APPLICATION NOTE

Sensata Technologies

HIGH PRESSURE HIGH TEMPERATURE MOTORS USED IN DOWN HOLE MWD (MEASUREMENT WHILE DRILLING) MUD PULSER APPLICATION

Background

The Oil and Gas exploration and drilling process has become more complex as it reaches deeper than ever before. An increase in the number of directional or "geosteering" operations has driven the need for improved Measurement-While-Drilling (or MWD) logging equipment, which is used to provide real-time positional data to assist with the proper orientation and steering of the drill. Traditional wireline MWD logging equipment is ineffective in directional drilling applications where the angular trajectories of the drill head relative to the surface increase beyond 60 degrees.

Mud pulse telemetry is the method used to encode and transmit the data from the sensors located at the "bottom of the hole" to the "top of the hole" or surface. This data consist of drill head positional data as well as information on the surrounding formations. This is achieved by utilizing the mud product within the well bore casing as a transmission line. A poppet valve within the pulser assembly located behind the drill head creates periodic pressure bursts which carry the encoded sensor data.

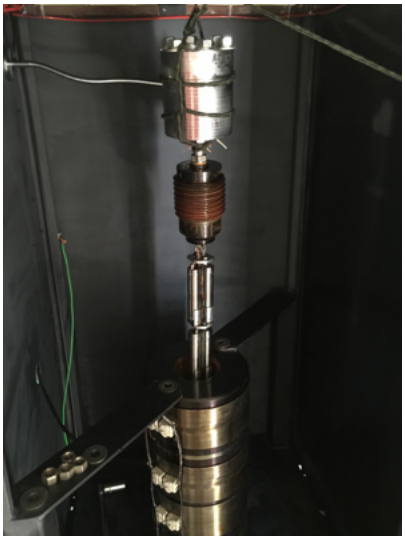
While there are a few different methods employed today, it is common for the mud "pulsing" poppet valve to be controlled through the use of BLDC motors rotated at short (i.e. 100 to 300 milli-second) burst every few seconds throughout the MWD process. For ultimate reliability, future component designs including the BLDC motors must be designed and successfully tested to operate under continuous duty in temperatures up to 200ºC, atmospheric pressures of up to 30,000 psi, shock loads to 1000g's and vibration to 25g's.

Sensata is among the few companies in the industry that has tested its motors to 30K PSI under maximum temperature extremes exceeding 200ºC.

Solution

The BEI Kimco Hall Commutated 1.5" diameter DII15-60-201A High Pressure High Temperature (HPHT) Brushless DC motor provides the ideal solution for the most severe down-hole mud pulser applications. The design has been validated and certified by an independent Environmental Test Lab to insure operational robustness under the most extreme conditions throughout its operational life.

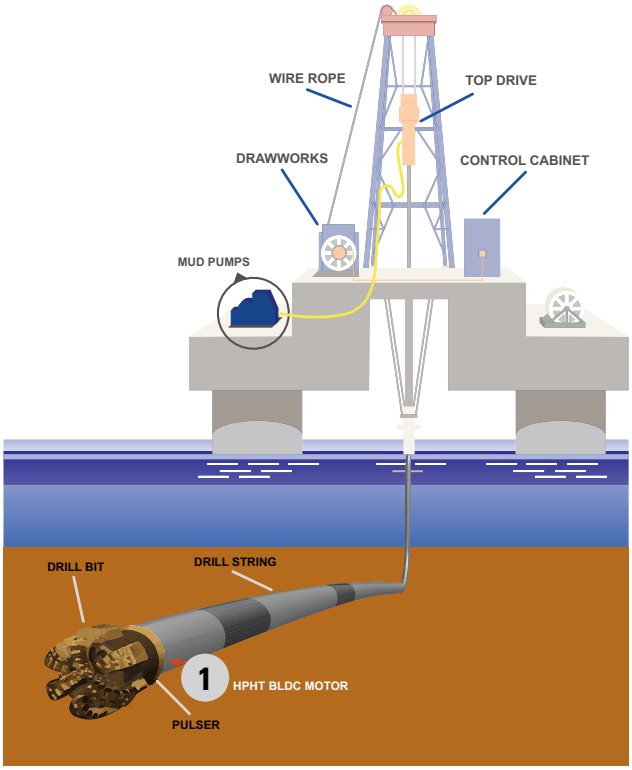
Sensata is among the few companies in the motor industry that has tested their motor design to the 30K PSI level under maximum temperature extremes in excess of 200 degrees C, simultaneously. This portion of the test protocol replicates the deepest drilling conditions where temperature, pressure, shock and vibration extremes combine to create most destructive environment for equipment operation. The motor features integral Hall commutation for simplified control options, Rare Earth Magnets to support high corrosion resistivity and other proprietary mechanical design features for improved robustness. A detailed report summarizing the HPHT test protocol is available upon request. Many of these same design approaches and feature are being incorporated in other designs intended for other Down-Hole applications.



RECOMMENDED PRODUCTS

Reference on Diagram	Product	Type	Features	Part Number	Function	Brand
1	 Brushless DC (BLDC) Motor	High Pressure High Temperature (HPHT)	• High Temperature Hall Commutation Assembly • High Shock/Vibe Tolerance Mechanical Design • Sleeved Permanent Magnet Rotor Assembly • High Temperature Adhesives and Encapsulation Materials • High Voltage Insulation Systems	DII15-60-201A	Motion Control	BEI Kimco

DIAGRAM



CONTACT US

Americas
+1 (760) 597 7042
sales.beikimco@sensata.com
Europe, Middle East & Africa
+1 (760) 597 7042
motors-info.eu@sensata.com
Asia Pacific
sales.isasia@list.sensata.com
China +86 (21) 2306 1500
Japan +81 (45) 277 7117
Korea +82 (31) 601 2004
India +91 (80) 67920890
Rest of Asia +886 (2) 27602006 ext 2808