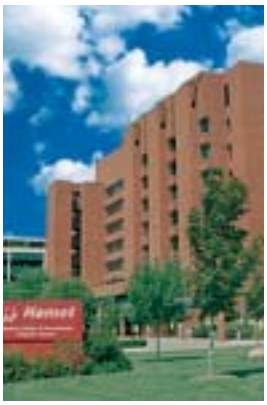
CASE STUDY



Hamot

FORESIGHT REWARDED AS POWER MANAGEMENT SYSTEM GUARDS AGAINST BLACKOUT AT HAMOT MEDICAL CENTER

ERIE, PA. – On the afternoon of the biggest power failure in the nation's history, Tim Markijohn was driving on Interstate 90 when Hamot Medical Center's power management system sent an alpha-numeric page to his beeper. Unknown to Markijohn, Hamot's facilities engineering supervisor, the blackout was skipping from New York, into New England and Canada, then back into Michigan and Ohio, heading for Pennsylvania. Thanks to Hamot's Hospital Emergency Incident Command Structure and its Square D® PowerLogic® system from Schneider Electric, Markijohn took precautionary measures that preserved power and patient service at the 336-bed tertiary care facility in Erie, Pa.

That afternoon, August 14, 2003, a cascading failure of the power grid serving the northeastern United States and southeastern Canada left many towns and cities in the dark, and caused voltage in many facilities to swing wildly. At 4:10 p.m., the pager message notified Markijohn that the hospital's electrical system was experiencing a series of voltage sags.

"The PowerLogic Active Paging Module contacted me based on alarm set points that had been programmed into the power management system," Markijohn said. "The system sends a message whenever utility power becomes unacceptable according to preset conditions."

In addition to paging Markijohn and more than 40 Hamot Medical Center maintenance technicians, the system took first steps to maintain power, in keeping with requirements of the National Fire Protection Association (NFPA) and the federal Joint Commission on Accreditation of Healthcare Organizations (JCAHO). Having sensed multiple voltage sags, transfer switches in the power management system switched loads to backup power generators. The three diesel-powered generators began cycling on and off as the sags continued intermittently, putting substantial strain on the 1,000-horsepower units.

While the power management system was doing its job, so were Markijohn and Hamot's Hospital Emergency Incident Command Structure (HEICS). According to a well practiced plan, after the second power "bump," the HEICS team assembled in its predetermined command center and began assessing damages. Team members went from floor to floor and room to room to check electrical equipment and reset ventilators and the flows on calibrated equipment critical to patient care.

While patient care was never compromised at the 1 million square foot facility, each voltage sag briefly interrupted power to computers and radiology equipment such as Magnetic Resonance Imaging (MRI) and CATSCAN units. Though such equipment was not performing optimally during the voltage sags, the medical center suffered no long-term equipment failures.

Simultaneously, the HEICS team contacted Markijohn and reported power fluctuation updates to him during his 15-minute drive back to the campus. Based on those reports, Markijohn determined that utility power was too unstable, and decided to shift power from the utility feed to the generators. On his return to the medical center, Markijohn dispatched maintenance technicians to the facility's 32 transfer switches. They manually activated the switches, locking in the emergency power supply.

"The HEICS team contacted a short list of predetermined electrical contractors, who were held in reserve to provide emergency maintenance," said Tim McQuone, director of emergency and trauma services for Hamot Medical Center, and the hospital's designated incident commander. "At that point, we were not aware of the situation outside, so we responded based on a response plan that we practice every month."

By 6 p.m., Hamot Medical Center had transferred completely to generator power, which provided an emergency load equivalent to three-quarters of the normal facility power supply. That load covered all life-sustaining, critical equipment and emergency lighting.

Throughout the evening, the city of Erie maintained power. At approximately 9 p.m. the utility company, First Energy, notified McQuone that it believed that power was stable enough to transfer back to the utility feed. But based on his experience and data from the power management system, Markijohn opted to continue running the generators for another several hours to assure utility service reliability. That decision proved especially prudent at about 10 p.m., when another local hospital encountered unstable power, and

considered evacuating. The evacuation was never activated but if it had, those patients would have been moved to Hamot, which is the only regional trauma center serving a 13-county area in northwest Pennsylvania. By approximately 8 a.m. on Aug. 15, Hamot Medical Center transferred back to its utility feed with no damage to patient care and no long-term damage to equipment.

Considering the chaos that the blackout wrought west, north and east of Erie, the city was lucky. Hamot Medical Center was more than lucky; it was prepared. Based on smart planning and monthly practice drills, inspired in part by recommendations by the federal Department of Homeland Security, Hamot's HEICS team responded seamlessly. The medical center's power management system excelled, too, reconfirming Markijohn's foresight when he began implementing the PowerLogic power management system during the fourth quarter of 2000.

Before adopting a power management system, Markijohn's facility engineering team monitored power the old-fashioned way, as many facilities still do. Technicians walked from power meter to power meter to monitor status and note usage. When an electrical anomaly occurred, the engineering team could not identify if the problem originated inside or outside of the campus, nor could they quickly identify which areas were effected – except through manual reconnaissance.

The key to power system improvement hinges on facility managers' ability to record the electromagnetic phenomena that can cause disruptions in facilities. To do that, they need a power monitoring system with an easy to use software platform for instant retrieval and analysis of data. And by connecting monitors to an entire energy system, the user can identify the patterns of consumption that will help them control costs.

Markijohn said he based his recommendation to invest in a power management system on its ability to provide practical capabilities, such as:

- Monitoring and evaluating the quality of power from the utility
- Identifying voltage sags, which can cause critical damage to patient care and equipment
- Measuring electrical load
- Using transfer switches to avoid overloads
- Comparing power bills to actual power usage to detect discrepancies
- Ensuring patient safety and satisfaction.

Currently, the system includes 50 power management devices in the hospital. In total, the campus uses 20 PowerLogic power monitors installed at service entrances, emergency power

sources, branch feeders and critical loads, and 37 Circuit Monitors, which Markijohn said is a significant concentration.

"Our PowerLogic system provides data logging, trending, power quality information and evaluates metering accuracy," Markijohn said. "It measures amperage, kilowatt demand, voltage, power factor, and harmonics, which is a serious concern because it interferes with computers. "

In addition to those capabilities, the system has provided an exceptional level of convenience by generating reports. "There is really no limit to the amount of measured points you can have, other than your ability to digest all of the information," he said. "We use the power monitoring software communications program to provide spreadsheet reports and custom tables to sort the data into usable information. For example, we perform monthly backup power tests and provide reports to the local fire department, health department and the JCAHO. The PowerLogic system measures the load on the generators, creates a graph, then trends and plots the load on a minute by minute basis.
It allows us to graphically show that we are complying with backup power testing requirements, and the system can provide similar real-time reports on electrical consumption by equipment."

Hamot Medical Center continues to extend the scale and scope of its power management system. "We added the paging module in 2002," Markijohn said. "We've also added PowerLogic capability to other buildings on our campus – our data center, ambulatory surgery center and the Hamot Heart Institute, and we plan to add it to a pneumatic tube communication system, our parking ramp and helipad."

Markijohn said he's also investigating Schneider Electric's ability to use the PowerLogic system to automate backup power by integrating Programmable Logic Controllers to transfer loads. "After our initial decision to purchase the power management equipment, I attended a training regimen that Schneider Electric calls PowerLogic University. During that training in Nashville, we visited the Veteran's Administration Hospital, which had deployed PowerLogic to automate testing of its backup power generators. That networked application made an impression on me, so we are moving in that direction as well.

"The power management system is continually evolving," Markijohn said. "As we continue learning how to use it to achieve additional efficiencies the evolution will continue."