

Coal conveying via temperature-measuring optical cable



Summary of Content

Distributed optical fiber temperature sensing (DTS) enables real-time, continuous monitoring of coal conveyor belts and coal yards, enhancing safety, efficiency, and predictive maintenance.

Technology Overview

Temperature-measuring optical cables, or fiber optic DTS systems, use the principle of Raman scattering and optical time domain reflectometry (OTDR) to detect temperature changes along the length of the cable. Laser pulses are sent through the fiber, and backscattered light is analyzed to determine the temperature at each point along the cable with high spatial resolution, typically around 1 meter, and temperature accuracy of $\pm 0.1^{\circ}\text{C}$ to $\pm 1^{\circ}\text{C}$. This allows continuous monitoring of critical components such as conveyor rollers, motors, and coal piles.

Installation Methods

Optical fibers can be installed in linear, U-shaped, or circular layouts depending on the application. In coal yards, cables are often arranged along the coal retaining walls at intervals of 1-2 meters to cover the entire area. For conveyor belts, fibers are laid along both sides of the belt, particularly at key points like the head, tail, and bridge sections, with spacing of approximately 1 meter between sensors. The cables are typically armored with metal or flame-retardant thermoplastic oversheaths to withstand mechanical stress, bending, and environmental hazards such as dust, moisture, and corrosive gases.

System Integration

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Figure 1 shows the technical principle of the distributed optical fiber temperature sensing system (DTSS), which

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The invention discloses a method for monitoring closed circular coal yard optical fiber temperature.

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