



Critical Power System Protects Hospitals' Ability To Provide Care



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After a car accident, an ambulance rushes four people to the nearest hospital. Doctors scrub in for surgeries on the victims just as a tornado touches down nearby, knocking out power lines in its path.

What happens next?

It's a scenario that every hospital in the U.S. has to plan for, which is why many are consistently updating their systems using new technologies to address such critical power scenarios and to answer the question above. The bottom line is that hospitals have to have a back-up plan in place to keep power flowing.

In the healthcare industry, critical power is a matter of life or death. To guarantee constant power, a hospital's critical power supply and all associated components must function properly, automatically.

St. John's Hospital in Springfield, Ill., is no different. St. John's is a 730-bed hospital with more than 1.7 million square feet of facility space, and functions as a regional referral medical center for cities throughout central and southern Illinois. In addition to the primary hospital, the complex includes the Prairie Heart Institute, Children's Hospital, Cancer Institute and Women & Children's Center.

The hospital has a long history in the community, dating back almost 130 years. Its roots started with a small group of Franciscan sisters emigrated from Germany. "In fact, some of our early sisters cared for Mary Todd Lincoln in the last years of her life," said Brian Reardon Director, Community and Government Relations at St. John's Hospital.

"We've really grown into a major medical destination for the residents of central and southern Illinois, and St. Johns offers a full spectrum of medical services," said John Short, associate administrator and chief operating officer at St. John's Hospital. "As we view ourselves as a regional medical center, we insist on having the most up-to-date technology to provide the most state-of-the-art care."

But a few years ago, the hospital realized that its electrical infrastructure needed some work. It was brought to light by some issues it was having with a substation transformer. It was overheating and causing concern among the hospital's 10 electricians, chief among them, Dean Salisbury, the general foreman for the electric shop at St. John's.



Power System Engineering Study Confirms Need for More Robust Power Monitoring System

Because of a long history of using Square D® products from Schneider Electric, Salisbury contacted the Engineering Services group at Schneider Electric to help conduct a study and determine the cause of the problem.

“We had an overheating problem with a substation transformer, and we were trying to determine what power quality issues or what factors were causing the overheating,” said Salisbury. “We tried to manually diagnose the problem, but we couldn’t figure it out.”

In short, the study identified two causes: harmonics and a slight load imbalance. It also crystallized the need for new power management technology to integrate all of the facility’s critical power components into one networked system. This facility upgrade would equip St. John’s engineers with a means to monitor utility power, emergency power and power quality at any time, from anywhere. Furthermore, it would integrate with existing emergency power supply system (EPSS) components to form a more robust system. The EPSS furnishes the critical backup power a hospital needs during a power issue or outage.

“Power reliability and quality are very important to us,” said Dean Salisbury. “We definitely need stable, reliable power for all the high-tech equipment we have consistently running in our hospital.”

New System Implemented in Phases

The plan was to implement the new power monitoring and control system in phases. This was for several reasons. First, there were budget considerations. Also, there were several generators and automatic transfer switches in the St. John’s system that were being replaced and required integration with the new circuit monitors and power meters that would be installed as part of the power monitoring system.

“About six years ago, I was introduced to PowerLogic® products and services at a Schneider Electric Services open house down in St. Louis,” said Salisbury. “I really liked all the capabilities of the system, and things just kind of grew from there.”

Schneider Electric worked directly with St. John’s Hospital to customize the PowerLogic® system to its application. It started with installation of circuit monitors and power meters at various key locations throughout the hospital’s facilities. The monitoring hardware St. John’s installed included nine PowerLogic® CM4000 circuit monitors, seven CM3350s, four CM2350s and one PM850 power meter. But the key to tying all this hardware together was Schneider Electric’s PowerLogic® System Manager™ Software (SMS) with integrated EPSS testing and reporting module.

In terms of the EPSS, St. John’s Hospital employs six diesel generators, two of which were replaced immediately with new 900KW generators. Those two run parallel with an existing 625 KW generator. Currently, in the initial stage of St. John’s Hospital’s phased equipment transition,





one generator along with several critical ATSs form the backbone of the PowerLogic System. In the near future, the hospital's four generators (900KW, 900KW, 625KW and 500KW units) along with the remaining 40 ATSs will be linked under the PowerLogic system.

Another important aspect of the power monitoring and control system and EPSS installation, although phased, was the necessity to seamlessly retrofit into the hospital's existing system as well as integrate with new equipment. From start to finish, installation was a team effort. While Schneider Electric provided specific recommendations about replacement of key system components along with a power monitoring and control system customized for St. John's Hospital, the hospital's electrical staff – 10 electricians and three technicians – installed the hardware, including conduit, wire and cable. Schneider Electric also assisted St. John's generator and ATS vendors with integrating their products into St. John's PowerLogic system.

In addition, hospital IT specialists played an important role. Due to its location off the main hospital campus, one of the hospital's substations could not be hardwired to the power monitoring system. The IT department devised a solution to transfer data from meters out of the utility substation wirelessly via Ethernet by placing an antenna on top of a nearby building.

"The substation is two blocks away, but with the wireless Ethernet network we were able to set up, we're still able to monitor it under the system as if it were on site," said Salisbury. "It's a neat way to monitor, and it's worked great so far."

St. John's Find Value in Automated EPSS Testing and Reporting

One of the great features of the System Manager Software is the integrated EPSS testing and reporting module. The EPSS reporting function automates the required documentation that St. John's needs to provide on a monthly basis to outside agencies such as the Joint Commission, which evaluates and accredits more than 15,000 health care organizations and programs in the United States. The Joint Commission is the nation's predominant standards-setting and accrediting body in health care.

"When the Joint Commission accredits facilities like St. John's, it looks at the environment of care and evaluates the systems and infrastructure in place, and the safety organization surrounding the whole process," said Short. "We're obligated to meet these standards and to demonstrate that we are meeting those standards."

Basically, St. John's must provide documentation showing that its EPSS is functioning properly. The PowerLogic® EPSS Test Module provides an automated test report documented to Joint Commission standards. Automating this process eliminates errors from manual readings, increases confidence that tests have been conducted correctly, and reduces required manpower and documentation time. In the past, the process was performed manually by staff basically using a stopwatch and clipboard.





"We've been able to save man-hours on things like testing the generators," said Salisbury. "Furthermore, the system removes the human element from the reporting, providing a clean report for the Joint Commission to review, and they now accept the new reports without question."

The PowerLogic system controls and monitors many aspects of the EPSS such as Gen Set vitals, fuel levels, battery units, ATS loading/trending, as well as monitoring the incoming utility for power quality and levels.

"The system gives us a good measure of what's going on with our city utility," said Salisbury. "It provides us an idea of our power usage, power quantities and the system capacity we have available. It also gives us all of our power quality indicators, power factors and harmonics."

Tornados Provide System with Big Test

The system's value really came into play during a severe storm a couple years back.

"In March of 2006, Springfield had two tornados come through and we had a black out for about an hour and 15 minutes," said Salisbury. "The utility had a small generator that was close to us, and was supplying some power, but the frequency was low (58Hz) and we had some transfer switches that wouldn't transfer back."

Salisbury logged on to the hospital's PowerLogic system to determine the source of the local power problem. After noticing the issue with the transfer switches, he quickly reviewed the power quality statistics using the real-time software and decided to transfer all power back to the hospital's generator to ensure a better quality of power for the essential equipment until the utility completely restored power. Once the system showed utility power back at 60 Hz, Salisbury transferred power back to the utility.

"I was able to get on the PowerLogic system and determine what the problem was, and then we went back to generator until the utility had us back up," added Salisbury.

Had this power quality issue occurred prior to installation of the PowerLogic system, on-site engineers would have had to test equipment across the hospital's campus manually. This system centralizes data collection and access to that information via a user-friendly reporting system accessible on St. John's network.

As a result, St. John's can respond instantly to a power outage or quality issue, and make smart decisions about power transfer, among other things, using data collected at that moment from all critical power system components.

Additionally, afterwards, the system can generate any number of custom reports and graphics to track alarming events, EPSS testing/reporting, capacity planning for future loads/expansion and transformer temperature monitoring, among other things. These reports can help a





facility determine cause, evaluate system capacity, update crisis plans for future incidents and provide detailed reports on functionality to the Joint Commission or other governing bodies.

In short, the PowerLogic system with the EPSS testing and reporting module removes the human element from the data collection and reporting processes, thereby increasing time savings and accuracy. Automation lessens cost and increases the amount of information from which hospital personnel make important infrastructure and power supply decisions. Readily available data enables actions that ensure the hospital has continuous power to support critical, life-dependent requirements.

Certain Future Growth

St. John's now has one system that provides a comprehensive solution for power monitoring and control with the added benefit of an automated EPSS testing and reporting module. With the first phase of the project complete, the next step is to expand monitoring and control capabilities to the remaining generators and transfer switches in the system to form a more complete EPSS. St. John's Hospital has laid the groundwork for future expansion as it continues to grow and serve the residents of Illinois. With an already long and storied history in the community, and with the new steps taken to upgrade its facilities, St. John's will likely continue its mission for many more years to come.

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