

## Equinor Huldra Field

The Equinor P&A team planned to permanently plug and abandon the exploratory well in the Huldra field, located in the northern part of the North Sea.

Equinor required to pull out the 9-5/8 tubular casings, in order to complete the well abandonment.

### THE CHALLENGE

Well-deployed tubulars that have been in place for extensive time periods, are very difficult to retrieve because the casing or liner is surrounded by cement or settled barite.

Equinor's first attempt to pull out the 9-5/8 casings failed in 2016 due to the very high loads required.

A second attempt was necessary, but a new method was needed to reduce the axial force required to pull the tubulars to the surface.

Deep Casing Tools were given the opportunity to trial a new prototype tool, the Casing Cement Breaker™.

### THE SOLUTION

Equinor decided to trial our Casing Cement Breaker™ tool for this project.

The Casing Cement Breaker™ expands the tubulars within its elastic limits to break the bond between the casing and the surrounding material. This elastic deformation allows the pipe to contract back to its initial shape and be pulled to the surface.

Breaking down the bond between cement or barite and casing, and the structure of the cement or barite behind the casing, drastically reduces the axial force required to pull the tubulars out.

In February 2019, a short top down pass with the Casing Cement Breaker™ was executed from the Deepsea Bergen.

### THE RESULT

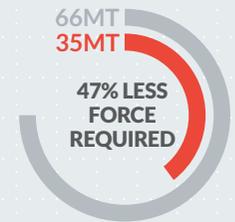
A prototype Casing Cement Breaker™ tool was run, the tool run was designed for workshop testing and not the downhole environment faced, as a result of previous cutting and perforating operations the prototype tool suffered due to the extreme nature of the casing internals.

The tool did however perform as expected over a length of 9 5/8" casing prior to failing due to a seal failure. On observing a pressure drop, the tool was POOH and found to be intact though not operational.

The length of 9 5/8" casing pulled prior to running the Casing Cement Breaker required 66ton/m of force to pull it free, the 3.5m length over which the Casing Cement Breaker was run required 35ton/m. This indicates a reduction in force of 31tons/m or 47%.

### IN NUMBERS

- Conventional Technology
- Casing Cement Breaker™



### REDUCED PULLING FORCE

Introducing the Casing Cement Breaker™ resulted in a reduction of required pulling force from 66tons/m to 35tons/m.

### TRIAL CONCLUSION

The prototype Casing Cement Breaker™ tool was designed to prove that breaking down the bond between cement or barite and casing, and the structure of the cement or barite behind the casing, significantly improves casing pulling efficiency.

Proof of this was demonstrated by the reduced force required to pull length of casing treated by the Casing Cement Breaker™. Following the trial, the tool is undergoing further redesign and additional testing to improve its robustness before the next field trial deployment.

