

NORTH SEA PLATFORM WELL CONDUCTOR FAILURE

2H Offshore helped a client determine the cause of a platform well conductor failure and assess the likelihood of a similar failure occurring on another well slot.

BACKGROUND

An operator in the North Sea has a number of temporarily suspended tieback wells that were drilled in the 1990s and have suffered from loss of centralisation at various conductor guide locations. Due to a fatigue failure of one of the tieback conductors and others having experienced similar operational histories, 2H was tasked with assessing the effectiveness of remedial action and likelihood of future failures. The remedial action took the form of re-centralising the conductor, which was performed by the operator after the conductor failure.

SOLUTION

To determine the accumulated fatigue damage for the failed well conductor and other similar tieback conductors at risk of failure, we performed fatigue analysis for a range of centralisation scenarios. The fatigue damage rates were combined with the duration of each centralisation scenario over each conductor's life to determine the overall combined fatigue damage.

We focused on the failed well conductor which had failed where centralisation was missing. The failure had occurred above a welded thrust collar, resulting in both longitudinal and circumferential failure. We used ROV data to determine the duration of the centralisation loss, prior to remedial work being performed.

CHALLENGES

The analysis showed that the shut-in and production operations had resulted in significant damage accumulation when the centraliser had failed, with shut-in operations being the more damaging. There were two key sources of uncertainty when trying to determine how much fatigue damage had been accumulated in each well.

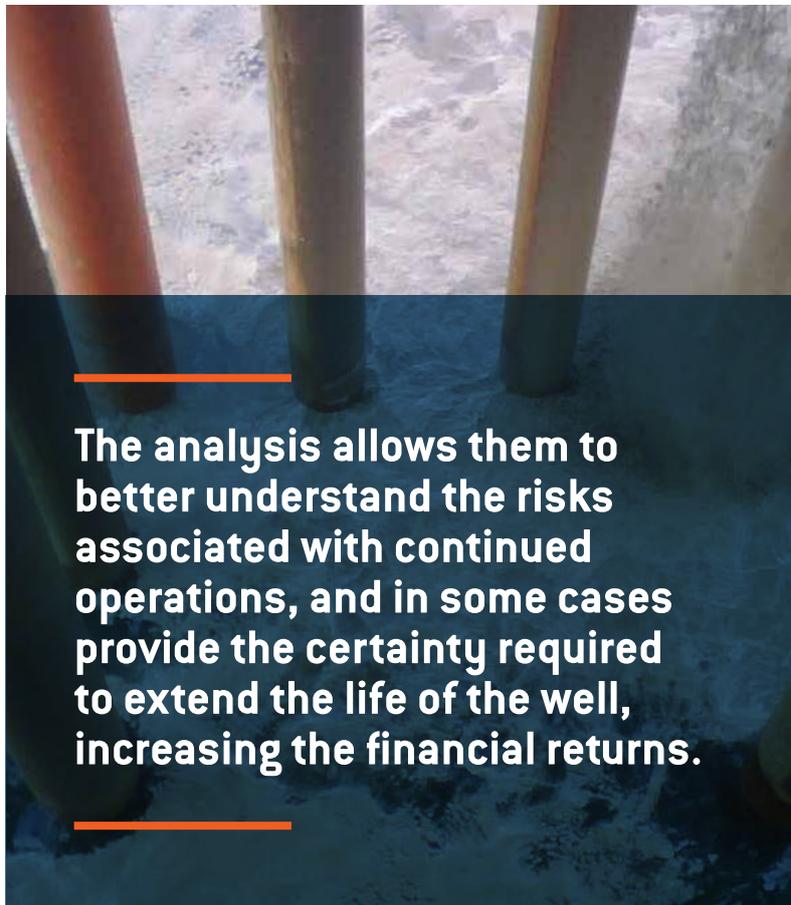
The first was the duration of the loss of centralisation, as there were long periods between ROV inspection intervals. The second was the appropriate fatigue detail to be considered for the thrust collar, as the weld quality was not known. The variability in the duration of centralisation loss and fatigue detail resulted in a wide range of possible fatigue damage scenarios. To account for this, we assessed a range of failure timelines and fatigue details to provide an overview of the risk of failure for the intact conductors.

To increase the accuracy of the results, we obtained the axial loads for each operation from well load software and incorporated it into the conductor analysis that we performed.

RESULTS

2H's in-depth knowledge of platform well conductors and expertise in subsea fatigue assessments enabled our client to make a probabilistic-based assessment of the risk involved in bringing wells back online once remedial measures had been taken to re-centralise the conductors. The analysis allows them to better understand the risks associated with continued operations, and in some cases provide the certainty required to extend the life of the well, increasing the financial returns.

We also provided advice on the consequences of a conductor failure, in which scenario the surface casing sees increased loading. Understanding the consequences helps the operator determine the most appropriate steps to take if a failure occurs, which may not result in unacceptable system performance, but may limit future operations.



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