

NEWS

Wireless Eliminates Ground-loop Noise

PROponents of industrial wireless technology typically talk up the benefits of reduced wiring costs and the ability of wireless to provide process information that is impossible or too expensive to obtain using wires. But for some applications, there are other notable benefits of wireless that are less frequently mentioned. One is the elimination of ground loops that can cause problems in some wired systems.

A case in point comes from Scott Broadley, president of Broadley James Corp. (www.broadleyjames.com), an Irvine, Calif.-based bioprocess technologies supplier. *Automation World* spoke with Broadley recently about some work done last year using wireless technology from automation vendor Emerson Process Management (www.emersonprocess.com), Austin, Texas.

The Broadley James product line includes single-use bioreactors (SUBs) and associated control systems, each housed individually on skids with rollers that can be moved around at a customer's site. "We have bioreactors from 50 liters to 1,000 liters in size that we can roll up to the controls, or, we can roll the control up to the bioreactor," Broadley explains. Connections between the SUB and controller—an Emerson DeltaV distributed control system—have traditionally been made using cables and wires.

RISK REDUCTION

As a way to potentially reduce the number of wired connections required, Emerson engineers worked with Broadley James to outfit a SUB with wireless pH and temperature transmitters—part of Emerson's Smart Wireless line—which communicate via radio frequency (RF) to the controller using the WirelessHart standard. "The idea was that with wireless, we can make the job less complex. Any time we can avoid hooking up a cable, we've lowered the risk a little bit of a cable becoming disconnected at the wrong time," Broadley says.

For the wireless test, the company performed a cell culture run using both the wireless transmitters as well as conventional pH and temperature transmitters attached via cable to the bioreactor. While the wired transmitters provide updates once per second, the wireless transmitters work on an exception reporting basis, communicating only when a measurement value has changed significantly since the last communication, or if the time since the last communication has exceeded a required reporting time. This approach, allowed as part of the WirelessHart standard, optimizes wireless transmitter battery life.

For the wireless transmitters, "we were looking to see if there was any substantive difference in the control, compared to the hard-wired hook-up to the control logic, where you're getting a



scan every second," says Broadley, "and we found that there was no substantive difference."

What's more, the tests turned up an added bonus. "Because the wireless transmitters are battery powered, this totally isolates them from spurious ground-loop potentials that get introduced into any reaction vessel from a number of different sources, and which drive pH sensors crazy," Broadley observes. During the test, when a ground-noise-induced spike appeared on the wired pH signal, it was not present in the wireless transmitter output.

STEP FORWARD

This noise reduction will lead to significant qualitative improvement in the control of future bioprocess applications, Broadley believes. "Improvement of signal quality equals better process control," he says. "These battery-powered transmitters are going to be a real step forward."

Temperature, pH and dissolved oxygen (DO) make up the basic troika of measurements needed for control of high-value biopharmaceutical reactors, notes Broadley. Emerson does not yet offer a wireless DO transmitter. But once that product is added to the Smart Wireless line, expected later this year, bioreactor systems using wireless pH, temperature and DO transmitters "will definitely be part of the package of options that we offer," Broadley concludes.

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