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MeshSlot XL Screens and ResFlow ICDs Control Variable Permeability and Exceed Expectations in ERD Wells

Combination of completion technologies optimizes production in deepwater well offshore Indonesia—ahead of schedule, under budget, and without incident

CHALLENGE

Provide extended-reach-drilling (ERD) sand-face completion in field with highly variable permeability to access undeveloped reserves off existing deepwater platform.

SOLUTION

Design completion with MeshSlot XL* four-layer premium sintered mesh screens, ResFlow* inflow control devices (ICDs), oil-swellable packers, and MFIV* mechanically controlled FIV valve to accommodate ERD wellbores and address permeability and pressure conditions, fines and plugging potential, and possible screen damage from erosion and hot spotting.

RESULTS

Achieved balanced production from full length of extended-reach lateral across multiple heterogeneous zones and completed the well ahead of schedule, under budget, and without incident.

Deep water and shallow reservoir require innovative completion approach

An operator planned to produce undeveloped deepwater oil reserves near an existing deepwater platform offshore Indonesia. The deepwater environment (3,000 ft) and shallow reservoir depth of approximately 3,000 ft TVD below mudline required a wellbore trajectory with kickoff points very near the mudline. This environment was especially tough because of highly variable permeabilities and low pore pressures along the lateral.

Combined technologies meet requirements of ERD well

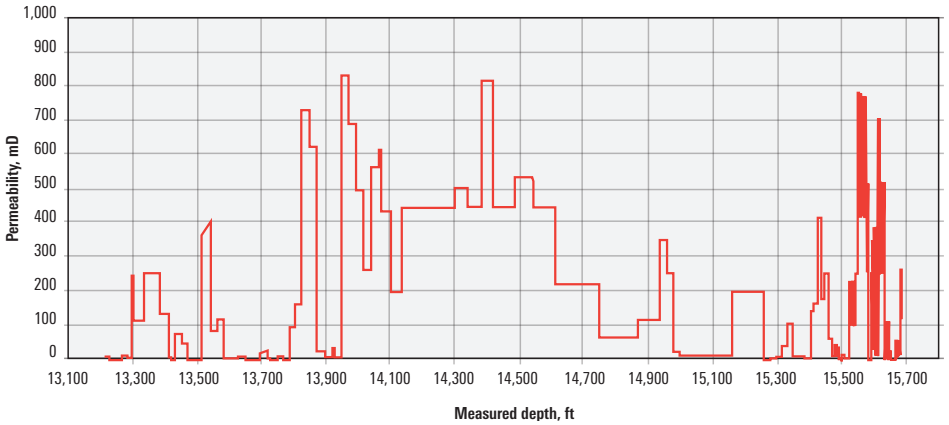
After considering various completion approaches, the Schlumberger team, in collaboration with the operator, settled on a strategy that included inflow control devices (ICDs), swellable packers, stand-alone screens, and formation isolation valves. The final design had to accommodate the ERD wellbores and address the permeability and pressure conditions, fines and plugging potential, and possible screen damage from erosion and hot-spotting.

Screen filter minimizes plugging and optimizes gravel pack geometry

Stand-alone MeshSlot XL four-layer premium sintered mesh screens were selected as the optimal filter medium to minimize plugging. These screens are among the strongest premium mesh screens available with a small outer diameter. Inner and outer drainage layers help ensure uniform flow over the surface area of the filter medium and enable operators to optimize the completion geometry.

ICDs promote balanced inflow and protect screens

Geomodeling had shown significant permeability variations along the lateral, indicating that segregation of the segments was required. ResFlow inflow control devices (ICDs) were used to promote uniform distribution of inflow and heel-to-toe production, prevent fines transport along the laterals, and reduce erosion velocities that could create hot-spotting holes in the screens.



Permeability variations due to the lack of overburden across the horizontal section required the use of ICDs and swellable packers to uniformly distribute the inflow of oil across the flow regions.

Swellable packers compartmentalize variable flow regions along lateral

Openhole oil-swellable packers were spaced at every screen length to provide compartments of approximately 38 ft, depending on the permeability variations along the lateral. The packer's elastomer swelled on contact with the oil and sealed the annulus around the screen, with differential sealing pressures from 1,000 to 1,600 psi, much higher than the 400 psi that was considered the minimal acceptable sealing pressure.

MFIV valve isolates upper and lower completions and prevents fluid loss

The MFIV formation isolation valve was run below the production packer and above the screens to allow the completion to be isolated while a tieback liner and the upper completion were installed. This isolation prevented completion fluid loss into the open hole and later, reduced fluid loss to the formation.

ERD completion succeeds where other completion types did not

Despite the inherent complexities, the ERD well produced at or above expectations with minimal solids production. Moreover, because of the extensive preparation and collaboration of the multidisciplined, cross-functional teams, the well came in ahead of schedule, under budget, and without incident.

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