

AutoFrac® System Delivers fracture cycle times in less than 12 hours



An RFID tag (green) is pumped downhole to transmit commands to stimulation tools.

Objectives

- Hydraulically fracture a horizontal well, stimulating and isolating each zone sequentially from toe to heel.
- Reduce time and risks associated with stimulating multiple zones in a high-cost offshore environment. The operator was concerned that conventional systems were too time-consuming and wanted to avoid delays in recovering from premature screenouts.
- Test and flow the well clean prior to handing over to production.
- Avoid the need for milling and intervention operations.

Our Approach

- Weatherford completion specialists installed an AutoFrac lower completion system across the horizontal pay section of an extended-reach well. This installation incorporated seven RFID-enabled Autostim flapper valves and seven RFID-enabled advanced reservoir isolation devices (ARIDs) to remotely isolate and access the reservoir. The Weatherford team isolated and stimulated each zone sequentially, using frequency modulated pressure pulses and RFID tags to actuate the downhole tools.
- The first set of frequency-modulated pressure pulses remotely opened the first ARID sleeve and simultaneously activated the tools. RFID tags were deployed at the 3-ppg stage, and commanded the next Autostim flapper valve to close after a predetermined delay. This allowed completion of the hydraulic stimulation and a shut-in analysis to be conducted prior to that zone being isolated.

LOCATION

North Sea

WELL TYPE

Gas Producer

FORMATION

Rotliegend Leman Sandstone

HOLE SIZE AND ANGLE

6.0 in. at 90°

TUBING SIZE AND TYPE

4 1/2 in. 15 lb/ft
P110 VAM THT

BOTTOMHOLE STATIC TEMPERATURE

176° F (80° C)

RESERVOIR PRESSURE

2,611 to 3,626 psi (180 to 250 bar)

DEPTH

15,748 to 20,997 ft (4,800 to 6,400 m)

PRODUCTS/SERVICES

Thru-Tubing Services
AutoStim flapper valves
Advanced reservoir isolation devices
AutoFrac lower completion system



AutoFrac® System

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Our Approach (continued)

- An early screenout occurred during the flush stage of the first zone treatment, which left proppant-laden fluid in the wellbore. However, it did not prevent the Autostim flapper valve from closing and well cleanout continued as planned. Had this been a traditional ball-drop system, extensive milling and plug-and-perf operations would have been required, with increased operational risks and costs.
- Once the cleanout was complete, operations continued immediately, and a new set of frequency-modulated pressure pulses opened the ARID sleeve in the next zone. When formation breakdown of that zone was achieved, an ActiFrac frequency-modulated pressure pulse triggered the Autostim flapper valve to open after a predetermined delay.
- The operational sequence was then repeated, moving up the well from the toe and allowing stimulation treatments to be completed in about 12 hours per zone. Upon completion of the final treatment, the cleanout process was carried out in a fullbore completion string without need for milling or shifting operations.

Value to Customer

- The Weatherford AutoFrac System enabled the customer to save time while stimulating each zone. Compared to industry-accepted fracture-to-fracture cycle times of 2 to 4.5 days in the southern North Sea, the AutoFrac system completed each cycle in about 12 hours.
- This system, with its multiple modes of activation, enabled the operator to use RFID commands, pressure cycles, and timers to optimally stage operations sequentially from toe to heel.
- The AutoFrac system recovered from a screen out while retaining system functionality and eliminated the need for milling and shifting operations.

