Innovation in Personal Gas Detection

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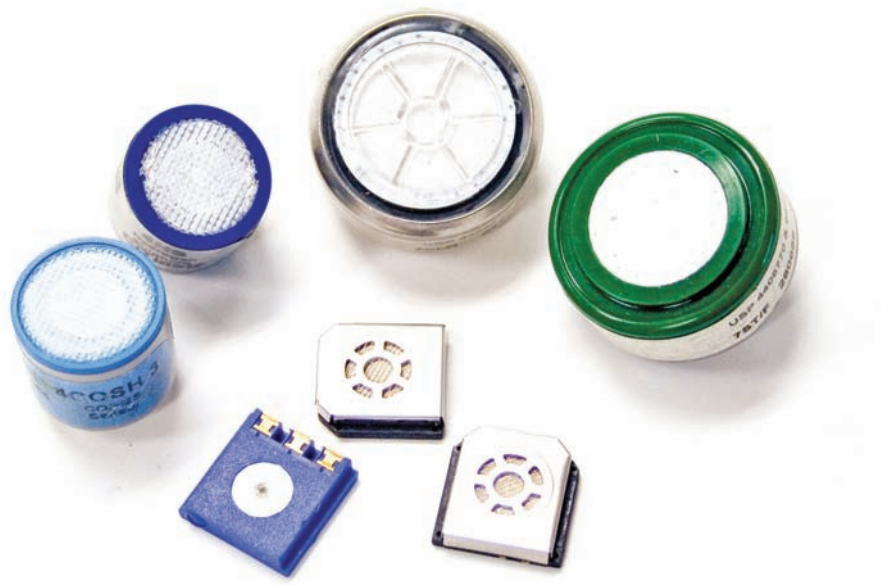

The ongoing trend in the electronics industry is to develop smaller, faster products that have more features and are easier to use, all for a lower price. Whether you are talking about computers, cell phones, gaming systems, or personal gas monitors, the trend is the same. The rapidly accelerating pace of change is no different in the gas detection industry. Manufacturers continually strive to engineer personal gas detectors that are smaller and can deliver more for less. The availability of miniaturized components has helped some gas detector manufacturers dramatically reduce the size of the personal safety gas monitor.

Sensor Technology

A sensor is at the root of every gas detection measurement. In safety monitors, combustible gases are most commonly monitored by a catalytic bead sensor and electrochemical sensors are used for oxygen and toxic gases. Photoionization (PID) sensors are also becoming more widely used as the hazards presented by a wide variety of volatile organic compounds (VOCs) are being recognized globally. Sensors available today are a fraction of the size and weight of those available less than a decade ago, however the same proven detection principles are used.

The GasAlertMicroClip is the first gas detector to incorporate the innovative MICROcel™ and MICROpel™ sensors. City Technology, one of the world's most recognized sensor manufacturers, is the creator of MICROcel™ and MICROpel™ technology. The new MICROcel™ OX oxygen sensor uses the industry standard capillary diffusion barrier technology. The sensor is 38% smaller than its immediate predecessor, the 4-Series, and incorporates the innovative IMES (Infection Molded Electrolyte Seal) process that ensures sensor seal integrity for the entire product life. MICROcel™ electrochemical sensors for hydrogen sulfide and carbon monoxide are 17 mm2 and 4 mm deep, weighing only 1.2 g. The MICROpel™ catalytic bead combustible gas sensor features new advancements in intrinsically safe design. The sensor consumes 40% less power than conventional catalytic bead sensors and is the same size as the MICROcel™. When the MICROpel™ was introduced by City Technology in the spring of 2003 it was hailed as the biggest development in the portable gas detection industry in 25 years.

Together, these four new generation gas detection sensors, MICROcel™ OX, MICROcel™ H2S and CO, and the MICROpel™, occupy 70% less volume than their predecessor, the 4-Series sized sensor. Smaller sensors and a catalytic bead combustible sensor that uses 40% less power have enabled BW Technologies by Honeywell to design a gas detector that is the size of an average cell phone, at a fraction of the weight of most other personal gas detectors, all with extremely low cost of ownership.

Developments in PID sensor technology have also resulted in dramatic reductions in sensor size. Improvements in design have made PID sensor technology available in handheld portable industrial gas detection instruments. The smaller PID sensor is the result of innovations in PID lamp design and a shorter UV path length, resulting in considerably reduced cell volume. But decreasing the size of the PID sensor does not result in a loss of sensitivity. With brighter lamp technology and improved signal amplification, increased linearity and faster response times are achieved. BW Technologies by Honeywell have introduced another important engineering advancement in PID sensor design – an unique electrode stack with a "fence electrode". Previously, PID performance has been hampered by interference from humidity, which caused false readings. In conventional PID sensors, moisture could create a current path between the sensor's two electrodes that the detector interpreted as a gas concentration. The fence electrode is a third electrode placed between the sensing and reference electrode to mitigate the effects of humidity. Background current created by moisture is absorbed by the fence electrode. With more efficient control of background interference, the stability and reproducibility of the PID readings has become more reliable.

VOC Vapours in the Workplace

A short number of years ago, PID technology was used only by industrial hygienists and environmental consultants. No longer is the technology limited to use in hygiene studies and soil remediation screening. PID technology is becoming more widely used in a multitude of industrial applications including confined space entry, indoor air quality monitoring and industrial safety.

Increased awareness of the toxicity hazard presented by many volatile organic compounds has increased the need for a detector that can provide real time measurement of these hazards. Many familiar substances containing VOCs can be encountered everyday, including solvents, paint thinners and nail polish remover. Vapours associated with fuels such as gasoline, diesel, heating oil, kerosene and jet fuel also contain VOCs. These vapours can contain specific toxic substances like benzene, butadiene, hexane, toluene, xylene and many others. The health effects of VOCs can manifest themselves either acutely or chronically. Some are known to be human carcinogens, while others may have more subtle, yet very debilitating effects. Solvents, fuels and many other VOCs are pervasively common in many workplace atmospheres and many have surprisingly low occupational exposure levels. One of the most widely accepted detection technologies used for VOCs is the photoionization (PID) sensor. The PID provides nonspecific, broad range detection, with parts per million (ppm) sensitivity for hundreds of potentially hazardous compounds.

Conventional catalytic bead combustible gas detection sensors are effective for the measurement of combustible gases, however they lack the resolution to monitor in low ppm levels. This low resolution limitation is problematic because the catalytic bead sensor is currently the most widely used technology for VOCs. Use of PID sensors as the most effective means of detection will increase as awareness of the health hazards presented by exposure to VOCs increases. Increasing concern over the toxicity of VOCs is leading to the lowering of exposure levels for many compounds including diesel vapour, kerosene and gasoline. The introduction of the PID sensor in a portable multi-gas detector is providing a new level of protection for the industrial workforce. The catalytic bead combustible sensor and PID sensor are complimentary measurement techniques. The catalytic bead sensor is exceptional for the measurement of common combustible gases like methane and propane which are not detectable by the PID, while a PID sensor can detect large VOC and hydrocarbon molecules not necessarily detected by the catalytic bead sensor.

The Importance of Size

When personal gas detectors are a requirement of standard personal protective equipment, smaller is definitely more comfortable. Safety footwear, protective clothing, head protection, hearing protection, eye protection, respiratory protection, fall arrest harness, two way radio, tool belt, and additional equipment is cumbersome enough without the additional burden of a bulky gas detector. For protection against potential atmospheric gas hazards, end users now demand multi-gas detectors that are the size and weight of a personal cell phone. Technical advancements in sensor technology and electronic components provide gas detection manufacturers with the ability to dramatically reduce the size and weight of personal gas detectors. Multi-gas monitors were formerly the size of a lunchbox and weighed in excess of a few kilograms. In 2006 the world of gas detection was introduced to a true innovation in multi-gas detectors, the GasAlertMicroClip, weighing a remarkable 160 grams. All of the portable detectors BW Technologies designs and manufactures are lightweight, user-friendly detectors. The GasAlertMicro 5 PID provides the added protection of a PID sensor in a personal monitor that weighs less than 400 grams. When the potential hazard of toxic VOCs exists in workplace atmospheres, prudent safety practice demands the use of a sensor technology capable of direct measurement in ppm concentrations. As realization of the dangers of VOCs is raised and advances in technology make photoionization detectors smaller and more affordable, their popularity is increasing.

Automated BUMP Test and Calibration Systems

Gone are the days of the manually intensive process of gas detection calibration that involved using a screwdriver to tweak potentiometers to zero and span the instrument settings. Microprocessors automatically control the calibration process in today's technologically advanced instrumentation. Once the user has properly initiated the calibration procedure, the detector automatically completes the procedure. While calibration adjusts the accuracy

of the gas detector, users must BUMP test an instrument to verify its ability to respond to a sensors' target gas between calibration intervals.

Many manufacturers of safety personal gas detection instruments have now developed automated calibration and BUMP testing systems. While these automated systems vary, in general they require the user to place a gas detector into a docking module or bay; push a button and the system will automatically apply gas to the instrument sensor cavity to perform either a BUMP test or calibration. These systems also automatically create and save a record of the procedure. The data may be demanded in the event there is an occupational health and safety investigation of an incident. Manual log keeping of BUMP testing and calibration records is no longer required. Regardless of how records of routine instrument care are kept, the idea holds true that "If it wasn't recorded, it wasn't done!"

What does all this mean from a safety viewpoint?

The safety gas detection industry has experienced rapid change over the past decade. The miniaturization of components has enabled manufacturers to engineer smaller personal monitors that are easier than ever to use. This evolution of components has also substantially lowered the price of safety gas detectors. Not all that long ago, the average four gas monitor sold for $2500.00 or more, with PID detectors starting at a price of $5,000.00 plus. A quick look at today's market will find a standard confined space entry four gas detector for $600.00 or less and a multi-gas instrument that includes a PID sensor for less than $2,000.00.

As personal industrial safety gas detection instruments continue to get smaller and more affordable, it becomes possible for employers to protect all workers against job related atmospheric hazards. The number one cause of death in a confined space is due to atmospheric conditions. An industrial accident

can be avoided with adequate warning of the hazard. Use sound safety practices and common sense to protect the lives of any worker who may be exposed to atmospheric hazards.

New Instruments Added to Crowcon's Automatic Gas Test and Calibration Interface

Crowcon's (UK) CheckBox IMH (Instrument Management Hub) automates the calibration and bump testing* of portable gas detectors, reducing operation time and so reducing costs. The station can test up to 10 Crowcon detectors at once, calibrating, bumping and uploading data files as required.

The CheckBox IMH now has added functionality allowing Crowcon's newest instruments "the Tetra:3 and the Detective+" as well as established detectors such as the Triple Plus+, to be tested and calibrated.

Tetra:3 is a rugged, lightweight and small personal monitor with single-button operation, IP67 enclosure, top mounting display and reliable lithium-ion battery technology. It is very easy to use, even with a gloved hand.

The Triple Plus+ has long been an industry favourite, with over 55,000 instruments now in circulation. With the new Checkbox IMH upgrade, users of existing fleets of Triple Plus+ units can now reduce their maintenance costs and enable automatic calibration traceability. The Detective+ is Crowcon's latest transportable area gas monitor. Tripod mounted, with optional folding or fixed legs, the device now has options for internal pump (complete with water trap/filter) and infra-red sensors for either CO_2 or flammable gases. Crowcon's wide range of toxic and oxygen sensors are available and Detective+ units also feature a stackable system to reduce carriage and storage costs.

By allowing both pumped and non-pumped detectors to be calibrated and tested using the same procedure, with no additional operator involvement required, the CheckBox IMH greatly simplifies the whole process. All data is permanently recorded ensuring traceable records and can be uploaded and saved for future access. Gas lot or batch numbers and expiry dates can also be entered into the CheckBox IMH records and printed on certificates.

The station supports up to eight gas inlets. One inlet provides air for zeroing, with the remaining inlets allowing up to seven different calibration gases (or a combination of gas mixes) to be tested. When testing standard four-gas monitors (flammable, oxygen, hydrogen sulphide and carbon monoxide), the device supports the use of quad-mixed calibration gas, minimising calibration time and gas usage.

The CheckBox IMH optimises gas bottle usage between single and mixed gases by automatically determining the best gas bottle or combination of bottles to calibrate each detector. It does this by comparing the sensor combination to the gas bottles attached to the system.

* A bump test applies a gas mixture to a detector to check whether the sensors are working within acceptable response limits.

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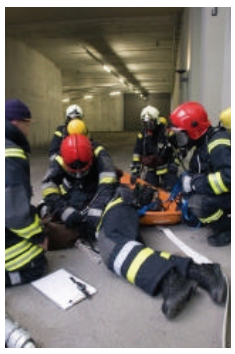
Emergency Software at the FIFA World Cup 2006



MSA's (Germany) package of software solutions for emergency services was introduced for use in the recent FIFA World Cup. This software provides the various authorities involved, such as emergency services, with the safety and security resources that enable them to deal with any possible scenario, should it arise. TecBOS.solutions offers essential field support for mobile incident command, documentation of field operations, status reports and coordination of forces, task and resource management among its capabilities.

Throughout the entire course of the FIFA World Cup, the MSA Software team was on call 24 hours a day to provide technical support to security and emergency services in the field. Hamburg's Municipal Fire Brigade, Professional Fire Brigades from Essen, Frankfurt and Gelsenkirchen, Cologne/Bonn Airport, St. John Ambulance Services and the Integrated Command and Control Centre at Elmshorn are among the organisations entrusting themselves to MSA's software solution. The Professional Fire Services of Essen have, for example, introduced TecBOS.solutions within the timeframe of the FIFA World Cup to support two major operational tasks.

Firstly, at the Communications Centre for the District Authority, Düsseldorf, TecBOS.solutions were being used throughout the FIFA World Cup to help run a back-up command and control centre for the District Authority of Düsseldorf. The coordination, control and monitoring of all emergency units from the outlying areas of Düsseldorf, was carried out through this "World Cup Communications Centre". TecBOS.solutions were being used to coordi¬nate the operations of emergency units, as well as to provide detailed cartographical situation reports.

In addition, the Fire Department Directorate, District Authority of Düsseldorf also used the system to assist their colleagues at the Essen Fire Brigade who are responsible for the organisation of the three fire-fighting task force teams from all five brigade divisions, as well as the management of a standby civil defence team. Here the Essen Fire Brigade was aided, through the provision of extra personnel, by its counterpart in Düsseldorf. The coordination of forces in the field, including the communi¬cation of status reports from a mobile command centre, was carried out by the Fire Department Directorate, through the use of TecBOS.solutions.

But beyond the framework of the FIFA World Cup, TecBOS.solutions incident command software, always convinces. It is currently being used by over 50 authorities and organizations in the public safety field, each operating up to 7 command centres, and comprising a total of 250 workstations.

MSA hopes that its World Cup software will only ever need to be used as a preventative measure. But in case of emergency, rescue and emergency services can always rely on a range of specially developed software that enables them to deal successfully with the demands, however great, of any situation.

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