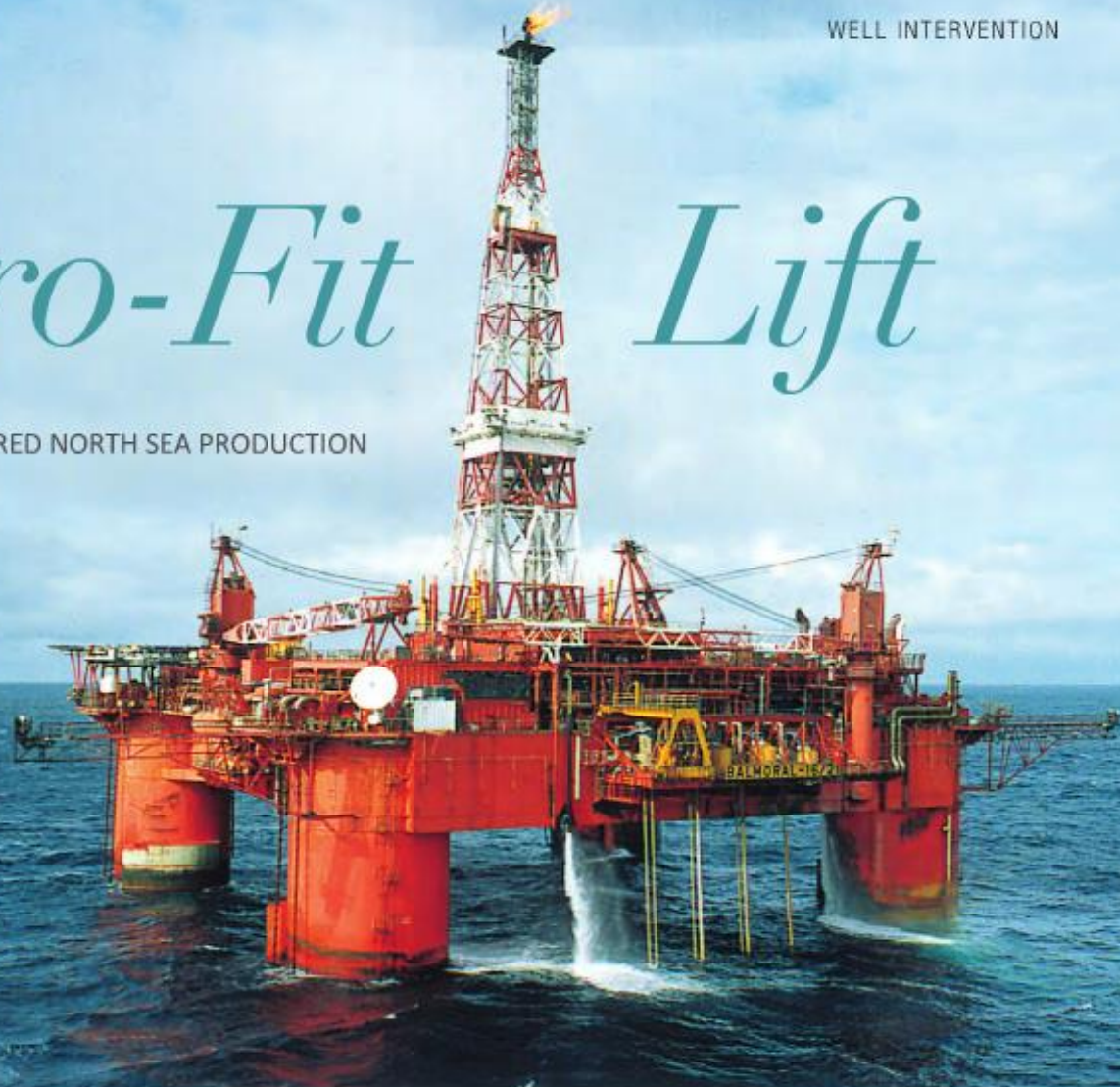


Retro-Fit Lift

LWI OPERATION RESTORED NORTH SEA PRODUCTION



WHEN A WELL OPERATED BY PREMIER OIL IN THE UK NORTH SEA UNEXPECTEDLY CEASED PRODUCTION, THE COMPANY UNDERTOOK A SUBSEA WELL INTERVENTION CAMPAIGN. PRODUCTION HAD ceased following suspected failure of the artificial lift system. Premier approached PTC who came up with a solution involving deployment of an Interwell straddle with the PTC Go-Lift Straddle sub and Safelift IPO and orifice valve that could be installed from a light well intervention vessel.

WORDS BY BEN LITTLER

The Brenda D3 well (block 15/25b) is a gas-lift oil producer located in the UK Central North Sea, 200km northeast of Aberdeen. Part of the Balmoral area, along with the Balmoral, Nicol and Sterling fields, the Brenda manifold connects to the existing Balmoral FPV facility, 8.5km away, via 10" and 6" gas-lift lines. Gas-lift compression was installed on Balmoral to maintain production on the Brenda and Nicol fields, to counteract water production or to act as a contingency for subsea pump availability.

Planning Ahead

The gas-lift failing is indicative of the challenge involved in designing such a system for a new well, with the inherent range of technical uncertainties.

"Getting the right completion design is particularly important for subsea wells where the cost of intervention is prohibitive. Reservoir models aim to provide accurate performance prediction to aid completion designs, but they too present some risk of uncertainty" says Murray Emslie, well integrity engineer at Premier. >>

Because of this, it is quite common, after several years of production, to encounter significantly different reservoir and well conditions than were predicted at the time of the original well completion and artificial lift designs. This is especially the case as the gas lift is often not required until later in the life of the well.

"Whilst gas lift valves have an impressive reliability record, they can fail and this necessitates retrieval in order to optimise well performance or to reinstate integrity."

Optimising Solution

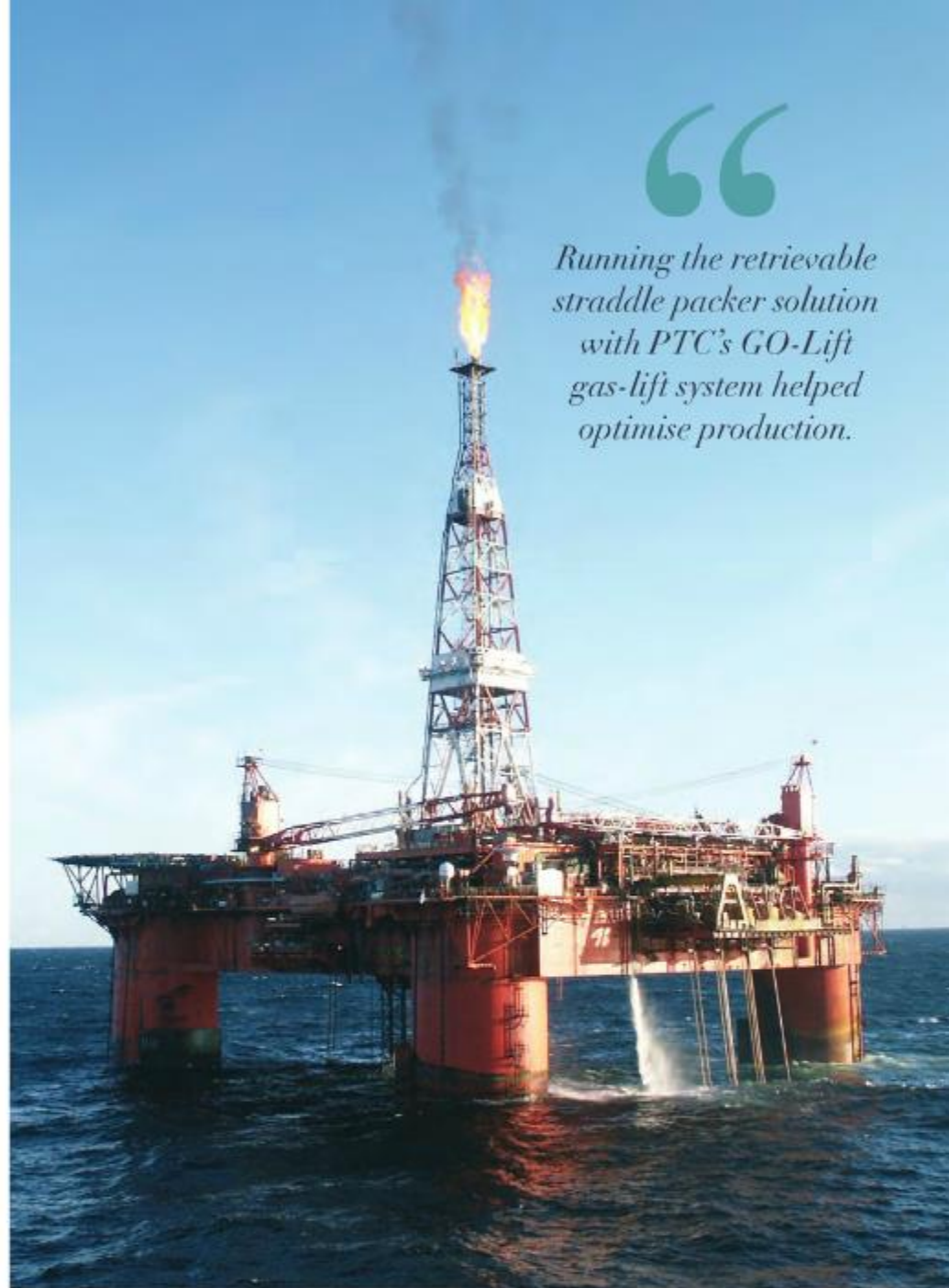
When production ceased at Brenda D3, analysis of the well performance data suggested that one or more of the existing gas-lift valves were inoperable and in addition to the discrepancy with the valve depths specified on the original well completion design it was not ideal. The original (Non PTC) gas lift design, consisting of two IPO unloader valves and an operating valve, maintained production via continuous gas-lift injection through the top IPO unloader valve only. This represented a sub-optimal solution, as Mr Emslie explains. "The top IPO unloader valve either blocked or failed and was unable to inject lift-gas."

Retro & Retrievable

PTC's scope of work involved the provision of detailed life of field gas-lift design and PTC GO-Lift Straddle sub and Safelift Gas Lift Valves for the well.

PTC developed a solution with Interwell that could be deployed from the Island Offshore light well intervention vessel, which Premier had contracted for the operation. Several attempts to change out the suspected failed gas-lift valves were made. However, in the end it proved easier and more efficient to retro-fit an Interwell straddle and PTC GO-Lift Straddle sub and Safelift IPO unloader valve and operating valve in the tubing between SPMs – at the depths specified by the PTC gas-lift design.

"The PTC Go-Lift Gas Lift Sub installed in a straddle proved the best solution," states Ross Cooper, sales engineer at PTC. "In order for this to take place, a retrievable straddle was first deployed. This was used to isolate the upper gas-lift valve. The tubing was punched immediately above the upper



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Running the retrievable straddle packer solution with PTC's GO-Lift gas-lift system helped optimise production.

SPM before the retrofit lift straddle was deployed."

Addressing the Challenge

Retrievable straddle packers are commonly used to isolate water and/or gas production in the sandface completion or to reinstate well integrity in the upper completion. However, when applying a retrievable gas-lift straddle packer, several challenges have to be addressed.

"You have to consider such things as the total length of the straddle required, surface rig-up height limits, wellbore restrictions, differential pressure requirements, wellbore temperatures and reservoir fluid properties."

Safe & Successful

Overall, though, the solution proved to be the most effective option, as Elliot Kinch, Business Development Manager at Interwell points out. "Premier performed a safe and successful LWI operation, bringing the well back onto full production, with all well intervention objectives achieved. Running the retrievable straddle packer solution with PTC's GO-Lift gas-lift system helped optimise production and saved the need for a more costly rig-based production tubing workover."

i. www.interwell.com

i. www.ptc.as

i. www.premier-oil.com