Cardinal Cogen

Designed for Success

Results

- Lower operations costs
- Improved system performance
- Higher reliability
- Less maintenance
- Easy documentation and trends analysis

"With alarm management and database logging, CIMPLICITY offers quite a bit of reporting capabilities. We're serving a hospital with 50,000 patients a year, supplying laboratories and facilities of a major university, plus producing revenue by selling power. It's a tremendous asset to get complete information—as well as automatic response—so quickly and simply."
Jim Soutter
Operations Manager
Cardinal Cogen

Class Act

GE Fanuc Earns High Marks for Cogen Control at Stanford University

While students at Stanford University, Stanford, CA, might not even notice several minutes without electrical power, patients at the Stanford Medical Center could experience life-threatening complications. Fortunately, the university can rely on round-the-clock, 49-megawatt service from on-site power plant Cardinal Cogen. This independently owned plant provides all of Stanford's steam and electricity with the help of a GE Integrated Control Systems (ICS) solution that features CIMPLICITY®* monitoring and control software from GE Fanuc Automation.

"Our first priority is to provide emergency backup power to Stanford Medical Center," says Jim Soutter, operations manager for Cardinal Cogen. "Other priorities include steam for sterilization and heat, as well as electricity for the entire campus. With high system reliability and performance, we can offer Stanford dependable power service and maintain our contractual arrangement."

Power Ties
In addition to its obligations to Stanford, the plant also sells about half of its electricity to local utility Pacific Gas and Electric.

"Right now, power reliability at Stanford is our foremost concern," Soutter emphasizes. "However, our ability to be a cost-effective producer in the utility market grows more and more important every day in light of deregulation. That puts pressure on controlling operations and maintenance costs and improving system performance."

Operations at the plant center around a GE 39-megawatt MS6001 gas-turbine generator and a GE 10-megawatt steam-turbine generator. Exhaust heat from the gas turbine produces 160,000 pounds of steam per hour in a heat recovery steam generator (HRSG). Part of this steam drives the 10-megawatt generator, resulting in a total 49-megawatt capacity. The remaining steam is sold to the university.

* Part of Proficy Intelligent Production Solutions from GE Fanuc.

imagination at work

To simplify operations and maintenance, the plant added unit controls for power-generation and balance-of-plant (BOP) equipment to the GE Industrial Control Systems architecture. This structure connects two GE Speedtronic Mark V controllers to the turbine generators, one GE Fanuc Series 90™-70 PLC to the HRSG, and another Series 90-70 PLC to the BOP equipment. All of the controllers are also connected to two redundant servers and three PCs. Operators access the control system through GE Fanuc's CIMPLICITY software, which supplies an easy-to-use graphical interface, centralized monitoring and control, alarm management, and database logging.

"We run CIMPLICITY on our Windows NT® servers," Soutter explains. "In this graphical environment, we have a user-friendly, point-and-click interface that makes life easy for our operators."

Soutter was able to configure 50 human-machine interface (HMI) screens without any traditional programming, saving setup time and expense. The HMI package employs an object-oriented approach that makes it simple to create screens to handle any number of operating parameters. Prebuilt and preconfigured screens are readily adapted using graphic tools. A built-in graphics editor incorporates Windows®-type toolbars on the development screen. The user simply selects 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.

Using these tools, Soutter created pictorial diagrams of equipment, adding buttons and data fields. With the click of a mouse, operators can control start and stop, speed, load, reset, crank, and idle. During operation, screens provide real-time data on temperatures, flows, speeds, pressures, levels, power, and valve status.

Real-Time Data

CIMPLICITY software receives data from nearly 2,000 I/O points. For the turbine generators, data is sent from the Mark V controllers' relays, thermocouplers, and resistance temperature detectors (RTDs). Additionally, a Mark V direct-interface card connects a Bently Nevada Proximitor® for inputs on vibration, axial position, thrust wear protection, differential expansion, and eccentricity. Magnetic speed sensors provide input to the primary controllers for speed control and overspeed protection. All of this data travels over an ARCNET™ LAN to the Mark V controller.

For the HRSG and BOP equipment, CIMPLICITY receives data from the two Series 90-70 PLCs. The PLCs feature a VME backplane with a power supply and CPU that permits continued operation if the LAN should fail. A Genius® bus controller in the PLC card rack communicates remotely with the appropriate Genius or field I/O block, which is wired directly to a sensor or actuator. Each block has its own microprocessor for communications, as well as monitoring and control capabilities. For example, one Genius block has the specific I/O function of reading a thermocouple input. Likewise, input can come from up to eight field I/O modules in a vertical rack. While the I/O communicate with the PLCs over a Genius bus, the servers receive the data over an Ethernet LAN.

"Since CIMPLICITY communicates with the controllers, we can configure them in a user-friendly environment," Soutter says. "Additionally, we can monitor and adjust controls from several convenient locations without having to go to each individual block."

CIMPLICITY also provides alarm management with automatic response. With four levels of alarms, the system can open and close valves, start redundant equipment, and signal an operator to take immediate action as needed. A database logger records alarms, events, and point values on the Windows NT server.

According to Soutter, the plant developed the database without any traditional programming. Because CIMPLICITY can be configured to automatically log data to Microsoft Access®—a Windows-based, relational database—the plant simply selected the items and conditions for logging. The system records individual points in detail and groups others for trend analysis. For example, diagnostic alarms help operators pinpoint under- and over-voltage occurrences and ensure proper action.

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Additional Resources

For more information, please visit the GE Fanuc web site at:
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