KISS Next's onshore gas volume measurement

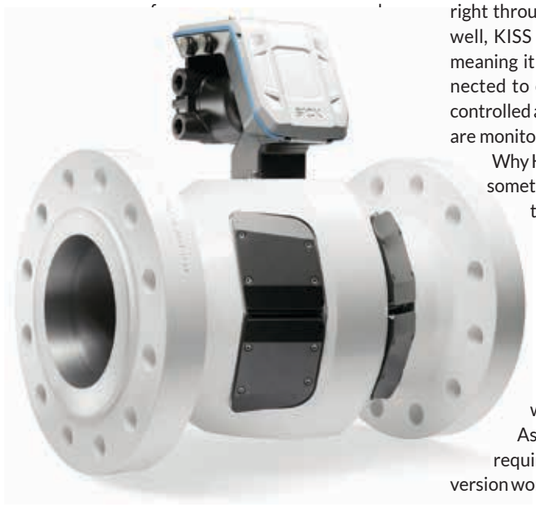
Following the commissioning and construction of the KISS mobile measurement station for Shell's reservoirs on the coast of Holland, the station's successor, KISS Next, enabled by the SICK FLOWSIC600 ultrasonic gas flow meter, is adding new features for stable gas volume measurement.

Shell's plants off the coast of Holland pump gas from 5 000 m below the surface for either internal processing or for direct sale to customers. As such, it is crucial that gas flow is measured accurately, even in the event of widely fluctuating pressures. Another consideration is the varied quality of untreated gas which, depending on the deposit, may contain water and condensate, sand and dirt – and its temperature can fluctuate from anywhere between -20 to 115 °C.

When it comes to measuring gas, the bar has been set high, which creates challenges and imposes conditions – on the measuring device, on the technology, and on installation and maintenance. The KISS and KISS Next measurement project, therefore, is not just attractive for Shell, one of the largest oil and natural gas companies in the world, but it is important to meet the Dutch government's energy policy as well as that of gas producers worldwide.

Dutch natural gas

In the Netherlands, natural gas is a key



The FLOWSIC600 from SICK automation is the market leader for reliable, maximum precision ultrasonic gas flow metering. "The FLOWSIC600 has a much wider measuring range of 1:120 and complies with the volume fraction of more than 1.0% (LVF<1%) for wet gas measurement," says Tang.

counts for nearly half of the total energy mix. As we enter a new era in terms of energy, an intelligent approach to gas production is crucial. Even small gas fields can support the Dutch government's energy policy.

"Economical production is a fundamental requirement for this. This includes lowering costs, using new technologies and taking advantage of infrastructure," explains Ying Tang, metering engineer at Shell in conversation with Jörg Wenzel, head of product marketing services at SICK.

Keep it simple and smart – that's KISS – a compact and mobile gas system, approximately 12 m long, 2.0 m wide, and 2.0 m high, that is ideal for small gas fields. SICK launched KISS in 2004. In doing so, the goal was achieved: to design an innovative type of technology for extracting natural gas in small fields – in a simple, standardised and automated manner, with reduced production, commissioning and project costs.

If a well dries up, KISS is loaded onto the truck and transported to another well. The practical construction and installation also simplifies the entire process, from planning right through to delivery. Positioned on the well, KISS has plug-and-play functionality, meaning it can be quickly and directly connected to control centres. The gas flow is controlled and the pressure and temperature are monitored from there.

Why KISS Next? "When you've launched something new on the market, you want to keep perfecting it. Optimising the gas flow measurement was crucial as the gas flow meter is one of the main components in KISS Next," says Tang.

The differential pressure measurement used previously with Venturi was too restrictive when it came to the flow range. As a result, different designs were required and this often resulted in conversion work – while also having to cope with fluctuating flows, Tang explains. "In the end, the installation conditions meant that the overall design of the Venturi was too large and costly. We had to find a

KISS Next onshore gas measurement with FLOWSIC600 ultrasonic gas flow meter.

feasible solution that was fit for purpose. That is now the FLOWSIC600," he says.

In addition to the main characteristics, the measuring device needs to cover a wide range of applications and significantly reduce the skid size. "We spoke to a few manufacturers so that we could gauge the application requirements for the meter's performance. We discussed minimum inlet zones, the measuring properties of untreated and wet gas, changing conditions in the process, noises in lines, and – most importantly – the very high level of measurement accuracy. That's something we have to be able to depend on.

"We were really impressed with the ultrasonic gas flow meter from SICK. In addition, the ultrasonic technology from SICK demonstrated clear advantages over the previous Venturi flow measurement principle," Tang continues.

Describing some of the advantages, Tang says that the direct path layout of the FLOWSIC600 is much more rugged in wet and dirty gas mixtures. Reflection paths, for example, quickly fail because dirt influences the reflection. What's more, the FLOWSIC600 has a much wider measuring range of 1:120, complies with the volume fraction of more than 1.0 % (LVF<1%) for wet gas measurement, and also has a longer service life. "Just what we need – and we can ensure fault-free operation," he adds.

Shell expects gas flow meters to measure very accurately for the long term. Even the noise from the pressure regulator, which is installed directly opposite the gas flow meter, must not have an effect on the FLOWSIC600. "But if the measurement is affected, we need to know the cause as soon as possible. Only then can we respond quickly and initiate countermeasures," he continues.

"With the MEPAFLOW CBM software solution from SICK, we get user-friendly data access to the FLOWSIC600 with lots of diagnostic options, such as the ability to check the signal-to-noise ratio or gain parameters. If these change, this could indicate contamination or an increase in CO_2 levers. Any impairment that arises is displayed before it can have an impact on the measurement. This is ideal for us – when it comes down to it, we want to ensure high-extraction volumes without faults and delays so that we can affirm Shell's excellent reputation as a reliable supplier," Tang explains.

From a legal perspective, he says that the FLOWSIC600 has all the relevant certificates for explosion protection. On top of this, it has to fulfil the requirements of ISO 17089 for ultrasonic flow measurement. Tang explains that in these standards and at Shell, measuring tasks with different accuracy requirements are categorised in different classes. At Shell, there are three classes: Class 1 provides for custody transfer gas measurement involving large quantities of gas and the uncertainty must be less than 1.0%. Class 2 is also for sales and taxation, but between facilities and entities and requires less than 2.0% uncertainty, while Class 3 is typically used for the gas production area close to the well and a maximum measurement uncertainty of 10% is allowed.

"With the FLOWSIC600, we achieve Class 2, despite the liquid content in the gas. As a result, we can use the skids in an even more versatile manner. Local authorities can also remove one path (Path 4) to achieve Class 2 requirement, as the FLOWSIC600 is certified with four MID measuring paths," he says.

KISS has been designed for a service life of 25 years. "All skids are ready for delivery on demand from our warehouse – KISS, KISS Next or Chemical Injection skids. We have currently built five of the 12 KISS Next units planned. With KISS Next, the system design is even slimmer and more cost-efficient, and mobility has become even more convenient. The standardised high-level pre-production means that it can be constructed on site within one to two weeks. At the moment, we are only aware of a few relocations of complete skids. However, this will soon change when companies start processing fields in sequence.

"And with the FLOWSIC600 gas flow meters, it is even possible to serve a group of wells using the same skid," Tang notes.

Shell and SICK have set precedents. The mobile gas system is already one of the most remarkable system developments. Without this innovative development, a lot of natural gas would probably remain unused underground. The KISS skid is small but refined – it regulates the gas flow in small natural gas fields, and controls and monitors the flow, pressure and temperature. "This outstanding system technology goes hand-in-hand with low investment and operating costs – that's remarkable in itself. With the rugged and compact FLOWSIC600 ultrasonic gas flow meter, we can reliably cover an enormous flow range. The system monitors itself constantly, provides intelligent device diagnostics and we get a measurement with long-term stability," Tang concludes. ❑

Autonomous food robots move with the times

Bruno Adam, Omron's mobile projects director, Europe, explains how smart mobile robots are adapting to meet future food factory requirements.

As with many other industries in the world today, food and beverage manufacturers are under immense pressure to increase productivity and sales, while keeping manufacturing costs down. There is also pressure from consumers for a wider variety of products: new flavours, sugar or gluten-free varieties, or different portion sizes.

There is also an increase in the number of test samples, which introduces identification and traceability issues, which, in turn, require a robust tracking system in place. Furthermore, the need to transport product around the factory is generally accomplished by hand, meaning that the efficiencies gained from automation are being eaten away by additional staffing costs.

One alternative method of transporting goods is by using automated guided vehicles (AGVs), but these generally use physical guides to navigate, such as magnets embedded in the floor or painted lines. But these guides have to be moved every time the AGV is asked to do a different task.

Autonomous intelligent vehicles (AIVs), such as Omron's LD platform, use sensors to create a static map of their surroundings, so they have no need for physical guides. Initially, all that is required is to take the robot to different positions on the factory floor and let it scan its surroundings. From the map, the AIVs can work out the optimal route between any two points. The sensors are then used to detect moving objects, such as humans, in the AIV's path. Vertical sensors are also incorporated to ensure the AIV avoids any obstacles, such as spillages on the plant floor, or overhang from forklift forks.

AIVs can work in fleets of up to 100 mobile robots, and the workload is controlled by fleet management software. The fleet management software can also assist AIVs' navigation by reporting any busy routes or blockages on the factory floor. If the management software is integrated into the production management system, as is the case with Omron's Sysmac software, all pick-ups and drop offs are automatically logged. The AIV can also check it is picking up the correct package by interrogating the machine using WiFi or optical networking. This comprehensive system ensures that the information required for testing is accurate and reliable, cutting down errors and reducing the risk of an expensive quality failure. ❑

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