



Great Northern Paper

Designed for Success

Results

- Lower operating costs
- Reduced downtime
- Simplified troubleshooting
- Enterprise-wide communication

"We've been using the GE automation solution for a little more than six months, and already we've seen a remarkable difference in our troubleshooting capabilities and in the level of confidence with which we operate."

*Pierre Letarte, Process Control, Superintendent,
Great Northern Paper*

Great Northern Paper Tames Troubleshooting, Decreases Downtime, Cuts Costs with GE e-Manufacturing Solution

Ethernet networking brings monitor and control system to hydroelectric stations

Back in 1900, when Great Northern Paper began manufacturing newsprint, even the greatest of its visionaries could not have imagined that one day the company would encompass 11 manufacturing and power generation plants and that each site would be linked by a ubiquitous communication tool called "Ethernet."

Today, Great Northern employs 1,325 people and possesses 400,000 acres of land in Maine, using 575,000 cords of pulpwood annually in the production of newsprint, directory paper, and groundwood specialties. Until recently, the six hydroelectric power stations that supply the energy to Great Northern's pulp and paper operations were controlled by a SCADA (Supervisory Control and Data Acquisition) master and remote terminal units, or RTUs. But, as component obsolescence, waning parts availability, and Y2K compliance became increasingly problematic, Great Northern looked to L&S Electric, a Wausau, Wisconsin-based integrator of hydroelectric systems, to design and implement an off-the-shelf SCADA and e-manufacturing solution using GE Intelligent Platforms Series 90*-30 PLCs, CIMPLICITY† industrial automation software, and Ethernet networking. This solution not only simplifies daily troubleshooting for significantly reduced costs and downtime, it also provides an integral communication link between each of Great Northern's remote locations.



† Part of Proficy Intelligent Production Solutions from GE.

No-Brainer Gets Smart

When Great Northern began its hydro station SCADA system revamp, officials already had some experience with GE PLCs and CIMPLICITY software. However, the application of these components throughout multiple locations was spotty, and none of the locations were networked. "Over the years, we added PLCs and HMIs here and there, but they were treated more as standalone equipment," explains Pierre Letarte, Great Northern process control superintendent. "We knew our GE components could have much broader applications if we incorporated them into a higher-level solution, which is why we specified GE when we approached L&S Electric." L&S confirmed this with their experience using PLCs to automate more than 220 hydro units over the past 18 years.



One of the biggest challenges to Great Northern's former SCADA master/RTU design was that it provided no intelligence at the RTU level. The RTU could only do what the SCADA master commanded; therefore, if the SCADA master failed, the RTU failed because it had no independent intelligence. Now, with the GE-based PLC system in place, Great Northern enjoys the benefits of truly intelligent automation. "All of the GE PLCs operate independently of CIMPLICITY and the Ethernet network," explains Wayne Michlig, L&S Electric's Marketing and Sales manager. "The PLCs add intelligence at the plants so that, if communication is lost, the PLCs are still in control of the stations."

According to Michlig, PLCs are now an integral part of Great Northern's overall energy optimization system. PLCs are responsible for all unit and station controls, which were pre-engineered by L&S Electric, and include start/stop, pond levels, station flows, station kilovars, units flows, unit kilowatts, and unit kilovars. The PLCs are programmed to optimize energy production by controlling setpoints and distributing flow to available power generation units, maintaining a constant power factor. Because Great Northern shares a power-tie to Bangor Hydro, buying and selling power based on loads and available generation demand, maintaining adequate power generation during the new system transition was critical. To achieve this, L&S Electric simply incorporated the optimization algorithms used by the former SCADA system into the PLC-based system to maintain equivalent generation efficiency.

Troubleshooting

In addition to their independent functions, each of Great Northern's GE PLCs is equipped with a sequence of events (SOE) recording module that feeds time-stamped information to CIMPLICITY software for monitoring, troubleshooting, and reporting. CIMPLICITY acts as an interface to PLC functions, and its ability to provide at-a-glance process status has proved invaluable to Great Northern dispatchers and maintenance and repair personnel. The system provides individual point alarming, equipment diagnostics, electronic trending, and unlimited reporting capabilities.

"By providing real-time hydro station information to our dispatch center," Letarte says, "we've significantly reduced our troubleshooting downtime, in some cases by as much as 100 percent, as we can now see exactly when and where the problem is occurring and immediately provide a targeted response."

In the past, troubleshooting was a tedious process for Great Northern because an alarm would only indicate at which hydro station the problem was occurring. With some stations as far as 30 miles away, troubleshooting could cost thousands of dollars per hour, as an operator would be required to travel to the station and do a physical inspection until the alarm trigger was located.

Behind the Screens

With an object-oriented approach, CIMPLICITY makes it simple for Great Northern to create screens to handle any number of operating parameters. Pre-built and pre-configured screens are readily adapted using graphic tools, and a built-in graphics editor incorporates Windows®-type toolbars on the development screen. Users simply select a tool for drawing, or for adding text and button objects. An Object Linking and Embedding (OLE) button eases importation of OLE 2.0 objects such as spreadsheets, charts, and bitmapped images. Once objects are created, they can be resized, rotated or moved using the "handles" that appear when the object is selected.

Comprising two redundant CIMPLICITY servers and three CIMPLICITY viewers, the Great Northern dispatch center logs more than 17,000 I/O points from 15 GE Series 90-30 PLCs to a database. From this central location, a single dispatcher responds to power requirements and resolves alarms communicated by CIMPLICITY via Ethernet from a server located at each of Great Northern's 11 remote sites. Each site server collects data only for that site, providing a separate level of redundancy that protects individual locations from any interruptions at the main dispatch center. In the event the dispatch center is disconnected, operators can still go to an individual site to control operations.

Expanding with Ethernet

"The whole process industry is rapidly heading toward Ethernet as the standard for real-time communication," observes Letarte, who notes that the decision to use Ethernet was greatly influenced by the fact that Great Northern had an existing Ethernet network in place. "The standardization allows us to perform in a familiar Windows NT/ Ethernet environment, making it an exceptional advantage when acclimating our personnel to the new functions and advanced capabilities of CIMPLICITY."

In addition to enabling dial-in troubleshooting for both the PLCs and CIMPLICITY, the Ethernet network will also provide a bridge to the next phase of Great Northern's automation expansion. Phase II of the project, currently in the design stage at L&S Electric, will replace mechanical actuator "governors" with new higher pressure PLC-based digital governors. L&S Electric's digital governor is a GE Series 90-30 PLC-based regulating system running software that contains the governor algorithm. The high-pressure, low-volume hydraulic power unit design greatly reduces the physical size of the system when compared with the original lower-pressure mechanical actuator governor. The new digital governors will

also provide automatic unit start and stop sequencing, automatic synchronizing, minimum discharge and bypass valve control - all while communicating with the SCADA and automation system via Ethernet. The system is fully compliant with IEEE and IEC standards for hydroelectric turbine governing facilitating black start and isolated operation.

"We've been using this new SCADA and automation solution for little more than six months, and already we've seen a remarkable difference in our troubleshooting capabilities and in the level of confidence with which we operate," Letarte reflects. "Great Northern has managed to thrive for more than 100 years, and every investment we make, including our automation solution, is ultimately an investment in our future."



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