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Design Considerations for a 200°C MWD System

Brian Stroehlein, SPE, SPWLA; APS technology, Inc.

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Abstract

It is a well-accepted rule in electronics that, at best, every 10°C increase in operating temperature shortens operating life by an additional 50%. Just as designers of 175°C+ MWD systems face new challenges in making their designs work to reliability and operating time requirements, so are they finding newly-available opportunities to help them meet those requirements. This paper summarizes a recent cross-disciplinary effort to identify and address the key challenges involved with development of a new 200°C MWD System.

In 2012 we completed a feasibility study, commissioned by an operator, for a 200°C directional-gamma MWD system with a mud pulser for real time telemetry and a turbine alternator for power. The primary users of this system would be MWD service providers servicing those operators drilling hot holes. This study included a comprehensive survey of the state-of-the-art in components, materials, system architectures, fabrication & assembly techniques, and statistical reliability & quality techniques required for successful implementation. Sufficient downhole memory for time-stamped directional, gamma and diagnostic records were essential parts of this project. Due to the potentially drastic life-shortening environmental effects of drilling hot holes, we also specified recording of temperature, shock and vibration data to enable Condition-Based Maintenance (CBM) based on Accumulated Damage Modeling (ADM).

Our feasibility study showed that several key technology developments inside and outside the oilfield made the 200°C MWD system technically achievable. The system was also shown to be operationally viable for all three parties in the application chain: our organization, the independent drilling service provider users and their operator customers. These factors were expected to have a positive effect on service availability for hot hole applications.

This paper provides insights into the drilling technology development process in general and the key technologies available for implementation, specifically, of a 200°C MWD directional-gamma system.

200°C MWD Feasibility Study Project Flow



