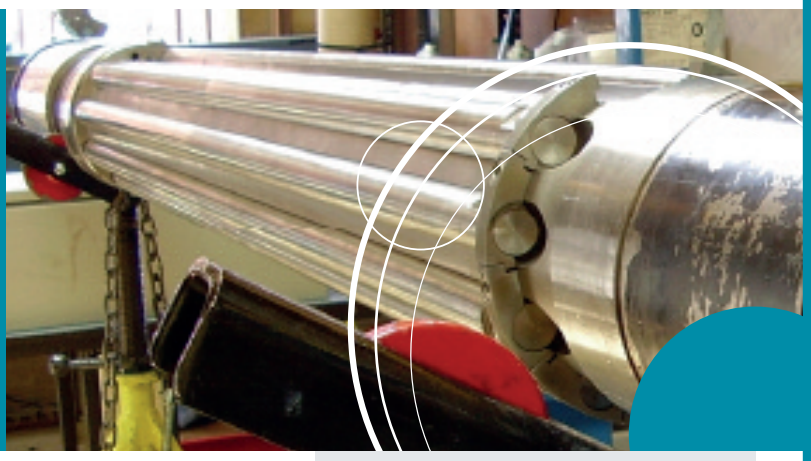
EXPRO

WELL FLOW MANAGEMENT™

/ Expro Excellence

Wireless Well Solutions

Wireless sandface monitoring solution delivers production optimisation and an improved reservoir understanding in big bore high rate gas wells



Objectives

- Ormen Lange's prolific reservoir capacity in terms of permeability, size and pressure led to the selection of a big bore, high flow rate completion design concept
- The completion design featured a $9^{5}/_{8}$" production liner and a high-set production packer, which resulted in the cabled permanent gauge (PDG) being located around 1,000-1,200m above the producing sandface
- In drawdown constrained wells it is critical to be able to measure the sandface flowing pressure accurately, allowing the minimal drawdown to be selected that will maximise production whilst avoiding causing damage to the reservoir or sandface completion
- Due to the gravity head difference and frictional pressure drop over a 1,200m separation distance, there is significant uncertainty in how the flowing bottom hole pressure measured at the permanent gauge reflects the actual sandface flowing pressure – any improvement in the accuracy of measurement results directly in a corresponding increase in production

Expro Excellence

- Six wells were equipped with Expro's CaTS™ wireless pressure gauges
- Large bore gauge mandrels were installed as part of a lower completion assembly and located directly above the sand screens
- The mandrel featured a high specification quartz P/T sensor, pressure build-up functionality, and full two-way communications with the onshore control room at Nyhamna (120km away)
- To ensure the mandrel would not impact effective gravel placement, flow loop trials were performed at varying eccentricities and slurry loadings during system qualification
- A CaTS signal pick-up was installed above the production packer with hardwire tube encased cable (TEC) running to an IWIS option three, ROV retrievable, CaTS transceiver mounted on the xmas tree
- Two-way communications from onshore to the sandface gauge enabled capture of pressure build-ups on demand
- Remote sandface monitoring was achieved without requiring any packer penetration by a cable or control line

Value to client

- The high value data collected was used to tune the lift curve correlations across the wider Ormen Lange field, optimising production even in those wells without a wireless gauge
- Pressure transient analysis performed on the CaTS data provided more representative values for permeability and skin than the remotely located PDG
- Having two-way communication provided the flexibility to request the sandface data at the time and frequency required, which proved critical to the project
- Avoiding having any packer penetration simplified completion running and enhanced integrity

> The CaTS data has already proven its value on one of the newly commissioned wells where produced water measurements at the xmas tree were outside the normal operating range. By having the CaTS data available, we were able to demonstrate this was a metering issue, allowing us to continue ramping up the well.

Contact

For further information, please contact:

Brian Champion
Global Sales Director
Wireless Well Solutions
brian.champion@exprogroup.com
www.exprogroup.com/wws

B.P. Champion, SPE, and D. Elliott, Expro; A van Kranenburg, SPE, K. Hals, SPE, and C. Combe, SPE, A/S Norske Shell, "Ormen Lange: Delivering Production Optimisation and an Improved Reservoir Understanding Using a New Cableless Sandface Monitoring System", SPE 145581.