

# Zero failures out of 300+ UHS ESP™ installations due to wear at oil fields with 2,000 ppm of the solids content in produced fluid

## Complicating factors

- Narrow operating range of existing ESPs
- Gas content at pump intake is above 60%
- Sand content exceeds 2,000 ppm (2,000 mg/l)
- High DLS
- High power consumption

## Results

- We proved the high tolerance of Ultra-High-Speed ESP (UHS ESP™) to solids in the produced fluid (over 2,000 ppm (2,000 mg/l)) due to innovative modular design and wear-resistant stage materials
- Ramp-up time was reduced in most of the field cases by average 30% vs. standard equipment
- Zero wear-related failures of Gen4 Ultra-High-Speed ESP from 300+ installations have been found since 2016

**The Cases below are based on the operating history of Lex Ultra-High-Speed ESP (UHS ESP™) in various fields with the highest recorded solids content of all wells equipped with our ESPs.**

**The project was targeted to overcome frequent ESP failures due to the high solids content in the produced fluid**

These reservoirs are found at 6,900–8,200 ft TVD (2,100–2,500 m TVD). Oil wells are drilled from well pads, ESP friendly deviated along 8,860–11,800 ft MD (2,700–3,500 m MD) and completed with 7" (177,8 mm) and 5,61" (168 mm) API Casing. Downhole temperatures are ranging between 176 and 212 °F (80–120 °C).

The Client contacted us to address rapid wear and frequent ESP failures due to high sand content in the produced fluid.

We have developed an innovative wear-resistant modular **UHS ESP™**. Also, we created new methods of testing the heat resistance of the **UHS ESP™** bearings. Also, we tested the reliability of bearings and components of the system in high sand content conditions on specially designed testing benches.

After passing extreme sand content tests, we manufactured and installed in Client's wells the following UHS ESPs:

- Low-flowrate **UHS-200** system

designed for NP flow range from 50 to 280 bblpd (from 8 to 45 m<sup>3</sup>/d)

- Wide-range **UHS-500** system designed for NP flow range from 125 to 560 bblpd (from 20 to 90 m<sup>3</sup>/d)
- Power efficient **UHS-600** system designed for NP flow range from 280 to 720 bblpd (from 45 to 115 m<sup>3</sup>/d)

It is considered that a higher rotational speed hurts the wear resistance of ESP components, particularly when exposed to abrasive fluids. However, advanced design features and material selection enlarged the tolerance of **UHS ESP™** to solids content more than 2,000 ppm (2,000 mg/l), which outweighs the traditional standard speed ESP 2-4 times and improved other performance properties due to a high operating speed of 12,000 rpm.