

Multistage Fracturing and Completion for Subsea Openhole Sidetrack

Case study: BP saves time and increases production in the Machar field, North Sea

Challenge

Optimize stimulation in an offshore well with water encroachment and uncertain fracture density prediction complications.

Solution

Apply StageFRAC* multistage fracturing and completion service[†], MSR* mud and silt remover, and VDA* viscoelastic diverting acid using the BIGORANGE* XVIII offshore vessel.

Results

Completed well in one vessel sailing, saving a significant amount of time and reducing risk to personnel. Achieved initial productivity index (PI) three times the expected value.



The BIGORANGE XVII stimulation vessel successfully deployed stimulation technologies in a North Sea field.

Suboptimal stimulation

The Machar field in the UK sector of the North Sea has a naturally fractured chalk oil reservoir over a salt dome with low matrix permeability. Typical wells have been completed by cementing the cased hole, applying clusters of perforations at each natural fracture location, and stimulating with large acid fracture treatments using ball sealer diversion and limited-entry perforating techniques.

The sidetrack of Machar W125, however, presented unique challenges that could not be met with previously implemented strategies. Concerns about water encroachment near the heel suggested a mechanical shutoff system, and the density of natural fractures could not be predicted prior to drilling the 1,000-m reservoir section. Stimulation was separated into several sequential, high-rate acid fracture treatments, with each fracture targeted at a limited interval in an attempt to allow more penetration while distributing the stimulation more reliably. To optimize stimulation and achieve its desired productivity for this well, BP required an innovative approach.



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From the stimulation control room on the BIGORANGE XVIII vessel, seven acid fractures were placed in the best reservoir sections.

Seven acid fractures in the best reservoir sections

Based on its success with execution speed and reclosable sleeves, StageFRAC multistage fracturing and completion service was chosen for focused acid placement. Using this system, BP placed seven acid fractures in the best sections of the reservoir while isolating the less desirable sections. The service eliminated running, cementing, and perforating a liner, and its reclosable stimulation/production sleeves prevented water encroachment.

MSR mud and silt remover connected the natural fracture networks and removed mud losses, and VDA viscoelastic diverting acid created additional fractures where a limited number existed naturally. To deploy all these technologies in the North Sea, Schlumberger provided its BIGORANGE XVIII offshore vessel, which maintained excellent handling and control and a high level of stability.

Faster well completion

Because BP did not need to run, cement, or perforate a liner, the company completed Machar W125 several days ahead of schedule. This achievement saved money and reduced risk to personnel. Furthermore, initial PI of the well was three times the expected value.

BP experienced flexibility in future reservoir management with the StageFRAC service and has planned more openhole-focused fracture completions similar to this successful job.

About the Contact family

StageFRAC technology is part of the permanent category of the Contact* four-category portfolio of staged fracturing and completion services. These technologies maximize reservoir contact by offering the most efficient and effective services for each well. The Contact permanent category enables fracturing and isolation of multiple stages in one pumping operation using equipment installed with the completion. Contact services can be enhanced with real-time measurement options.

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