Reciprocating-Rod Lift System Increases Run Life by 26 Times From Less Than 30 Days to Nearly 800 Days

The VSH2 variable-speed hydraulic system has a lightweight, compact, and uncomplicated design that minimizes site preparation, transportation, and setup costs. Easy, variable speed control provides greater flexibility in operating the equipment and adjusting to well conditions.

Objectives

- Provide an alternative artificial-lift solution for a field in Colombia with a high gas-to-liquid ratio (GLR) and limited space available for surface equipment. General conditions in the field included deviated wells with an inclination of up to 80°, no electricity source in the area, formation depth between 4,000 and 8,000 ft (1,219 and 2,438 m) measured depth (MD), water cuts lower than 5%, fluid rates up to 700 BFPD, 24° American Petroleum Institute (API) gravity, low sand production (less than 0.1%), and low viscosity.
- Initially, the field was equipped with progressing cavity pumping (PCP) systems. However, the high GLR created issues for the elastomers, such as swelling and high torque variation during operation. This resulted in a run life of less than 30 days. The short lifespan of the systems coupled with a lengthy waiting period for workover rigs caused an unfavorable amount of downtime.
- As an alternative, electrical submersible pumping (ESP) systems were installed to replace the PCPs. The ESP systems satisfied the surface-space limitations and, in general, worked well. However, the high initial investment and high cost of energy for the low-efficiency ESP pumps made increasing their use in the field unacceptable.

LOCATION
Colombia

WELL TYPE
Onshore, deviated, oil

INCLINATIONS
Up to 80°

FORMATION DEPTHS
4,000 to 8,000 ft (1,219 to 2,438 m) MD

OIL API GRAVITY
24°

WATER CUT
Less than 5%

PRODUCTS/SERVICES
- VSH2-150 electric unit
- WellPilot® rod-pump controllers
- CORODⓇ continuous rods
- Gas Pusher II pump
- Gas separators

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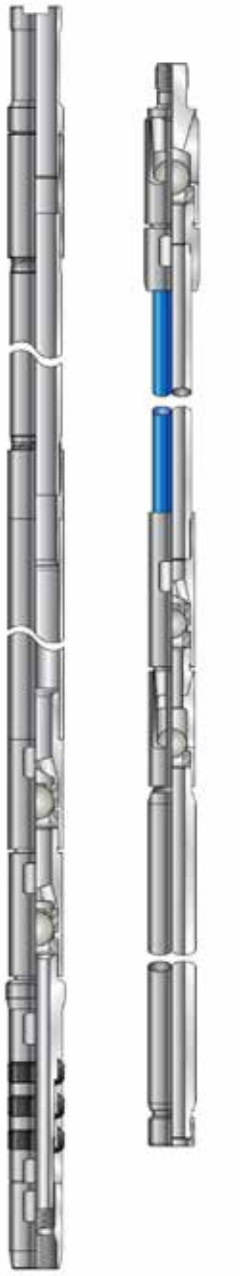
Results

- A field analysis indicated that a reciprocating rod lift (RRL) system was the best alternative solution based on the space limitations and previous field conditions. The Weatherford VSH2 variable-speed hydraulic unit and Weatherford Gas Pusher II pump were selected as the key pieces of equipment in the RRL system for adapting to continuously changing well conditions and working with high GLR without a significant effect on system efficiency. Meeting the limited space requirements of the field required modification of the VSH2 anchoring distance of the guide-wires. Changing the anchor angle (guide-wire position) from 45° to 70° from the ground reduced the length from the center of the wellhead from 24 to 12 ft (7.32 to 3.66 m), which met the maximum space available per well.
- In addition to the VSH2, the RRL systems consisted of WellPilot rod-pump controllers to provide continuous monitoring of well conditions; COROD continuous rods to reduce the wear associated with well deviation; Gas Pusher II insert pumps to significantly decrease time in case of pulling; and gas separators to improve the handling of free gas at the intake of the pump.

Value to Client

- The installation of the Weatherford RRL system eliminated most failures caused by artificial-lift equipment and increased run life to approximately 800 days.
- This solution achieved investment-versus-cost balance that enabled the client to continue development in a new field.



Weatherford Gas Pusher pumps help minimize gas interference, gas lock, and fluid pound.

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