

Case study: Gulf of Mexico

ProductionLink Optical Solution optimized real-time gas-lift operations, reduced costs

Gas-lift is one of the most commonly used types of artificial lift methods. During the production phase of the well, when bottomhole pressure drops causing the production rate to decrease, a limited amount of natural gas is injected into the wellbore via mandrels (gas valves) to enhance the production. One of the major challenges of gas-lift application is the lack of real-time understanding of the gas entry effect at any specific mandrel position.

Keeping all the mandrels at an optimal operating condition is the key to gas-lift success. One of the gas-lift optimization issues is to allocate a specified amount of gas to a number of wells in a reservoir to maximize total oil production. Since the gas amount available can vary from day to day, operators face the challenge to

maintain all mandrels at a peak gas-lift injection rate.

Baker Hughes developed the **ProductionLink™ Optical Solution**, a tool that analyzes real-time distributed temperature sensing (DTS) data from the gas-lift well to improve production. The ProductionLink Optical Solution gas-lift alert feature enables customers to visualize gas-lift mandrel locations and status changes, as well as brine interface positions in wells, catch impending failures early with actionable notifications, and reduce maintenance costs while keeping operations safe.

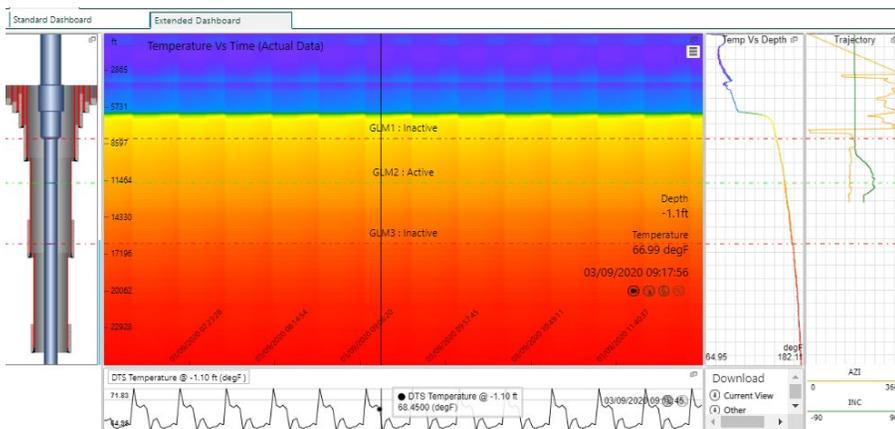
A customer in the Gulf of Mexico had experienced a decrease in the oil production rate from the field's gas-lift wells. By utilizing the ProductionLink Solution's gas-lift alarms, engineers were able to identify the precise

Challenges

- Maintain optimal gas rate injection via gas-lift mandrels to increase the production rate
- Analyze real-time DTS data proactively and alert users of mandrel malfunction via status change

Results

- Evaluated real-time DTS survey diagnostics to identify unstable operating conditions
- Generated alarms to indicate appropriate gas-lift status change
- Increased oil production by optimizing mandrel condition based on real-time DTS data analytical alarms
- Experienced no health, safety and environmental (HSE) issues or nonproductive time (NPT)



The ProductionLink DTS dashboard provides an overview of temperature data in 2D and gas-lift mandrels along with the line markers.

operating status of each mandrel based on real-time DTS traces.

During the diagnostics, Baker Hughes experts discovered a well was not being unloaded as expected at the designed gas rate due to wide mandrel spacing. Gas-lift alarms status indicated Mandrel 6 was not active while gas was being injected from Mandrel 4, higher in the wellbore. Remedial action to “rock” the well was implemented to allow the injection to work down to the lower valve until Mandrel 6 became active.

On another offset well, the customer observed a 3% drop in the oil production rate. The ProductionLink Optical tool analyzed real-time DTS surveys and identified Mandrel 3 was undergoing intermittent activity every 30 minutes, indicating a potential valve leak. With the ProductionLink Optical tool, the customer was able to pro-actively catch the mandrel failure and replace it, reducing maintenance cost and achieving a 5% production increase after stabilizing the injection pressure.