Gas lift surveillance and production optimisation

Sonar flow surveillance enables optimisation of gas lift

Background

Gas lift is a widely used artificial lift (secondary recovery) method to enhance oil production from mature wells. The process consists of gas being injected into the production conduit at depth, reducing the density of the produced fluids and therefore reducing the bottomhole pressure or hydrostatic head. However, although a seemingly simple process, understanding the pressure and rate of gas injection are crucial in attaining the optimised production potential from the well.

The optimal gas lift injection rate for a well, which is dependent on many factors, is usually modelled for each well and on a field-wide basis. Modelling gas lift efficiency is useful, but empirical monitoring is also required to validate these models; especially in light of other physical challenges such as: operating condition of compressors and overall compression capacity, condition of gas lift valves, downstream back-pressure, etc.

Customer's challenge

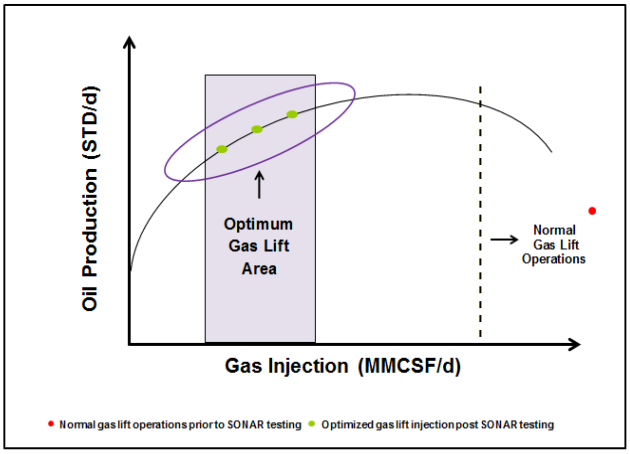

Figure 1: Gas Lift Optimization Curve

In order to optimise production from gas lift, it is necessary to measure the production rates from the well whilst simultaneously measuring the injection pressure and gas lift rate. By doing this, production models based on varying gas lift rates can be validated and the system can be "tuned" for optimum production.

Most oil wells are not equipped with in-situ wellhead production metering and installing traditional multiphase flow meters on each well is, in most cases, not practical or is cost prohibitive.

Likewise, many gas lifted wells do not have flow meters installed on the gas lift lines. If there are flow measurement devices installed on the gas lift lines such as orifice plates, it is not uncommon for these instruments to be subject to mechanical failure, are out of calibration or blocked by hydrates or other debris.

Key deliverables

- Non-intrusive design
- Real time measurement
- No process shut down
- Cost effective
- Accurate

Technology Used

- ActiveSONAR™ flow meter
- Data acquisition hardware and software
- FlowStudio™ well testing automation software

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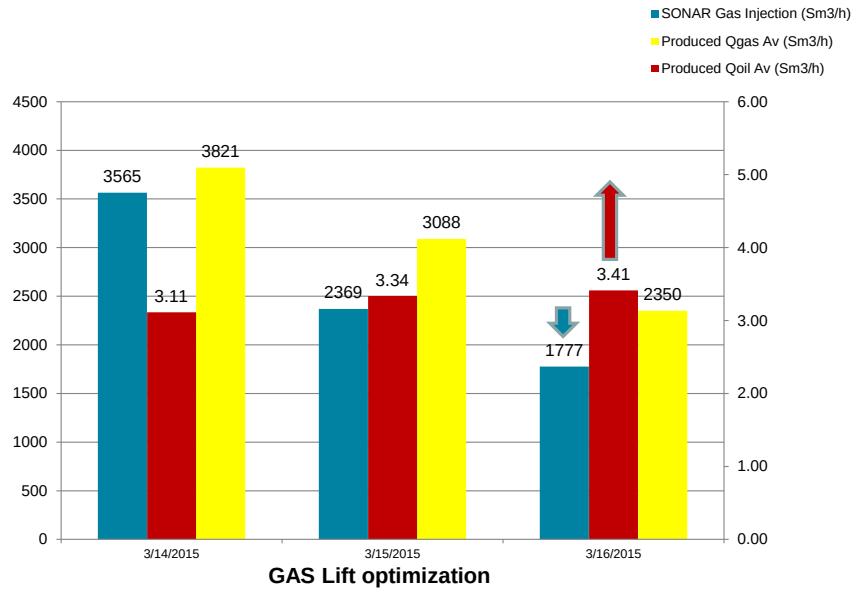
Expro Solution

Expro's Sonar*Test*™ non-intrusive surveillance package is used to measure lift gas injection rates during production testing. Typically for gas lifted wells, the ActiveSONAR™ meter is used to measure the gas lift injection rate on the injection line. Production testing can be done with traditional separator based packages or with Sonar*Test*™ to closely monitor wellhead production rates simultaneously with the injection rates. For oil production testing, the PassiveSONAR™ meter is typically used for the production measurement. Both meters are clamped onto the existing pipework at the well site.

In a recent client engagement, Expro mobilised several packages of ActiveSONAR™ meters to continuously measure gas lift rates in tandem with traditional separator packages. As the equipment is both lightweight and portable, transportation to the well site by a small vehicle (or offshore via a single man lift package) can be achieved and deployed by one Expro field technician. The Sonar*Test*™ approach requires only 30 minutes for installation and commissioning, which allows multi-rate testing of wells in a single day.

Result

The optimisation of gas lift using Sonar*Test*™ resulted in increased production in this field. A typical well is presented below:



Optimisation of gas lift using Sonar*Test*™ resulted an additional two barrels per hour from this well, which equated to over $500,000 in increased annual revenue. In addition, by reducing the gas lift rate to the optimal setting, the cost related to gas compression was also reduced.