Case Study: Vista Irrigation District

Technology-savvy water district partners with systems integrator and local automation manufacturer to keep Southern California's fresh water supply flowing

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CASE STUDY: VISTA IRRIGATION DISTRICT

Technology-savvy water district partners with systems integrator and local automation manufacturer to keep Southern California's fresh water supply

THE CHALLENGE

In Northern San Diego County about seven miles inland from the blue waters of the Pacific Ocean lies the town of Vista, California. Vista was founded in 1882 and grew quickly as its Mediterranean climate proved to be excellent for agricultural homesteaders. During the 1920s Vista was referred to as the avocado capital of the world. But the town faced many hurdles during its growth including severe drought, a problem that Vista, like the rest of California, is seeing today.

As the area increased in population, the Vista Irrigation District was created in 1923 to ensure a reliable source of water for the naturally arid region. At the time, local avocado and citrus farms were expanding so rapidly that residents quickly developed serious concerns for the area's dwindling water supply. To supply local residents with water from nearby Lake Henshaw, the District constructed 14 miles of concrete flume to deliver water from the lake to the irrigation district.

In the 1950s, faced with drought and the devastating impact it would have on the agricultural community, Vista Irrigation District sought additional water sources to supplement its local source from Lake Henshaw.

In February 1954, the District joined the San Diego County Water Authority so that it would have the option to receive water imported from northern California and the Colorado River. Since then the District has persevered through droughts and economic fluctuations while supporting a massive shift from a predominantly agricultural to a more economically diverse community.

Vista Irrigation District sources a portion of its water supply from Lake Henshaw in San Diego County, California.

The mission of Vista Irrigation District is to provide a reliable supply of high quality water that meets the needs of its present and future customers in an economically and environmentally responsible manner. The water district transports over five billion gallons of water per year.

Moving that volume of water requires more than 435 miles of pipeline, monitored and controlled at over 30 remote sites including pump stations, reservoirs, source water connection points, and flow control facilities.

Sourcing, transporting, and storing that much water for 127,000 people creates a need for real-time situational awareness of the water transportation system. And during times of extreme drought the need is even greater—every measure must be taken to properly manage this valuable resource.

Throughout the water district's history, technology has played an important role in its ability to support its customers. Over 20 years ago the District partnered with local automation manufacturer Opto 22 and systems integrator IDAC West. During their first project Vista Irrigation District and IDAC West needed a reliable remote monitoring and control solution to manage each of the remote sites.

An Opto 22-based SCADA system was chosen consisting of mistic I/O controllers and G4 I/O modules. (Most users in the automation industry would recognize these products as the yellow, white, red, and black I/O modules they still find in their installed systems today.) Remote sites were networked together using RS-232 serial connections and leased lines from the local telephone company.

G4 I/O modules were designed to last for the long haul. They even came with a guaranteed-for-life warranty, like most Opto 22 I/O modules still do today. Through over two decades of service the Opto 22 system continued to run well. But eventually the District decided it was time to upgrade their current serial-based SCADA hardware platform to an Ethernet-based system.

"Because of its distributed architecture approach, the SNAP PAC System allowed us to upgrade one piece of our SCADA system at a time."

- Steve Wuerth, Systems Controls Supervisor

Pump stations, reservoirs, and other resources at remote sites are monitored and controlled from the water district's headquarters.

THE SOLUTION

"After developing a small pilot PAC system at our well field at Lake Henshaw, it became very clear that we needed to move forward and upgrade the serial system within our potable water distribution system," states Frank Wolinski, Operations and Field Services Manager for the Vista Irrigation District.

Vista Irrigation District puts new technologies into operation using a phased approach. This approach allows the District to spread the costs of technology investments out over time and receive the greatest return on investment possible.

"The distributed intelligence capabilities of the SNAP PAC System allowed us to prototype, test, and roll out upgrades to one remote site at a time," says Alan LeVezu, Engineering

Manager at IDAC West. "We were able to run both existing and new systems in parallel and cut over to the new system when we were ready to."

"We also utilized the research and development test center at IDAC West headquarters to design and prototype new features of the updated system. This allowed us to verify that the new controllers, I/O, and updated control software were running as intended before cutting over to the upgraded system."

"Using other SCADA systems often requires the system to be taken offline for several weeks to perform a complete upgrade," says Dave Smith, President of IDAC West. "Using our R&D test center reduces the District's downtime for upgrades from weeks to just a couple of hours."

Adds LeVezu, "We can also provide our customers with remote training through online meeting applications, where they can work with an Opto 22 system in real time over the Internet."

Leveraging distributed architecture and pushing intelligence to the edge

LeVezu put many of the SNAP PAC System features into use during the design and rollout of the new SCADA system.

Independent 10/100 Mbps Ethernet interfaces connect to separate IP subnets.

Dual independent Ethernet network interfaces on a SNAP PAC controller can increase network security by isolating control and business sides of a network.

"The distributed intelligence of the SNAP PAC System allows us to perform process control at each individual site," says LeVezu. "Because each controller and brain in the SNAP PAC System is intelligent, we can configure setpoints directly at each site so that if the network goes down, the site continues to operate autonomously."

Opto 22's SNAP PAC System also allowed the District to take advantage of the latest networking communications protocols, such as Ethernet and TCP/IP. Each Opto 22 programmable automation controller (PAC) and I/O processor (called a *brain*) has two built-in Ethernet network interfaces.

"SNAP PAC controllers offer a lot of value in a small package. With built-in Ethernet already on the controller, we don't need to purchase additional Ethernet cards or upgrade the controller to a higher-priced model to add networking capabilities," says LeVezu.

As the SCADA system was transitioned from serial to Ethernet, system performance was also improved. Using the SNAP PAC controller's built-in Ethernet traffic monitoring capabilities, LeVezu was able to display network performance statistics between Vista's headquarters location and remote sites directly in an HMI system. This increased visibility into the system provides the District with near real-time situational awareness at all of its remote sites.

The District's 30 remote field locations consist of pump stations, source water connection points, 12 reservoirs, and several flow control facilities. Field locations are woven together with over 435 miles of pipeline to move water throughout the District. The SNAP PAC System monitors and controls valve positions, flow rates, pressure, and reservoir water levels intelligently, depending on the requirements of other system components and zone water usage nearby.

Some of the District's field sites are powered by solar panels where commercial power proved to be cost prohibitive to install. The SNAP PAC controller and I/O at these solar sites are powered via batteries that are charged daily through solar panels. The SNAP PAC System not only provides control and monitoring for the site, it also monitors the health and performance of the solar system.

Through the use of Opto 22 products, the District has been able to upgrade its hardware while maintaining solutions for its legacy systems. Over a 23-year period, the District has migrated through three generations of Opto 22

products, the latest being Opto 22's Ethernet-based SNAP PAC System.

ABOUT IDAC WEST

Since 1996, IDAC West has provided services for industrial, water supply, and marine applications. From developing supervisory data aquisition solutions for water districts in Southern California, to information collection in food processing plants in the Midwest, to marine platform monitoring all over the world, IDAC West is in the forefront of technology.

http://www.idacwest.com

ABOUT OPTO 22

Opto 22 was started in 1974 by a co-inventor of the solid-state relay (SSR), who discovered a way to make SSRs more reliable.

Opto 22 has consistently built products on open standards rather than on proprietary technologies. The company developed the red-white-yellow-black color-coding system for input/output (I/O) modules and the open Optomux® protocol, and pioneered Ethernet-based I/O.

In early 2013 Opto 22 introduced *groov* View, an easy-to-use IoT tool for developing and viewing mobile operator interfaces—mobile apps to securely monitor and control virtually any automation system or equipment.

Famous worldwide for its reliable industrial I/O, the company in 2018 introduced *groov* EPIC® (edge programmable industrial controller). EPIC has an open-source Linux® OS and provides connectivity to PLCs, software, and online services, plus data handling and visualization, in addition to real-time control.

All Opto 22 products are manufactured and supported in the U.S.A. Most solid-state SSRs and I/O modules are guaranteed for life.

The company is especially trusted for its continuing policy of providing free product support, free training, and free pre-sales engineering assistance.

For more information, visit opto22.com or contact **Opto 22 Pre-Sales Engineering**:

Phone: **800-321-6786** (toll-free in the U.S. and Canada) or **951-695-3000**
Email: systemseng@opto22.com

OPTO 22 www.opto22.com
43044 Business Park Dr. Temecula, CA 92590-3614

SALES sales@opto22.com
800-321-6786 • 1-951-695-3000

SUPPORT support@opto22.com
800-835-6786 • 1-951-695-3080