Logging fiber optic cable model



Overview

Research on the Data Interpretation Model of Optical Fiber Profile. Abstract: Fiber optic cables have the advantages of high temperature resistance, high.

Key Takeaways

Fiber optic logging cables are specialized downhole cables designed for distributed sensing and real-time monitoring in harsh wellbore environments, available in wireline, coiled tubing, and permanent installation models. Types of Fiber Optic Logging Cables1. Wireline Fiber Optic Cables Wireline-deployed fiber optic cables are used for temporary logging operations in cased or open-hole wells.

These cables often integrate multiple fiber optic lines with electrical conductors to power and communicate with downhole tools. For example, a specialty wireline cable may include three integrated fiber optic lines (one multimode and two single-mode) tightly coupled to a coaxial electrical conductor, with a polymer-coated outer layer to reduce friction and simplify pressure control during horizontal well deployment. Conveyance is typically achieved using a wireline tractor, allowing multiple logging passes without removing the cable from the wellbore.

2. Permanent Fiber Optic Cables Permanent installations are designed for long-term monitoring of production or injection wells. These cables use a fiber-in-metal-tube (FIMT) design, where optical fibers are hermetically sealed in stainless steel or INCONEL tubes, often filled with protective gels to prevent microbending and chemical ingress.

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The FIM

T is supported by an extruded polymer layer and an outer tube that provides mechanical shielding and pressure resistance. Permanent cables can accommodate single-mode and multimode fibers for distributed temperature sensing (DTS), distributed acoustic sensing (DAS), and distributed strain sensing (DSS), enabling continuous monitoring of wellbore conditions. 3.

Optical Fiber Injection Cables Some systems, such as those used by JASON, employ optical fiber composite cables or fibers pumped through conduits for high-volume applications. These cables allow distributed sensing in wells where conventional electrical sensors may fail due to high temperature, pressure, or electromagnetic interference.

Construction Features

Fiber Configuration: Single-mode and multimode fibers for different sensing and communication needs. Protective Layers: Polymer coatings, metal tubes, and encapsulation to withstand high pressure, temperature, and corrosive fluids. Electrical Integration: Coaxial conductors for powering downhole tools and telemetry.

Deployment Adaptations: Slim OD tractors for horizontal wells, dual packoff systems for pressure control, and tight fiber coupling for improved signal-to-noise ratio. Advantages Over Conventional Logging CablesHigh-Temperature and High-Pressure Tolerance: Optical fibers are less sensitive to extreme downhole conditions. Electromagnetic Immunity: Optical sensors are not affected by geomagnetic or electrical interference.

Distributed Measurement Capability: Provides spatially resolved data along the wellbore, unlike point sensors. Compact Design: Smaller cross-sectional area allows easier deployment in narrow or horizontal wells. Permanent Monitoring: Enables continuous, stage-level flow and temperature monitoring in production wells.

Applications

Geothermal and Oil & Gas Wells: Flow profiling, injection monitoring, and production logging. Enhanced Geothermal Systems (EGS): Monitoring water circulation and heat transfer efficiency in horizontal wells.

Real-

Time Reservoir Management: Continuous data acquisition for optimizing production and injection strategies. In summary, logging fiber optic cables come in wireline, permanent, and conduit-based models, each tailored for specific wellbore conditions and monitoring requirements. Their robust construction, distributed sensing capabilities, and resistance to harsh environments make them superior to traditional electrical logging cables for modern well monitoring applications.

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Article Content

Research on the Data Interpretation Model of Optical Fiber Profile ...

Fiber optic cables have the advantages of high temperature resistance, high pressure resistance, corrosion resistance, and high accuracy in measuring temperature DTS data. They are widely used

Permanent fiber-optic cable

If required, instead of using a cable, the optical fiber can be pumped through a conduit using SLB patented techniques to provide a cost-effective monitoring system suitable for high-volume applications.

Application status and development prospects of fiber optic logging ...

Distributed fiber optic sensors achieve continuous measurement of temperature, sound waves, and strain throughout the entire well section through a single fiber optic cable, accurately identifying the

Research on the Data Interpretation Model of Optical Fiber Profile ...

We used this fiber-optic monitoring system to collect distributed temperature data once the well was set into production. We inversely modeled the inflow from the formation into the borehole...

Fiber Optic Model Based Flow Quantification Enhancing Geothermal

This project marks a significant shift as Fervo decided to run fiber optic cables for injection profiling. The fiber optic acquisition was performed as part of a larger-scale injection test, focusing on capturing

Optiq Fiber-Optic Solutions | SLB

For permanent deployment, the hybrid fiber-optic electrical cable of Optiq solutions is installed within the completion string or behind tubing. It can also be installed across the sandface for both wet and dry

Repeat DAS and DTS Logging for Production and Cluster Efficiency ...

In this project a multi-stage horizontal gas condensate producer within the Montney Formation was logged with Distributed Acoustic (DAS) and Temperature Sensing (DTS) and Distributed Strain

Research on IIVIFM Model for Batch Processing of Fiber Optic

The article proposes an integrated batch processing oriented big data retrieval and filtering model, IIVIFM, for the first time to address the difficult problem of fiber optic DTS&DAS big data processing

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Production logging via coiled tubing fiber optic ...

As can be seen in Fig. 1, the optical fiber used in the system is to place four fibers in the Cr Ni Fe alloy fiber carrier, and then the fiber carrier is placed in the continuous tubing.

Distributed Fiber Optic Vibration Signal Logging Well Production Fluid ...

The distributed fiber optic vibration signal data extracted from the fiber optic sensor for injection well A were selected for processing, and the well was logged for the purpose of detecting

An Armored Fiber Optic Logging Cable

An ultralow stretch armored cable containing 3 optical fibeRs and 8 electrical conductors has been developed for use in oil well logging operations. A mating cablehead termination, optical transmitter

Application of optical-fiber temperature logging

Within this study, we show the influence of temperature changes on the acquisition of distributed acoustic/strain sensing data along a fiber-optic cable suspended along a rigid but freely

Well Logging with Carina 100Xlog Fiber Optic | Silixa Ltd.

Carina 100Xlog is a high-efficiency retrievable fibre optic well logging service that visualizes entire well dynamics in real-time much more rapidly than conventional technologies, reducing deferred production.

Optical fiber logging cable Special cable

Optical fiber logging cable enables the transmission of detailed data over long distances, making it an essential component in oilfield service operations. Overall, the use of optical fiber

Design and Experimental Research of a Fiber-Optic Communication

Additionally, the number of fibers used in fiber-optic communication in logging will be reduced to only a single fiber for transmitting and receiving.

Distributed Fiber-optic Sensing Based Production Logging ...

Summary At Colorado School of Mines, we are conducting a series of flow loop experiments to understand the fundamental physics of the interaction between the optic-sensing fiber and the

Wireline Fiber Optic Cable | Fibercore

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Wireline Fiber Optic Cable Fibercore, in conjunction with selected partners, offer wireline logging cables that utilize Fibercore''s hydrogen resistant, high temperature fibers. The optical fibers are protected in

CT logging service leverages powers of fiber-optic telemetry

The fiber-optic telemetry allows the BHA to communicate with the logging system, which provides real-time production logging data from the coiled tubing. This provides a means for looking

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