Panametrics
a Baker Hughes business

Application note

Sentinel in LNG terminal offloading application

Benefits:

- Low maintenance
- No pressure drop = reduce flashing risk
- No Interruption to operations after installation
- Long term stability and drift characteristics

Summary

Natural Gas is one of the most in-demand energy sources of the century as we look for more sustainable energy sources. As the energy transition rapidly gathers momentum, the demand for natural gas will continue to increase. To manage the growing demand, construction of LNG receiving terminals are also increasing. As of Feb-2021, global LNG regasification capacity reached a high of 850.1 MTPA; and is still growing (source: World LNG report 2021).

Keep reading to learn how Panametrics measurement technology was used at the Qingdao, Tianjin LNG terminal in China to help optimize the conversion of LNG to Natural Gas.

Application

The main LNG component is methane; ranging between 75% and 99% content. Regasification terminals harbor ships carrying LNG which need to be unloaded into storage tanks, before being converted into Natural Gas and connected to the grid. Offloading the LNG is a critical step. It must be measured accurately to compare with what has been recorded from the vessel tank gauges. If the two sets of data do not marry up to an acceptable level, then the operator may raise questions and challenge the vessel owner or their supplier, even if the billing is typically always coming from the vessel. There are various potential technologies to measure LNG flow, including Venturi, Coriolis and ultrasonic flow meters.

Challenges

For these offloading applications, Coriolis mass flowmeters are usually unsuitable due to very high flow capacity - the pipe size is typically > 24" and in the Qingdao example 42" (DN1050). During the offloading process the LNG flows at low pressure, therefore it is critical that any risk of local flashing is prevented, particularly given LNG's close proximity to its vapor pressure point. Knowing that local flashing causes serious issues, especially as the volume ratio of gas is 600 times that of liquid, careful measurement technology selection is required. This would rule out Venturi type differential pressure flow meters.

Although they exhibit the lowest pressure drop among the differential pressure technologies, the Venturi technology is still susceptible to drops in pressure and are expensive for such large line sizes. In this case an ultrasonic transit time flowmeter was the most effective choice.

Solution

At the China Qingdao, Tianjin LNG terminal the customer selected Panametrics 4-path Sentinel LNG flowmeter as a fit for purpose solution. The customer recognized the level of accuracy and reliability that the technology offers, developed after more than 20 years at the forefront of the ultrasonic measurement sector for LNG.

The Sentinel LNG uses a BWT (Bundle Waveguide Technology) transducer with feed thru buffers to create a temperature gradient that doesn't expose the transducers to cryogenic temperatures while also allowing online retraction under flowing conditions.

Computational Fluid Dynamics (CFD) analysis was used to simulate different path configurations under various flowing conditions enabling Panametrics to optimize its configuration while also ensuring good accuracy under cryogenic conditions.

Result

The customer can now confidently offload the LNG vessels while ensuring the volume transferred to the terminal measured by the flow meter matches the calculated volume from the vessel tank gauges.

Panametrics Sentinel LNG was also successfully tested on the Rotterdam LNG accredited laboratory to assess its performances under real life conditions.

Application specification

Qingdao LNG Terminal application data

- Pipe diameter: 42" 150# RF
- Material: SS304/SS304L
- Process pressure: 0.6Mpa (87 psi)
- Process temperature: -160 °C (-256 °F)
- Flow range: 5,880 - 67,280 t/hr
- Flow velocity: 0.46~5.49 m/s (1.5~18 ft/s)

Panametrics, a Baker Hughes business, provides solutions in the toughest applications and environments for moisture, oxygen, liquid and gas flow measurement.

Experts in flare management, Panametrics technology also reduces flare emissions and optimizes performance.

With a reach that extends across the globe, Panametrics' critical measurement solutions and flare emissions management are enabling customers to drive efficiency and achieve carbon reduction targets across critical industries including: Oil & Gas; Energy; Healthcare; Water and Wastewater; Chemical Processing; Food & Beverage and many others.

Join the conversation and follow us on LinkedIn
linkedin.com/company/panametricscompany

Baker Hughes

BHCS39136 (09/2021)

panametrics.com