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WirelessHART Gas Detection Provides New Opportunities

This article presents the recent advancements in technology that are enabling a new class of long-life *WirelessHART* toxic and combustible gas detectors and the emerging opportunities for these devices, particularly in augmenting existing gas detection capabilities in brownfield applications.

Keywords: Gas Detection, *WirelessHART*, Wireless, Chemical, Combustible, Refinery, Safety, Alarm, Shutdown, Toxic Gases, Electrochemical, Petrochemical, Oil, Gas, Power Generation, Methane, Hydrogen Sulfide

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Summary



WirelessHART devices have been available for nearly 10 years for temperature, level, pressure, and flow measurements, but only a few select suppliers have recently introduced wireless toxic and combustible gas detectors, and even fewer offer devices with open wireless protocols like *WirelessHART* or ISA100.

This article presents the recent advancements in technology that are enabling a new class of long-life *WirelessHART* toxic and combustible gas detectors and the emerging opportunities for these devices, particularly in augmenting existing gas detection capabilities in brownfield applications.

Long Road to Wireless Gas Detection

Hundreds of thousands of fixed, wired gas detectors are deployed globally each year that represent over \$700M USD or more than 300,000 units. However, wireless (proprietary & open protocols) gas detectors have gained little traction and represent only a minuscule portion of the market due to the limitations of available devices. Why is this so? Sensors, particularly those measuring methane and using Infrared (IR) and catalytic bead technology; and those measuring toxic gases and using electrochemical technology, consume significant power, making battery operated *WirelessHART* devices last less than a year and resulting in a huge maintenance nightmare. Today, typical industrial *WirelessHART* devices last five years or more, with many organizations adopting 3-5 year battery replacement schedules, indicating a trending prerequisite of a minimum 5 year battery life for all devices including gas detectors.

Taking a wired (power & signal) gas detector and snapping on a wireless radio and battery pack will not work effectively. The product description of wired devices never included low power operation and operated on many watts or a thousand times more power hungry than available in a battery powered device. With limited advances in battery technology, suppliers needed to go back to the drawing board

and completely reengineer the devices, taking into consideration every electrical component including the power-hungry sensor and power management software to allow for longer life. Furthermore, the device had to operate with open wireless communication protocols such as *WirelessHART* and ISA100 with encryption and other cybersecurity measures typically used in process industries, certainly not a trivial task!

But... with the burgeoning industrial and commercial wireless market and increasing adoption of wireless technologies in all sectors, component and sensor suppliers have had to adapt, developing and fine tuning devices utilizing a new generation of extremely low power radios and sensors.

The time for Wireless gas detectors is near. There are different industrial wireless protocols in the market but the *WirelessHART* protocol has the clear edge in availability of all types of devices from a host of suppliers with a significant lead in adoption rate.

Why *WirelessHART* Gas Detectors?

Industrial processes in vertical markets such as O&G Exploration and Production, Refining, Chemical & Petrochemical, Power Generation, and Water & Wastewater often produce toxic and combustible gases in the process or as a byproduct.



These gases can create serious hazards if they escape into the atmosphere. Gas detection systems covering all critical plant points have traditionally been specified in the Front End Engineering and Design phase (FEED) of the project. At this point all potential gas detection measurement must be mapped so appropriate power and signal wires are available. However, it is nearly impossible and/or is typically not financially feasible to ensure coverage for all possible points, resulting in less than ideal coverage.

Asset Integrity Applications
Pipelines
Connections
Valves
Pumps
Compressors
Seals
Tank Farms
Abandoned Wells
Refineries

Identify Leaks Early and Deploy Proactive Mitigation

The cost of adding one new gas detector measurement point, including the cost and labor of obtaining “hot” work permits, running conduits for wires, burying them, and other installation details, can be in the neighborhood of \$10,000 per device for land based systems and as much as 5 times more for offshore applications in the O&G industry. *WirelessHART* technology removes the physical and economic barriers associated with wired devices, reducing up to 90% of installed cost and can be applied in both field and plant networks. The lower price of design and installation makes it more cost-effective to add sensing devices at multiple locations, detecting leaks that might not be detected by sparse array of wired units until the situation had advanced to more harmful levels.

New Role of Gas Detectors- Asset Integrity

Gas detectors are typically under the control of the Health Safety and Environment (HSE) department with the primary goal of emissions reporting to regulators and the protection of the workforce, environment and the general population. In case of a leak in concentrations that pose a threat, alarms are activated to prohibit entrance into the affected area and/or alerts are sent to the appropriate command center and safety

mitigation professionals where the threat is analyzed and appropriate measures are taken.

In an asset (process equipment) integrity application, which typically falls under the scope of the maintenance and reliability departments, a series of gas detectors are deployed for the sole purpose of identifying leak trends in an area. Accuracy is not required but repeatability is essential as day-to-day and month-to-month trends are compared and analyzed to determine pressure integrity of piping, tanks, and equipment. In this application, *WirelessHART* gas detection system promotes a predictive maintenance culture that deploys the workforce before a failure and reduces inspection work to the “bad actors” rather than checking all assets. This results in cost and time savings while improving safety.

Failure in piping, particularly insulated piping in a refinery, poses one of the most difficult challenges for the maintenance crew. Deploying *WirelessHART* gas detectors in older brownfield applications with decaying infrastructure would be an appropriate place to start since it is unlikely gas detectors are placed in the correct locations for an asset integrity role. Unlike wired gas detection systems, which have expensive infrastructure requirements, *WirelessHART* gas detectors can be deployed just about anywhere there is a potential for a gas leak. End users have tried in vain to solve this problem with technologies such as real-time wall thickness measurement devices, and in-line corrosion monitors, but accidents continue as breaches in equipment are not discovered in time.

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