Stimulating a mature offshore field

Perenco faced a significant challenge in the M’Bya field in the southern waters offshore Gabon, West Africa. This mature field still contains significant quantities of reserves in multiple layers of low-permeability consolidated sandstone. The challenge was to develop an effective stimulation strategy that was also economically viable.

In West Africa, reserves in low-permeability rock have often been ignored, but current economic conditions and recent advances in completion technologies have prompted a second look at these plentiful resources.

A four-well pilot program using StageFRAC technology was implemented with the following objectives:

- improve the low production rates from unstimulated wells
- show that multistage fracturing techniques can be successfully applied offshore
- develop a new, economically viable completion technique for use in this and other low-permeability fields.

The StageFRAC* multistage fracturing service provides effective reservoir drainage through multistage fracturing of openhole wellbores and reduces completion times from days to hours.

The mechanical openhole packer with tandem elements is rated to 68.9 MPa [10,000 psi] and 218 degC [425 degF].

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Challenge

Develop an effective and economically viable stimulation strategy for offshore low-permeability fields to improve low production rates.

Solution

Use StageFRAC* technology to create multiple fractures in a single pumping operation.

Results

Average oil production increased fivefold.
Case study: Multistage completions achieved in pilot test for Perenco in West African field

A step-change technology

The StageFRAC service can create multiple fractures in a single pumping treatment. Packers run on conventional casing are used to segment the reservoir. Hydraulically activated sliding sleeves are located between each set of packers. Balls are dropped from the surface during pumping to open each sleeve, isolating previously fractured zones. The design allows selective opening and closing of the ports to shut off unwanted fluids, thus maximizing well production life.

The StageFRAC service also offers relatively simple completions. Production casing is not cemented, perforations are not required, no bridge plugs are needed for isolation, and no intervention is required once stimulation is completed. As many as 17 segments can be stimulated in one pumping operation, reducing cycle times from days to hours.

The StageFRAC service permits precise placement of fractures to maximize reservoir contact and increase resource recovery. Since its introduction, the StageFRAC service has been used successfully in more than 2,750 stages in more than 1.25 million ft of open hole.

Exceptional results

Using the StageFRAC technology, 9 propped fracture treatments were placed in 4 wells during a 56-day period. Ninety days after treatment, the average oil production of the 4 wells increased fivefold. Based on the success of the test wells, the entire field is under review for redevelopment using multistage fracturing.

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.

“Perenco has a history of applying new technologies and StageFRAC was selected based on a strategy of more efficiently improving reserve recovery. The application proved worthwhile and the promising results will lead to further field development using multiple hydraulic fracture technology.”

Christopher Green
Lead Petroleum Engineer
Perenco

†Incorporate Packers Plus® Technology
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