Schlumberger

Operator Increases Oil Production, Saves Time, and Cuts Costs by USD 422,000 Offshore Indonesia

Challenges of tight fracture-to-pore pressure window in unconsolidated reservoir overcome by meticulous collaboration, completion design, planning, and execution

CHALLENGE

Prevent fluid loss in unconsolidated reservoir with tight fracture-to-pore pressure window.

SOLUTION

Combine FIV-II* formation isolation valve, MeshRite™ stainless steel wool screens, and MudSOLV* filtercake removal service to accommodate complex reservoir challenges.

RESULTS

Completed well faster and with increased productivity than for previous wells that had used sand screens only, minimized rig-related costs and risks, and saved an estimated USD 422,000 in overall operating costs.

Pressure window creates high risk for fluid loss and formation damage

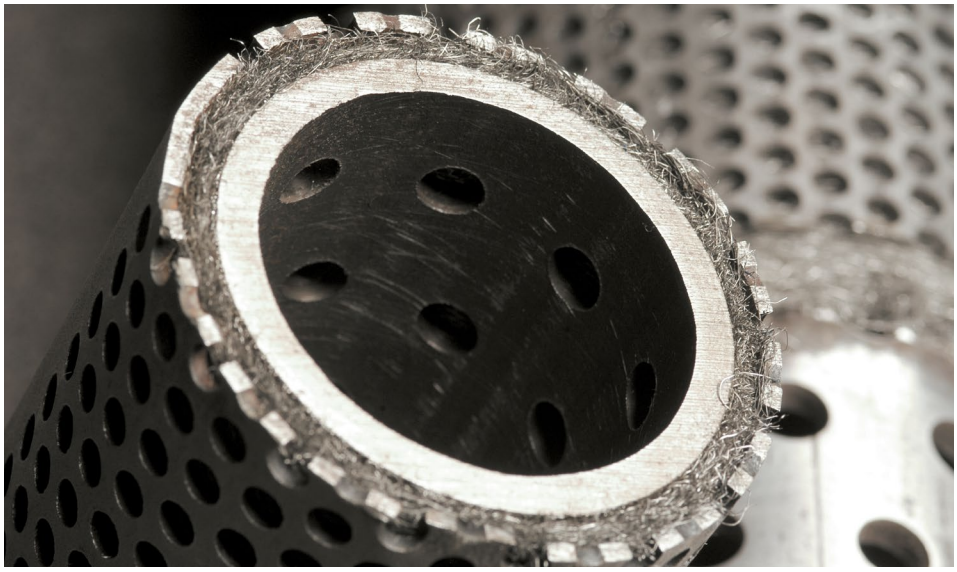
An operator was developing an unconsolidated reservoir in an oilfield offshore Indonesia that had a relatively tight fracture-to-pore pressure window. This pressure created a high risk of sand production and fluid loss. Sand production restricts production rates and is costly to clean out. Completion components and fluids had to be chosen that would minimize fluid loss and formation damage and help ensure unimpeded oil production.

Combined technologies target challenging conditions

Schlumberger recommended a gravel-pack approach for the highly deviated well. The gravel-pack completion, designed to meet the tight pressure window, included a formation isolation valve to isolate the upper and lower completion as required, prevent fluid loss to the formation, and allow the upper completion to be deployed without incident. The FIV-II valve also eliminated the need to run slickline to test the upper completion. Stainless steel wool sand screens were chosen because of their high flow capacity and resistance to plugging. The chemical treatment had to both remove filtercake and stimulate the formation.

Highly permeable screens provide high flow area yet retain harmful sand

MeshRite stainless steel wool screens are made of perforated basepipe wrapped with a thick layer of compressed steel wool and are protected by a perforated steel shroud. These highly permeable screens have a large open inflow area (40%) with high porosity (90%) and high retained permeability (>50 D) that provides a higher flow capacity than most other screens and reduces fluid acceleration at the interface of sand and screen. The compressed wool layer has a wide distribution (15 to 600 um) of angular pores and accommodates a wide particle-size distribution, critical for horizontal wells. The pores



MeshRite stainless steel wool screens created a partial exclusion filter, designed to retain the largest sand particles while allowing fine solids (<40 um) to pass through continuously, thereby retaining permeability and optimizing sand control.

retain only the harmful sand and allow fines to flow through them, which minimizes plugging,.

Treatment eliminates filtercake without damaging formation

When gravel packing was complete, MudSOLV filtercake removal service for openhole completions was used to pump a breaker down the washpipe to dissolve and remove the filtercake and reintroduce natural permeability. The treatment chemicals were customized to be compatible with the existing wellbore fluids and help prevent formation damage. The MudSOLV service treatment was left to soak in the well for about 72 hours, after which the washpipe workstring was pulled out of hole.

FIV-II valve isolates wellbore sections and prevents fluid loss

The FIV-II valve installed in the lower completion enabled the screen and openhole section to be isolated after the workstring was removed. A shifting tool placed on the bottom of the washpipe closed the valve as the pipe was pulled out of hole. This isolation prevented completion fluid loss into the open hole and allowed the production tubing to be run in hole without well control concerns.

As the upper completion was being run in hole and production tubing was being pressure tested, the FIV-II valve continued to isolate the wellbore. After the upper completion was landed and tested and the rig was removed from the wellsite, the FIV-II valve's Trip Saver* one-time remote-opening mechanism was activated remotely with surface pressure cycles and the valve was cycled open, allowing production to begin.

Successful design reduces rig time and costs, increases production

Multiple benefits were obtained as a result of this combination of technologies—all within the tight fracture-to-pore pressure window. Preventing fluid loss meant that remedial workovers were avoided, and the associated rig time, risks from slickline operations, and rig and fluid loss material costs were greatly reduced. The particular chemical treatment resulted in a cleaner well, thereby increasing production and flow rate. Overall, the operator estimated its savings in operating costs to be more than USD 400,000.

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