PCPs in Heavy-Oil Wells

Increases Overall Efficiency to 55%, Reduces Energy Consumption by 83% Compared to Previously Installed ESPs

Objectives

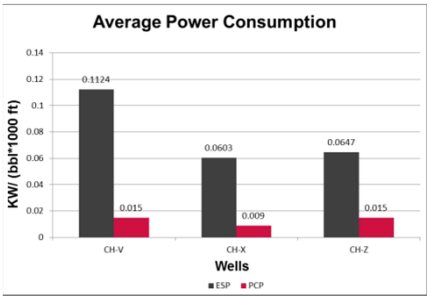
- Identify an artificial-lift system to increase the profitability of a high-temperature, heavy-oil application by reducing energy consumption, minimizing intervention costs, and improving lifting efficiency. The application comprised three wells, each using electric submersible pumping (ESP) systems working at approximately 30% efficiency and each requiring more than one intervention per year.

Our Approach

- Weatherford proposed a progressing cavity pump (PCP) pilot project to monitor key performance parameters, such as energy consumption, system efficiency, and intervention costs.
- The PCPs were installed in three extra-heavy oil wells with flow rates of 800 bpd, fluid viscosity up to 4500 Cp at 150°F (65°C), and 7 to 10° API wellbore fluids in pay zones at 5,000 ft (1,524 m) true vertical depth.

Value to Client

- As a result of the PCP test pilot project, the client achieved the following average benefits for the three wells:
  - Reduced energy consumption from 0.079 kW/(bbl*1,000 ft) to 0.013 kW/(bbl*1,000 ft), resulting in an 83% energy savings
  - Increased lifting efficiency from 30% to 55%
  - Decreased well intervention costs from US $600,000 to US $185,000 per intervention—a 69% cost savings
- The PCPs that Weatherford installed operated for more than 500 days, far exceeding the typical prior ESP run life of 358 days.



Average power consumption comparison of ESP and PCP artificial-lift systems installed on three wells of the field.

LOCATION
Colombia

WELL TYPE
Onshore, deviated well

NUMBER OF WELLS
3

PUMP SEATING DEPTH
4,000 ft (1,219.2 m)

FLUID TYPE
7 to 10° API wellbore fluids

PRODUCTS/SERVICES
- PCP model 41
- MG dual drive head

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