Wireless Points Avoid Interruption

Wireless sensors can detect sulfur loadout fan imbalances.

Hundreds of potential measurement and control points in the process industry are not connected to an automated process control system. This is often due to the high cost of engineering and installing wire and cable, especially to remote locations or devices not directly related to production. Yet many of those points are critical to maintain uptime, security of personnel and equipment, environmental integrity and more.

Now a standards-based wireless technology is enabling companies to obtain continuous data from many diverse points, thereby improving productivity, maintenance and safety. With this wireless mesh infrastructure, many assets that previously were untouched by a data retrieval or control network can now be tapped for diagnostic information. A user can install an online vibration monitor, add a wireless transmitter tuned to an existing gateway or receiver, and monitor that point remotely from the control room or instrument shop.

The cost of installing each new wireless device may be as much as 90 percent less than for a wired point. As a result, plant assets that once were considered too expensive to monitor can now be outfitted to return a continuous stream of real-time data, helping managers improve production processes and overall asset management.

One leader in adapting wireless is the BP Cherry Point Refinery, the largest petroleum processor in Washington state and fourth largest on the West Coast. The

plant was constructed in 1971 and currently processes more than 225,000 barrels of crude oil per day, producing gasoline, diesel and jet fuel.

The refinery's growing use of wireless is not based on migrating existing wired points to the technology, but by adding wireless transmitters where it would be important to know more about a point for optimization and troubleshooting. In the past, handheld equipment was used to gather vibration data on rotating machinery where there had been issues, but these procedures were slow and generally produced low-resolution data. The availability of cost-effective high-resolution wireless devices encouraged refinery management to expand monitoring to many new areas.

One of the first was a 15-transmitter Smart Wireless network in the refinery's calciner unit, the largest single supplier of calcined coke to the aluminum industry. Wireless monitors for bearings and coke temperatures provide early warnings of fan and conveyor failure, which could shut down the refinery's calciner unit for up to 10 days, resulting in production losses and repairs.

Once a scenario is identified in which more real-time information is needed, managers have the option of setting up any temperature, pressure or vibration monitor that would provide the best picture of what is happening during an essential operation.

A good example is the wireless vibration monitor on the sulfur loadout fan at the calciner. The fan is attached to a tube that encloses a loading arm used to feed sulfur trucks. Air and sulfur fumes are drawn away from the loading zone to protect drivers and the surrounding areas from exposure to the sulfur. The motor-driven fan operates intermittently during loading operations, allowing sulfur particles to cool and solidify on the fan blades when they stop turning. Sulfur buildup on the fan blades can lead to excessive vibration, and damage the fan and bearings. Although this motor and fan were previously checked periodically by manual vibration data gathering, the buildup can occur very quickly, making it difficult to obtain meaningful data with occasional checks.

It would have been too expensive in this case to install a wired online vibration monitor for continuous transmission of data back to the control system. This problem was solved by adding a CSI 9420 wireless vibration transmitter to the motor/fan unit. This technology is capable of making in-the-field assessments and automatically warning plant personnel whenever the possibility of a failure exists.

Being able to simultaneously see the vibration readings at each measurement location can also be beneficial. High vibration due to a bearing problem can typically be isolated to a specific bearing location, while vibration due to cavitation can be detected at every pump measurement location.

Automated diagnostics packages can augment the work of maintenance personnel by giving analysis results directly to operators in time for them to make adjustments to the process. When combined with information from other sources, such as lubricant analysis and infrared imaging, a true picture emerges of the

operating condition of essential assets and their potential for failure.

Refinery officials cited the savings per installation as the major benefit of employing wireless technology with this equipment, so more points can be monitored. One says, “We could never justify hardwiring these points or sending operations personnel out 24 times a day to obtain data from such a remote location. Once the wireless infrastructure is in place, the deployment cost of each point is very low. This allows us to easily access data that has been desired for years or temporarily monitor certain points as needed.”

The first Smart Wireless network was deployed at this site in 2005 with transmitters at 18 temperature and two pressure measurement points. Projects are currently underway to add about 50 more points. There are also plans to install one gateway in every operating unit, making it easy to add wireless points wherever and whenever a need is recognized.

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