



APPLICATION NOTE

Oil & Gas

Flow measurement of natural gas for gas lift

- Monitoring of high-pressure natural gas injection to produce crude oil
- Long-term stable Coriolis mass flow measurement despite rapid pressure changes
- Accurate readings for billing of natural gas consumption
- Reduced OPEX after replacement of an orifice plate flow meter

1. Background

A US-based oil and gas producer explores various basins for crude oil in the States and abroad. One of their production fields is located in Southeastern New Mexico, United States.

2. Measurement requirements

With the natural pressure in an oil field decreasing over time, gas lift can be applied as artificial lift technique to increase the production. To this end, high-pressure natural gas is injected into the annulus of the well. Downhole the gas enters the production tubing via gas lift valves. The gas reduces the density of the fluid in the tubing and consequently reduces the static head. This process allows wells to keep producing even in case of very low reservoir pressures. One of the most vital control variables in gas lift performance monitoring is flow measurement.

At one of their producing basins in Southeastern New Mexico, the company faced accuracy issues and high operating costs with their differential pressure measurement for gas injection. The recalibration and maintenance of a DP transmitter combined with frequently occurring wear and tear on the orifice plates along with monthly verification requirements weighed heavily on the OPEX of the well. It also affected the billing of the natural gas quantities consumed. As the natural gas typically comes from another well, the company is bound to pay the landowner for the gas being used. The company was thus in urgent need for increased system uptime, reduced costs as well as transparency to properly verify the natural gas consumed to the landowner, the Bureau of Land Management (BLM) and other state authorities.

Although orifice plate flow meters are still widely considered the standard instrument for this application, the exploration company was ready to test an alternative measuring principle. The flowmeter was to handle high operating pressures of up to 2000 psi / ~138 bar as well as frequent pressure changes and temperatures of up to +200°F / +93°C.

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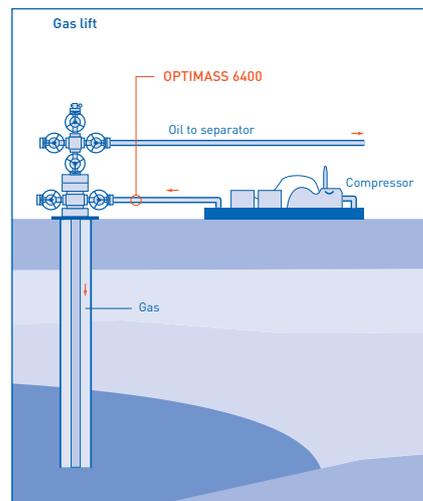
3. KROHNE solution

The OPTIMASS 6400 succeeded in the gas lift test trial and was selected as replacement meter. The high-performance Coriolis mass flowmeter has a track record in upstream oil and gas applications and meets all requirements of the client in terms of accuracy, reliability and long-term stability.

Due to the elevated pressure conditions, the flowmeter was provided with a twin bent tube in Hastelloy-C22 for high pressure resistance and extra stability in the event of pressure changes. It was additionally equipped with a burst disc for pressure relieve and increased safety. The flowmeter comes cFMus certified for use in hazardous areas. It was installed with 1" ANSI 1500 flanges into the gas injection line.



Natural gas flow measurement with the OPTIMASS 6400 Coriolis mass flowmeter



Process scheme of gas lift with the OPTIMASS 6400

All device settings can be managed via a secure Bluetooth® connection. Using KROHNE's OPTICHECK Flow Mobile app allows wireless on-site commissioning, verification and monitoring of the OPTIMASS 6400 on a tablet or smartphone.

4. Customer benefits

The exploration company benefits from more reliable and accurate readings of high-pressure natural gas. Notwithstanding pressure and temperature changes, the OPTIMASS 6400 provides long-term stable flow measurement. There is now transparency over the amount of natural gas injected and consumed. This allows the operator to optimize the gas lift process and contributes to undisputed billing procedures with the landowner.

Maintenance associated with the DP orifice plate flowmeter has been fixed and is a thing of the past. The OPTIMASS 6400 yet still opens room for future optimization: Keeping in mind that any DP flow measurement for gas injection is subject to recalibration on a regular interval and given that this is eventually required for hundreds of wells, the KROHNE Coriolis mass flowmeter offers the operator a vast potential for further cost and time savings.

Thanks to the Bluetooth® connectivity of the OPTIMASS 6400 there is no need to physically touch the unit and open the housing. This translates into added value for technicians on site as it facilitates and speeds up flow monitoring and device verification. The OPTICHECK Flow Mobile allows a view of live values such as density changes and enables personnel to perform quarterly verification for BLM and State reporting guidelines. They can easily monitor and verify the device from their mobile device at up to 65.6 ft / 20 m of distance away. These speeds up service procedures and helps them quickly move on to the next installation.

5. Product used

OPTIMASS 6400

- Coriolis mass flowmeter for advanced process applications with extended temperatures up to 400°C
- Integrated measurement of mass, volume flow, temperature and density
- Device commissioning, verification, and monitoring via a secure wireless Bluetooth® connection using the OPTICHECK Flow Mobile app

Contact

Would you like further information about these or other applications?
Do you require technical advice for your application?
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