

Case Study  
i-Shift™

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Re-stimulation using multi  
open close frac sleeves  
operated by i-Shift™ on  
wireline (WL) Tractor

## Background

A North Sea operator had successfully installed and stimulated several wells with a ball drop operated frac sleeve system. The i-Frac MOC™ (Multi Open Close) system simplified the stimulation methodology compared to the conventional plug and perf method, and allowed significant operational time savings during the completion and stimulation phase. The Multi Open Close features of the frac sleeves allow production management and multistage re-stimulation. Previously, re-stimulation had been problematic for the operator, typically relying on “pump and pray” type treatments.

In one of the early wells, production rates had declined significantly. The operator suspected that the reservoir liner was plugged with debris from the formation. It was decided that re-stimulation would be beneficial. The operator decided to make use of the built-in MOC functionality in the i-Frac sleeve to operate the sleeves to enable re-stimulation. They would re-stimulate the two upper zones in the well. All intervention would be performed on WL and run on a tractor/stroker, due to the inclination of the well.

## Solution

During original completion, the reservoir section had been divided into several zones using i-Frac MOC sleeves with corresponding ball seats below each frac sleeve. All sleeves installed had shifting profiles allowing unlimited number of opening and closing operations later in the life of the well – using WL Tractor BHA equipped with i-Shift.

We mobilized a shifting tool package set up to be run in wireline mode. This was to be run together with the tractor BHA which included a stroker tool. Testing and qualification was conducted onshore, in cooperation with the WL tractor company, by operating sleeves in a test environment, to refine the operational procedures to be used during the job.

During the offshore operation, the tractor with shifting tool was run to the i-Frac MOC in the upper zone to close this sleeve off. On the first run, the shifting tool did not reach the desired depth, and debris was observed on the tractor BHA when it was retrieved from the well. It was decided to conduct an acid cleanup by pumping a pill of acid to soak the area with debris. After the acid treatment, the shifting tool BHA was deployed again and reached the desired depth.

The i-Shift shifting tool was run below the sleeve, and pulled upwards to latch in and located the shifting profile of the i-Frac MOC. An overpull was observed to indicate that the shifting tool had engaged in the shifting profile. The stroker was activated to shift the i-Frac MOC up to close. A check pass was performed to verify a closed sleeve. The downhole pressure gauge in the zone confirmed that the sleeve was closed, as the pressure inside the tubing and outside the sleeve diverged after the sleeve was shifted.

With the upper zone closed, the zone below was successfully re-stimulated by dropping a dissolvable ball to land in the i-Seat™ below it, followed by a bullhead treatment out of the open i-Frac MOC sleeve. The i-Shift shifting tool was deployed again to re-open the upper i-Frac MOC. The tractor transported the i-Shift shifting tool to the i-Frac MOC sleeve and the shifting tool engaged in the shifting profile. The stroker was used to push the sleeve open. A check run was performed to verify that the i-Frac MOC was fully open again. Both the check run and the downhole pressure gauge verified that the sleeve was fully open. The wireline BHA with the i-Shift shifting tool was then pulled out of hole.

## Result

By installing the i-Frac MOC sleeves, we provided a safe and cost-effective system for the initial completion and stimulation, and proved the value of the sleeves as a means to re-stimulate each zone and improve declining production rates. By using the existing frac sleeves and i-Seats in the completion to provide mechanical diversion during re-stimulation, the operator significantly increased the production rate with only a few days of intervention and stimulation.

In addition, the operator did not experience any HSE incidents during the operations. Shifting operation was conducted without any non-productive time, and all tools functioned as intended. We used the i-Shift shifting tool in conjunction with dissolving balls to re-stimulate the well that had been completed with i-Frac MOC sleeves and i-Seat ball seats. The shifting tool has a high expansion rate to allow it to be run through small restriction and be activated to shift sleeves below these restrictions. The i-Shift can be deployed on coiled tubing, WL Tractor or slickline. Dissolving balls can be used multiple times during the wells lifetime to provide isolation points. The operator will use the i-Shift shifting tool for their future sliding sleeves operation as their primary shifting tool both for WL Tractor and coiled tubing operations.