Wireless—It’s Under Control

Carrie Ellis, Editor

Bob Karschnia, vice president of wireless at Emerson Process Management, says that automated wireless control can be defined in two ways: “The first is wireless delivery of information (device condition, calibration and so forth) collected from field devices to a control system to help with making process adjustments, or aid in device maintenance and field device setup. The second definition includes the use of wireless networks to close PID loops with both feedback signals and outputs to final control elements.

“Wireless use can be divided into two classes,” continues Karschnia, “wireless for field applications and solutions for plant operations. Wireless solutions for field applications apply to difficult process monitoring, rotating equipment, environmental conditions, auxiliary systems, safety system status, operator safety, mobile assets, on/off valve position, process startup, temporary installations, wired alternatives and disaster recovery.”

Wireless solutions for plant operations, which are implemented as either direct communications or as a control network wireless bridge, include: field data backhaul, communications with mobile workers, video for security and process monitoring, control network bridging, safety mustering and location tracking.

“In control network bridging, a wireless link makes it possible to connect control system units when a control room is separated from a controller by either distance or an obstruction like a road or body of water,” says Karschnia.

The Mystery of PID

It has taken time for wireless use for PID control to be effective. This capability has been forced to wait for software development to catch up to provide stable operation when feedback is non-periodic and sometimes intermittent. Now that the software is available, it is gaining popularity.

"Tests have shown that, with the proper software, wireless PID control is comparable in performance to PID using wired measurements," declares Karschnia. In fact, Emerson has patented methods for performing process control in situations in which updates from field devices are non-periodic, as well as in situations in which communications are unreliable or sporadic.

This method makes it possible to hold a PID loop steady and not make ill-advised moves in the algorithm without an update. It not only reduces process variability, but also extends valve packing life by reducing the accumulated valve travel, and extends battery life of wireless measurements by reducing the number of communications.

"PID software must be restructured to allow proper control with non-periodic feedback from wireless," adds Karschnia. "Without this software, wireless control is restricted to non-time-critical applications."

Control Loop Performance Monitoring

The real-time continuous monitoring of all aspects of control system functionality includes automated diagnostics for instruments and valves, automated identification of improvements, such as controller tuning, and automated recommendations for process improvement. This is control loop performance monitoring (CLPM). A CLPM system typically resides on a server, and gathers real-time data from the control system via OPC. Users interact through a web-based interface.

According to George Buckbee, PE, the vice president of product development at ExperTune, "In a way, it is like having an experienced team of engineers converted into an automated software system that never sleeps. The CLPM system has access to a continuous stream of real-time data when connected to the existing control system or data historian.

"From this data, users can extract meaningful information, and then apply engineering knowledge in the form of a powerful expert system. The result is actionable advice, based on true system performance," says Buckbee.

"For example, maintenance technicians now have the ability to immediately identify which control valves and instruments are not performing properly; process engineers are able to identify ways to increase production; and control engineers can stabilize the operation and reduce variability. Operations can benefit from suggested set-point changes that would drive the process toward more efficient operation.

"Plants can see benefits such as energy reductions, production increases and

quality improvements,” says Buckbee. “The benefits come from having detailed knowledge of how the control system is actually performing. Overall, the key benefit is that resources are more focused on solving plant problems, and can do so very quickly.” Moreover, he notes that CLPM is a software tool, and it can’t automatically fix hardware problems. To get the most value from these tools, the user must be ready to take corrective actions in their plants—such as repairing faulty instrumentation or control valves.

The latest cutting-edge addition to CLPM is a root-cause problem-solving tool that has become possible by combining process and control engineering knowledge with advances in computing power. “[Root-cause problem solving] lets engineers solve problems far faster than ever before,” says Buckbee. “What used to take weeks can now be completed in hours. Being software, it is very consistent and objective so plant engineers can also make better decisions faster.”

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