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 keep 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%

There is a case of successful conversion from Progressive Cavity Pump/Sucker Rod Pump to UHS ESP™ in onshore wells and from gaslift to UHS ESP™ at offshore, located in the Democratic Republic of the Congo, Central Africa.

The project was targeted to increase the run-life of equipment and gain production in harsh well conditions (high DLS, high-temperature fluid, solids, high gas factor).

The fields are 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.

The client contacted us to overcome several challenges. The existing artificial lift equipment in onshore wells (progressive cavity pumps, sucker rod pumps, standard pumps) failed quickly. 18 systems had a run-life of about 46 days. The gaslift equipment had low efficiency, a low fluid rate and oil withdrawals. It was necessary to optimize production and replace equipment with more reliable and efficient ones.

Since mid-2019, we worked on the best approach to the client's needs regarding technical challenges. After doing research and detailed analysis, we designed the project to replace the client's equipment with Lex Ultra-High-Speed ESP (**UHS ESP™**) 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 m^3/d with 80 m^3/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 Central Africa from the manufacturing facility. Lex engineering team came to Africa to execute pre-installation check, start-up, commissioning, on-site daily monitoring, and equipment performance review. Also, we trained the client local engineering team.

In mid-October 2020, the **UHS ESP™** systems were installed and put into operation. Installation took only 1 hour. This short term became possible because **UHS ESP™** is always tested at the manufacturing facility being fully assembled. After testing, **UHS ESP™** is delivered to the well site and ready for installation, consisted 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.

The Project results have proved the Lex Ultra-High-Speed ESP technology is reliable and applicable to replace the other artificial lift solutions in harsh well conditions. Also, the economic efficiency of the technology in current oil prices drop, and OPEC+ restrictions by increasing wells profitability was confirmed.