



City of Greensboro

Designed for Success

Results

- Quick return-on-investment
- 65% reduction in maintenance costs
- Scalable system to handle increasing capacity
- Easy trending and analysis
- Automatic documentation to help meet government regulations

"The high level of control afforded by the system allows us to maintain a minimal staff, while operating Osborne at optimum capacity."

Arthur White
Plant Operator
T.Z. Osborne Wastewater Treatment Plant

GE Fanuc Controls Save Sinking Systems at Two NC Wastewater Treatment Plants

Back in 1980, when the North Buffalo Wastewater Treatment Plant in Greensboro, NC, went online with a central computer linked directly to all of its field devices, operators were excited by the newfound advantages of automation. The 16-MGD facility, situated on 3.5 acres, lent itself nicely to the central computer design, as its compact operations were contained within one building. It wasn't until the city was later faced with the immense expense of a seemingly inevitable computer hardware and software upgrade at North Buffalo that they discovered the lifesaver that rescued this plant's and a second's sinking automation system.

Instead of the expensive upgrade, Greensboro found an alternative with a new Series 90™-70 programmable logic controller (PLC) and CIMPLICITY®* monitoring and control software system from GE Fanuc Automation. The North Buffalo conversion to a PLC ultimately proved more economical than the originally planned upgrade and it allowed the City to convert to a PC-based solution. Moving away from the old control system configuration resulted in a 65 percent reduction in maintenance costs that quickly returned the PLC investment. Greensboro successfully upgraded its North Buffalo operation by tying all of the building's I/O to the GE Fanuc PLC. Field I/O blocks located in a central control panel will eventually be relocated when the plant undergoes improvements to extend its data highway to an additional building.

* Part of Proficy Intelligent Production Solutions from GE Fanuc.



imagination at work

Wanting to repeat North Buffalo's success, Greensboro later applied the same technology to a second water plant. The city's 35-acre, 22-MGD T.Z. Osborne Wastewater Treatment Plant was also suffering from an outdated distributed control system (DCS). Though state-of-the-art in the early 1980s, due to a lengthy government bidding process, the DCS was already three years old when it entered the development phase, and, by the time it was finally operational in 1984, it was nearly obsolete.

Arthur White, T.Z. Osborne plant operator, recalls his first day of DCS training: "We were told the manufacturer was no longer producing that type of system. It was a proven, reliable system, but, right from the start, we had no room to grow." Soon after, White received an eight-year parts notice from the manufacturer. "We bought as many parts as we could in an attempt to protect our investment, but eventually, we had to face facts that we had an outdated system."

Greensboro initiated system replacement by incorporating the latest PLC technology into the design of a new centrifuge dewatering installation followed by a new fluidized bed incinerator. Both installations are monitored and controlled using distributed PLCs and PCs with an Ethernet communication protocol. The City then bid total replacement of the remaining DCS, using the flexibility of the new PLC framework for integrating additional PLCs into one system. Greensboro directed designer/integrator Control Instruments, Inc. (C2i), Atlanta, GA, to capitalize on the openness of GE Fanuc's PLCs in a new Osborne design.

Using the GE Fanuc Series 90 PLCs, which were compatible with Osborne's existing PLC system, all remaining remote terminal unit (RTU) hardware was removed and field sensors were reconnected directly to the PLCs. C2i added the simple connectivity of GE Fanuc's Genius® I/O system and the powerful, yet user-friendly CIMPLICITY software for a complete design solution. By systematically replacing Osborne's outdated components, C2i was able to salvage Osborne's DCS, extend the facility's monitoring and control capabilities, and safeguard the system against a similar situation in the future.

A Smart Solution

Comprising seven wastewater treatment areas on 35 acres, Greensboro's Osborne plant includes an administration building, solids handling building, blower and service building, three pump stations, effluent chlorination and chemical storage, and effluent filters. In the solids handling building, a combination of GE Fanuc Series 90-70 and Series 90-30 PLCs send and receive data from the centrifuge, incinerator, fluid beds, sludge cake pumps, continuous emissions monitoring, belt feeder press, and multiple hearth furnace.



Three Genius distributed I/O blocks linked by Genius LAN to a Series 90-70 PLC provide automatic diagnostic information on the centrifuge's wiring, power condition, and load, as well as on the state of the LAN, blocks, and circuits. This configuration sharply reduced initial setup time and continues to provide cost-cutting diagnostics by instantly identifying the cause of a problem. These diagnostics provide up to a 600 percent increase in overall system fault detection, which in many cases translates into a 50 percent reduction in system downtime.

Additionally, three remote pump stations, a remote filter area, and a remote chlorination/storage area tie to respective Series 90-30s. Like the solids handling building, the blower and service building also employs a Series 90-30/90-70 combination with the addition of a dedicated operator interface (OI). All of Osborne's PLCs and Genius I/O blocks are connected by Genius LAN and Ethernet, providing communication with CIMPLICITY servers and viewers in the main control room, incinerator control room, and maintenance department. The system consists of over 6,000 points logged at five-second intervals using Microsoft® SQL Server™. Detailed process data is kept for 15 days and then summarized for use in performance evaluations and general troubleshooting.

Using an object-oriented approach, the Windows®-based CIMPLICITY software makes screen creation simple, and prebuilt and preconfigured screens are readily adaptable. Each screen's color graphics mirror real field components, so operators can easily recognize and navigate different areas. CIMPLICITY's standard Quick Trend feature provides instant pop-up trends for any points on a screen. "Quick Trend is a real time-saver for us because regulations require us to perform significant trending and analysis," White says. According to White, operators use the software to provide two levels of graphs—process control graphs of quarter-hour

and hourly averages within a 24-hour period, and five-second system integrity scans used primarily for maintenance.

White says Greensboro also plans to add CIMPLICITY's Pager and WebView features to the Osborne system, further extending its communication capabilities. The Pager option sends alarm information to an alphanumeric pager, alerting an operator to alarm conditions. It also supplies an escalation capability if alarms are not acknowledged. WebView provides a fast, efficient way of sending



CIMPLICITY information to users over the Internet or Intranet. WebView transmits CIMPLICITY screens from the CIMPLICITY server directly to standard Internet browsers, so casual users can view the data without having to install or maintain anything but mainstream PC software.

One to Grow On

Though currently operating at 22 MGD, Osborne plans to increase its capacity by nearly 50 percent, expanding to 30 MGD without increasing its staff. The advantages provided by distributed PLCs foster this level of growth by providing better control with more efficient staffing. "Using the network interface, an operator can troubleshoot the PLCs right down to the individual wires running into the them without having to physically inspect the site," White says. Each PLC area can operate independent of the interface, so if the interface is disconnected, the PLC will continue to perform. Adds White, "The high level of control afforded by the PLC-based system allows us to maintain a minimal staff, while operating Osborne at optimum capacity."

The combination of GE Fanuc PLCs, Genius I/O, and CIMPLICITY software helps Osborne consistently achieve the pinpoint accuracy demanded by strict government water regulations while also keeping an eye on the future. Easy integration and programming, open architecture, and commonality of design will facilitate upgrading as Osborne's requirements become more demanding, and with an additional 10 MGD, there will definitely be more demand.

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Additional Resources

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

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