GeoTHERM
expo & congress

Donnerstag, 20. Februar 2025, 16.00 Uhr
Ortenauhalle Kongress 1
Tiefe Geothermie

Thursday, 20 February 2025, 4.00 pm
Ortenauhalle Congress 1
Deep geothermal energy

Limiter redesign workflow yields positive results in deep geothermal drilling in Switzerland

Arbeitsablauf zur Umgestaltung des Begrenzers führt zu positiven Ergebnissen bei tiefen Geothermiebohrungen in der Schweiz

Garcia et al.
NOV

As companies are considerably increasing geothermal energy as a crucial element in their decarbonization strategies, the need to reduce costs and increase efficiency in hot hard rock drilling is gaining significant importance.

The lessons from FORGE (Frontier Observatory for Research in Geothermal Energy), a U.S. Department of Energy (DOE) geothermal project in Utah that started in 2020 over a 5-well program, were implemented using the same physics-based practices workflows developed by a group in Texas A&M University, aimed to reduce flat time generated from key performance limiters such as BHA whirl, lack of weight transfer, resonant RPM, and other parameters that accelerate drilling dysfunctions.

To reduce the drillability uncertainty into hard rock, evaluation of core samples extracted from 3 different offset wells yielded conclusive results. The lithologies included Monzonite, Metapelite and Granite, representing different grain structures. These were analyzed in the laboratory for single PDC cutter testing at different depths of cut. One of the three samples required 10-15% higher forces both axially and tangentially, suggesting a higher compressive strength compared to the granite found at FORGE.

Rapid bit iterations were critical to extend the cutting structure longevity and rate of penetration based on dull conditions seen in each run. These included different body configurations and PDC cutter grades and shapes that would perform optimally under typical higher weight on bit using high torque motor and rotary assemblies.

The combination of a good BHA design, the use of aggressive bits with shaped cutters and maximizing WOB resulted in reduced vibration levels as recorded in the MSE (Mechanical Specific Energy) trends and bit dulls led to better drilling performance. Physics-based practices training and re-training for all people involved played a significant role for achieving such results.