

Concerns holding UK industry back

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Steven Hill of steute argues that wireless control technology now offers the reliability that production engineers have always craved

FOR ENGINEERS WORKING IN ANY SECTOR OF industry, and especially in potentially explosive and hazardous environments, wireless control technology should be the default option. Yet in the UK, the very benefits that have led wireless control technology to be widely adopted in mainland Europe safety, security, reliability are often quoted as reasons not to adopt it.

History has played its part in this. A few years ago, embracing wireless technology in industrial environments required almost an act of faith, especially as most people's first experiences of wireless devices was the early broadband router.

As often happens with new technologies, the first wireless routers offered good performance but were unreliable due to infrastructure. These experiences either created or reinforced concerns that wireless systems are not reliable enough to work in industrial environments.

Protocols for today

Today's wireless protocols are, however, very stable and extremely reliable, with many options available for specific environments and applications.

The 868MHz licence-free wireless protocol, for example, can be used in normal safe areas and ATEX-certified zones Gas 1, 2 and Dust 21, 22; and thanks to a growing range of wireless explosion-proof switches and sensors (certified to II 2G Ex ib II T6 & II 2D Ex ibD 21 T80_C) there is no longer a need to use the special tools, cables or glands associated with hard-wired position switches.

For some engineers, the issue of batteries being required to power the transmission data protocol is a barrier when considering wireless products. This is especially problematic when switchgear is installed in difficult and/or remote locations.

This problem has now been solved by companies such as steute that have developed battery-less position switches or push-button devices that generate their own power on demand. This enables the devices to transmit signals back to the receiver, even over distances of 300m when located outside and 30m inside, and between five walls.

Reliability is further enhanced because the signal is transmitted quickly, within 80m/s, so there are no underlying issues regarding interference from external sources.

When considering wireless transmission, engineers often ask: "How do I know the strength of a signal after it has been transmitted from a device?"

Apparently, the response from some companies has been worryingly vague: “If it is over a short distance then it should work.”

Fortunately, most engineers would know that such a response is unacceptable as there is no proven test to show that the signal generated is just on the minimum receiver signal strength level required.

To reassure engineers that the signal generated will be received by the receiver module, steute has introduced an RSSI (radio signal strength indicator) meter that can be used to measure the signal strength transmitted from the switching transmitting device.

Metering is offered as part of the standard service during installation and, if required, signal strength meters are available to purchase. Companies will also arrange site surveys to determine whether a particular installation requires a high-gain antenna or a number of strategically positioned repeaters to re-direct the transmission signal to the receiver module.

But what about the potential problems that could arise in hazardous areas?

The answer is simple. For most applications the combination of Ex and wireless shouldn't pose a problem to those wanting to use both technologies in an industrial environment.

Tackling challenges across the entire plant

Technology can address many process safety challenges, writes Ignace Verhamme, EMEA solution consultants manager, Honeywell Process Solutions

Industrial wireless has an increasing role in ensuring process safety compliance at process plants and refineries worldwide. When properly applied, this technology will solve difficult measurement problems not presently served with wired instrumentation, or not being captured at all.

The latest generation of industrial wireless solutions utilises a highly distributed, self-organising and self-healing mesh network infrastructure, which enables an inclusive wireless network cloud for the entire plant.

Plant-wide industrial wireless networks offer a flexible, standards-based solution, helping process industry end users to improve response time, collect and disseminate robust safety data, and improve critical decision making.

Standards-based wireless infrastructures (for example, ISA100.11a, IEEE 802.15.4, IEEE 802.11, DSSS and OFDM) have built-in fault tolerance, excellent throughput and bandwidth, and high security, as well as the desired latency performance typically required for industrial applications.

In a typical process plant, wireless sensors can be used for risk-reduction purposes, such as

manual alarm call points, smoke detectors, flame detectors, flammable and toxic gas detectors, beacons, and sounders. They can also supplement traditional fire and gas sensors to raise alerts based on equipment conditions that can trigger a leak. Elsewhere, many existing level gauges are equipped with alarm contacts to signal abnormal fluid level in tanks. These contacts can be harnessed through a wireless connection to alert control-room operators on an independent alarm panel.

- Equipment health monitoring

Wireless equipment health monitoring (EHM) solutions can be used to ensure the trouble-free operation of essential rotating assets, such as fire-fighting water pumps and compressors.

- Tracking and positioning

Wireless RSSI/WiFi triangulation and RFID technology helps locate and enable personnel to take immediate actions to isolate a safety incident and/or dispatch rescue to a specific location. GPS-based technology can be used on board fire engines, vehicles used for managing hazardous material leaks and ambulances to navigate to the exact location where response is needed.

Plants can also use wireless to track the location of assets and workers ensuring they are not in harm's way and eliminating the need to undertake dangerous tasks in the first place.

- Digital video surveillance

Centralised, wireless-enabled process area surveillance enables operations and safety teams to significantly enhance plant safety and security. Industrial-grade digital video monitoring (DVM) systems will communicate with wireless networks and stream live video images to the safety office, fire station or operation centre console.

Video cameras can be mounted on fire engines and other emergency vehicles to relay video wirelessly on a real-time basis to the safety command centre in order to facilitate faster assessment, coordination and decision-making.

- Mobile visualisation

Wireless mobile operator stations extend the reach of control-room operators into the field, giving access to operator displays, alarm management tools and procedural operations, also to play live or recorded video for scenario-based analysis.

- Voice-over-IP systems

Plants can alleviate challenges with walkie-talkie VHF handsets and public address systems by deploying a WLAN-based voice-over-IP system, which can be integrated with other subsystems as part of a facility's emergency response system. Battery-powered wireless VoIP devices can be carried on-person and configured for point-point and point-multi-point operation within the same network, or across PABX to phone systems to ensure the desired reach.

- First-responder notification

With wireless infrastructure, plants can set up voice, paging, text and other notification mechanisms to notify first-responder emergency support in the case of an incident.

- Eyewash and safety shower stations

Many plants utilise wireless to implement a monitoring network for safety stations. When one of the stations is turned on, the wireless device in a field network immediately communicates with the operating system to activate an alarm in the facility's control room. This allows operators to quickly dispatch assistance to the station and investigate for possible injuries.