

Germany

Real-time performance calculations improve GeoESP® pump system performance

Proactive monitoring strengthens geothermal pump reliability and early scale detection

CHALLENGE

- Scale deposition on flowlines, pump components
- Solids, abrasives, corrosive, and erosive wear
- Resonant frequency, high vibration
- Limited real-time diagnostics
- Difficulty identifying abnormal events

SOLUTION

- Deploy Intelevate® platform
- Provide real-time calculations for produced and required total dynamic head (TDH), productivity index (PI)
- Deliver physics-based and statistical modeling
- Provide real-time pump and well surveillance, abnormal event detection framework

RESULT

- Detected scale early
- Tracked pump wear, recirculation, flow behavior
- Identified abnormal events sooner
- Improved decision making
- Preserved pump integrity and power output

Overview

A geothermal operator in Germany relied on high efficiency GeoESP® pump systems to sustain consistent water production for power generation. The field's extreme temperatures, corrosive fluids, and abrasive solids created persistent challenges for electrical submersible pump (ESP) performance. Scale deposition, solids production, corrosive and erosive wear, and excessive vibration frequently contributed to premature pump failures. Traditional diagnostic methods depended on static sizing software, which lacked real-time analytics and limited the operator's ability to detect performance degradation early.

To support the geothermal plant's economic performance, the operator needed a real-time approach to monitor pump behavior, identify abnormal events, and reduce the risk of early GeoESP pump system failure. The Intelevate® platform, powered by the Summit Knowledge® digital ecosystem, offered a physics-informed, digital solution that could deliver the continuous insights needed to increase operational reliability.



Challenge

The geothermal wells faced a combination of harsh conditions that made pump surveillance difficult. The operator needed to identify pump wear, fluid recirculation, and scale buildup on both surface flowlines and downhole pump components before major failures occurred. Previously, the absence of dynamic, automated calculations slowed performance diagnostics, and operators could not easily distinguish between routine fluctuations and early signs of pump distress. Without clear, real-time intelligence, decisions on maintenance, treatment schedules, and CO₂ injection optimization lacked precision.

Solution

Summit ESP®, a Halliburton service, deployed the Intelevate® platform to provide continuous surveillance using three real-time calculations: produced total dynamic head (TDH), required TDH, and productivity index (PI). The team combined these parameters with physical and trained mathematical models tailored to each well. This allowed the platform to differentiate normal operating patterns from emerging issues such as scale accumulation, recirculation, and abnormal vibration.

The Summit Knowledge® digital ecosystem enhanced predictive accuracy by applying statistical processes calibrated to historical operating conditions. This hybrid physics and data-powered approach allowed for early recognition of performance deviations. The operator could then benchmark real system behavior against expected flow conditions, evaluate wellbore treatment effectiveness, and make rapid, informed decisions about an adjustment to CO₂ injection rates to protect pump integrity.

Result

Using the Intelevate platform's automated TDH and PI calculations, the operator gained real-time visibility into pump and well performance. Team members monitored continuous diagnostics to identify scale buildup earlier than previous methods and facilitate mitigation efforts before major damage occurred. The enhanced surveillance improved the operator's ability to assess pump wear, monitor fluid movement, and recognize abnormal events that could shorten run life or reduce geothermal energy output.

This data-powered solution supported faster operational decisions without additional cost, which safeguarded pump integrity and improved downhole conditions. The operator maintained more stable performance across its GeoESP pump systems, which strengthened plant reliability and ensured more predictable geothermal power generation.

Three real-time calculations



help track
GeoESP®
pump performance
and detect scale

Powered by Summit Knowledge®
digital ecosystem

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