

Water plant control system saves time and money

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Providing high quality drinking water for a city of 59,000 people is a challenge in itself. Retrofitting the controls and instrumentation for six water treatment plants and 13 remote stations, and tying them all together is an even greater challenge. When the City of Meriden, Connecticut, Water Division, was facing this task in April 2001 they called on USFilter for help.

The water plants and remote stations had limited monitoring and control capabilities. The newer treatment facilities used motor control centers or analog controls, while the older treatment plants, remote pump stations, storage tanks, and metering facilities were manually controlled. Operators had to drive to each facility to solve problems. Effluent water quality data from the filters and water usage data had to be collected at each individual plant. Record keeping and daily, weekly, monthly and yearly reports were also prepared manually, which was very labour intensive. After-hours and unmanned plant alarms were sent as general alarms to a security service and then to an on-call operator.

Operational benefits of implementing a SCADA system are continual monitoring and alarming of process variables, automatic generation of reports, built-in security, streamlined record keeping and archiving, and potential operational and energy savings.

A team from USFilter met with consulting engineer Metcalf & Eddy, the City's Water Division personnel, and the City's Management of Information Technology (MIS) staff to discuss the best solution for automating each water treatment plant and connecting it to the remote facilities using state-of-the-art controls technology. While the City knew they had to install a SCADA system to automate and upgrade current controls, they also knew they needed someone to do the design/build and act as general contractor of this phased installation. With its extensive experience in systems integration and project management, USFilter recommended a Microsoft Windows-based Honeywell distributed control system integrated with USFilter D620i remote telemetry units (RTUs), and Cisco networking equipment.

USFilter provided design engineering, installation, training, commissioning and service.

The Honeywell control system integrates continuous, batch and discrete control capability into a single, cost-effective, scalable control solution. The key element of the process is the seamless integration of the C200 controller with the Honeywell process server for optimum performance. Additionally, the Honeywell control software offered an option called Distributed System Architecture. This feature allows multiple plants to share point data, alarms, messages, and history without the need for duplicate configuration on any server. This means that, with proper security credentials, an operator or engineer can log in to the system from anywhere on the network and 'see' all six plants and remote RTUs at the same time.

USFilter documented the "as-is" wiring of the equipment at all the facilities, and then met with City operations personnel to work out a description of operation for each facility. These descriptions served as the basis for how the operators would interact with and use their new system, and also served as a guide for USFilter in engineering the controls. The City also added several new instruments and controls in areas that previously had none.

While the company was building the panels, the project team met with the consulting engineer and the City to agree on standards and conventions for the control system screens with which the operators would interact. When this phase was completed, the City's water division personnel and MIS department visited USFilter for a week of training, then returned later for a week of hardware and software Factory Acceptance Testing.

After testing was complete, the hardware was shipped to the site. Installation began in June 2003. During a seven-month installation period, each plant was individually taken off-line while the instrumentation and controls were installed and tested, and then placed back online.

Control system servers are located at each of the six treatment facilities: Broad Brook Water Treatment Plant, Merimere Filter Plant, Elmere Filter Plant, Bradley

Hubbard Water Treatment Plant, Evansville Avenue Water Treatment Plant, and the Platt and Lincoln Water Treatment Plant. Each of these facilities' servers is dedicated to supporting local plant process control and monitoring. The servers also connect to, and communicate with, all the plant's remote locations, such as pump stations, wells and tanks.

Each location uses a standard switched Ethernet network topology communicating over ISDN lines. This allows the City's MIS personnel to easily dial in to the network over a standard telephone line to troubleshoot/upgrade each piece of equipment in the system, including controllers, routers, device servers and all PCs. The ISDN network serves as a private isolated network for control system use only. It was chosen to use Cisco ISDN networking equipment because of its widely accepted use, and because the City was already using Cisco.

The control system servers at each water treatment facility collect and store continuous process data, and securely display the data, locally and remotely, in any user-desired format. The data is transferred automatically from each of the treatment facilities to the central redundant server located at the Broad Brook water treatment plant. Supervisory staff has access to the entire control system from any computer in the system, including secure dial-up access.

The control system reduced labour costs, improved operating efficiency and allowed more accurate reporting of water usage, water quality and realtime operation.

The phased start-up of each plant was completed according to schedule in February 2004. The networked operation of all six water treatment plants using the control system has proven to be a great success. Says Dave Lohman, Assistant Director of Water Operations at Meriden: "We've seen labour cost savings now that our operators can handle issues that arise at a plant without having to drive to that site. Being able to monitor operations of all the plants at once reduces the reaction time, and ultimately improves operating efficiency. It also increases security, and has allowed us to more accurately report water usage and effluent water quality." Dave adds: "Another plus is the fact that we can automatically manage filter run times, producing more product at less cost."

Additionally, all plant and RTU alarms now dial out automatically using control system software. This eliminates the need for a security company to contact the on-call operator. Instead, the control system calls the operator's home, cell phone or pager, and if there is no answer, the system will call the next person on the list. The specific plant alarm is enunciated (such as "Broad Brook clearwell level high alarm"), so the operator knows the specifics and can either dial in to fix the problem or drive to the site.

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Background Information:

Siemens Water Technologies delivers cost-effective, reliable water and wastewater treatment systems and services to municipal, industrial, commercial and institutional customers worldwide. The division "Water Technologies" is part of Siemens' Industrial Solutions and Services Group (I&S) which is a system and solution provider for industrial and infrastructure facilities and global service provider for the plant and projects business covering planning, installation, operation and the entire life cycle. In fiscal 2006 (to September 30), I&S employed a total of 36,200 people worldwide and achieved total sales of EUR 8.819 billion.

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