CASE STUDY

GEOGUIDE AND MICROGUIDE SERVICES HELP OPERATOR VERIFY CASING INTEGRITY, OPTIMIZE ESP PLACEMENT, AND IMPROVE PRODUCTION

TECHNOLOGY

- GeoGuide™ cement bond log (CBL)
- MicroGuide™ wellbore tortuosity logs

APPLICATION

- Artificial lift
- ESP placement

LOCATION

- Latin America

INDUSTRY CHALLENGE + OBJECTIVE

In a recent project, an operator in Latin America worked with Gyrodata to optimize their completions operations. As part of a unique, turnkey offering, we integrated an equipment, technology, and service package to help them take accurate wellbore surveys, conduct more effective formation evaluation, optimize their ESP placement, and improve their overall production.

TECHNOLOGY + SERVICE SOLUTION

We provided three primary services to the operator: logging, energetics (perforation), and production evaluation.

- The operator needed to know the status or integrity of the 7-in. and 9⅝-in. casing. We provided our casing integrity service with a multi-finger caliper and magnetic thickness detector tool.
- Several perforating technologies were incorporated during completions.
  - Propellants were lowered together with stimulation guns sourced from a third-party to make microfractures, improving the formation response and allowing well perforation and perforation breakdown.
  - High-performance charges enabled the operator to stimulate each formation before executing the perforation job to achieve the best possible combination of charges, propellant, and underbalanced valves.
  - The dynamic underbalance perforating technique also optimized wellbore cleanup, especially with previous perforations. Lowering the underbalanced valves with empty chambers in front of the perforations and generating a surge effect helped dramatically improve the quality of the cleanup operation while minimizing the risk of sanding up the perforating guns.
- We ran the MicroGuide system in combination with the radial CBL tool to obtain high-resolution well data, enabling 3D visualization of the wellbore's trajectory as well as areas of tortuosity and microdoglegs in the well that could be negatively impacting production.
  - The goal was to determine if the ESPs could be positioned at particular depths without exceeding the maximum deformation recommended by the OEM of 1°/100 ft.
  - We performed a simulation to evaluate the depths suggested by the operator for the lower ESP and upper ESP, which were 7,445.75 and 7,207.49 ft, respectively. Both pumps had a maximum OD of 4.56 in., while the lower pump would be placed within the 9⅝-in. casing with an ID of 8.681 in.

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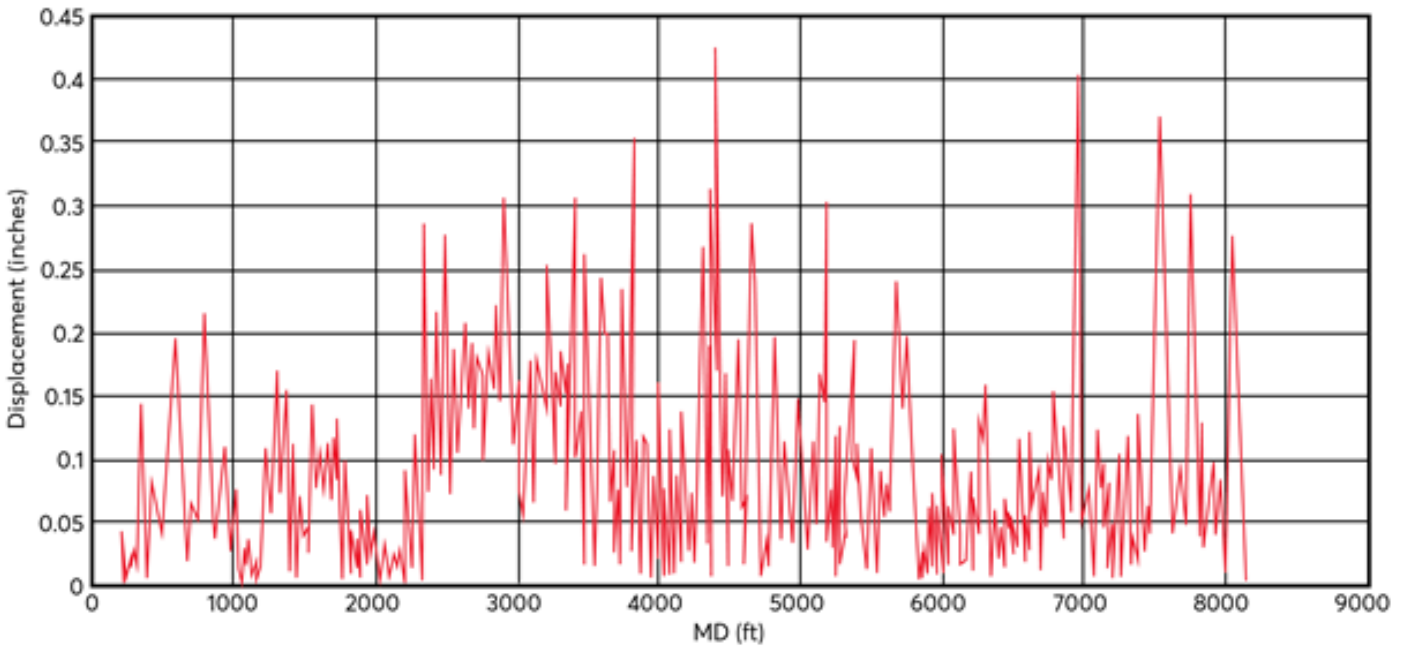
CASE STUDY

RESULTS + VALUE DELIVERED

- Running the GeoGuide system allowed the operator to obtain the information necessary, via the CBL, that proved the effectiveness of the cement job.
- Our casing integrity service allowed the operator to register the entire well by evaluating the two casings in one run while maintaining the quality of the data.
- At both depths suggested by the operator, the MicroGuide logs proved that the ESPs would not be subjected to uniform deflections at or above the suggested OEM tolerance level, validating the pumps' positioning. However, the logs noted areas of high tortuosity that could cause strain and damage to the ESPs when placing them downhole, which meant special care needed to be taken when passing through those areas. The areas of high tortuosity were from 2,877 to 2,935 ft, 4,388 to 4,437 ft, 4,659 to 4,677 ft, and 6,919 to 6,997 ft.
- We recommended performing a depth correlation of the ESPs once they were successfully placed at the theoretical depths to ensure that the equipment was correctly positioned precisely within the zones with extremely low tortuosity.
- The combined tortuosity logging and radial CBL solution saved the operator approximately 8 hours per run, while using the new energetics and completion techniques that Gyrodata provided and confirming optimal ESP placement improved production and kept the pumps working with no issues since their installation.
- Using dynamic underbalance chambers during completions enabled prediction of dynamic pressure and fluid flow while modeling the effects of pressure transients. By understanding this information, the operator was able to reduce the damage to the formation by the guns and improve production.



Graph of the total transverse displacement of the casing, depending on the measured depth. The transverse displacement of a station in the well is the distance from that station from the best straight line adjusted around the nearby stations. A small deviation indicates a smooth path, while a high value indicates high variation along the path.