



ELECTRONS IN THE AIR – THE ROLE OF DIGITALISATION IN IMPROVING EFFICIENCY, SAFETY AND THE ENVIRONMENT

On the 29th of August 2018 the US technology stock index, the NASDAQ Composite, reached a new all time high at just above 8109. The world is going digital and there is money to be made by those that are winning the race to innovate with the right ideas. The momentum in this topic is phenomenal perhaps most importantly because the changes are transforming people's lives and industry for the better. Water treatment companies can trouble shoot odour emissions. Refineries can detect gas leaks in the knowledge that their wireless sensor network will function with utmost reliability. Service engineers can travel to engagements with the right spare parts in their van, having received diagnostic information prior to leaving their depot. It all adds up to increased efficiency, improved safety and has many positive environmental benefits.

QR Codes Help CEMS Service Engineers Get it Right First Time

The holy grail of any CEMS installation is to achieve 100% measurement accuracy 100% of the time. FTIR instrumentation is commonly used for the most complex CEMS applications, for example waste incineration or the co-combustion of fossil fuels with biomass or waste. A blue chip standard in this sector could arguably be the ACF5000 from ABB. With more than 1700 installed units worldwide and an average availability exceeding 98%, this technology is well on the way towards the 100% uptime target. Marjus Seubert, Head of Product Management for Continuous Gas Analyzers at ABB Automation GmbH is proud that "the reliability of our FTIR is already very high and we continue to innovate to take it even higher."

Digital advances are playing a role in the next step up the ladder to 100% availability of the CEMS. The ABB FTIR instrumentation is often supplied to the end user with a maintenance

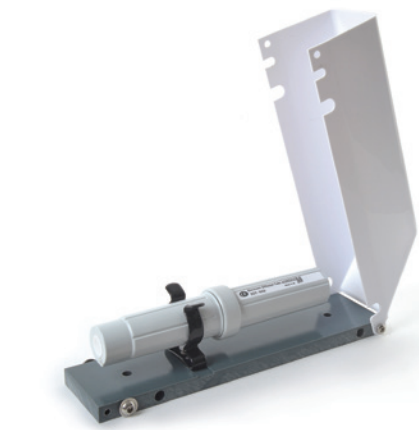
contract. Much of the service work can be done using a planned preventative maintenance schedule to ensure that problems are avoided. However, on occasions there are also reactive call outs for the service team and a rapid response on site with the right spare parts can mean the difference between 97 and 98% uptime... a small change in the performance but a big difference in terms of legislative compliance for the CEMS system operator.

Dynamic QR codes are making this step change in performance possible. Seubert explains how: "we can display Dynamic QR codes on the control panel of our latest FTIR instrumentation and all products of our complete portfolio. In addition to static information for system identification, the Dynamic QR code displays the latest system configuration data and the real-time analyser health status. It is compatible with standard QR code reader APPs that end users will have on their mobile phone or tablet. It also communicates with our proprietary APP called 'my Installed Base (myIB)'. The idea is that the instrument owner can send our service team real time information so that our engineer can respond immediately with remote support or with a site visit and fix the issue. The days of our engineers arriving, looking at the instrument and then driving back to the depot to pick up the relevant spare parts are history!"

Some of the most hotly debated topics in this digital age are the issues of data privacy and data security. This issue is more topical than ever with the recent introduction of the EU General Data Protection Regulation (GDPR) on the 25th of May this year and the

controversy surrounding Facebook that came to light one month earlier. Marjus Seubert reflects on how the ABB technology is sensitive to this issue when he adds that "there is no permanent data transfer from the FTIR unit to our systems. We are not collecting data about emissions levels and the operator is fully in control of the information that they share with us through this Dynamic QR code system. We really did our homework to understand the needs of our customers when we developed this technology and the early feedback from our end users is tremendous. 'One step further towards 100% up-time': that seems to be the phrase we hear the most."





Bluetooth NO₂ Sensor Helps Identify the Cause of Nuisance Odours

Following complaints of nuisance odours, a major UK Water Company sought a cost effective method of monitoring and logging ppb levels of Hydrogen Sulphide (H₂S). It suspected the gas was being released from their pumping station, located next to a new housing development. Challenges included its remote location without AC power and being an unmanned station, staff could not oversee the 24/7 monitoring.

Fortunately, the new Alphasense Electronic Diffusion Tube (EDT) was designed for use by local authorities to monitor either roadside Nitrogen Dioxide (NO₂) or H₂S odour in the wastewater treatment industry. The battery-powered EDT was supplied pre-calibrated with a measurement range of 0 to 500 ppb, recording concentrations every two minutes.

Mounted on the fence line between the pumping station and housing development, it connects with a tablet or smartphone

over Bluetooth and recorded data is logged on the in-built SD-card. Using its internal battery, the IP67 housing allowed the Water Company to locate the EDT outdoors for three months. The collected data pointed to specific events that prompted further investigation and ensured residents were no longer affected by emissions from the pumping station.

David Johnson, European Sales Manager at Alphasense Ltd comments: "the EDT was highly appreciated by our customer and the neighbouring residents. Following on from that success, we plan to launch additional EDT products, such as CO₂ and VOCs for indoor air quality monitoring. Alphasense have been developing and manufacturing gas sensors for more than two decades, but this new product has really been an adventure for us into the Digital World".

WirelessHART® builds a highly secure data mesh for gas detection

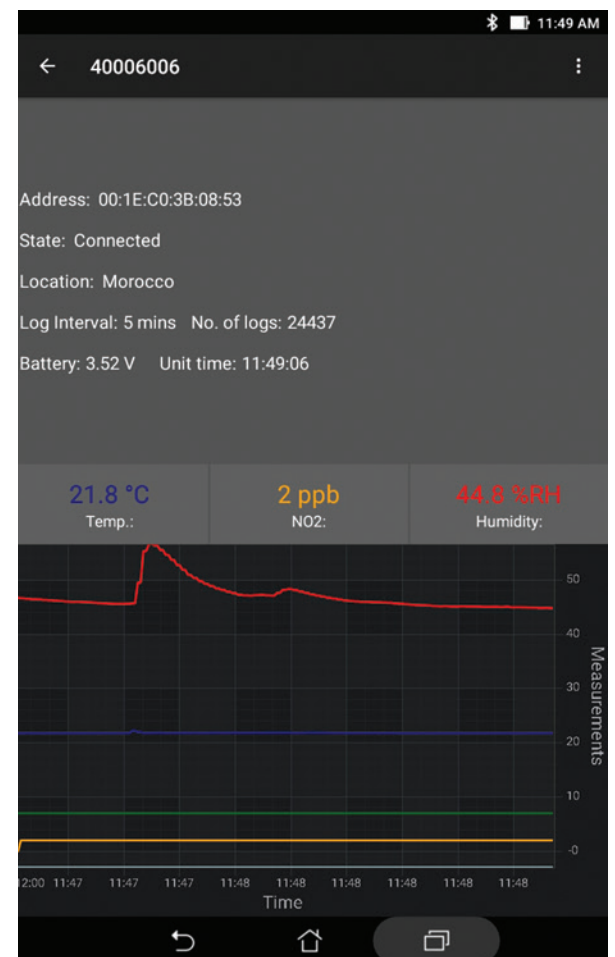
The cases above refer to QR codes and, both of which were developed in 1994 and are digital technologies that we encounter frequently in our daily lives. This next application uses a digital communications protocol that is perhaps less well known and is just over a decade old. WirelessHART® is a networking technology based on the Highway Addressable Remote Transducer protocol.

WirelessHART® is an open protocol and has been implemented into commercial products by several leading process automation companies. One such firm is United Electric Controls (UEC) of Massachusetts in the USA. They have integrated this communications protocol into their Vanguard range of wireless gas detectors. This takes process safety gas detection one step further up the ladder of reliability because the WirelessHART® network of multiple wireless gas detectors can transmit data in all directions and to and through all devices in the mesh. The implication is that if one device fails, or is taken out of service for routine maintenance, the data from the network of Vanguard detectors will flow through an alternative route to



ensure the security of gas detector data transfer and the safety of the operation. The resultant mesh of sensors can therefore be both large and complex in shape.

Product Manager for the Gas Detection Product line at UEC, Andrew Liptak, reflects on their digital innovation: "when refineries and gas storage terminals want to monitor for Methane and Hydrogen Sulphide they do so for good reasons: a gas leak can be toxic or cause an explosion. So, the combination of the gas detectors with this self-repairing wireless network mesh is the optimal solution to monitor for gas leaks in their hydrocarbon processing facilities. Furthermore, with a data transmission frequency of 8 seconds and a guaranteed battery life of more than 5 years we have broken new ground in the realm of operational longevity."



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