

Application of Electro-Optical Hybrid Cables in Horizontal Well Production Logging

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Abstract : For decades, well logging with coiled tubing has relied solely on surface data such as pump pressure, wellhead pressure, depth counter, and weight indicator readings. While this data serves the oil industry well, modern smart logging utilizes real-time downhole information, which automatically increases operational efficiency and optimizes intervention qualities. For example, downhole pressure, temperature, and depth measurement data can be transmitted through the electro-optical hybrid cable in the coiled tubing to surface operators on a real-time base. This paper mainly introduces the unique structural features and various applications of the electro-optical hybrid cables which were deployed into downhole with the help of coiled tubing technology. Fiber optic elements in the cable enable optical communications and distributed measurements, such as distributed temperature and acoustic sensing. The electrical elements provide continuous surface power for downhole tools, eliminating the limitations of traditional batteries, such as temperature, operating time, and safety concerns. The electrical elements also enable cable telemetry operation of cable tools. Both power supply and signal transmission were integrated into an electro-optical hybrid cable, and the downhole information can be captured by downhole electrical sensors and distributed optical sensing technologies, then travels up through an optical fiber to the surface, which greatly improves the accuracy of measurement data transmission.

Keywords : electro-optical hybrid cable, underground photoelectric composite cable, seismic cable, coiled tubing, real-time monitoring

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