A Watchful Eye With Smarts For Hot Tanks

Emerson Process Management [1]'s Smart Wireless network proves to protect the hot asphalt tanks at Hunt Refining Co. of Tuscaloosa, AL.

Several hot tanks at the refinery are fitted with wireless temperature transmitters as a cost-effective means of keeping control room operators informed of internal tank conditions. This enables them to maintain temperature uniformity in the tanks, thereby preventing the formation of cold spots in which trapped moisture can lead to extensive damage-with repairs costing up to $200,000 per tank, according to the company.

In about 10 tanks, operators at Hunt Refining keep asphalt at process temperatures above 212ºF to avoid cold spot formation. When very hot asphalt (at 300º to 400ºF) is added to a tank, the hot fluid may "melt through" the currently stored asphalt and reach cold pockets where any moisture can flash off violently. There is a real potential for tank roof failure if operators do not recognize these cold spots and take corrective action.

To aid in avoiding these cold spots, Hunt decided to install temperature sensors in the tanks and connect the measurement data to the refinery's distributed control system (to more easily identify if or when cold spots do occur). Analysis shows that the traditional installation of wired monitors would have been very costly, so the company initiated a trial of Emerson's Smart Wireless technology.

With three Rosemount® Wireless temperature transmitters positioned 120º apart around the circumference, and 1 to 2 feet above the bottom, of the tank, the Smart Wireless Gateway is located near the I/O building with a repeater between the tank and gateway to ensure all signals transmitted are received on the self-organizing wireless network.

According to the company, two-wire Modbus communication carries the temperature data from the Smart Wireless Gateway to the refinery's distributed control system. Then Emerson's AMS® Suite predictive maintenance software is connected, along with the Plant Information (PI) network, so wireless field devices can be added to all wired devices managed by this software. Wired or wireless, the data appears the same.

"These transmitters just work; they don't fail," says Hunt Refining process control engineer Dennis Stone. "The wireless network proved its value.

"The installation was simple, and the transmitters came up immediately and talked with the gateway as soon as power was applied. The gateway was easily connected to the distributed control system via a two-wire Modbus communication. Now any computer with access to our Plant Information network can obtain this information."

Each wireless device on a self-organizing network can act as a router for other nearby devices, passing messages along until they reach their destination. If there is an obstruction, transmissions are simply rerouted along the mesh network until a clear path to the Smart Wireless Gateway is found, says Emerson.

Although the transmitters at Hunt Refining are spaced evenly around the tank and not within sight of each other, their transmissions easily "bend" around the tank, and then on to the repeater and gateway.

As conditions change or new obstacles are encountered in a plant (such as temporary scaffolding, new equipment or a parked construction trailer), these wireless networks simply reorganize and find a way. All of this happens automatically, without any involvement by the user, providing redundant communication paths and better reliability than direct line-of-sight communications between individual devices and their gateway.

According to the company, this self-organizing technology optimizes data reliability while minimizing power consumption; it also reduces the effort and infrastructure necessary to set up a successful wireless network.

"This wireless technology proved to be so reliable and robust," Stone says, "it has already been expanded with temperature monitors on more tanks, networked to a second Smart Wireless Gateway. That gateway also receives transmissions from a single wireless temperature transmitter, monitoring the water being returned to the Black Warrior River to be certain of compliance with environmental regulations."

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