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Case Study

Siemens Integrator helps small town modernize water supply while cutting costs

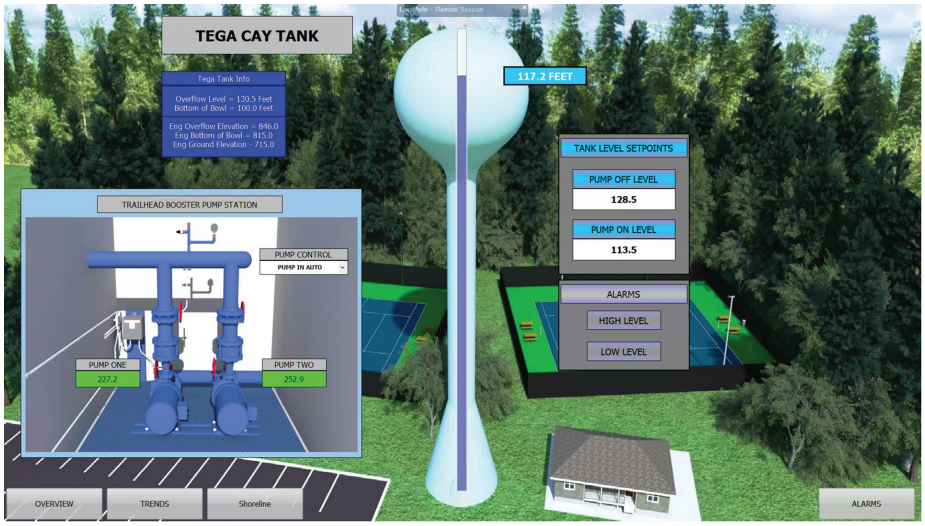
Solution built on S7-1200 controller, TIA Portal, and WinCC

Municipal water systems can be complex, with multiple pumps, tanks, valves and miles of pipelines. Unfortunately, in many municipalities water facilities are aging and neglect of water systems is exacting a steep price. According to the Center for Neighborhood Technology, an estimated six billion gallons of clean drinking water per day is wasted because of antiquated water systems. In an era of tight municipal budgets, the efficiency of the water and wastewater network must be maintained for costs to remain in check. A sound water network needs to address the challenges of leakage control, pipe repairs, pressure management, and asset management.

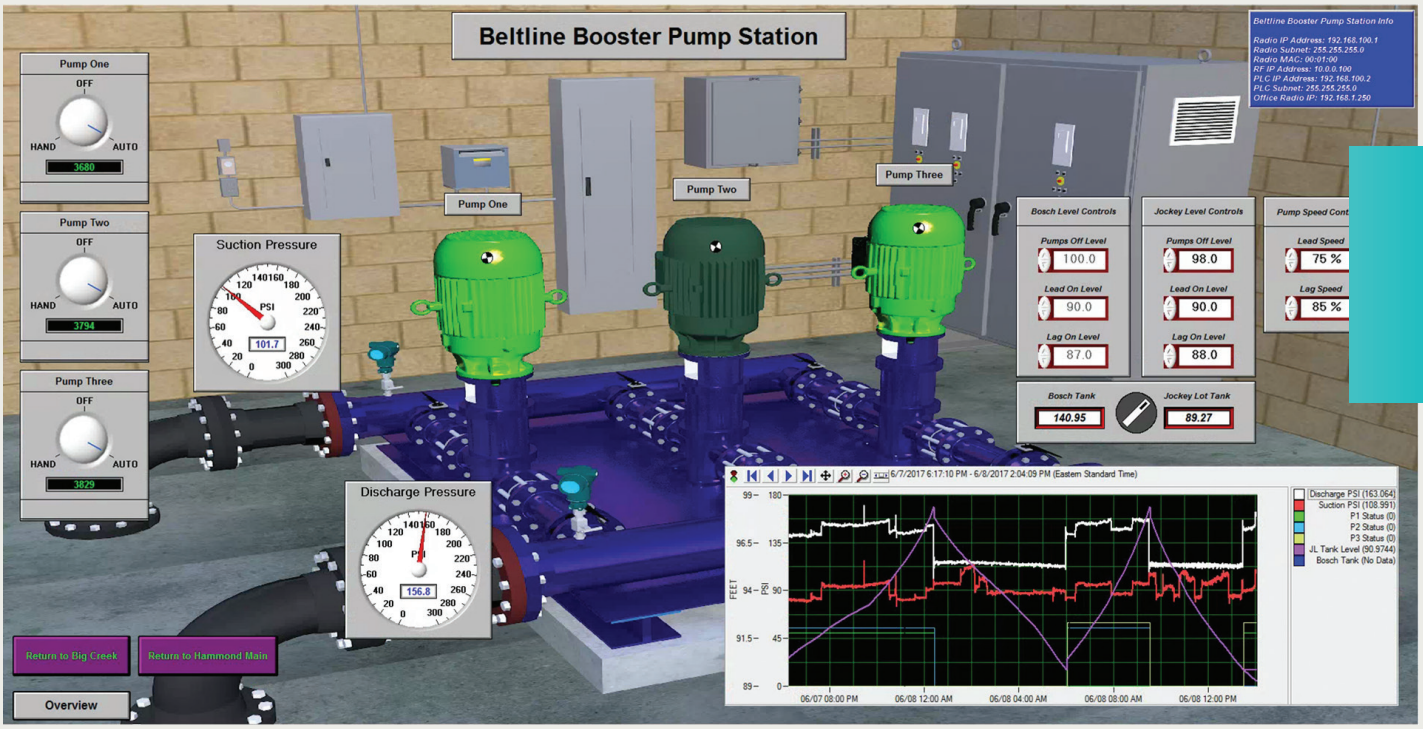
Tega Cay, South Carolina, a small town of 8,000 residents, faced the challenge of providing their citizens with a reliable and stable but cost-effective supply of fresh water. To cut costs, the town decided to buy water from a less expensive secondary source, and needed to bring the system online.

To access the secondary water supply, the town required the construction, control and monitoring of water tanks and booster pumping stations. The pumps fill the tanks and then water flows to consumers as needed. In this particular instance, the pumps and tanks were located miles away from each other. Many small-town water systems traditionally link to each other via existing copper telephone wire networks that are leased from the telephone company. In this very basic setup, the lines act as control electrodes in which a signal from a tank turns on and off the pumps.

However, the copper telephone wire network was deemed a risky solution, because copper wire networks are being phased out as phone companies are replacing copper lines with fiber optic cable.



usa.siemens.com/simaticwincc



Tega Cay town officials decided to turn to a specialist in municipal water and wastewater control systems, Kinard Control Systems of Newberry, South Carolina. Brian Kinard, President, explains the water system challenge. “When phone companies make the decision to pull out their copper wires, they give you about two weeks-notice before they replace a line.” Such a situation leaves residents without access to water and is out of the town officials’ control.

After evaluating the Tega Cay’s water distribution requirements, Kinard proposed a solution based on the Siemens S7-1200. This powerful controller is compact and therefore well suited to the application. A second part of the solution was TIA Portal, a unified engineering framework that is user friendly and saves time and money. The final element was Siemens WinCC supervisory control and data acquisition (SCADA) system. The entire system used computers, networked data communications and graphical user interfaces to perform high-level process supervisory management, which would give the city of Tega Cay more control and monitoring capabilities.

User friendly and efficient programming environment

Since the main components of the water system were located miles away from each other, a decision needed to be made on how to best connect the system. Based on the local terrain and location of cell towers, Kinard proposed a radio telemetry communications system to help in the monitoring and control. Radio telemetry is a real-time technique that uses radio waves for transmitting information from a distant instrument to a device that indicates or records measurements.

In the case of Tega Cay, the radio telemetry system links together the SCADA components to enable remote monitoring and control. Kinard configured a solution consisting of pumps, sensors, and programmable logic controllers (PLCs) connected through a standardized panel developed by Kinard engineers. The equipment was installed at four remote locations. The system was designed to monitor and manage two new booster pumps that fed some existing above ground water tanks.

Each site transmits data to each of the other sites and also to the master Human Machine Interface (HMI), which is based on the Siemens WinCC SCADA system. Variable tank setpoints enable precise control over system operations.

When the town decided to add an HMI component to their system, some reprogramming had to take place. Fortunately, existing Siemens libraries and modules developed for other solutions already existed, and using a Siemens Totally Integrated Automation (TIA) Portal tool, Kinard was able to quickly implement the changes.

“I started at 9 o’clock in the morning, and by 12 o’clock I had the entire system reprogrammed because I was able to use those libraries,” said Kinard. “I was able to drag and drop from other systems we had programmed. If we had to start the process from scratch without the libraries, the very same work would have taken a week,” Kinard said.

Faster implementation means lower costs

According to Kinard, Siemens products helped to improve the project development and deployment speed in other ways. It was possible, for instance, to have the Siemens S7-1200 Programmable Logic Controller (PLC) host a web page, which enabled access through any browser on any device. As a result, troubleshooting could be performed remotely.

The S7-1200 Programmable Logic Controller (PLC) can host a web page, which enabled access through any browser on any device.

Kinard experienced this remote capability with Tega Cay when they indicated they wanted to log into the system without using cumbersome methods that only allowed one person to log into the system at a time, or required a difficult login for access. So Kinard logged into the Siemens system at Tega Cay and enabled the WebUX client. Within an hour of their conversation Kinard sent Tega Cay the link, user name, and password to log in using WebUX. Kinard said, "Siemens made remote troubleshooting and access so easy for us and our clients."

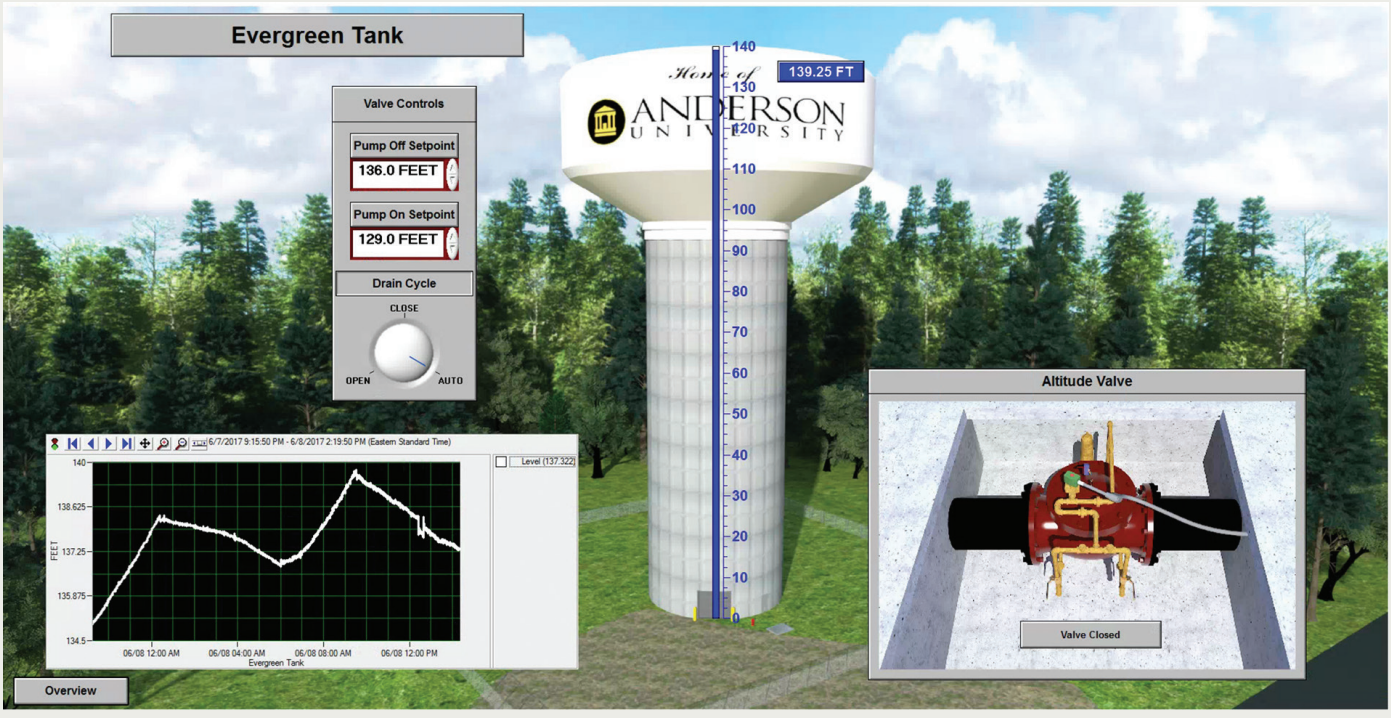
In addition, most PLCs require connection to a serial cable and assigning an IP address to the controller. This allows for communication to and from the PLC (but without integrating to the Internet). Under such a scenario, developers must assign an IP address and release it, doing so repeatedly during development. Adding a secondary site requires additional PLCs, further complicating the process.

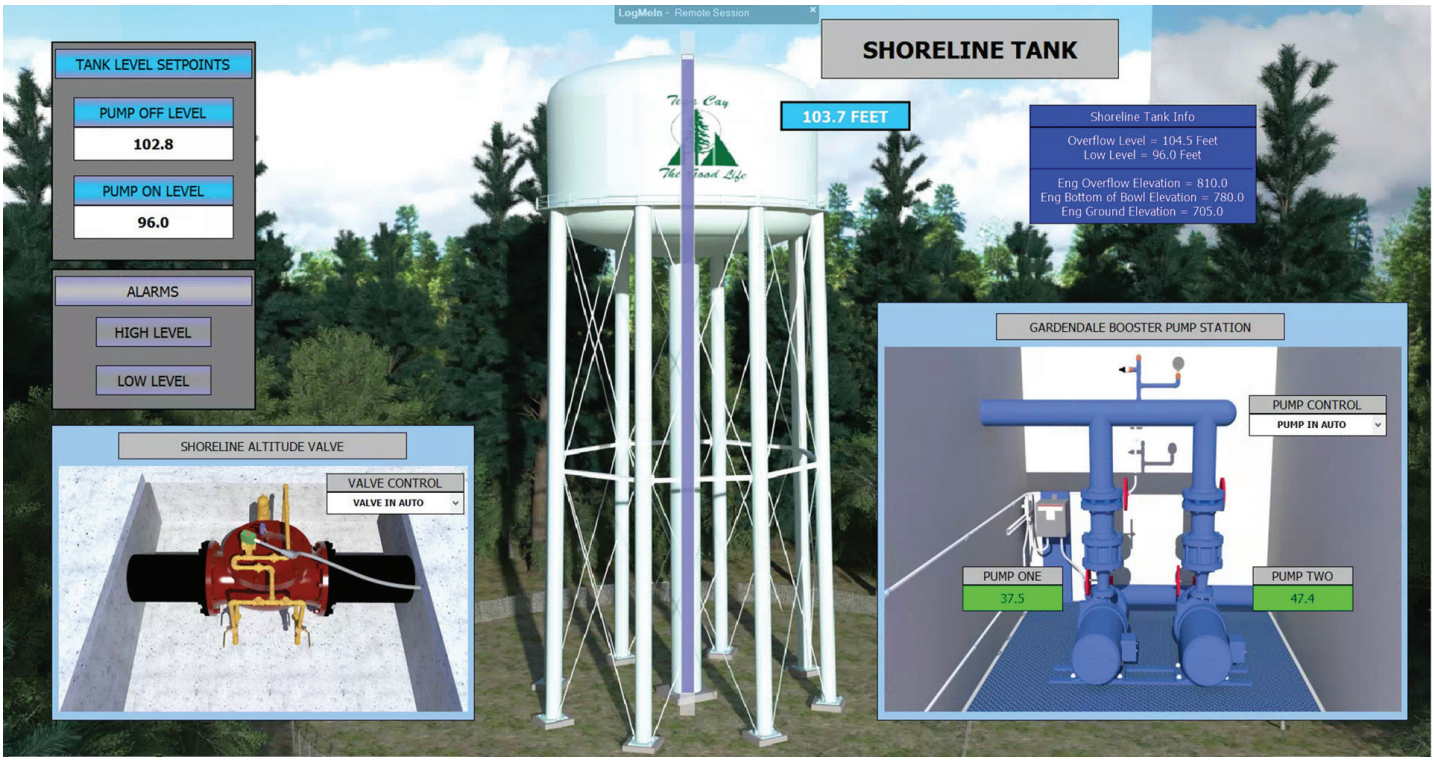
The Siemens TIA portal triggers a search for the PLC and automatically adds the appropriate IP addresses through a secondary Domain Name Server (DNS). This DNS allows developers to communicate to the PLC while retaining the ability to seamlessly communicate with the wider Internet, enabling access to all the resources needed when creating and rolling out a solution. As other sites are added, the software inserts them into this secondary DNS. All of this occurs automatically in the background without having to involve time from the engineer.

"I don't have to change my IP address back and forth in order to accomplish tasks," Kinard said. "The Siemens software designers have clearly incorporated the Siemens extensive field experience to help greatly simplify the IPS address issuance task."

Expertise + quality technology = peace of mind

The expertise of the Kinard engineers in the domain of instrumentation and sensors also helps its customers. For instance, having sensors in the right place can help diagnose problems, such as when a sticky valve causes a pressure spike that makes pipes leak. By placing the instrumentation in the right location, problems can be discovered and fixed.





Doing that is easier with the right technology, the S7-1200, for instance, can be expanded with a wide variety of communication modules, signal boards, and signal modules to fit machine requirements. Its integrated technology is optimized for loop control, weighing, high-speed counting, telecontrol, identification and more.

With TIA Portal, Siemens is driving to full scalability from basic to advanced controller families. An integrated PROFINET interface ensures flexibility. Also, with functions that range from counting and measuring, speed, position and duty cycle control, remote I/O through simple process control functionality, the S7-1200 guarantees the ability to solve a wide array of applications based on proven technology. It is also available in fail-safe version for safety-related tasks. In both versions, security is integrated in the form of comprehensive access, copy and manipulation protection.

The engineering knowledge of Kinard Control Systems, the S7-1200 and the optimized design of the Siemens WinCC SCADA solution, helped Tega Cay to achieve their water availability goals while reducing their operational costs. As a result, the town's water customers are seeing lower water bills. In the future, they may see even lower costs and experience fewer instances of downtime because of their modernized SCADA system.

To find out more about the Basic Controller, the S7-1200 and its comprehensive range of technological functions here: usa.siemens.com/s71200

To learn more about how WinCC SCADA systems can help to better control municipal water systems, download the Siemens introductory brochure

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