Cost Savings and Improved Production Uptime due to the use of DuraLift 'Anti Scale' Gas Lift Valves

Abstract

The propensity for mineral scale deposition exists in many gas lifted wells. It is widely recognised as one of the most common causes of failure in gas lift valve check valves. Also, if the latch becomes coated in scale, intervention operations to replace the failed valve can become very challenging.

To address this problem in late 2014 PTC developed the 'DuraLift' family of valves, designed specifically to reduce the likelihood of mineral scale formation on the latch and in the vicinity of the check valve. This white paper describes design changes that were implemented. Details of the track record of the Duralift valves, in wells where gas lift valves have previously failed prematurely because of scale are also provided.

The Impact of Mineral Scale Deposition on Gas Lift Valve Reliability and Retrievability

When the propensity for mineral scale deposition exists in gas lifted wells, premature valve failure was common across all valve manufacturers [1]. The impact of this was that valves require regular replacement. This incurs CAPEX to buy a new valve, OPEX to carry out the well intervention (which is more challenging when valve latches are coated by scale) and production revenues are deferred.

Computational fluid dynamic (CFD) modeling of the PTC gas lift valves, concluded this was due to an unexpected flow pattern around the valve nose, when gas was being injected through it. Specifically, it was discovered that at the same time the lift gas exits the gas lift valve into the tubing, a small amount of produced fluid is also drawn from the tubing into the check valve module of the gas lift valve. If the produced fluids have the propensity for sale deposition, then scale can be deposited there, and the check valve becomes in-capable of effecting a seal from the tubing to the annulus.

Anti Scale 'Duralift' Gas Lift Operating and IPO Valves

The PTC 'DuraLift' Gas Lift Operating and IPO valves are an evolution of PTC's field proven 'well barrier' rated SafeLift valve designs. The key differences are:

- The nose architecture is modified based on CFD modelling, to eliminate the possibility of produced fluids entering the valve during lift has injection operations.
- The valve nose and latch are coated using a hydrophobic material, which, because the mineral scale is dissolved in the produced water phase, reduces the likelihood scale forming on the coated parts of the valve.

DuraLift Track Record

The first Duralift valve was installed in a North Sea well in January 2015. The well was known to have a strong propensity for scale deposition. Indeed, a competitor 'anti scale' valve installed one month earlier in January 2015 had failed due to scale formation on its check valve after less than 1 month service. The installed 'Duralift' valve has since been integrity tested on a monthly basis, and until now it is still performing as per expectation.

In total, 14 DuraLift valves have been installed since January 2015. 2 valves were pulled for inspection after 1 and 6 months respectively. No scale problems were observed on these valves. The 12 remaining valves are still operating, without any problems. The longest run life to date is 1.5 years. The cumulative, problem free, lifetime of all 8 valves currently stands at 7.25 years.

Cost Savings and Production Uptime Benefits Delivered

On each of the wells where the Duralift valves replaced existing valves, the mean time to failure for standard valves was typically less than 6 months. The value delivered as a result of investing in Duralift valves is therefore very easy to recognise, and is almost always many orders of magnitude higher than the incremental cost to purchase the Duralift valves.

[1] Laing C: 'Gas Lift Nonsense' Presentation published at ALRDC Gas Lift Conference Feb 2014 (picture above also taken from same presentation)