

Produced water treatment and overboard discharge

Water treatment floatation cell optimization

Summary

Floatation cells are used for the proper treatment and disposal of produced water. Expro's non-intrusive SONAR meters are well suited for measurement of the performance of floatation cells.

Background

Floatation cells are used to remove contaminants from produced water to meet water quality standards for discharging the treated water overboard. These systems involve the introduction of recirculated hydrocarbon gas in the form of fine gas bubbles that attach to the oil and fine solids in the produced water and then float to the surface where they are removed. One of the industry's major operators in the Gulf of Mexico requested a trial to demonstrate SONAR performance, on their offshore platform, against their existing meters where available.

Expro's solution

Expro installed a 12" PassiveSONAR™ flow meter for the float cell system to monitor the total flow rate of the produced water/recycled gas mixture in addition to monitoring the mixture's Gas Void Fraction.

The SONAR flow meter was tested over a wide range of fluid loading:

- varied produced water flow rate and regime
- varied injected gas pressure and flow rate

Expro demonstrated the feasibility and benefits of using SONAR for float cell system optimization:

- The Sonar meter accurately measured the volumetric flow rate of the mixture
- The Sonar measured the Gas Void Fraction of the water/gas mixture
- The combination of the two measurements (volumetric flow & GVF) could be used to monitor the individual phase flow rates



Key deliverables

- Gas Void Fraction measurement
- Non-intrusive design
- Real time measurement
- No process shut down
- No modification of the surface lines
- Cost effective
- Accurate

Technology used

- 12" PassiveSONAR™ flow meter
- PassiveSONAR™ GVF output
- Well Test Studio™



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Result

The PassiveSONAR™ flow rate measurement compared closely to the reference meter. The PassiveSONAR™ provided the added benefit of monitoring GVF. The GVF measurement can be incorporated into the floatation cell control loop to optimize the system's performance.

The trial validated the SONAR's suitability for float cell process monitoring and optimization:

- Two-in-one measurement of volumetric flow rate and gas void fraction
- Non-intrusive and relatively quick installation
- No process interruption
- No leak potential and no pressure drop
- Minimal HSE risk and no maintenance requirements
- Easy to integrate the digital output into the existing DCS

