Application note

Enhancing LNG Process Efficiency with Portable Aluminum Oxide Moisture Analyzer

Summary

The LNG value chain consists of gas extraction and preliminary treatment, transportation to a processing facility, liquefaction, and distribution of the LNG product to end users. Moisture measurement and control is critical right throughout this value chain, preventing corrosion and blocking of pipelines, protecting compressors and cryogenic heat exchangers, and ensuring product quality. A portable aluminum oxide-based moisture analyzer offers a practical solution for monitoring moisture levels at various stages of the process, especially during plant start-ups and maintenance.

Application

Portable analyzers are used to verify online analyzers and for doing spot measurements in normal operation and during plant start-ups. Key measurement points in the LNG value chain include the outlet of glycol dehydrators (first stage drying) and the molecular sieve dryer bed outlets (second stage drying), Fuel Gas Dryers, Seal Gas for compressors and utilities like instrument air and nitrogen. Excess moisture can lead to hydrate formation in pipelines causing blockages, ice formation in the cryogenic section of the plant and general corrosion of metal infrastructure.

Critical Stages for Moisture Measurement:

- Extraction & Drying: TEG (Triethylene Glycol) contactors at onshore and offshore platforms.
- Processing: Onshore facilities, including fuel gas dryers and LNG molecular sieve dryers.
- Purging: purging of the metal infrastructure with nitrogen (N2) to eliminate ambient moisture
- Transportation: Metering skids for monitoring moisture levels during transportation.
- Utilities: moisture measurement in utility gases like instrument air, nitrogen etc.

Benefits:

- Improved Start-Up Efficiency
- Enhanced Equipment Protection
- Accurate and Reliable Measurement

Panametrics designed systems maximize uptime:

Challenges

- **Inconsistent Moisture Levels:** Variability in moisture levels during start-up sequences and after maintenance can lead to operational inefficiencies and increased downtime.
- **Corrosion and Equipment Damage:** Excess moisture can cause significant corrosion and damage to equipment, leading to increased maintenance and repair costs.
- **Accurate Measurement:** Ensuring accurate moisture measurement in harsh LNG environments with extreme temperatures and pressures.
- **Hydrate Formation:** Excess moisture can cause ice formation in cryogenic units of the LNG process which results in flow blockages, damage to equipment and increase in energy consumption to manage flow, decreasing overall efficiency.
- **Long term purging during startup:** During the startup phase, nitrogen is used to purge the LNG train's metal infrastructure. This step is essential for removing any moisture present in the system, thereby preventing wet gas from entering the cryogenic section of the LNG train. The presence of moisture in this section can lead to ice formation, blockages, and potential operational failures.

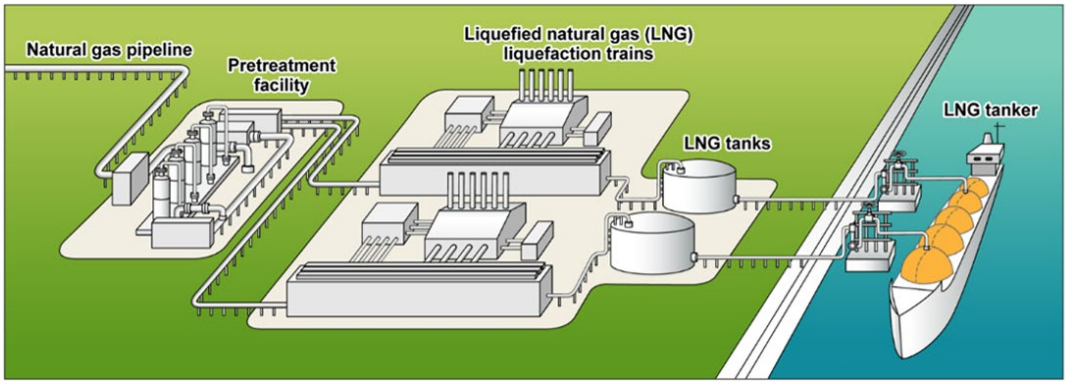
Solution

Panametrics PM880 Portable Aluminum Oxide analyzers are employed to measure moisture content at various points in the LNG value chain processes, particularly during plant start-ups and maintenance. It measures moisture at line pressure to reflect actual process conditions.

To ensure the effectiveness of the purging process, Panametrics PM880 portable moisture analyzer is utilized to monitor moisture levels in real-time. The goal is to achieve moisture levels below approximately <10 ppm. Once this threshold is reached, the purging process can be deemed complete, allowing for the safe initiation of the LNG process.

Specifications

- **Measurement Range:** Accurate detection of moisture levels in expressed in water dewpoint or parts per million (PPMv).
- **Temperature Range:** Capable of operating in extreme temperatures typical of LNG processes.
- **Pressure Tolerance:** Designed to handle high pressures encountered in LNG systems.



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