

# Gas Lift Surveillance and Optimization

## Well Intervention and Integrity

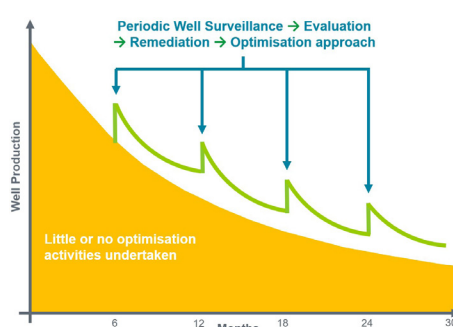
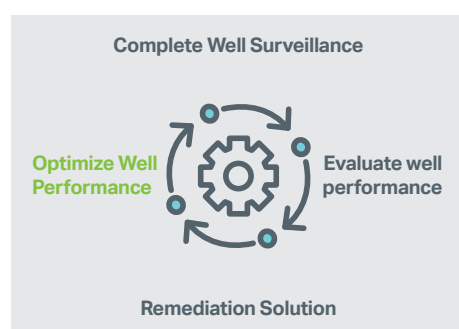
Expro are experts in improving the productivity and efficiency of wells and fields on gas lift. This is achieved through complete well surveillance and well performance evaluation using cutting edge technologies such as Distributed Fiber Optic Sensing (DFOS) Intervention and ActiveSONAR™ non-intrusive metering. With a comprehensive and interconnected portfolio, Expro can apply the most suitable remediation solution to optimize the gas lift performance at well and field level.

Fields on gas lift features a system of interconnecting and interdependent elements from the reservoir to the production facility via clusters of wells that each have their own set of perforations, casing strings, completion strings and configurable gas lift components.

At single well level, gas is injected at high pressure into the production casing from surface and then into the well bore via Gas Lift Valves installed in Gas Lift Mandrels in the completion. This injected gas then mixes with the produced fluids from the reservoir. This continuous gasification process lowers the effective fluid density of the fluid column and lowers the hydrostatic pressure at the producing interval. The subsequent increase in draw down across the sand face supports the flowing of the reservoir fluids to surface and on to the production facility.

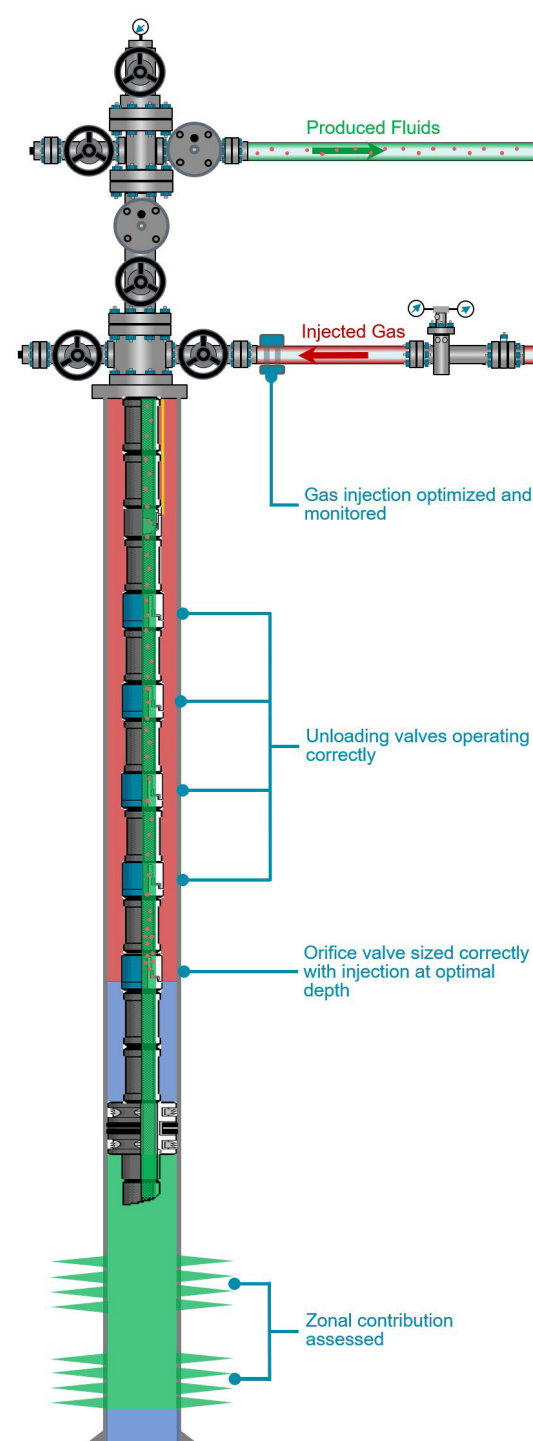
Over a period of time, due to factors such as reservoir depletion, increase in water cut and wear or failure of Gas Lift Valves, the lift performance of the well declines. In many fields, identification of under performing wells is hindered by the lack of measurement of gas injection and oil flow rates at individual well level, so as the lift performance in a growing number of wells in a field continues to decline this significantly impacts field wide oil production and injection gas usage.

Well surveillance plays a significant role in maintaining reservoir performance, keeping field production at optimal levels and maximizing the return on investment (ROI). The Expro Gas Lift Optimization workflow features a periodic **Surveillance, Evaluation, Remediation** and **Optimization** cycle to maintain each well at optimal production, and when applied to all wells in the field systematically, the goal of field-wide optimization can be realized.



### Surveillance, Evaluation, Remediation and Optimization approach and value delivered:

- Up to 10% production improvement per well through restoration of optimized lift performance
- More stable well production through reduction of annular heading
- Efficient use of lift gas
- Optimization of compression costs per well
- Revival of shut-in wells
- Systematic approach enables fields on gas lift to be perpetually optimized



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### Complete well surveillance

Expro delivers complete well surveillance by performing a **DFOS intervention** in the well. The intervention can be complimented with gas injection rate measurement at surface, using our **ActiveSONAR™** metering technology.

DFOS Intervention features a straightforward thru-tubing deployment with a Fibre Optic Slickline or E-line cable which enables continuous and distributed acquisition of temperature and acoustic data along the length of the well under surveillance. A range of well performance and well integrity issues can be diagnosed during the DFOS Intervention, for a well on gas lift this includes zonal flow assessment, gas injection through multiple gaslift valves, annular heading, leaking gas lift valves and fluctuating flowing conditions.

The ActiveSONAR™ meter avoids dependency on a production test separator and hence enables surveillance to be performed on an as required basis, with multiple wells being surveyed in a single campaign. The meter provides non-intrusive and accurate gas injection rate measurement before, during and after the DFOS intervention. The ActiveSONAR™ measurement is robust and unaffected by Wetness or CO<sub>2</sub> composition and when coupled with our Portable Well Testing solutions, Expro can measure gas injection rate and oil production rate simultaneously.

The combination of non-intrusive, efficient and mobile metering of gas injection on individual wells and distributed acquisition of temperature and acoustic data along the length of the well therefore enhances the complete well surveillance and optimization workflow.



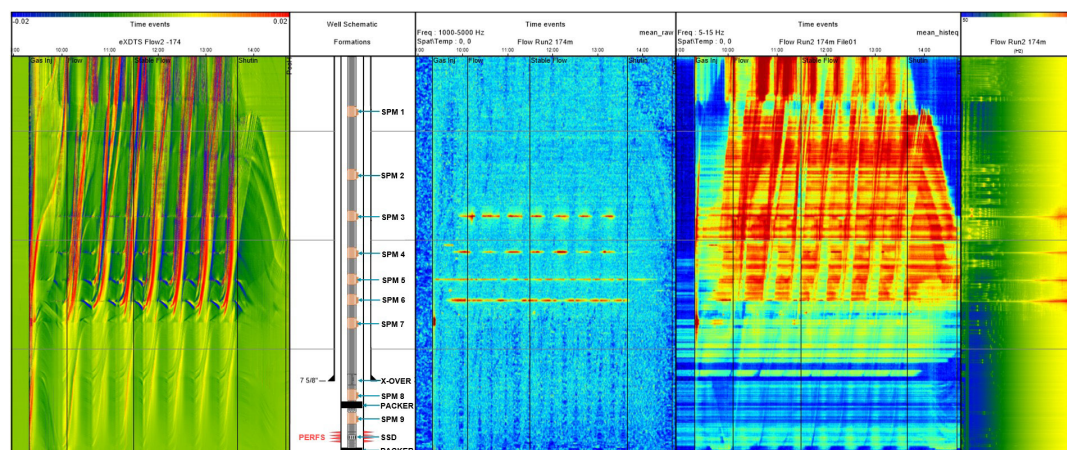
### Evaluation of well performance

The multiple and unique means of DFOS data processing utilized by Expro, including high definition eXDTS temperature processing, enhances the accuracy of fluid movement tracking and corresponding velocities. This enables analysis and interpretation of dynamic events within the well to a higher degree of confidence compared to other approaches. As a result, a better understanding of subsurface well performance and well integrity issues is gained.

The image on the right shows a DFOS data set acquired from a well on gas lift. This data view is output using Expro's QikView software.

The evaluation of the DFOS data revealed intermittent activity across SPM #3, #4, #5, and #6, a poorly operating SPM #7 and surge and fall-back events as the well flowed under sub-optimal Gas Lift conditions. These well performance aspects would likely have been missed or incompletely observed if using conventional Logging Tools.

The Expro QikView software enables a comprehensive visualization of data and well elements which in turn enhances the viewers understanding of the wells dynamic performance characteristics.



### Well centric and field wide remediation and optimization

Following the evaluation phase, simulation and modeling at well and field level can take place, covering a range of potential remediation and optimization options, with the solution, or combination of solutions, that add the most value and return on investment subsequently being implemented, these may include:

