huge savings without the negative business impact of stopping production during periods of high demand. So where in the past an input to a control loop would have been a temperature sensor, in this application it is an XML data message from a utility company computer published in a web services format. It gives a new meaning to I/O (inputs and outputs). The same technology and approach can be used for peak load management via demand limiting and load shedding. Now, it is practical to make those load management decisions based on real-time energy costs and usage information.

On the Horizon

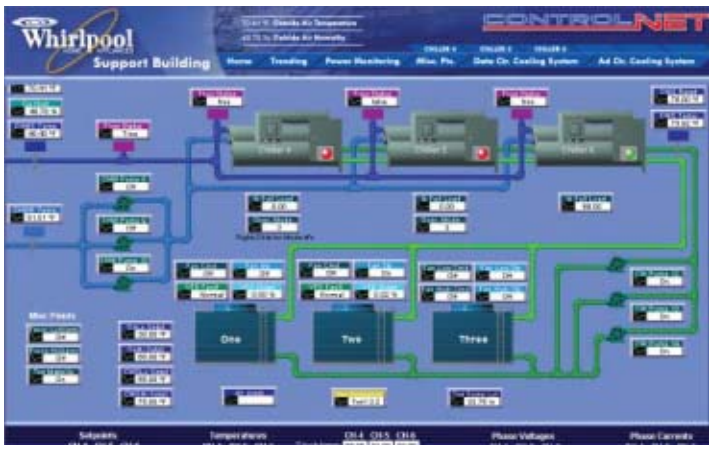
Wireless is perhaps the most significant of a number of trends to watch. Wireless technologies will transform the building automation and energy management industry yet again. In this case, wireless includes a wide range of solutions with a wide range of applicability.

One area of rapid advance is in "wireless mesh networks," sometimes called sensor networks. This wireless technology promises the ability to easily and quickly mount sensors anywhere without having to pull signal wire to the sensor. The result is dramatic reductions in installation costs that will lead to more widespread use of sensing devices, which will in turn, provide much more real-time information to make better decisions on the operation of facilities.

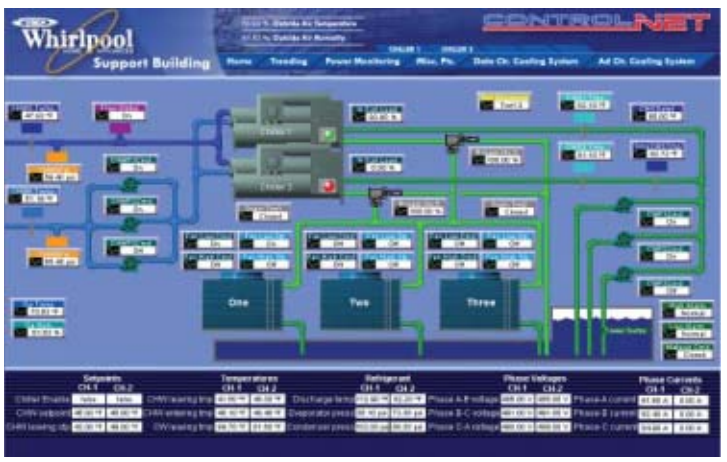
Above sensor networks (literally above them) are cell phone wireless networks. The ability to connect devices and systems cost effectively to cell phone networks to provide access to real-time data is a reality today. The benefit--no more slow and trouble-prone dial-up modems for connecting to remote sites, higher bandwidth to support richer presentations of information and graphics, always on connectivity, and the ability to avoid the security concerns and complexity that can often be associated with connecting equipment systems to business IT networks.

And then there is WiFi--the same networking technology used to connect to the Internet in homes and hotel rooms is being applied to control and monitoring devices. WiFi is a good fit when power is available and high-speed data throughput is needed. Again the simplicity and cost savings over wired networks are significant.

Installations of these new technologies are happening today and will continue to become more prevalent. As they do, they will change the landscape in building automation and energy management yet again. *e&pm*



Ac chiller graphical view



Dc chiller graphical view

The Benefits

After a year and a half in operation, Brown is more certain than ever that the move to an integrated control system was the right decision. Integrated controls make it much easier to plan and conduct maintenance on the multi-million dollar power system, he says.

First, the control system can tell if there are problems with the equipment—pumps, air conditioners—that need tending. Second, the system makes a great tool to help facilities managers undertake the maintenance. "If we're doing equipment maintenance on the UPS (uninterruptible power supply) system, we have to transfer the power supply loads," says Brown. "Before, we used to have to walk from building to building to verify that the transfers had taken place. Now we can do it from a laptop at either location." Third, the entire system is monitored for alarms and dispatched 24/7/365 through a third-party security management company using Tridium's Vykon Alarm Server (VAS) component of the package.

Whirlpool has demonstrated technology that provides a seamless integrated solution to the problems of managing multiple building systems.

But Bonzheim says the greatest satisfaction comes from meeting the challenge presented by a highly respected global manufacturer for control, automation, security, and reliability while delivering the energy efficiency that identifies Whirlpool as a good corporate citizen.

"People have been talking about the benefits of intelligent buildings for years now," says Bonzheim. "Finally, they're here. With Whirlpool, we've demonstrated technology that provides a seamless integrated solution to the problems of managing multiple building systems. The ControlNET team is proud to lead the way toward making intelligent buildings a reality." *e&pm*

About the Author: Marc Petock has more than 25 years of technology and automation marketing experience. Petock heads strategic marketing and all the brand management, marketing programs, and public relations for Tridium. Prior to joining the company, he served as vice president at Patrick Marketing Group where he developed marketing and communication initiatives for a variety of technology and telecommunications clients including IBM, Siemens, Red Hat, and Nortel.

Major Components

- **York chillers**, integrated through a Microgateway Panel (BACnet protocol)
- **Trane chillers**, integrated through a Trane BCU Panel (BACnet protocol)
- **Cooling tower systems**, with backup well water to protect against the loss of city water, utilizing ControlNET controls
- **Liebert air conditioning units**, integrated with a Liebert Sitelink Panel (BACnet protocol)
- **Liebert leak detection system**, integrated through a Liebert Sitelink Panel (BACnet protocol)
- **Liebert uninterruptible power supply units**, integrated through Liebert Sitelink Panel (BACnet protocol)
- **Liebert static transfer switches**, integrated through Liebert Sitelink Panel (BACnet protocol)
- **Russelectric ATS complet with bypass switches**, integrated through Russelectric Microprocessor (Modbus protocol)
- **Onan generators**, each with its own fuel system, fuel tanks and parallel switchA, integrated through an Onan Microprocessor (LonWorks protocol)
- **ATS for fuel system backup**, integrated through an Onan Microprocessor (LonWorks protocol)
- **Cutler-Hammer electrical substations**, integrated through Westinghouse Modbus NetLink (Modbus protocol)
- **Square D electrical substation**, integrated through Square D's ECC21 ethernet card (Modbus protocol)
- **Cutler-Hammer electrical switchboards**, integrated through Cutler-Hammer Modbus NetLink (Modbus protocol)
- **Pre-action sprinkler systems and fire detection systems**, integrated through ControlNet. *e&pm*