"Valero’s Wilmington refinery has implemented a site-wide industrial wireless infrastructure for process measurements in areas of the plant where wiring is impractical or cost-prohibitive. Honeywell’s OneWireless™ Solution enables operators to monitor a wide range of operations and process variables.”

- Rick Felix, Associate Process Control Systems Coordinator, Valero Energy Corporation

**Background**

Valero Energy Corporation is a Fortune 500 company based in San Antonio, Texas. Valero is the world’s largest independent petroleum refiner and marketer. Its operations include 15 refineries and 10 ethanol plants in the U.S., Canada, U.K. and Caribbean.

Valero’s Wilmington Refinery was originally commissioned in 1969. This fully integrated refining complex processes a blend of California and foreign crude oil, as well as unfinished feedstock from local and foreign sources.

The Wilmington refinery has implemented a site-wide industrial wireless infrastructure for process measurements in areas of the plant where wiring is impractical or cost-prohibitive. Honeywell’s OneWireless™ Solution enables operators to monitor a wide range of operations and process variables.

The refinery’s OneWireless R200 installation includes Honeywell Wireless Device Managers (WDMs), Field Device Access Points (FDAPs) and XYR6000 wireless transmitters. A series of multiyear projects has provided site personnel with valuable insights into the use of wireless technology in a demanding refining industry environment.

**Benefits**

For Valero, Honeywell’s OneWireless Solution helps optimize plant processes and reliability, improve safety and security, and ensure regulatory compliance. Much more than just avoiding the cost of wire, wireless integrates valuable data into control systems and advanced applications, while also sharing that data with other networked applications.

Process industry plants like Valero’s have significant motivations for adopting wireless technology. Wireless networks make it possible to easily obtain point measurements in the most remote and hard-to-access locations without interrupting normal operations. Wireless systems also work consistently and reliably in areas previously considered impractical.

In addition, the lower cost per I/O with wireless may justify projects that would not have been feasible with wired transmitters.

Other advantages of current industrial wireless solutions include:

- Reduced cost for comprehensive process monitoring
- Easy expansion for additional measurement for simply the cost of the transmitter
- Robust security, predictable power management and multi-speed monitoring
Valero’s Multi-year Wireless Projects: Benefits and Lessons Learned

ISA 100-compliant wireless mesh networks such as OneWireless provide improved reliability and ease of use. They eliminate security concerns with other wireless standards, support multiple industrial protocols, and are efficient to operate. Maintenance of the system is straightforward and consists of refinery maintenance personnel replacing batteries.

In addition, plant infrastructure investments are reduced and significant ROI can be realized from an effective wireless solution.

At the Wilmington refinery, the wireless system has provided a cost-effective, manageable solution for various non-critical process monitoring applications. These include: pipeline movement, flare monitoring, LPG purge gas pressure, heat exchanger temperature and tank high-level alarms. Operators can react quickly to changing conditions, and gather information they need to optimize processes.

Valero has learned some valuable lessons from its experience with the OneWireless Solution. For example, while there’s a reduction in conduit runs with wireless, power still needs to be provided to the FDAPs. The CISCO Aironet can assist with providing more “wired” FDAPs to reduce hop count problems. A site survey prior to implementation also proved to be invaluable for FDAP placement.

Valero plans to install six universal I/O transmitters to operate gates at the Wilmington refinery, and also use wireless technology for coke drum vent valve monitoring. Plus, the facility will serve as a beta site for the OneWireless R220 release with redundant WDMs and redundant Fault Tolerant Ethernet (FTE) networking.

**Challenges**

In the current global economic climate, manufacturing facilities are under pressure to increase the efficiency and profitability of their processes. Incentives to improve, automate and extend the enterprise apply to everything from operations to maintenance, and are rooted in virtually every aspect of the manufacturing process.

Refinery assets are typically spread over a large geographical area. Operators are often required to monitor multiple points in applications involving level, flow, pressure and gas detection. Up to 90 percent of the installed cost of measurements in these applications can be for cable conduit and related construction.

The Wilmington refinery originally employed a Honeywell TDC 2000 Distributed Control System (DCS). Subsequent upgrades added TDC 3000 equipment, and legacy US Stations were migrated to Experion PKS with new HMI interfaces, ICON stations and Experion Servers. The site is currently moving to a C300 controller environment, which will be used for a blender control application.

Valero had its first introduction to wireless technology when a third-party wireless point-to-point system was installed to extend process monitoring. After its initial experience with wireless, the company sought improved capabilities with the OneWireless R120 Solution. Honeywell installed the initial wireless transmitters and multinodes, and then handed the system over to refinery engineers for expansion and day-to-day maintenance. Challenges encountered by refinery engineers with the initial wireless installation included signal strength issues due to antennae wrapping and cabling, as well as difficulty programming multinodes.

**Solution**

In August 2012, Valero updated its OneWireless R120 installation to the latest R200 functionality. This work replaced multinodes with FDAPs; improved system reliability and connectivity; provided an intuitive, web-based user interface; and allowed integration of the wireless network with the DCS using industry-standard protocols. Work on the R200 system has proven to be much less labor-intensive than with the original R120 system, and the updated wireless equipment is much more dependable and robust.

OneWireless Field Device Access Point (FDAP)
The Wilmington refinery’s active OneWireless network currently consists of:

- 30 wireless transmitters
- 11 FDAPs
- 2 FDAPs wired to the DCS
- WDM connected via serial Modbus to the Honeywell DCS

In the OneWireless infrastructure, the FDAP assumes message-routing duties so the user can connect wireless devices to the control network and route data from the field. It also allows creation of an ISA100 wireless network of field instruments that communicate with each other and route messages from neighboring field devices to process control applications.

The WDM serves as a gateway and security manager to ensure communication between field instruments and plant network is secure. It supports a web-based user interface allowing process and field instrument engineers with basic IT knowledge to quickly set up the wireless system. This approach reduces the time required to commission, monitor and troubleshoot the wireless device network.

**About OneWireless Solutions**

OneWireless Solutions help sites tackle critical industrial challenges in the areas of reliability, safety and process efficiency. The solutions comprise Honeywell's distributed control system, wireless field instruments, mobile computing devices, wireless networks, advanced applications and facility management applications. The solutions also include Honeywell’s engineering services such as consulting, design, installation, commissioning and support that play a key role in ensuring a turnkey experience that protects users’ wireless investment.

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