Maximus ESP System Increases Drawdown Pressure, Boosting Production by 18,000 m³

Integrated ESP system application and engineering approach optimizes oil production and improves reliability in Salym oil fields, western Siberia, Russia

**CHALLENGE**
Address low production from high-potential wells with very tight clearances in the Salym oil fields in western Siberia, Russia.

**SOLUTION**
Use larger-diameter S-series pumps with the REDA* Maximus* ESP system to improve production and system efficiency.

**RESULTS**
Increased cumulative oil production by an additional 18,000 m³ over seven months.

**D-series pumps failed to meet bottomhole pressure and production requirements**
Located in western Siberia, the Salym oil fields are developed by Salym Petroleum Development (SPD)—a joint venture between Shell and Gazpromneft. Production began in 2004 and averages approximately 160,000 bbl/d from more than 500 wells, all of which use ESPs. In late 2011, SPD was struggling to meet its production requirements for the year, and in 2012, some of the wells were not achieving their low target bottomhole pressure (BHP) because of the D-series pumps’ limitations.

The D-series pumps were too small to draw in enough fluid to meet BHP targets. They were also less productive overall owing to limits in maximum shaft strength, less shaft diameter, gas separator capacity, length relative to well dogleg severity, and flow rate (the target 1,000 m³/d was not possible). Additionally, to maximize production, the D-series pumps were operating at their technical limits, which reduced run life due to increased scale deposits, high-frequency operations, and asymmetric radial wear on the pump stages.

**S-series pumps with the Maximus system enable multiple efficiencies**
Schlumberger recommended deploying larger S-series pumps with Maximus ESP systems to draw in more fluid and increase production, improve system efficiency, and decrease electrical operating costs. Although they can be challenging to install, the advantages of the S-series pumps in comparison with the D-series pumps include more than twice the head development per stage, higher efficiency, and a wider operating range. The pumps would also enable SPD to reduce ESP string length by 50%, minimizing bending stress on the ESP system and increasing run life. The pump also has lower thermal, electrical, and mechanical system stresses and larger pump stages to minimize scale formation.

**CASE STUDY**
Artificial Lift

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CASE STUDY: Salym Petroleum Development increases drawdown pressure, boosting production by 18,000 m³ in 7 months

The tight clearance required that the motor lead extension be shielded by protectolizers, which are used for robust cable protection but have a larger OD than simple bands wrapped around the assembly. The maximum OD of the proposed ESP assembly was greater than the casing drift ID, so Schlumberger developed a specially modified protectolizer with a 5.91-in [150-mm] OD and clearance of 0.12 in [3.06 mm].

Integrated S-series pumps and Maximus system increase oil production by more than 18,000 m³, reduce operating costs

S-series pumps with Maximus ESP systems were successfully installed in seven oil wells and four water wells. Seven months of production resulted in reduced operating costs and incremental increase in oil production rates of more than 18,000 m³ due to the pumps’ ability to draw in more fluid and consequently reduce BHP. All subsequent candidate wells have been installed with an S-series pump and Maximus system.

After replacing the D-series pump with the S-series pump and Maximus system, the flow rate (measured at surface) nearly doubled, and the pump intake pressure reduced by more than 75%, which corresponded to a drop in BHP. The larger motor enabled improved cooling, reducing the motor temperature. The larger gas separator and pump stages improved gas handling efficiency, leading to more stable motor current and temperature.