

Metropolitan Industries, Inc.

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Romeoville, IL 60446



Metropolitan Gives Boost to Hammond

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service need. Issues are solved quickly and end-users eliminate the need to consult with multiple vendors in an attempt to figure out which company to call. This ultimately reduces your downtime and helps to eliminate the headaches of dealing with multiple vendors.

“One manufacturer means one number to call anytime technical support is needed,” says Municipal Sales Engineer Keith Girup who coordinated the Hammond job.

“A controlled environment allows for testing of the system prior to jobsite delivery, which minimizes

start-up problems in the field. When a customer takes delivery of a system they simply need to pipe in, pipe out and run power,” said Girup.

Metropolitan Industries, Inc. is a single source supplier of pumps, control systems and ancillary equipment serving the commercial, municipal, industrial and residential markets. They specialize in packaging pump systems such as housed booster pump stations, valve/control stations, skid-mounted booster systems, lift stations, HVAC water and boiler packages and green water systems for rainwater harvesting and gray water recycling. For more information about this particular system contact Bob Wedell, Metropolitan Sales Manager at 815-886-9200 or visit <http://www.metropolitanind.com> to learn more.

“One manufacturer means one number to call anytime technical support is needed.”

*- Keith Girup
Municipal Sales Engineer*



A Metropolitan custom-designed quadraplex, variable-speed control system operates the entire Hammond system.



Inside look at Hammond, Indiana's new prefabricated housed booster system where (4) 125HP horizontal close coupled, end suction pumps supply 3500 gallons a minute at 105' TDH each pump for total system output of 14,000 GPM.

Metropolitan Industries achieved a milestone recently with the delivery of the largest prefabricated housed booster system ever designed and manufactured by the company to the City of Hammond, Ind. that will increase flow capacity for nearby residents by pressurizing the potable water from Lake Michigan.

Two large 6 million gallon reservoirs take filtered Lake Michigan water and feed the 93,000-pound booster system, which pressurizes and

distributes the water within the city. Inside, energy-saving variable speed controls operate (4) 125 HP horizontal close coupled, end suction pumps that pump water at 3500 gallons a minute (GPM) at 105' TDH, each pump, for a total system output of 14,000 GPM.

Everything about this system is huge. From the 46' long by 16' wide housing, to the 24" piping and valves, this project sets the bar high for how big a prefabricated or packaged pump system can be. Due to its sheer size

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Write In 100

Plus...

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Installation of the packaged system involved lifting it off the delivery truck and setting it on top of the pre-poured concrete crawl space waiting onsite. Workers then simply connected the piping and power to make operational.

Metropolitan Gives Boost to Hammond

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alone, special permitting and scheduling was required to deliver the system via a 10-axle low-boy trailer. In addition, a two-crane lift was needed to get it onto the truck securely.

“This project shows we are not afraid of challenges and the sky is the limit,” says Bob Wedell, Metropolitan Sales Manager. “The City (Hammond) wanted a quality, self-contained system, we said we can do it and worked to complete the job in the tight deadline asked of us,” he said.

Working together with officials from the City of Hammond, Nies Engineering of Hammond, Ind., and contractor Jeffery T. Porter of Crowne Point, Ind., Metropolitan manufactured and delivered a complete housed booster packaged solution that was shipped to the jobsite and ready to install. This station makes two large booster systems that were supplied to the City of Hammond by Metropolitan Industries, Inc. to help them meet the needs of their growing community.

Fabrication

Metropolitan had a tight deadline of just 80 days from the time of approved drawings to delivery in order to complete the project. During those 80 days, two hurricanes struck the gulf states, affecting some of the supplies of component delivery to Metropolitan but nonetheless, team members worked diligently and

put in extra hours to try to make up for the lost time in an attempt to meet the deadline.

The structural base serves as the foundation and backbone of the entire system. During installation, the base supported all 93,000 pounds of the system when cranes lifted it onto the truck for delivery and then lifted it again at the jobsite. Given that this particular base was so large, welding was critical and done as all systems are in accordance to DE 1.1, or the structural welding code. Lifting points on the base are also key and in this case, critical due to the large size, so all lifting points on the base were inspected after fabrication to ensure quality.

“This project shows we are not afraid of challenges and the sky is the limit.”

- Bob Wedell

Metropolitan Sales Manager

Unique to Metropolitan’s housed systems is the running of conduits within the structural frame versus inside the actual housing. This gives the system a “neat” appearance and eliminates any tripping hazards and eyesores within the building.

The 24” piping inside the structure is fusion bonded and powder coated after sandblasting to near white. The interior portion of the pipe is fusion bonded and epoxy coated with NSF61 coatings. The exterior has a blue poly coat that meets and exceeds all painting specs making it a lifetime coating and providing a great finish for years.

Controls

The brains behind any system are the controls operating it. Metropolitan Industries is proud of the fact that their U.L panel shop can design, build and

“These RTUs are responsible for running pumps, operating pressure valves, monitoring flow, electrical power, and a number of other system attributes. The RTUs also collect such data and report it back to the main water department office via 2-way radios for analysis and archiving,” says Burza.

The radio system, responsible for the communication, is a Logic Trunked Radio (LTR) repeater system. There is a single repeater radio installed at the Police Department, which is centrally located. Behind the Police Department is a radio tower where the repeater antenna was mounted after an installation deal was made with a phone carrier. “This Very High Frequency (VHF) repeater radio receives all intended communications and rebroadcasts them to all of the sites within the city limits,” says Burza. Each point within the system has its own antenna and 25-Watt radio with an attached 1200-Baud data modem for data/audio conversion. This repeater-based system works especially well, given Lockport’s hilly topology.

When the data is received at the main water department office, a SCADAPack-based communication server collects it first. Through its own radio and firmware, this server is responsible for organizing all of the communication within the radio system, polling each RTU when data needs to be refreshed or control commands need to be sent. Any data the server receives is then passed onto a nearby master SCADA computer, whereas control commands intended for the RTUs are sent to the repeater for citywide broadcasting.

The master SCADA computer is a password-protected standard desktop PC running Trihedral Engineering VTS software customized by Metropolitan Industries for the customer’s needs. It is here where the majority of the data analysis and archiving occurs. The software locally stores all of the data coming in for future retrieval. It also allows for graphing of the archived data, conversion of the data into other formats, and hard copy printing of the data in the form of customized reports. Such data manipulation is helpful for troubleshooting, scheduling future maintenance, allocating man-hours, and reporting system status to technical and lay persons alike.

The master SCADA computer also allows for remote control of RTU settings over the radio system. For security, these features are only accessible by certain personnel via password. Other security features include automatic recording of who logs into the system, and what system-wide alarms have occurred; the system is also programmed to call out for human intervention via a telephone dialer when certain alarms have occurred.

For added flexibility, the latest addition to the SCADA system leverages the power and ubiquity of the Internet, allowing

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*- Joe Burza
Metropolitan Industries
Software Engineer*

connectivity to the firewall-protected master SCADA computer. This feature lets system operators log into the master SCADA computer (via an unpublished IP address) from wherever they have Internet access, to monitor, or even remotely control, system functionality.

CONCLUSION

As you can see from the two case studies, SCADA communication technology has advanced rapidly over the last two decades and is expected to advance further in the future. The future of SCADA lies in surveillance technology. Given the security measures taken at water sites after the attacks of 9/11, surveillance will surely increase monitoring capabilities which will increase security overall. For more information regarding this article, please contact Wayne Barkley or Joe Burza at 815-886-9200.

Harvesting the energy of the sun is a logical way of providing power to your SCADA application in remote areas with no access to line power.



Communication Vital to Any SCADA System

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by the SCADA system to appear at any site in the SCADA system. For example, in Romeoville, Barkley says, a collection of system wide information such as pressure, flows, levels, etc. were hand picked by the operator and this specific data was then moved at a user specified interval to 8 different locations in the SCADA system. A worker at any one of these 8 locations now has the ability to see what is happening system wide by looking at the OIT (touch screen) locally.

“Data collection helps makes everyone’s life easier by allowing workers to input data, that was normally written down and handed in, right into the local OIT. The SCADA system then collects the data and a report is automatically generated every month,” says Barkley.

Not only does Romeoville’s water infrastructure have a SCADA system, but the Romeoville WWTP enjoys its own SCADA system as well. According to Barkley, the WWTP SCADA system is unique because the plant itself is divided into two separate physical locations, which are miles apart yet still function as one. Each side of the plant, separated by approximately a 1/2 mile, contains its own SCADA server running Trihedral VTS and 6-12 AB CompactLogix controllers. Each plant location contains a high speed DSL line and is set up in a redundant fiber optic ring. All RTU’s connect into the fiber optic ring via Ethernet cable and each SCADA server is responsible for polling its own side of the plant. The two SCADA servers then continuously synchronize with each other over a VPN tunnel.

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*- Wayne Barkley
Metropolitan Industries
SCADA Engineer*

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The Romeoville WWTP SCADA system allows operators to view/control any process on either side of the plant. An operator can access any process plant via touch screen giving him the ability to do everything from one location. Access to the system again can be achieved locally or remotely and alarm notifications are handled by voice dialer, email, pager, etc. Fiber optic architecture will also allow for future integration of IP video surveillance.

RADIO CASE STUDY – Lockport, Ill.

Lockport, Illinois is a community 30 miles southwest of Chicago that was incorporated in 1853. As indicated by its name, Lockport was established around a thriving canal-based industry, moving supplies to and from Chicago and other cities along the Illinois and Michigan Canal. Opened in 1847, the canal operated until the early 1900s. Today, the most important water flow in Lockport is used directly by its rapidly growing population, and is controlled by electronic systems (instead of the lock-tenders of yore, who would manually move the canal’s water gates). Lockport’s entire water system is monitored and controlled by a state-of-the-art Supervisory Control and Data Acquisition (SCADA) system.

Lockport’s SCADA system operates 30+ remote sites, each with a rugged Control Microsystems SCADAPack electronic controller running customized firmware program written by Metropolitan Industries software engineer Joe Burza.

program custom packages related to any pumping application.

Hammond’s system incorporates the latest in PLC control logic and integrates into their existing SCADA system via cellular communication. Their SCADA system will allow officials to monitor this system and other sites remotely without the need to be onsite.

Variable speed drives were desirable in this case due to the size of the motors and the fluctuation of system demand. For instance, during off peak hours, one pump may run to meet demand. However, when the city uses more water (for example during the summer when demand is up), there may be two or more pumps called to operate. In the unfortunate circumstances of a fire in town, the city could activate all four pumps to deliver a higher fire flow. Variable speed technology not only adjusts to the demand seamlessly but it also saves the City money in energy costs because of its superior efficiency. Variable

speed drives turn any system into a “green”, energy-saving system.

A 500kW standby-generator with an 850-gallon sub base fuel tank supplies power during an outage to ensure water service to the city continues. During a power failure, the system will automatically switch to standby power by way of the automatic transfer switch included in the packaged design.

Why Packaged Systems?

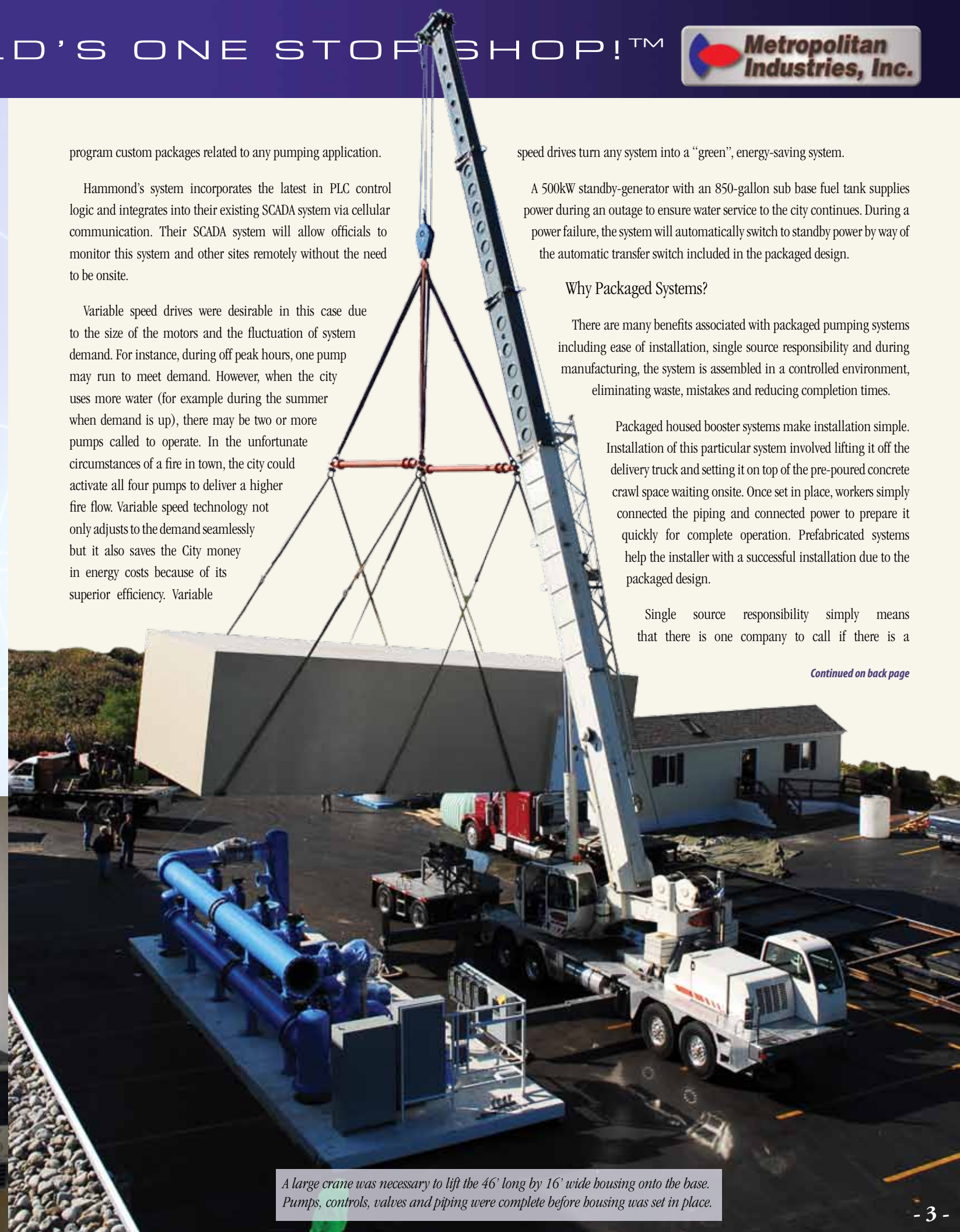
There are many benefits associated with packaged pumping systems including ease of installation, single source responsibility and during manufacturing, the system is assembled in a controlled environment, eliminating waste, mistakes and reducing completion times.

Packaged housed booster systems make installation simple. Installation of this particular system involved lifting it off the delivery truck and setting it on top of the pre-poured concrete crawl space waiting onsite. Once set in place, workers simply connected the piping and connected power to prepare it quickly for complete operation. Prefabricated systems help the installer with a successful installation due to the packaged design.

Single source responsibility simply means that there is one company to call if there is a

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An inside look at Metropolitan’s SCADA testing and design center.



A large crane was necessary to lift the 46’ long by 16’ wide housing onto the base. Pumps, controls, valves and piping were complete before housing was set in place.

Communication Vital to Any SCADA System

Write In 101

Supervisory Control and Data Acquisition Systems have developed at a rapid pace over the last two decades allowing public works officials to easily monitor and operate vital water and wastewater facilities from literally anywhere in the world. Having this technology helps especially during tough economic times by allowing for the efficient allocation of staff, reducing wasteful spending, allowing for faster troubleshooting and minimizing the downtime of an installation.

The most important aspect of any SCADA system is the way it communicates. Not every village, town or city is in the same given terrain, elevation, site locations etc. so there is not a "one

size fits all" solution. SCADA systems are customized around the goals and needs of the client using all technologies available. Currently there are four communication options available, which are Internet, Cellular, Spread Spectrum Radio and VHF-UHF Radio.

INTERNET

A broadband Internet connection is typically used at the center of a SCADA system providing the fastest communication speeds for any system. Firewalls are typically installed to protect against outside threats and virtual private network (VPN) tunnels are configured to ensure data security between sites. Using a broadband internet connection opens the doors to IP video surveillance to add enhanced security at any site.



CELLULAR

Fast becoming the first choice of clients wanting dependability and 99.9% uptime, Cellular communication is the easiest way to integrate remote sites in to a SCADA system. If cellular service is available in your area, a cellular modem can bring DSL-like speeds to any site for just a small monthly fee. Cellular modems as those installed by Metropolitan Industries, Inc. of Romeoville, Ill., have built-in firewalls and VPN capabilities for date security. Cellular is used in place of broadband Internet connections when this service is not available or radio when installation and maintenance costs are too expensive. Cellular is particularly used at remote sites and can accommodate IP video surveillance as well.

SPREAD SPECTRUM RADIO

Spread Spectrum Radios can connect systems wirelessly without monthly fees or reliance upon an outside broadcasting station. They split up serial data and send it over multiple frequencies where the receiver radio merges the pieces and passes it along to the intended node. With line-of-sight communication, this option can be a secure way of linking together sites that could be many miles apart.

CELLULAR/INTERNET CASE STUDY – Village of Romeoville, Ill.

The Village of Romeoville, located 30 minutes southwest of Chicago, has undergone unprecedented growth this decade. As Romeoville continues to grow and expand, so do the number of wells, lift stations, pump stations and wastewater treatment plants. Currently, there are 12 wells, 3 pump stations, 22 sanitary lift stations; over 100 miles of water mains and sanitary sewers servicing an increasing population of people. The 12 wells distribute an average of over 4 million gallons of water daily and have the ability to output 11 million gallons into four elevated and four ground storage facilities, with a total capacity of eight million gallons. Two wastewater treatment plants have the ability to process up to an average of 7.5 million gallons of wastewater daily.

Romeoville's water SCADA system includes two SCADA servers running Trihedral VTSCADA software and 30+ Control Microsystems' RTUs scattered throughout the town. The two server configurations allow for redundancy by deeming one server as the primary and the other as a backup.

"If the primary server has a problem, the backup computer takes over automatically," says Wayne Barkley Metropolitan Industries' SCADA Engineer. "This functionality provides failover protection for all features of the SCADA software including polling, archiving, alarm notification, remote access, etc.," he says.

The 30+ RTUs contain cellular modems that provide DSL-like speeds at the remote sites allowing for future enhancements such as IP video surveillance. The SCADA servers communicate with the 30+ RTUs via the Internet utilizing a dual WAN VPN router. The dual WAN VPN router allows for two broadband internet connections (one cable, one cellular) providing security and redundancy for the SCADA system's communications.

The SCADA system was built with speed, security, and redundancy in mind.

According to Barkley, the SCADA system was built with speed, security, and redundancy in mind. The operator, with the right permissions, has the ability to view and control the processes at all 30+ sites which include lift stations, elevated tanks, pump stations, ion exchange filters and more either locally (on the SCADA computer) or remotely from the comfort of their own home. Voice dialer, email, pager and/or cellular phone can handle alarm notifications. An operator can also view any site in virtually real-time with polling updates as quick as one second allowing the operator to view/troubleshoot system operations as they happen. "The quick polling speed is possible due to the high speed communications the cellular modems provide," says Barkley.

Barkley adds that the SCADA system architecture also allows for high end features such as data broadcasts and data collection. Data broadcasts allow any data collected

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Metropolitan Industries, Inc. has a staff dedicated to the design and programming of custom SCADA systems.