Case Study:

# Smart plugs for intervention-free well completion

Date: *Dec 2021*
Region: *Norwegian Continental Shelf*

## Key Capabilities

- Intervention-less completion
- Remotely activated
- Efficient removal
- Bi-directional ISO 14310 Vo barrier

## Challenge

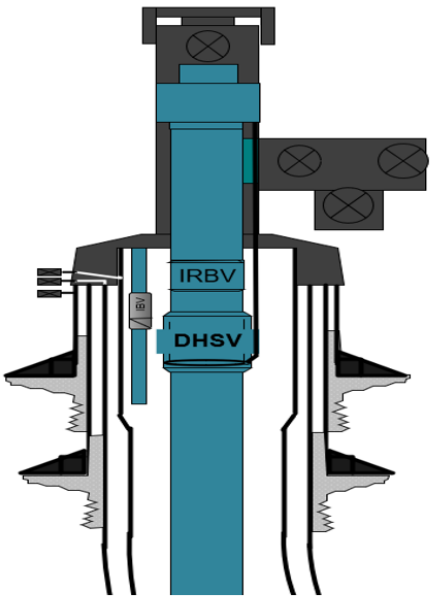
An NCS operator had a new subsea field planned with smart completion to facilitate intervention-free completion. The operator requested smart hanger plugs to be installed as a part of both the main and annulus bores. The plugs needed to be installed in open position to allow for displacement and testing. After completion and displacing the well to light well fluid, the operator needed to remotely activate the plugs to closed position. The wells were designed to be suspended up to two years prior to activation to open position, and after installation of the x-mas tree both the main and annulus plugs needed to be remotely activated to permanent open position to allow for production in main bore and injection of gas in the annulus bore.

## Solution

We proposed to implement our Inter Remote Bypass Valve (IRBV) as the smart hanger plug for the main bore and our Intelligent Barrier Valve (IBV) as part of the annulus bore. Implementing the IRBV as a part of the main bore meant the operator could autofill during installation and displace the well to light weight fluid prior to closing and establishing the shallow barrier. The IBV was installed in the open position to allow for annulus testing before closing it with a pre-defined pressure command to establish a barrier in the annulus bore. After successfully testing the IRBV and IBV, the BOP could be removed, and the drilling rig could safely move to the next slot on the template. Once all the wells on the template were completed the rig could move over to the next enabling a vessel to batch install the x-mas trees, saving high rig costs.

## Value created

The project successfully achieved the goal of removing intervention from the pre-production phase as both the IRBV and IBV were successfully closed remotely. The installation of x-mas trees was conducted with a vessel saving high rig costs and increasing the drilling rig's operational efficiency. Once the x-mas trees were installed the IRBV could be remotely activated to open position by pressuring up to the pre-defined pressure cycles and the IBV could be opened with the pre-defined pressure command.




### IRBV & IBV

A simplified well schematic showing the IRBV & IBV

interwell