

Case Study

Chemical Plant



Hydrogen Chloride Open Path Gas Detection

The Challenge

One of the largest chemical companies in the world wanted to improve overall plant and personnel safety at a plant in Holland, by accurately detecting fugitive hydrogen chloride (HCl) gas emissions from an outdoor storage tank.

For chemical plants, regularly calibrating and documenting all safety-critical sensors and instrumentation devices installed throughout the plant is time consuming and a drain on plant resources. In this particular application, the customer wanted to increase plant safety and protect personnel from potential HCl gas releases, without overloading its already stretched maintenance technicians with additional inspection and calibration tasks.

Furthermore, some of the plant equipment and components installed at the site were corroding due to very small releases of HCl from the storage tank. The releases were below levels deemed harmful to personnel. The customer wanted to verify these releases while measuring and recording the frequency and magnitude of these gas releases on a continuous basis.

Previous Solution

The HCl storage tank had no existing gas detection in place, although the customer had installed several hundred fixed point gas detection devices across other areas of the plant, using electromechanical cell technology. These gas detectors require frequent calibration and maintenance, typically 3-4 times per year, which is costly and time-consuming. Calibrating a point gas detector requires a work permit, resulting in unwanted delays and additional costs in administrative tasks. In addition, maintenance personnel calibrated the point gas detectors using real test gas at least twice a year, which proved problematic in terms of logistics and execution.

Instrument maintenance and gas analysis engineers at the plant were very aware of the complexities of HCl detection, particularly when measuring very low concentrations.

Maintenance personnel were keen to trial a new and alternative gas detection technology that would be more reliable than point gas detectors, but without adding to their existing maintenance and calibration workload.

At a chemicals industry forum, the customer was introduced to Senscient's open path gas detection technology by another chemicals producer who was utilizing the technology at one of its production plants. Senscient's open path laser-based gas detectors for HCl utilize enhanced laser diode spectroscopy (ELDS™), a laser-based technology that provides the fastest speed of response and best in class uptime availability compared to more traditional gas detection technologies. Unlike point gas detectors that simply measure the gas concentration at a particular (fixed) location, open path laser-based gas detectors measure the concentration (ppm.m) over the full distance between the transmitter unit and receiver unit, up to a maximum distance of 60m (in the case of HCl detectors).

The Senscient Solution

Senscient supplied the customer with two HCl gas detectors. Constructed in high-grade, corrosion resistant 316L stainless steel, these robust ELDS™ units are suitable for harsh, outdoor, open environments.

The detectors are mounted 1.8m above ground level with a clear line-of-sight and path lengths set to 50m and 60m on two sides of an area downstream of the HCl storage tank. This innovative technology has a response time of less than 3 seconds, compared to 120-300 seconds for electro-chemical cell devices, providing plant operators with advanced, early warnings of any HCl release. Alarm thresholds are set at 10ppm.m and 20ppm.m, as these are suitable benchmarks for both safety and avoiding any unwanted, spurious alarms. Alarm signals are interfaced to the plant's DCS (Distributed Control System). Senscient's ELDS™ units were installed efficiently and issue-free, and commissioning was successful on the first start.

Benefits

Cross-sensitivity

Unlike traditional point gas detectors, the Senscient ELDS™ units are HCl-specific. By operating at a single absorption wavelength that means no false alarms from interference gases, the detectors are less prone to water vapor interference and provide greater reliability and performance in challenging environments such as rain or fog

Operational status / diagnostic indication

Operational performance on any open path device is dependent upon having a clear line of sight. Senscient's ELDS™ units have built-in, sub-4mA diagnostics information. For example, should the line of sight become completely blocked or subjected to poor visibility resulting in a low signal strength, Senscient's ELDS™ units can be set up to provide discreet warning outputs to inform operators that the system needs attention.

Fail safe operation and performance warning messages

Electro-chemical cell devices are not fail safe thus providing the end user with no live information on the operational status of any device and a false sense of security. With a daily auto-self testing feature called SimuGas™ the ELDS™ gas 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™. The ELDS™ units also provide a wireless connectivity feature, enabling plant operators to interrogate or troubleshoot the units or download event log files.

Reduced lifecycle costs

While the 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 multiple fixed point devices. In this particular application, the customer would have required



six separate point gas detectors over the 50m to 60m path length. The ELDS™ units are maintenance-free as they have no consumable parts therefore resulting in zero ongoing costs for replacement sensing elements and associated service labor costs. With virtually zero calibration effort required, the ELDS™ units offer significantly reduced lifecycle costs compared to traditional point gas detectors.

Outcome

Senscient ELDS™ open path gas detectors were installed in May 2013. They have performed as specified and the customer has enjoyed the benefits of uninterrupted operation and no additional burden on its maintenance team. An additional ELDS™ gas detector system was installed in April 2014, also performing as specified and providing reliable and trustworthy results.

About Senscient ELDS™

Senscient's Enhanced Laser Diode Spectroscopy (ELDS™) product range builds upon the proven benefits of laser based gas sensing, taking this sensing principle to the next level. Patented technologies such as the Harmonic Fingerprint™ and SimuGas™ provide the highest levels of gas specificity, false alarm rejection and safety integrity in the most challenging operating conditions.

Detectable gases include: Methane (CH₄), Ethylene (C₂H₄), Ammonia (NH₃), Carbon Dioxide (CO₂), Hydrogen Sulphide (H₂S), Hydrogen Chloride (HCl), Hydrogen Fluoride (HF) and Multihydrocarbons (MHC). Other gases to be added.

www.senscient.com

E-mail: info@senscient.com

Web: www.senscient.com

International Headquarters : F2 Arena Business Centre, Holyrood Close, Poole, Dorset BH17 7FP United Kingdom