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Many are familiar with Kent State University, located in Kent, Ohio because of the tragic events of one day in 1970, an event that had a profound effect on the nation and the world. But the university has recovered and moved on to become a leading institution of higher learning.

Kent State University was founded in 1910, but many things have changed during that time. As is the case with many of the larger university campuses across the country, the campus at Kent State is growing in size and sophistication. Many of the nation's larger campuses in operation today include their own water treatment plants and power plants.

Supplying power to these campuses has become a huge endeavor. Take for example the increasing energy consumption of today's typical college student. He or she may arrive on campus with a laptop, stereo, TV, refrigerator and so on. This can put a strain on a campus' distribution system as it struggles to meet the growing electricity consumption of its residence halls. Not only that, but a power outage can cripple a campus full of students and professors increasingly reliant on technology.

To meet demand at Kent State, the university recently built a new power plant and is updating its distribution systems on campus. At this plant, there are two gas turbines that produce the majority of the campus' power. The turbines supply about 90 percent of the energy needed on campus and the remainder is imported from the utility – FirstEnergy Corp. Part of bringing the new Power Plant online, was updating the distribution system from a 5KV system to a 15KV system.

The man charged with overseeing the campus' power is Tom Dunn, the Associate Director of Energy. He's been with Kent State for over 28 years. "By choice, we maintain a minimum import from the utility," says Dunn. "In the summer, it increases a little and we produce 80-85 percent of our own power and import 20 percent – but for the most part we're pretty self-sufficient." Even before the new Power Plant, a more robust power distribution system needed to be in place, and the need for an improved power monitoring system was identified.



New Power Distribution System Offers Opportunity to Expand Monitoring Capabilities



“Updating our system to include a new power plant and distribution system gave us the opportunity to also look at improving our power monitoring system,” says Dunn. “We had some metering in place before, and we’ve been doing power monitoring since the early 1990s, but we just didn’t like the vendor support system we had. So we opened up the bid and looked for other companies that sold the same types of products.”

“It just so happened that we were using Schneider Electric’s Square D® brand of products in much of our distribution equipment,” says Dunn. “It opened the door to working with them on our power monitoring needs as well, especially since their power monitoring equipment easily integrates with the distribution equipment already in place.”

Working with Schneider Electric, Kent State added Square D PowerLogic® CM4000 circuit monitors to its system. These were installed to monitor the university’s incoming electricity. The CM4000s monitor all aspects of power quality from impulsive voltage transients to flicker. The installation of this core system was complete in 2002.

Since then, Kent State has been continuously adding power meters across campus, including PowerLogic 650s and 850s, about 25 in all. “We continue adding meters and upgrading our system as budgets allow and as new buildings are added to the campus,” says Dunn. “Currently, about 25 percent of the campus is being monitored by the new PowerLogic monitors and meters, 50 percent is old equipment including analog meters, and 25 percent of campus isn’t monitored yet.”

There is a plan in place to eventually retrofit all campus buildings with new meters. “Within 10 years, we’d like to have the entire campus updated with Square D equipment,” says Dunn. “In a typical year, we average between four and six meter replacements, which our staff do in-house. That’s another reason we really liked the Square D meters, because they were easy for our guys to install and maintain.”

Included as part of the power monitoring system is PowerLogic® System Manager Software (SMS), used to help gather and analyze system data. “The SMS allows us to see the state of the entire distribution system, or we have the ability to simply click on specific parts of the system,” says Dunn. “The electricians can go right on the Web to see the information they need, and it’s very easy to navigate.”

Submetering is also a challenge that Dunn and Kent State are taking on. “We’re in the process of developing a system using the power monitoring system to enable us to bill our auxiliary services on campus because we can determine consumption using live reads from our meters,” says Dunn. “It’s not easy, because it covers 25 buildings, but it’s important because our auxiliary services account for approximately 40 percent of our electric bill.”

System Identifies Problems, Provides Multiple Benefits

With its power monitoring system, Kent State detects between five and seven voltage sags per year – usually caused by something originating at



FirstEnergy. “The contract we have with FirstEnergy stipulates that if the campus generation trips offline and this is caused by an event outside of the Kent State System, the utility will allow up to one hour for Kent to get its generators back online without standby charges being assessed.

“In addition, if the utility drops and we start sending power to their system, our turbines trip off because they include protective reverse flow relays,” says Dunn. “FirstEnergy gives us one hour to get our turbines back on-line before we get billed standby power.”

In the summer of 2006, Kent State experienced a voltage sag originated on the utility side and its system started to supply power to the utility. “Our system caught this event and was able to identify it as a switching issue on the utility’s end,” says Dunn. “They hadn’t even noticed it yet, and we were able to provide them with the waveform captures to prove it.”

Having the waveform captures readily available has provided a big cost savings for Kent State. “On average, and in part because of our agreement and good relationship with FirstEnergy, we can save as much as \$10,000 in standby charges from the utility from one event. With only thirteen events allowed each year not having to incur those charges, we can save even more” says Dunn. “We use the waveform captures very frequently – this system is great for that.”

“We also use the meters to track the peak KW of each feeder by month and by season,” says Dunn. “The reason that is important is that it lets me know how much power we can consume at any time. We then use this to set up all the breakers and the main feeders, based on the historical information we catalog with the meters. Also, our engineers are always looking for the maximum KW numbers for design criteria for older buildings – things like transformer sizing.”

“A huge benefit of the PowerLogic system is its reporting capabilities,” says Dunn. “We’re able to create and manipulate reports right in Microsoft Excel files, and everyone, from our electricians to our engineers, is able to access and use the information. They can use the historical information to set up all of our generating scenarios for load shedding purposes.”

Just recently, Kent State upgraded the System Manager Software that manages its PowerLogic system. The new version includes all new reporting tools, and a Web interface that allows easy connection to the software. “It’s also been much simpler to prepare trending information,” adds Dunn. “You don’t have to be a rocket scientist to use and gather data from these meters.”

Kent State continues to move forward. “All this certainly didn’t happen overnight, and we’re still growing and still learning as we go,” says Dunn. “But we’re very pleased with where we’re at and continue to add to the system.”

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