



Metropolitan Water & Wastewater Utility

Designed for Success

Results

- Approximately \$150,000 reduction in implementation costs
- 10% decrease in implementation programming and configuration
- 25% reduction in spare parts inventory
- 50% decrease in training time and costs
- On time, on budget delivery
- Faster, more informed decision making across all water operations
- Rapid troubleshooting with remote monitoring and diagnostics capabilities
- More rapid, easier compliance with industry regulations
- Proven reliability
- Expert local service, support and spare parts
- Scalability for long-term incremental upgrades
- Easy-to-use, consistent graphical environment

"Using a single control and automation software supplier has been a key strategy in keeping our training time and costs to a reasonable level."

SCADA Project Manager
Water & Wastewater Utility

Making a Splash:

Major City Treats Its Water and Wastewater Reliably and Cost Effectively with Help from GE Fanuc SCADA System

Spread out over more than 100 square miles, this major metropolitan water and wastewater utility's treatment system consists of a vast array of physical components and facilities, including: two water treatment plants, three wastewater treatment plants, six remote water distribution sites in the advanced stages of design and early phases of construction, reservoirs, wells, pumps, valves, lift stations, and water and sewer lines. While the infrastructure itself has held up well to a harshly cold climate, three different and aging SCADA systems were putting the freeze on the city's monitoring and controlling capabilities. Evolving as the city expanded over the years, the team was forced to maintain and manage these disjointed systems - which increased costs and spare parts inventories. However, with the installation of a single, system-wide SCADA solution from GE Fanuc well underway, the city's diverse systems soon will be completely connected—delivering an impressive yet cost-effective array of functionality and helping the team to save time, decrease inventory and associated costs, meet environmental regulations, and improve water and wastewater treatment processing quality.



imagination at work

Dated SCADA

The city installed its first supervisory control and data acquisition (SCADA) system in 1986 at one of its water treatment facilities. More than 15 years later, it was running three different combinations of SCADA hardware and software.

- The company's water distribution and water treatment plants' SCADA systems were based on DEC MicroVax mini computers running proprietary software and aging field hardware;
- One of the city's wastewater treatment facility SCADA systems was built on obsolete PLCs, DEC workstations, and proprietary software;
- The other wastewater treatment facility SCADA system was based on antiquated PLCs and hardwired panels.

Maintaining these complex and unconnected SCADA systems was costly, as the team had to store spare parts and manage three different sets of hardware and software. And, as the systems aged, finding both available spare parts and technical support knowledge became more and more difficult. Adding to the headaches was the fact that the SCADA systems were installed by three different contractors under three different contracts, so there was no single point of reference for training, troubleshooting, and creating common graphics.

Realizing that the SCADA systems were past their useful life and were nearing obsolescence, the city decided that replacing all three was necessary in order to maintain the high levels of quality and reliability at their treatment facilities and water distribution and wastewater collection systems – and that one overall SCADA system would provide the cost and time savings for a fast ROI.

Diving In

With internal resources already tapped to maximum capacity, the city looked to speed the upgrade process with expert assistance.

“While we knew that we needed outside help, we also wanted to have as much control as possible over the project schedule, specifications, and design, so we kept the project design under our roof,” says a SCADA project manager at the city.

To bring cohesion and organization to the massive undertaking, the city contracted with MWH (<http://www.mwhglobal.com>), one of the world's top experts on water and wastewater issues, to help design, procure, install, and integrate the SCADA system, under the condition that MWH's staff engineers work in the city's local office.

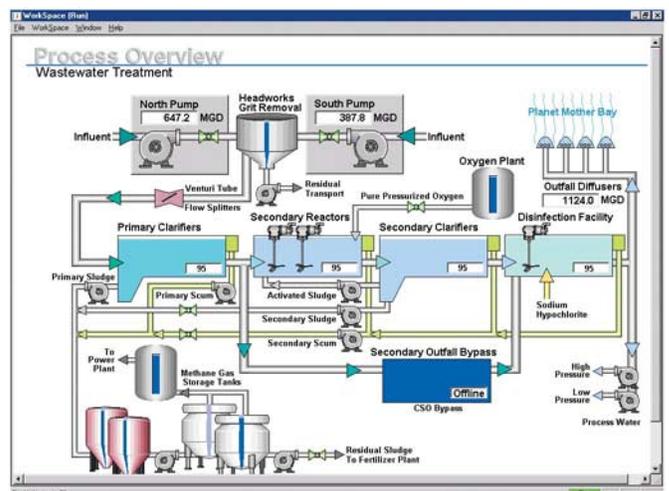
During the year-long design phase of the project, the MWH and city team mapped out all aspects of the communications systems, determined how to integrate historical and new data from each facility into one database management system, and designed training programs for plant staff and maintenance personnel. During this process, the goals for the new SCADA system were clearly identified:

- Common hardware, software, and operation;
- Readily available parts from a local supplier built on a software package with a large base for proven capabilities;
- Easily maintainable in-house;
- The ability to incrementally replace and upgrade system components;
- Central control room;
- Ability to connect seamlessly with enterprise tools;

- Local service and support; and
- Complete the project within a target time frame—on budget.

Specific criteria for the new HMI / SCADA software were:

- **Operator Ease of Use**
- **Wide Area Network (WAN):** HMI nodes had to be able to communicate with each other via the Transmission Control Protocol/Internet Protocol (TCP/IP) used on the city's Cisco routers.
- **Historical Database:** The HMI had to include a best-in-class set of tools for moving data into Oracle and, at times, read data out of Oracle so that the operating data from the SCADA system was integrated into an enterprise system.
- **View Nodes:** Since the city's plans called for establishing a virtual control room for monitoring and controlling facilities from a common point, and for providing near-real-time information from remote sites for use by the Customer Services Division, as well as historical data to the Engineering Department, a view node (preferably running on a Citrix server) was required.
- **PLC Drivers:** The input/output driver that handles communications between the HMI software and PLCs is key to the SCADA system's reliable operation.
- **Alarm Features and Redundant Servers:** The city currently uses voice alarms at its treatment facilities, and operators plan to extend this function to remote paging and remote off-hour, dial-out alarms.
- **Microsoft® Activation Software:** The HMI software had to work with the Microsoft Windows® XP security system and network services, as operator desktop computers run on Windows XP operating systems.
- **Application Programming Interface:** Since the city uses Microsoft Visual Basic (VB) and Microsoft Visual Basic for Applications (VBA) as its in-house application programming languages, the ability to use VB, VBA, Active X, and Common Object Model (COM) as an Application Programming Interface (API) would enable the team to use in-house resources to write special applications for the SCADA system.



A Comprehensive Solution

MWH performed a complete review of the city's current system and researched available replacement solutions based on these goals. After

conducting extensive research and holding a series of workshops involving various suppliers and users, MWH recommended that the city install GE Fanuc's Proficy HMI/SCADA – iFIX software and Proficy Historian. The new system is a web-accessible, client/server software solution that allows users anywhere on the city's business network to view Key Performance Indicators (KPIs) and graphical interface screens. The solution consists of the following components:

- **Proficy HMI/SCADA – iFIX** is a powerful and highly flexible client/server-based HMI/SCADA solution that provides process visualization, data acquisition, and supervisory control over the water and wastewater processes. The software gives operators and engineers the power and security to precisely monitor and control every aspect of their process, equipment and resources. iFIX fully addresses all of the city's SCADA system and HMI software criteria.
- **Proficy Historian** is a plant-wide data historian that collects, archives, and distributes a high volume of plant floor process information at extremely high speed in real time. Proficy Historian represents a leap in the performance, utility, and affordability of plant-wide data historians. Scalable to 100,000 data points per server, Proficy Historian delivers high-volume data collection and retrieval without sacrificing speed or performance, and it gives users extensive visibility into their manufacturing operations.
- **iClient**, which is installed on the hard disk of the client computer, gives users the proper authorization for complete access to the data in all networked SCADA servers. All applications can be run on iClient, including real-time graphics, trending, alarming, and reporting. And, users can perform development tasks—including building graphics and adding tags—online at SCADA servers.

In addition to the comprehensive functionality of the solution, the city decided to specify GE Fanuc because, according to MWH's estimates, the GE Fanuc software would require 5-10 percent less effort to configure and install than the other packages reviewed. And, MWH estimated that using the GE Fanuc software would reduce the cost of configuration and programming by approximately \$100,000 to \$200,000 over the other solutions that were considered.

Phasing in the New System

In addition to installing the SCADA software, control systems and operator stations, the multi-year project for designing and installing the new SCADA system also includes the wide-area microwave network and 900 MHz polling

radio sites. The progress made during the first half of the project has been truly impressive, says the SCADA project manager. He reports that the new SCADA system is on-line at a water treatment facility and a wastewater treatment facility after being completed on budget and on time. The first set of 20 remote sites for the water distribution is under construction—again, on budget, and on time; and that Pump Station 2 has been integrated successfully into the new SCADA system. The wide-area microwave network linking the plants, operations and maintenance facility, and headquarters is operational, while the 900MHz polling radio sites are also up and running successfully. The control system changeovers from the old systems to the new systems has proceeded smoothly – including while the plant maintains full operations – says the SCADA project manager, who credits everyone involved in the project.

The city's SCADA standardization project is approximately half finished, but the benefits of installing a fully integrated, utility-wide SCADA system are already becoming readily apparent. Radio terminals on more than 8,000 monitoring points (i.e., pumps, valves, reservoirs, and lift stations) send and receive data to and from a central operator 24/7 via radio communication.

“With instant access to information from all of our sites, we can provide better customer service, make more prompt and informed business decisions, share information with other city business units, and readily comply with industry regulations,” the SCADA project manager notes. “And, with a single standard system at all sites, our operators can work at any location without the additional expense and time of training on several systems.”

The SCADA project manager cites two major factors in the success of the SCADA standardization project to date: the city's design philosophy, and using a single, proven supplier for the SCADA hardware and software.

“Doing all of the engineering here was a key part of keeping the project on budget and on time,” he explains. Since the results of their efforts will directly impact their jobs, his staff has been motivated to work quickly and thoroughly, and they're receiving on-the-job training. Hiring MWH to provide the programming and design has played a key role in the smooth integration of all facilities into one SCADA system, while selecting GE Fanuc as its single-source SCADA system supplier has been crucial in keeping training time and costs to a reasonable level.

In fact, the manager says, the only aspect of the project to date that he and his colleagues would go back and change is how long the city waited to start the standardization of its SCADA system. Now that's making a splash!

GE Fanuc Automation Information Centers

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Additional Resources

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

www.gefanuc.com

