VERSATILE LASER-BASED, OPEN PATH GAS DETECTOR SEES GASES--NOT FAULTS

When it comes to maintaining a safe work environment, process and plant engineers today face many challenges. They are pulled in multiple directions by the need to design processes and plants that operate cost-effectively, produce a quality product, and comply with a web of local, country, and international health and safety standards. The role of safety monitoring instrumentation therefore has become more important than ever to avoid accidents with tragic loss of life consequences and/or physical damage.

The Challenges

Those responsible for monitoring and detecting flammable, combustible and toxic gases will find there is a wide range of proven gas detection technologies available (catalytic bead, non-dispersive infrared, electrochemical cell, etc.). All the technologies have their well-documented advantages and some limitations or disadvantages depending on the specific hazardous gas, the location, the environment, etc.

While conventional point infrared gas detectors and electrochemical toxic gas detectors have proven themselves to be highly reliable for decades, they still have some limitations. These point detectors need to be placed relatively near potential gas leak sources such as pipe valves, pumps or tanks, but their effectiveness can be limited under environmental factors such as windy conditions, high humidity levels, or extreme temperatures. For example, traditional electrochemical sensors can have a shorter lifespan in hot, dry desert conditions.

To be effective, the number of point detectors required by these technologies for safe coverage can be a substantial expense—both at initial purchase and installation, including wiring. In addition, the maintenance cost for inspection, cleaning and replacement of sensors can be significant. Also importantly, the potential for false alarms can lead to unnecessary shutdowns or reduced operational capacity due to the required maintenance issues.

A Reliable Cost-Effective Alternative

In comparison, the innovative Senscient ELDS™ Laser-Based Open Path Gas Detector (Fig 1) from MSA Safety is capable of monitoring and reliably detecting a wide range of combustible or flammable threats (methane, ethylene, sour gas) or toxic gases (ammonia, carbon dioxide, hydrogen chloride, hydrogen fluoride, hydrogen sulfide). They are suitable for many applications in oil and gas production operations, petrochemical processing plants, distribution pipelines, storage and port facilities and heavy or light general industry manufacturing plants (Fig 2).

The advanced technology behind the Senscient ELDS™ Gas Detectors eliminates false alarms and enables faster, more reliable detection of hazardous gases, thereby improving worksite safety while reducing operational costs. They create a highly reliable full detection perimeter around any process or plant area inside or outdoors. The technology behind ELDS open path gas detectors (OPGD) relies on enhanced laser diode spectroscopy (ELDS) to detect specific flammable, combustible or toxic gases. In the event of a gas leak, the sensor's laser technology recognizes and analyzes a gas's specific harmonic fingerprint and issues an alarm when the gas is present (Fig 3).

During normal operation some of the detector's laser light is reflected continuously through a sample of the target gas contained by a hermetically-sealed reference cell. This design ensures the laser remains locked on the selected gas wavelength for the specific target gas. False alarms caused by interference gases, which are experienced with other detection technologies, are no longer a problem. The detector's harmonic fingerprint technology (Fig 4) helps ensure precise target gas recognition, eliminating the potential for false alarms, even during adverse environmental conditions.

False alarms are a serious problem with many gas detection technologies. They can result in excessive plant down-time, which often requires complex investigations and regulatory reporting. From a safety perspective, frequent false alarms lead to a lack of confidence by employees in the gas detection technology and a culture of apathy that can cause employees to fail to act promptly during an actual emergency event.

Class 1 eye safe lasers designed into ELDS detectors are used to penetrate thick fog, heavy rain and snow beyond the capability of traditional open path infrared (OPIR) detectors. With its automated SimuGas™ safety integrity self-check, there is no need for the typical routine gas checks associated with OPIR detectors. This removes the need to send field technicians into hazardous locations whilst reducing maintenance costs. Unlike other sensing technologies, Senscient ELDS detectors are also immune to sensor poisoning and interferent gases, thanks to their gas specific harmonic fingerprint detection method.

The Senscient ELDS Detectors also feature Bluetooth® wireless technology with advanced smart diagnostics. After installation, using a mobile friendly device and product specific software, the detector can be interrogated from a safe distance. This is especially useful in hard to access high areas where scaffolding and safety harnesses might be necessary to prevent employee falls.

Process engineers will find this gas detector's performance to be excellent for perimeter monitoring and other interior plant process

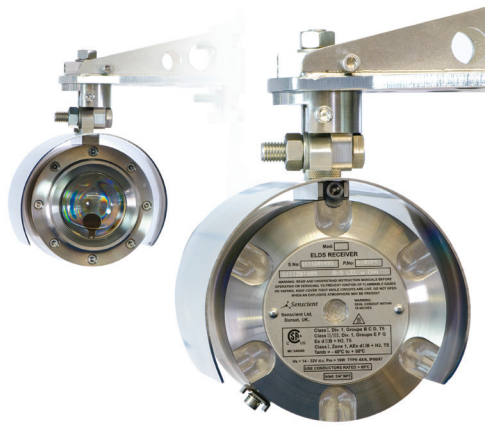

Fig 1. Senscient ELDS Open Path Gas Detector

Fig 2. Applications for Senscient ELDS Detector

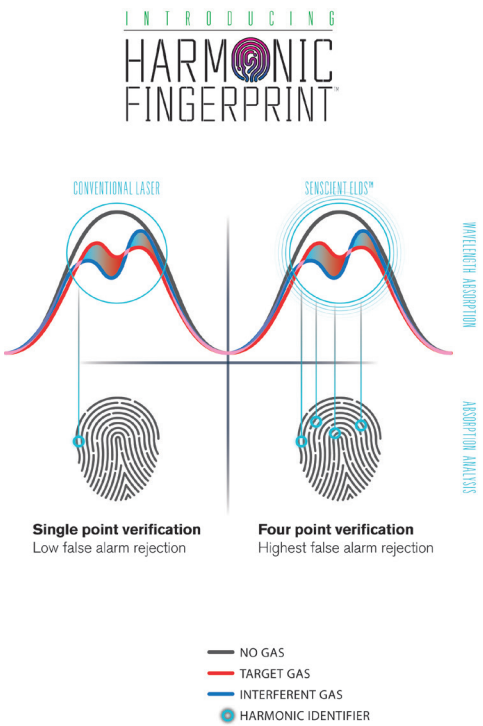

Fig 3. Senscient ELDS Harmonic Fingerprint Theory of Operation

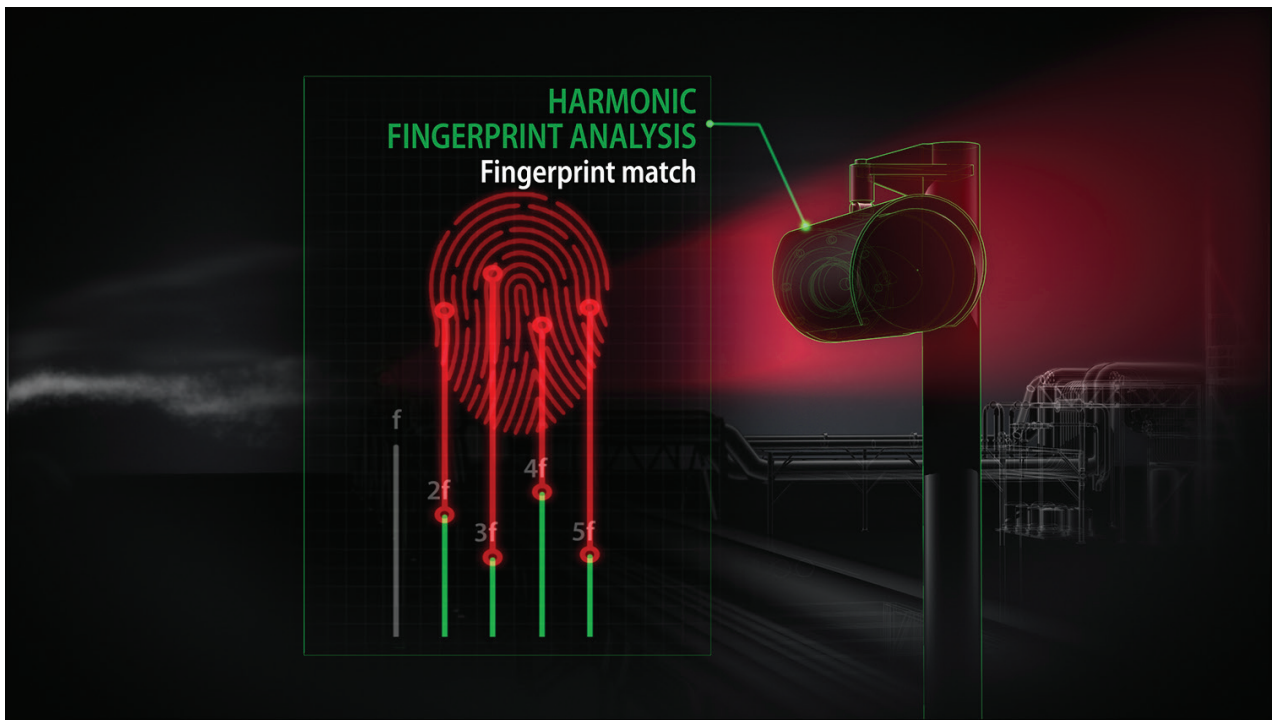

Fig 4. Senscient ELDS Harmonic Fingerprint Analysis

applications. With a fast response time (<3 seconds), ELDS technology provides a relatively fast alert to the presence of gas compared to other combustible and toxic gas detector technologies. The Senscient ELDS gas detector features separate transmitter and receiver assemblies, which are certified for use in potentially explosive atmospheres and can detect gas over distances of 5 to 120 meters.

Senscient ELDS detectors are ideally suited for both open and enclosed environments. That includes the cold freezing winter temperatures in northern latitudes, or the high temperatures required for service in much of Asia, the Middle East, or Africa. Heated optics provide service over a wide temperature range from -40° to 140°F (-40°C to +60°C). Senscient ELDS detectors are also hazardous area approved to CSA, UL Class 1, ATEX, IECEx, EAC and INMETRO standards.

Conclusions

Senscient ELDS detectors offer significant installed and operational cost savings over conventional fixed-point toxic gas detectors. Manual intervention and ongoing costs for routine real gas testing are eliminated with SimuGas. Many times the cost of inspecting and maintaining some gas detector technologies can exceed the cost of the actual instrument. While the initial cost of an open path detector may be higher than traditional point gas detectors, the total installed cost can be similar or less expensive than installing multiple fixed-point devices to achieve an equivalent coverage area.

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