



Reducing well life cycle cost in high scale environment

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Challenge

- The propensity for mineral scale deposition exist in many gas lifted wells and it's widely recognized as one of the most common causes of failure in gas lift check valves.
- Changing out gas lift valves can be significantly costly, and if the latch becomes coated in scale, intervention operations to replace the failed valve can be challenging.

Challenge

An Operator in the North Sea Continental Shelf approached the industry to develop a scale resistant gas lift valve.

Computational fluid dynamic (CFD) modelling of the PTC gas lift valves, concluded that the failures in a high scale environment was caused by an unexpected flow pattern around the valve nose when gas was being injected through it

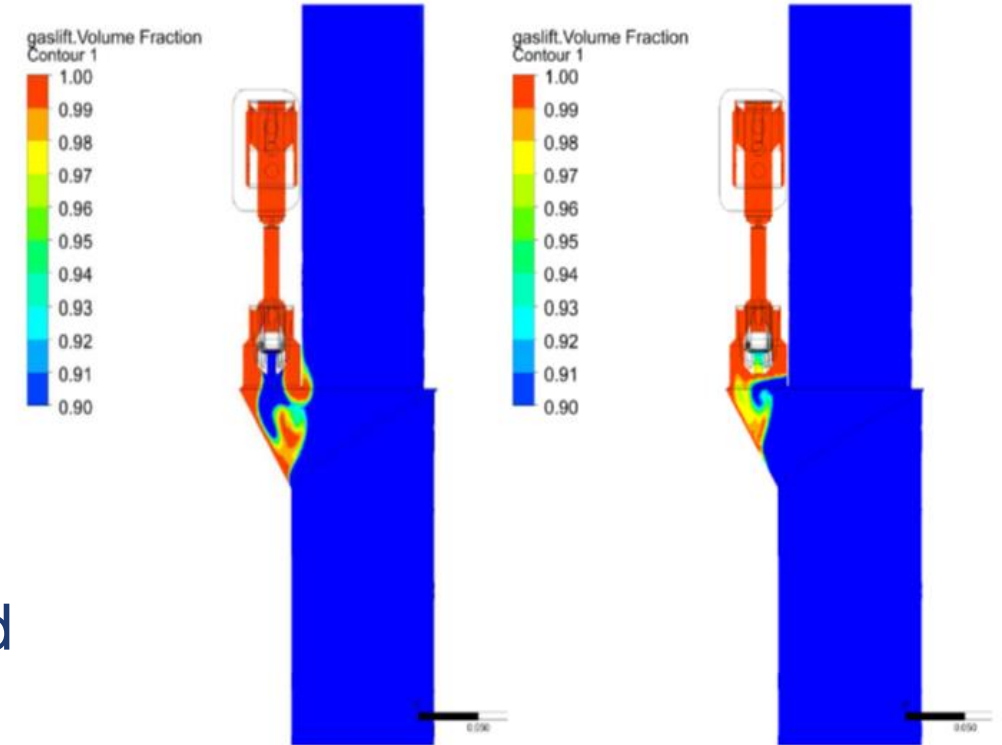


Figure 5-11: Volume fraction of gas in a vertical plane through valve and SPM. The range is between 0.9 and 1.0, i.e. the blue areas have a volume fraction of gas of less than 0.9. Case I to the left, case II to the right

Solution

PTC's DuraLift gas lift valve was designed.

- Evolution of the field proven 'well barrier' SafeLift valve designs.

Key differences are:

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

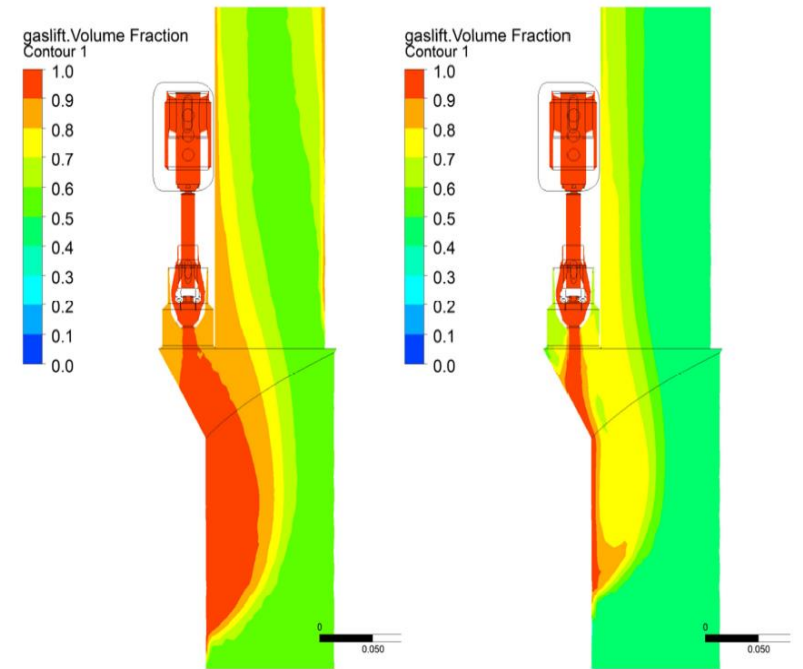


Figure 5-10: Volume fraction of gas in a vertical plane through valve and SPM. Case I to the left, case II to the right

Example well

Operator: NCS operator

Well: XX

Valve: SafeLift

Installed date: 27.02.2009

Pulled date: 01.05.2015

Operating days 2254

Valve: SafeLift

Installed date 10.06.2015

Pulled date: 02.03.2016

Operating days 266

Valve: SafeLift

Installed date 02.03.2016

Pulled date: 15.01.2017

Operating days 319



Same well – Different valve

Operator: NCS operator
Well: XX
Valve: DuraLift

Installed date: 16.01.2017
Pulled date: Still operating
Operating days 1968



Example well

D&W technology implementation:

PTC – Duralift GLV

First Use:
Multi Use:

Technology description:

The traditional GLV nose design during gas injection created a turbulence in the nose part of the valve and the lower SPM pocket area. This turbulence 'pulled' the produced fluids into the nose part of the valve. The turbulence could lead to scale building up in this area in wells with scale potential. Scale building up, could either lead to dart being stuck in open position, or in closed position.

The DuraLift nose with its unique geometry "jets" away the produced fluids instead of creating the turbulence effect. The nose also function as a "divers bell" when the GLV is not on gas injection. This prevents fluids from entering the check area also when the well is not on gas injection.

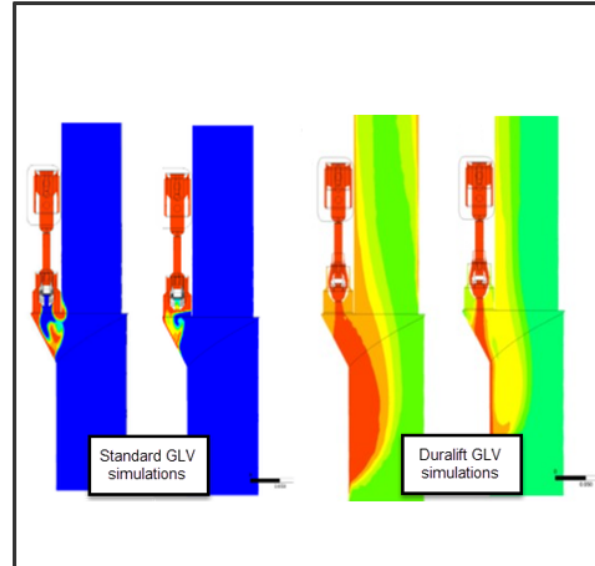
In addition to the nose geometry, all the flow wetted parts (including the latch) are xylan coated. The coating will function as a non-stick material, and will also reduce the risk of any scale building up on the Latch preventing proper pulling of GLV's.

Results and value creation (incl. HSE effects):

The GLV in C-3 A was replaced yearly after completion due to scale build-up failure. The Duralift valve has now been installed 19 months and still not failed.

Recommendations:

If scale observed in well / GLV, consider installing Duralift gas lift valve to avoid regular replacements.



Installation/well:

D&W unit:

Author:

Date:

Reference:

- Previous valves failed annually
- DuraLift Anti-scale GLV installed 04.07.2016 and pulled only due to optimisation of injection depth in the well

Inspection photos of pulled DuraLift valves



Scale formation on the outer part of the valve



No evidence in scale inside the barrier check valve.

Value created

The DuraLift anti scale has proven to last longer in high scale environments than traditional gas lift valves and as such:

- Reduces cost (CAPEX and OPEX)
- Reduces CO2 footprint related to wireline operations
- Reduces production deferrals.

Thank you for listening.



Reduce Cost,

Increase Production,

Enhance Well Integrity