Runlife has been increased by 4 times, 29% total cost of ownership economy

Onshore and offshore fields in Democratic Republic of the Congo, Middle Africa

Complicating factors

- Offshore 9 5/8" (244,5 mm) casing with whipstock with DLS of 13° per 100 ft (30 m)
- Slim 5.5" (139,7 mm) casing onshore well with pass-through DLS over 9° per 100 ft (30 m)
- High downhole temperatures 230-266 °F (110–130 °C)
- Gas content at pump intake is above 70%
- High sand content over 1,000 ppm (1,000 mg/l)

Results

- Runlife has been increased by 400% (and still growing) vs. average runlife of 18 previous installations.
- Pump setting depths were below / in the middle of perforations interval
- Successful passing the DLS casing due to compact design
- Stable operation in complicated environments:
  - the fluid temperature in offshore wells of 230-266 °F (110–130 °C) with 9 5/8" (244,5 mm) casing
  - free gas content at the pump intake over 70%
  - sand content over 1,000 ppm (1,000 mg/l)
- Total cost of ownership has been reduced by 29%

An excellent example of successful conversion from Progressive Cavity Pump/Sucker Rod Pump to UHS ESP™ in onshore wells as well as from Gas Lift to UHS ESP™ at offshore wells is located in Democratic Republic of the Congo, Central Africa.

The project was designed to increase the runlife of equipment and gain production in harsh well conditions (high DLS, high temperature fluid, solids content and high GOR).

Client's fields are located in the Democratic Republic of the Congo in Central Africa. The onshore reservoir is located at 5,905 ft TVD (1,800 m TVD), operated well is completed with 5.5" API Casing. The offshore reservoir is located at 7,218 ft TVD (2,200 m TVD), operated well is completed with 9 5.8" (244.5 mm) API Casing.

Client contacted us to overcome several challenges. The existing artificial lift equipment at onshore wells (progressive cavity pumps, sucker rod pumps, standard pumps) failed often and quickly - their 18 systems had a runlife of about 46 days. Current gaslift equipment had low efficiency with low fluid and oil rate. It was necessary to optimize production and replace equipment with more reliable and efficient technology.

Following research and detailed analysis of the wells, we recommended replacing the client's equipment with UHS ESPTM systems, all with a nameplate speed of 10,000 rpm. We proposed installing the wide-range **UHS-500** system designed for NP flow range from 125 to 560 bblpd with 500 bblpd at BEP (20-90 m3/d with 80 m3/d at BEP), with integrated advanced gas handling device and shroud construction improved for a large-hole casing.

In mid 2020, we sent the Lex Ultra-High Speed ESPs to Middle Africa from our manufacturing facility. The Lex engineering team travelled to Africa to execute pre-installation checks, start-up, commissioning, on-site daily monitoring, and equipment performance reviews. We also trained the local engineering team to ensure they had the expertise to manage the system.

In mid-October 2020, the **UHS ESP™** systems were installed and put into operation. Installation took only an hour, which is eight times faster than previous ESP installations at this well. This is possible because **UHS ESP™** systems are always tested at the manufacturing facility being fully assembled. After testing, the UHS ESPTM is delivered to the well site for the installation, which consists of MLE connection and protectolizers positioning.

After leaving the field, Lex engineers continued to remotely monitor the operation of wells and provide engineering support to client's personnel.

This project's results have proved the Lex Ultra-High-Speed ESP technology is effective and reliable enough to replace other artificial lift solutions in harsh well conditions. Also, we were able to increase wells profitability despite the current oil prices drop and OPEC+ restrictions, proving the economic efficiency of the technology.