

Emerson's Flow Technologies Used to Reduce Cost and Increase Reliability in Eagle Ford

BENEFITS SUMMARY

- Improved operational efficiency with a standardized and integrated separator solution
- Enhanced production management decision making with increased measurement accuracy and operational reliability
- Remote monitoring, operations, and diagnostics provide early insight into production issues allowing the ability to pinpoint troubleshooting
- Reduced deferred production and maintenance cost with devices that have minimal moving parts
- Reduced HSE risk

APPLICATION

A global oil company, with operations in shale and tight formation development, focuses on production flow measurement within the challenging Eagle Ford shale environment.

CHALLENGE

For improved visibility of individual well production, the application requires continuous measurement of oil, water, and gas streams for each well. Eagle Ford crude production is volatile. Production is close enough to the boiling point that any pressure drop can cause flashing and create difficulty in measurement, leading to losing product to emissions and destroying traditional mechanical flow measurement devices.

Mechanical flow devices are more susceptible to damage caused by flashing and sand production, requiring repair and replacement every few months. Frequent maintenance of mechanical meters can increase exposure to Hydrogen Sulfide (H₂S), increasing HSE risk to both the environment and field staff.

To optimize oil, water, and gas production in the Eagle Ford, the company strives for as little downtime as possible and relies on accurate and consistent flow measurement to efficiently manage production. In an attempt to reduce cost and the physical footprint at the wellhead, several different measurement approaches were tested but none offered the ability to handle Eagle Ford production conditions or provide the measurement accuracy and reliability demanded. In addition, many of the devices tested offered minimal to no diagnostic insight into measurement or separator performance.

Due to the cost of maintenance/replacement of each device every few months, increased downtime, unnecessary HSE exposure, and no diagnostic insight available, the producer sought an alternative solution.



"The new system gives me daily diagnostics into separator operations so I can catch issues before they become problems."

Measurement Foreman

SOLUTION

In addressing these challenges, Emerson installed an instrumented, integrated 3-phase separator flow solution:

- Micro Motion Coriolis meters for measurement of oil and water on the separator
- Daniel Senior Orifice meters for measurement of gas on the separator
- FloBoss 107 Flow Manager for remote monitoring of water, oil, and gas on each well
- MVS205 Multi-Variable Sensor to provide static pressure, differential pressure, and process temperature inputs to the FloBoss 107
- Rosemount Pressure and Temperature sensors



Emerson's 3-phase separator solution installed at the Eagle Ford Shale site

This system offers the reliable accuracy, minimal maintenance, and reduced HSE exposure required.

In addition to using devices with minimal moving parts and improved construction, the 3-phase separator solution offers diagnostics and well production insight not available from traditional technology. Production Managers can now review daily production and diagnostic trends, from office computers via the Remote Automation Solutions' FlowBoss 107, to identify any field issues.

Using Micro Motion Coriolis meters, a simple analysis of production, density, and drive gain immediately identify the presence of gas in the liquid stream, an improperly working dump valve, or contamination of the oil stream with water or vice versa. With this insight, technicians can be dispatched to the exact location required with fore-knowledge of the problem instead of troubleshooting onsite, increasing downtime and uncertainty.

On the gas leg, Daniel orifice meters with the multi-variable sensor were selected. The Senior Orifice meter allows for easy plate removal for inspection or change out based on production declines without shutting down the well, and unlike other orifice meters, use metal carriers instead of plastic carriers that can warp or damage in rapidly changing flow rates. Plastic carriers can result in the orifice plates needing be changed more frequently than necessary, risking H2S exposure in the replacement operation. The multi-variable sensor provides a means for fully compensated flow measurement by measuring static pressure, temperature, and differential pressure in one device minimizing leak points.

This solution was installed and commissioned by Emerson's Lifecycle Care service field technicians. The entire solution has enabled the company to establish a standardized design for each shale well pad with standard protocols for setup and programming of monitoring equipment by the field technician.

RESULTS

The 3-phase separator flow solution is now installed on 50-60 well pads in this Eagle Ford shale play site. Not only have maintenance issues been avoided, but the additional operational insight and diagnostics have enabled production and measurement issues to be caught early, improving field management efficiency. This insight has minimized gas sent to oil tanks, thereby reducing emissions or flaring and has maximized the amount of gas to sales.

Other Emerson customers are experiencing similar results in over 600 well sites in the Eagle Ford shale play.

This solution has been in service for three years without failure or maintenance. Given the operating conditions, it is estimated that the installed cost of a mechanical meter is 67% higher than the Coriolis meter for this application. This is based on the conservative estimate of one mechanical meter rebuild per year (some operators have to rebuild meters every 1 to 3 months), which takes 1.25 hours for each rebuild, and defers 12 hours of production per year, impacting an operation that produces 100 barrels per day with crude oil at a price of \$80 per barrel.

Emerson's instrumented 3-phase separator has helped the producer generate accurate, real-time well production data that can be accessed remotely with advanced diagnostic insight to avoid production interruptions and downtime.

Emerson's instrumented 3-phase separator flow solution identifies separation issues early to ensure quick resolution and optimized production

