Power Company Gets Wired with Opto 22

The town of McMinnville, Oregon, built its first electrical power system in 1889. The town maintained this system until the 1940's when it began to buy a portion of its power from the Bonneville Power Administration. In 1948, the city began to purchase all its power from the hydroelectric power project on the Columbia River.

Today, McMinnville Water & Light, the local utility for the city and outlying area, maintains and manages the water and power, ensuring quality and minimizing outages and other problems. With this history of careful stewardship, the 25,000 people of McMinnville have come to expect low rates and dependable service from their water and power company. So when it came time to update its electric power and indicating system, MW&L sought a solution that was a good bargain, yet also delivered reliable performance—just like their own facility. They chose a system from Temecula, California-based Opto 22.
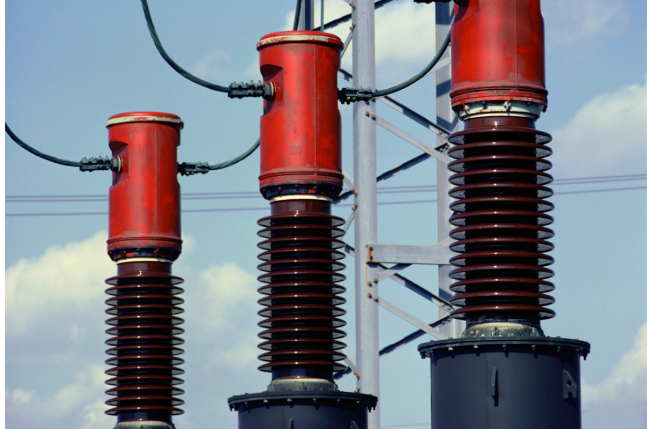
Distributed Control

McMinnville Water & Light determined that its power control and indication system was no longer adequate in that it did not allow the utility itself to manage the municipal power system efficiently and effectively. According to Electronic Technician Frank McCallie, the existing supervisory control and data acquisition (SCADA) system was slow, cumbersome to use, and lacked reliable alarm reporting. "It used leased telephone line modem connections to our electric substations and was poorly designed," he explains. "It was too slow and critical information was getting to the operational staff too late."

For a small utility like MW&L, such delays can cause problems in power quality. "When we do switching, we need to see what's going on with our entire electric grid," says McCallie. "Switching can also affect the balance among the three phases, causing them to become asymmetrical or unequal. We then have to adjust loading in the system to bring that into balance."

"We also need to have the ability to adjust the system to prevent problems that can affect our customers. Quick action can make a big difference in assuring excellent service to our customers."

With the old system, it sometimes took two minutes or more for staff to get a response from a programmable logic controller (PLC) in a substation. "Typically, we would gather peak loading, maximum phase imbalance, and minimum voltage from the remote substations once per day," recalls McCallie. "As a result, it could be 24 hours or so before we even knew that we had a problem in the field."

In addition to being slow, the old system could not provide the necessary billing information. Clearly, it was time for a new electric power control and indication system.

From Phones to Fiber Optics

"We purchased an Opto 22 SNAP Ethernet I/O control system," says McCallie. "It uses Ethernet connections and Modbus protocol, so we can connect all our field control and metering devices at our substations to Opto 22 LCM4 controllers and SNAP Ethernet I/O systems. We communicate with our electric substations and Opto 22 devices via Ethernet using our fiber-optic network."

McCallie began with an Opto 22 Ethernet "brain"— a compact communications and I/O processor—and a set of I/O modules. After ensuring that the equipment would work with both the utility's control system and its local area network, McCallie and his staff began the installation process in May of 2000. In slightly more than six months, the entire utility was converted over to the Opto 22 system.

The new system proved its worth on the first substation installation. "For our electric metering, we count pulses from revenue meters that equate to kilowatt hours. When we hooked the Opto 22 system up, we could see that the old system was capturing only a portion of the pulses," says McCallie. "We also had a discrepancy between two different metering systems—the existing

SCADA system and a second, separate metering system—but the Opto 22 system was able to determine which one was correct."

Now, pulses from the revenue meters arrive reliably. Billing information is stored in a modern SQL database and is used to generate much more accurate billing statements.

Additionally, engineers and technicians are able to see problems in the system almost immediately. "Using the Ethernet connection, we're able to operate substation distribution breakers on a real-time basis," says McCallie. "We can set up trends and look at information, so we can perform substation switching and see the results in a few seconds. We can also see the impact that switching has on the system balance almost instantaneously, so we can take whatever corrective measures are needed immediately, instead of having to wait for data updates."

Inside Software Support

Another major concern for personnel at McMinnville Water & Light was the issue of self-sufficiency. "Anytime you have an outside company install and program a SCADA system for you, you usually incur steep expenses," declares McCallie. "In many cases, you have to pay an annual licensing fee. Also, if you need anything changed, you have to pay for an engineer or programmer to come in, and that can be very expensive. With the Opto 22 system, however, we don't have to worry about that. We turn everything over to technician Jon Spence. He handles all of our SCADA programming."

Spence has been programming the Opto 22 systems from the beginning. "I like the system because the programming software is easy to learn and work with. Opto also has very good debugging tools," says Spence. "It took just a little while for me to change over from ladder-logic programming to flowchart diagrams and it's much easier. I create control programs on a desktop PC and then download them to the remote Opto 22 controllers over the network."

Pricing also proved quite favorable for MW&L. "The Opto 22 software package is relatively inexpensive, and we don't have to pay a licensing fee to use it," says Spence. "In fact, the overall cost of the Opto 22 system is less than comparable hardware and software. Plus it's more flexible. We can upload and download data from the SQL database and use Ethernet and Modbus protocols to easily connect to all of our field devices. Everything just fits together with the Opto 22 system." Spence is assisting other members of MW&L in setting up a company Web page so operational staff and others will be able to obtain data from the SQL database using an Internet browser on a desktop PC.

For this self-sufficient, relatively small municipal power and water utility located in the coastal mountains of Oregon, Opto 22 has proven to be the key to smooth operations and continued reliability. The big winners, however, are McMinnville Water & Light customers, who continue to receive excellent service and quality electricity and water at a very economical price.

About Opto 22

Opto 22 manufactures and develops hardware and software products for applications in industrial automation, remote monitoring, and enterprise data acquisition. Using standard, commercially available Internet, networking, and computer technologies, Opto 22's SNAP systems allow customers to monitor, control, and acquire data from all of the mechanical, electrical, or electronic assets that are key to their business operations. Opto 22's products and services support automation end users, OEMs, and information technology and operations personnel. Founded in 1974 and with over 85 million Opto 22-connected devices deployed worldwide, the company has an established reputation for quality and reliability. Opto 22 products are sold through a worldwide network of distributors, partners, and system integrators. For more information, contact Opto 22 headquarters at 800-321-OPTO or visit our Web site at www.opto22.com.

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