



DEEPFRAC service saved \$40M USD in 15-stage deepwater completion

A major operator working in the Gulf of Mexico was looking for a way to significantly reduce OPEX across its Lower Tertiary developments. While these deepwater plays can be lucrative investments, the conventional approach to complete and stimulate them can be time consuming and cost-prohibitive.

Typically, a cased-hole multizone frac-pack completion is executed, and can take more than a month of rig time and can cost up to \$100 million USD—or more. In addition, conventional lower completion tools are typically limited to only five zones, resulting in uneven treatment distribution across long intervals. They also have configuration requirements that create 'dead space' along the reservoir, restricting contact.

Recognizing a huge opportunity to reduce costs and also improve pay zone contact, the operator worked closely with Baker Hughes, a GE company, (BHGE) to explore an alternative approach. Some of the operator's

requirements included: performing an openhole completion; delivering treatments to 15 stages in a single trip, and at significantly lower cost than the status quo; providing proppant flowback control without using conventional sand screens; and enabling flowback without post-treatment intervention. The combination of the stage count and the openhole requirement were unprecedented for offshore completions. Jobs of this nature had only ever been performed on land.

With significant field-proven experience in these types of applications on land, BHGE recognized that the best starting point for this challenge was its ball-activated multistage fracturing sleeves. Engineering teams worked to adapt the technology not only to meet the operator's specifications, but to also meet deepwater traceability requirements. They also incorporated patented **BeadScreen™ proppant flowback control technology** directly into the new sleeve as an alternative to

Challenges

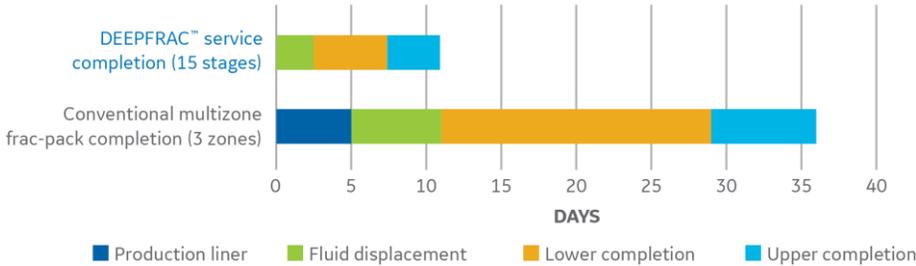
- Lower tertiary formation
- Well drilled to more than 25,000-ft (7,620-m) total measured depth in 10,000 ft (3,048 m) of water
- Conventional completion options were time consuming and cost-prohibitive
- Customer needed to reduce OPEX and wanted to explore a radically new completion approach

Results

- Shortened and even eliminated entire steps of a conventional cased-hole multizone completion
- Significantly reduced OPEX, saving an estimated 25 days rig time and \$40 million USD
- Completed 15 stages in a single trip and in less than 60 hours pump time



RIG DAYS: DEEPFRAC SERVICE COMPLETION VS. CONVENTIONAL CASED-HOLE MULTIZONE COMPLETION



using conventional sand screens. The customized tools are key enabling technologies of the new **DEEPFRAC™ deepwater multistage fracturing service**, which was used to complete the target well.

The service's specially-designed DEEPFRAC sleeve has three positions: closed for run in, frac ports open for treatment delivery, and frac ports closed with production ports open for flowback. **IN-Tallic™ frac balls** are used to shift the sleeve and then disintegrate downhole, enabling intervention-free production. And unlike conventional screens that can fail under high pressures, the BeadScreen flowback control media cartridges feature higher burst/collapse ratings and offer improved erosion and plugging resistance to help enable long-term, sand-free production.

Because the DEEPFRAC sleeves are modular, the lower completion assembly was delivered in only seven weeks as

opposed to an average of six months for conventional equipment. Using an openhole completion method eliminated casing and cementing operations and simplified fluid logistics, trimming rig days by more than a week before lower completion operations even began. And simplified rig handling and running procedures accelerated installation and the DEEPFRAC sleeves enabled treatment of 15 stages in a single, rapid pumping operation. No service tool movement was required and treatments were delivered in under 60 hours from start to finish.

The new approach also maximized reservoir contact. Conventional systems with limited zone counts often result in large treatments being pumped across long vertical sections, allowing fluids to take the path of least resistance and leaving some areas of the pay zone undertreated, or even untreated. The DEEPFRAC sleeves, which are modular and can be placed as close as

13 ft (3.9 m) apart, enabled more uniform treatment delivery across more stages. And the volume of proppant pumped exceeded that of a conventional three-zone stimulation job by almost 50%.

Built-in BeadScreen filtration media eliminated surface flow tests that would have been required if a basic screen system had been used, saving an estimated two and a half more days completion time.

In addition to increasing reservoir contact, the new DEEPFRAC service saved the operator an estimated 25 days of rig time and \$40 million USD compared to the average time and cost for a conventional cased-hole multizone completion. The new approach also significantly simplified operational logistics and reduced HSE risks.

The operator plans to complete more deepwater wells using the new DEEPFRAC service based on the unprecedented savings and potential economic impact. As of summer 2017, BHGE was the only company that had deployed a ball-activated multistage fracturing sleeve system in an openhole deepwater application.

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