

Launching ceremony of the LNG cruise ship built in Northern Europe



GAS MEASUREMENT ADVANCES

Correlative measurement systems master uncertain times, says Florian Krischker

To reach the goals resolved at the climate conference in Paris in 2015, energy efficiency must be increased, and energy production must become sustainable. Green alternatives for seasonal energy storage such as biogas from natural or synthetic sources and hydrogen will not be available in sufficient quantities to replace traditional natural gas for years to come. In the interconnected natural gas networks, there will therefore be more and more gas mixtures of all different sources. As a result, the gas quality can fluctuate strongly from point to point within a short time.

Mems has been producing correlative measuring devices for determining gas parameters since 2014. These devices are used in all three sectors: the production (biogas and methanation); storage (gas grid monitoring); and consumption (burners, motors, and fuel cells) of flammable gas. The company is currently working on two innovative projects on land and on water.

MONITORING FLUCTUATIONS

The largest gas network operator in France, decided to monitor the gas

network more closely due to increasing fluctuations (see Fig. 1) in the gas composition. The challenge was to develop a measuring system that was energy self-sufficient, low-maintenance and very compact (installation volume less than 10 litres). For grid monitoring, the measurement data must be made available on a server every half hour. The solution chosen was a 100Wp solar cell with 40Ah battery buffering to power the intrinsically safe gasQS flonic and a 4G modem. The photo (right, inset) shows the measuring device in the middle of the lower half of the picture and the solar cell behind the control cabinet. A very interesting point about the correlative gasQS technology is that no carrier nor calibration gases are needed. And it can therefore be used in deserted locations with the smallest installation volume.

LNG CASE STUDY

Stringent legislation on air pollution and greenhouse gas emission and conflicts in countries with oil reserves all drive the shipping industry to focus on alternatives to heavy fuel oil. Small ferries can be powered purely by electricity, but large



Self-sufficient installation for measuring the gas quality

cruise and transport ships usually rely on LNG. Boil-off gas from an LNG tank can be very different from the gas that is pumped from the bottom of the tank and vaporised, e.g. to supply a ship's engine. In addition, the composition varies depending on where the LNG was bunkered. Additionally, there is a lack of skilled workers in the sector who can operate the complex and very sensitive process gas chromatographs. Therefore, operators must resort to alternative measurement techniques.

A gasQS static had to prove itself in two sea trials at the beginning of 2022. The challenge here was to be able to integrate

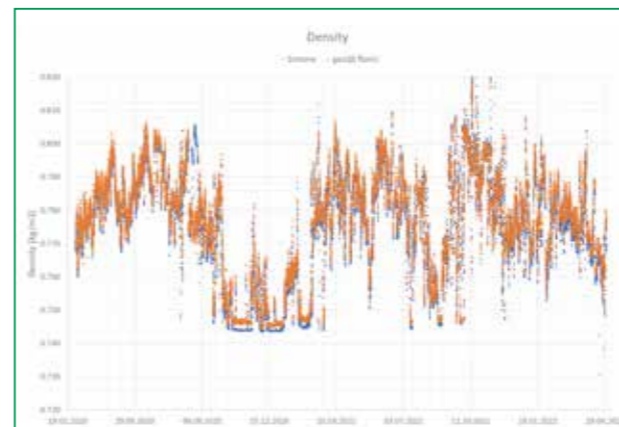


Fig. 1. Measured (gasQS flonic) and simulated (Simone) fluctuation in density in the gas

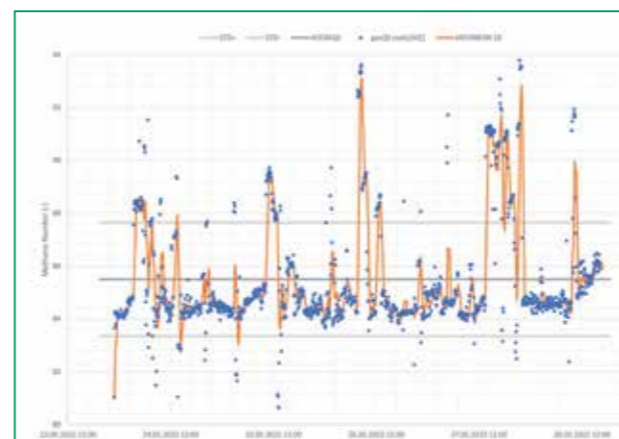


Fig. 2. Variation of methane number in sea trial

additional measuring technology into an almost finished ship. The measuring device had to be installed within a few days and the workers on site had to be trained accordingly. The successful measurements in Fig. 2 show the variations in the methane number. The transitions between gas from the boil-off phase and from the liquid phase (after evaporation of LNG) are interesting: the boil-off gas with a high methane content has a higher methane number than that from the liquid phase. Since the higher hydrocarbons can condense out in the feed line from the liquid phase, the LNG from this feed line briefly contains an increased proportion of higher hydrocarbons after switching from boil-off gas, resulting in a lower methane number. Measuring the gas quality will be necessary for gas engine manufacturers in the future. ●

Florian Krischker is with Mems.
www.mems.ch