The objective of Functional Safety, according to IEC 61508, is “freedom from unacceptable risk of physical injury or of damage to the health of people either directly or indirectly.” Functional safety relates to the engineering and performance of a gas monitoring system, including controllers, software, hardware and field devices.

In industries characterized by hazardous work environments (e.g., oil and gas, chemical, power generation and heavy manufacturing) increasingly rigorous requirements are being imposed on safety-critical functions; one notable example is Safety Integrity Level (SIL), which requires an end-to-end assessment of the risk reduction required by the safety function. In many instances, a gas monitoring system must be proven to be so reliable that even if the system fails, it fails with advance warning, or in a predictable way, so that actions can be taken to avert downtime or mitigate consequences.

At Honeywell Analytics, Functional Safety is conceived, planned, developed and validated from the beginning of the Honeywell Design-for-Manufacture process. An even higher level of safety is assured by following standards not only developed from within the industry but from those we impose on ourselves. Some of the ways we advance this higher standard:

**Intelligent Product Design through the Honeywell Operating System (HOS)**

Honeywell Analytics achieves intelligent product design through the Honeywell Operating System. Using proven Honeywell Research & Development processes and testing for New Product Introduction (NPI), the company ensures that our products exceed industry performance standards.

Our aggressive implementation and daily practice of six sigma and lean manufacturing methodologies is focused on reducing errors/failures, improving cycle time, and reducing costs.

Using Honeywell global engineering teams in cross-disciplinary collaboration, we design our gas detectors to go beyond safety to drive our customer’s business performance, making their operation run smoother and helping them control costs.

**In-House Testing and Proprietary Technologies**

Honeywell Analytics tests its products rigorously and continuously. One way that quality assurance is maintained is by subjecting our products to severe environmental conditions in our own on-site environmental chambers. In this way, products like our XNX™, XCD and Midas gas detectors and other industrial products are proven to be rugged, reliable performers, even before they go to market.

**Reflex** is Honeywell’s patented self-diagnostic electrochemical sensor cell technology used in many detectable gas options with the XNX, XCD and other gas monitors. Reflex alerts one to sensor cell health by sending a continuous electronic pulse to the cell, a form of bump testing exclusive to Honeywell. When a sensor becomes degraded or enters a variety of fault conditions (such as open or short circuit), Reflex provides automatic notification, registering as a fault condition on the detector’s display. Reflex continuously monitors the health check status of electrochemical cells, making doubly sure that a customer’s safety is maintained. (See graph below.)

**Oscilloscope graph shows cell responding to Reflex pulse, indicating sensor condition.**

**GREEN** shows optimal sensor condition (dynamic responsiveness to gas).

**RED** shows degraded sensor condition (indicating cell dry-out or failure).

In creating its sensing technology, Honeywell Analytics derives its strength from Honeywell’s core strength in sensor manufacture. Honeywell operates three sensor manufacturing plants, including the world’s first automated plant — and with over 10 million sensors sold, has acquired an extensive database of field reports, user experiences and algorithms that are analyzed and acted on to continuously improve sensor performance. Through Honeywell’s sensor manufacturing, we provide an entire industry with its core detective element. Even our competitors use Honeywell sensors in their products.
Global Performance Standards

Using the XNX universal transmitter as one example, Honeywell Analytics certifies its products through various, globally accepted accreditation agencies, which broadens the overall review of the product’s safety, performance, and reliability. Some of these agencies include:

- **Atmospheres Explosives (ATEX)**, Europe
- **Canadian Standards Association (CSA)**, Canada
- **Conformite Europeenne (CE)**, Europe
- **China Compulsory Certification (CCC)**, China
- **Factory Mutual (FM)**, North America
- **gosudarstvenny staandart (GOST)**, Russia
- **National Institute of Metrology, Standardization and Industrial Quality (INMETRO)**, Brazil
- **International Electrotechnical Commission System for Certification to Standards Relating to Equipment for use in Explosive Atmospheres (IECEx)**, International
- **Underwriters Laboratory (UL)**, North America

SIL Accreditation

There are a number of independent agencies that perform functional safety assessments under the Safety Integrity Level (SIL) review, some of these include TÜV, exida and Sira. Honeywell Analytics evaluates each testing agency as well as its own methodologies for specifying a targeted level of risk reduction.

In addition, SIL levels for field instruments are established by various designations such as SIL Certified, SIL Proven in Use, SIL Suitable and Failures, Modes, Effects and Diagnostic Analysis (FMEDA) testing. For each approach, Honeywell Analytics follows IEC 61508/61511 guidance in evaluating a system's operational history and records, fault reporting systems in place and other field data, with the view of reducing the potential for fault conditions. Honeywell Analytics takes the most conservative approach, identifying ways to add redundancy to the system design, and works to eliminate system failures.

Improving safe behavior through safety leadership is the goal. It’s why Honeywell Analytics is a sponsor or active member of leading safety and safety standards organizations, including the National Safety Council (NSC), International Society of Automation (ISA), American Society of Safety Engineers (ASSE), Ammonia Safety Training Institute (ASTI), US Green Building Council (GBC) and others. As Life Safety leaders, Honeywell Analytics is morally and commercially committed to advancing the highest safety standards in our industry.

Honeywell Analytics operates five environmental chambers for product validation at its 160,000 square foot manufacturing plant in Lincolnshire, Illinois. Products such as the XNX gas monitor are subjected to temperature extremes of -60 degrees Celsius, simulating conditions one might find in the Arctic Circle.