



Partner Projects

Tool String Electrification a Deep Subject

Customer

A global well solutions provider designing a next-generation tool string was seeking a replacement for an existing electric motor solution that could provide similar power output in a shorter package while consuming less current.

Application

As directional drilling of oil & gas wells became more sophisticated, engineers started replacing hydraulic actuators with electric to satisfy increasing demand for directional precision and flexibility. Induction motor technology was initially utilized to drive the hydraulic pumps on the LWD/MWD tool strings due to simplicity and low cost. As the customer gained experience with electrification, additional functions on the tool string were identified for conversion.

Challenge

The relatively small diameter wellbore and low power density of induction motor technology led to a very long, thin motor and an even longer tool string; a solution that could be used on land-based rigs but not offshore platforms. And because power was supplied by batteries located in the tool string, the induction motor's low efficiency required frequent tool string retraction to allow battery replacement which significantly increased the time to drill a well. To further complicate matters, any solution would need to survive the extreme temperature, pressure and vibration present at well depths over 5 miles below sea level.

Solution

Windings' engineers worked closely with the customer's engineering team to develop a brushless DC motor solution that provided the required power and speed in a form factor that was half the length of the induction motor it was replacing and delivered a 35% increase in efficiency. The result was a custom 5kW, 8,000RPM permanent magnet motor in a stainless steel 3-1/8" O.D. x 11" long housing rated for 260°C operation while submerged in hydraulic fluid.

Results

Overall length reductions allowed the new tool string to be used on offshore platforms with limited rig height, opening up new opportunities for the customer. The increase in efficiency allowed the customer to complete wells faster, resulting in millions of dollars of increased annual revenue.

Windings

For more than 20 years, Windings has pioneered the development of electromagnetic solutions for critical upstream applications in the Oil & Gas industry. As a full-service provider, Windings is a leader in the engineering, optimization and manufacturing of custom electric motors, alternators and related components engineered to survive and perform under the hostile conditions present in drilling and maintaining oil & gas wells.

For further information, please contact us!

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