Distributed Optical Fiber Pipeline Leakage Monitoring System

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XBPP 兴邦管道
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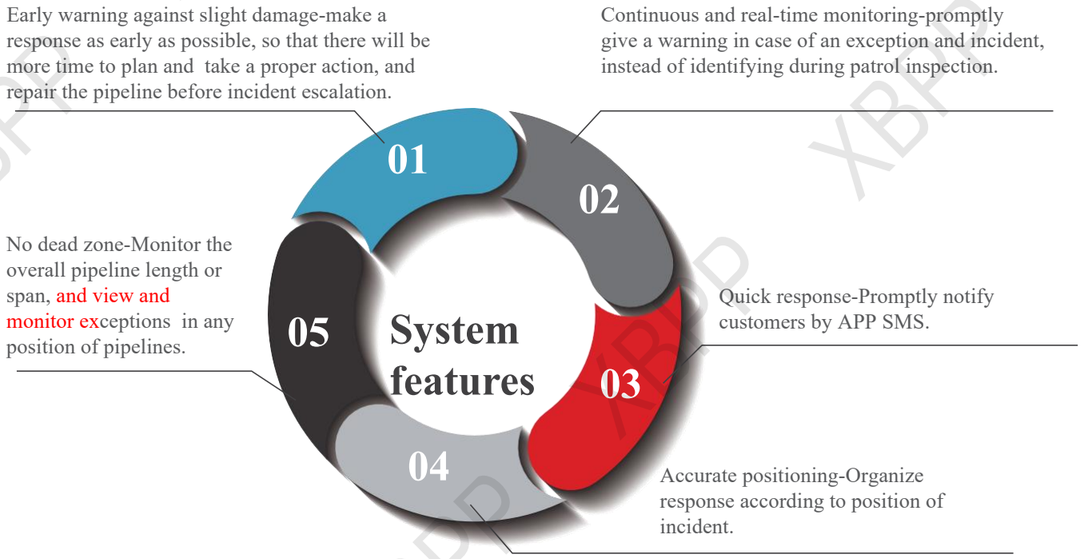
Contents

Pipeline burst brings disastrous consequences to our lives!

How does XINGBANG DTS pipeline leakage monitoring system ensure safe operation of pipeline?

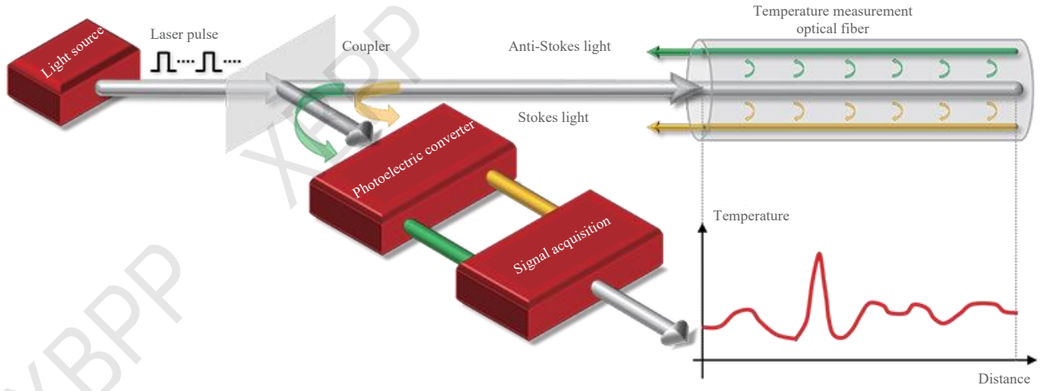
XINGBANG DTS pipeline leakage monitoring system converts optical cable into a continuous real-time monitoring system. This technology helps customers detect pipeline leakage in the early stage and offers time and information to make an effective response and avoid major accidents such as pipeline explosion.



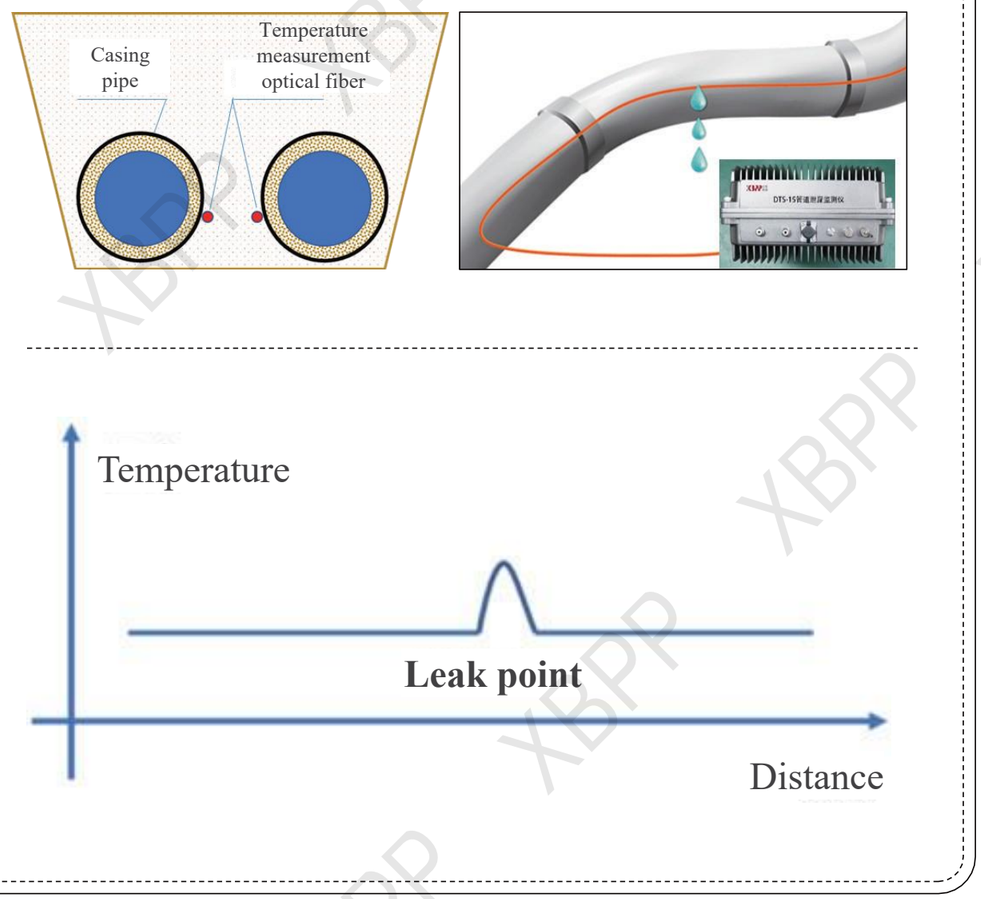
System principle

The high-speed drive circuit of the system drives the laser to generate a narrow laser pulse, the laser pulse is transmited forward along the optical fiber via the wavelength division multiplexer, and the laser pulse and the optical fiber molecule interact with each other to generate different types of weak backscattering, including Rayleigh scattering, Brillouin scattering and Raman scattering. Raman scattering produces Strokes light insensitive to temperature and anti-Strokes light sensitive to temperature due to thermal vibration of optical fiber molecule, which have different wavelengths and are detected by the high-sensitivity detector after separated by the division multiplexer.

The anti-Strokes light in the optical fiber is modulated by external temperature, and the light intensity ratio between anti-Strokes light and Strokes light accurately reflects the temperature information; the time for Raman scattering signals in different positions to return to the detector varies, and the echo time can be measured to determine the position of the optical fiber corresponding to the scattering signal; the temperature signal at any point of the optical fiber can be acquired accurately and quickly using high-speed signal acquisition and data processing technology.



Pipeline Leakage Monitoring



XINGBANG pipeline leakage monitor

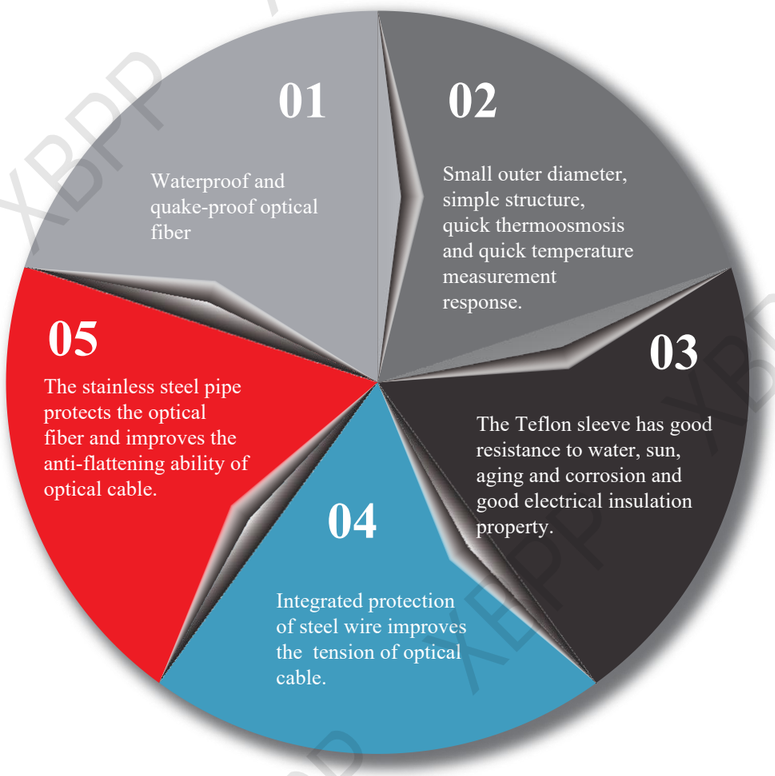
XINGBANG pipeline leakage monitor is a distributed temperature sensing system (DTS) that can detect temperature variation in different positions of optical fiber using advanced OTDR technology and temperature-sensitive Raman scattered light for genuine distributed temperature measurement and positioning. As a mature distributed temperature measurement method, this equipment features long measurement distance, high measurement accuracy, quick response, anti-electromagnetic interference and good portablility and can be widely used in leakage monitoring of heating pipe network. This equipment uses 4G wireless communication module to upload monitoring data wirelessly and in real time, with no need for on-site network cable. Low networking cost, high reliability and no need for maintenance.

Parameter	Parameter value
Single-channel effective monitoring range	15KM
Number of channels	4
Temperature resolution	0.1℃
Positioning accuracy	±1M
Temperature measurement accuracy	±0.5℃
Temperature measuring range	-40℃ -300℃
Communication mode	4G (Note)
Power	8W

Temperature Measurement Cable

This system adopts 2-core multi-mode temperature measuring optical fiber for temperature monitoring and has the following features:

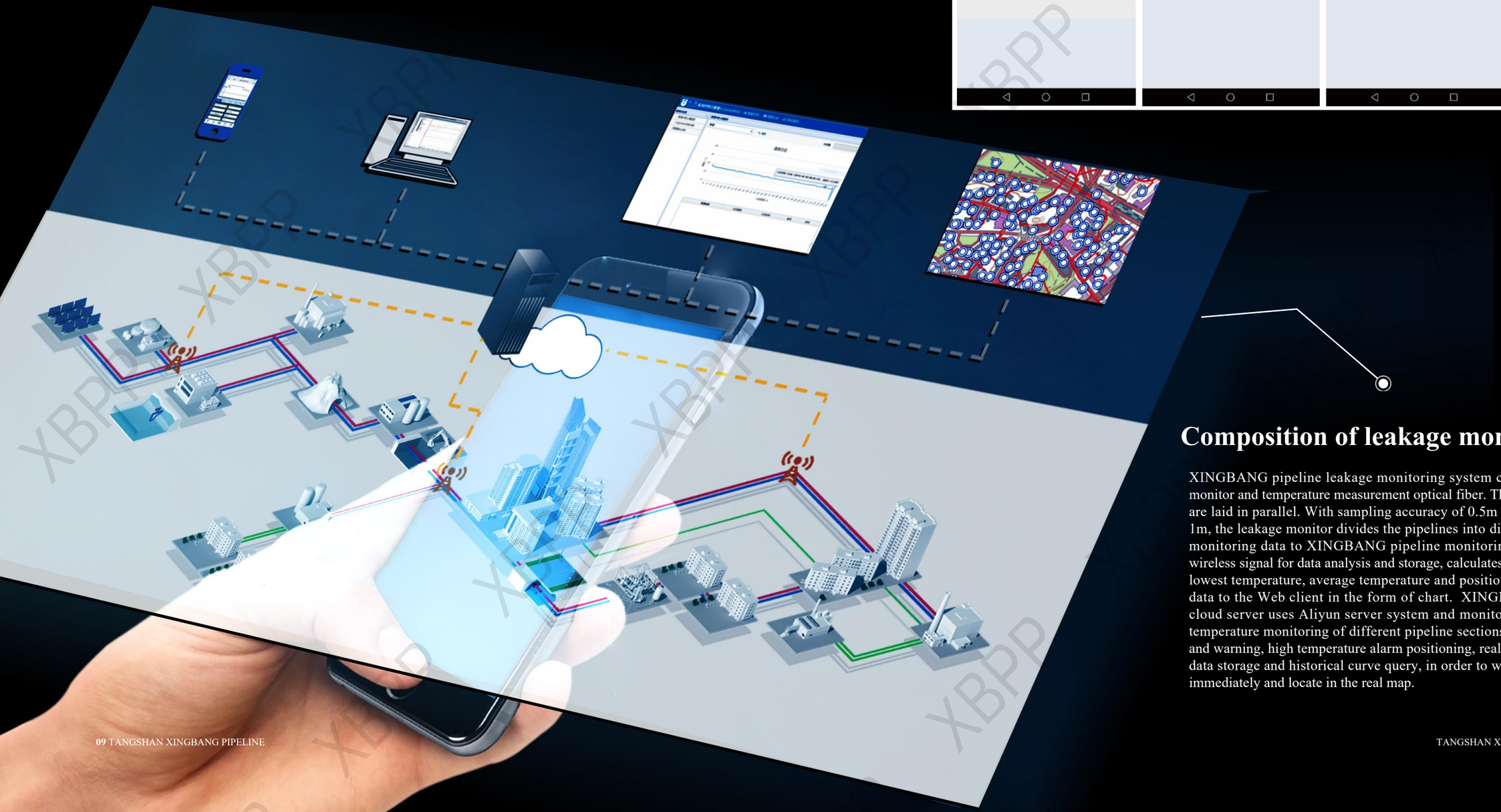
2-core Multimode Temperature Measuring Optical Cable



Pipeline leakage monitoring software system

It transmits data to the management platform through 4G wireless communication, analyzes and configures them to generate intuitive and concise monitoring images and query and search windows. The temperature measurement detection software consists of pipeline process diagram, pipeline temperature data summary, alarm summary, historical curve, network status and system login interfaces, etc. The platform can also upload and save all engineering technical documents for consultation when necessary.

The user can receive pipeline alarm information, view pipeline status, temperature variation curve and historical data using mobile APP to master safety status of the pipe network in real time. The user can also view engineering technical documents.



Composition of leakage monitoring system

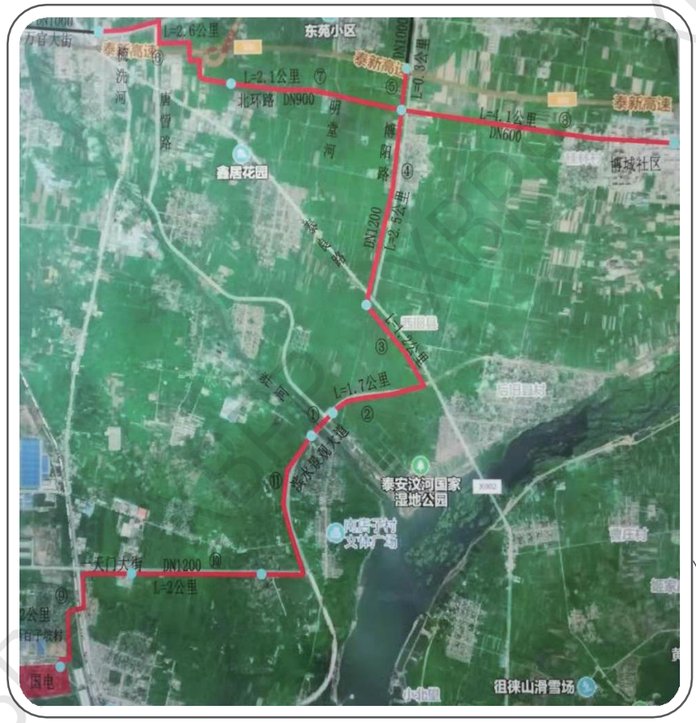
XINGBANG pipeline leakage monitoring system consists of pipeline leakage monitor and temperature measurement optical fiber. The optical fiber and pipelines are laid in parallel. With sampling accuracy of 0.5m and positioning accuracy of 1m, the leakage monitor divides the pipelines into different areas, sends original monitoring data to XINGBANG pipeline monitoring cloud server through 4G wireless signal for data analysis and storage, calculates the highest temperature, the lowest temperature, average temperature and positioning information, and sends data to the Web client in the form of chart. XINGBANG pipeline monitoring cloud server uses Aliyun server system and monitoring software for real-time temperature monitoring of different pipeline sections, temperature measurement and warning, high temperature alarm positioning, real-time curve query, historical data storage and historical curve query, in order to warn against pipeline leakage immediately and locate in the real map.

Project Cases

China Guodian Corporation heating project

Project overview

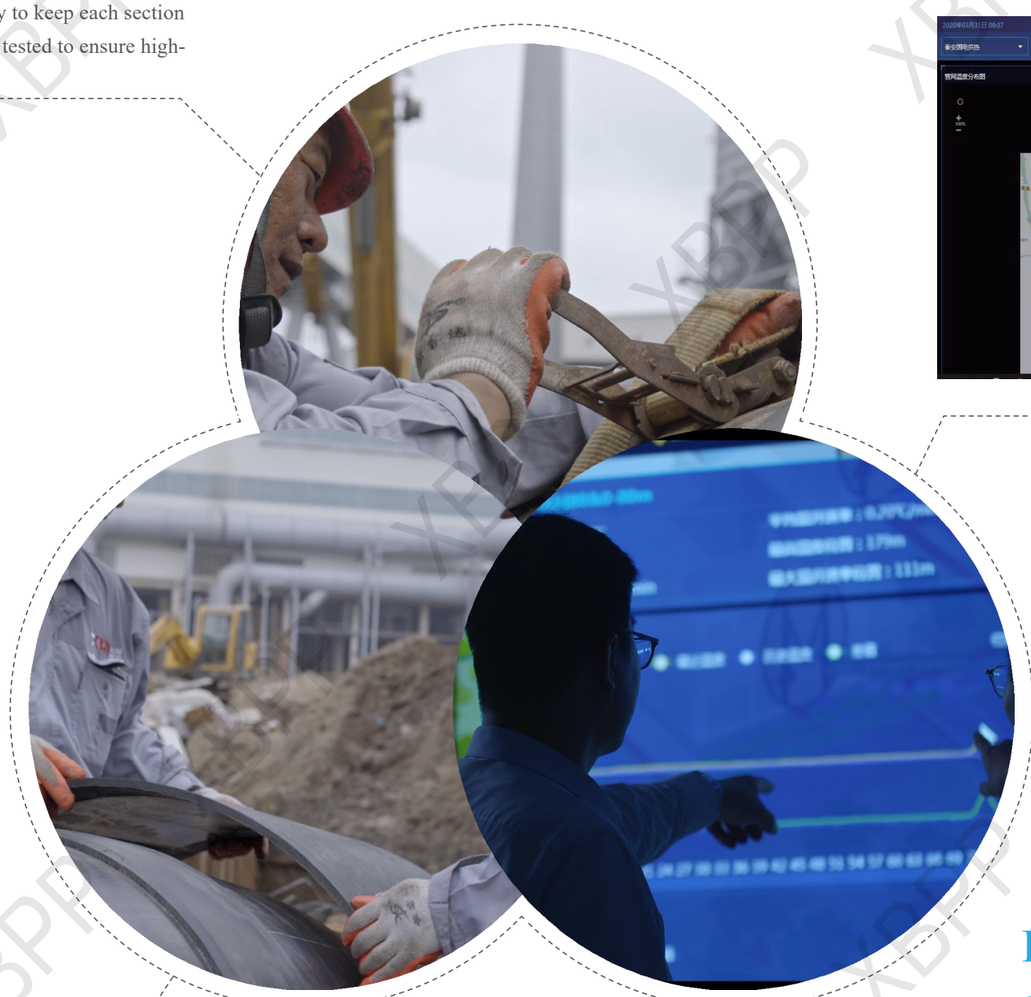
This project is eastern heating pipeline of China Guodian Corporation heating project of Heating Power Co., Ltd. in Taishan District, Taian City, Shandong Province. The pipe diameter of this project is DN1200, DN900 and DN600, and the overall length of pipeline trench is 19226m. This heating system should be built according to the principle of safety, stability, centralization and reliability, so higher requirements are put forward for pipeline reliability. To ensure the reliability of heating pipe, DTS optical fiber temperature measurement and leakage monitoring system is adopted to identify the leak point immediately to shorten the leakage detection time and ensure the production efficiency.



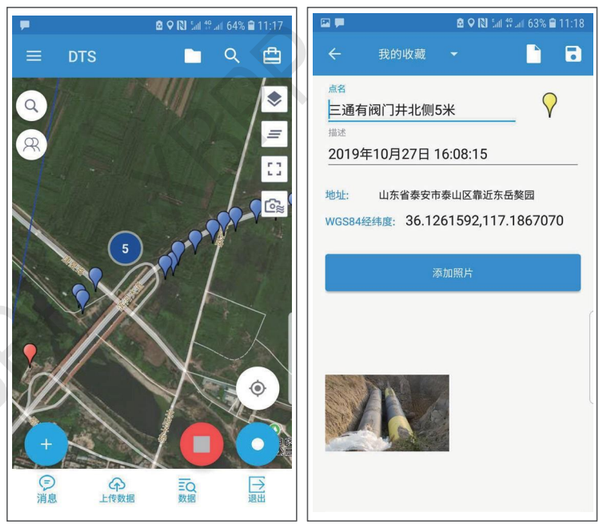
Project overview

Scientific construction

The professional construction team adopts scientific construction technology to keep each section of optical fiber smooth and undamaged; every node is strictly dissolved and tested to ensure high-quality measurement result of pipelines.



Visualized data display



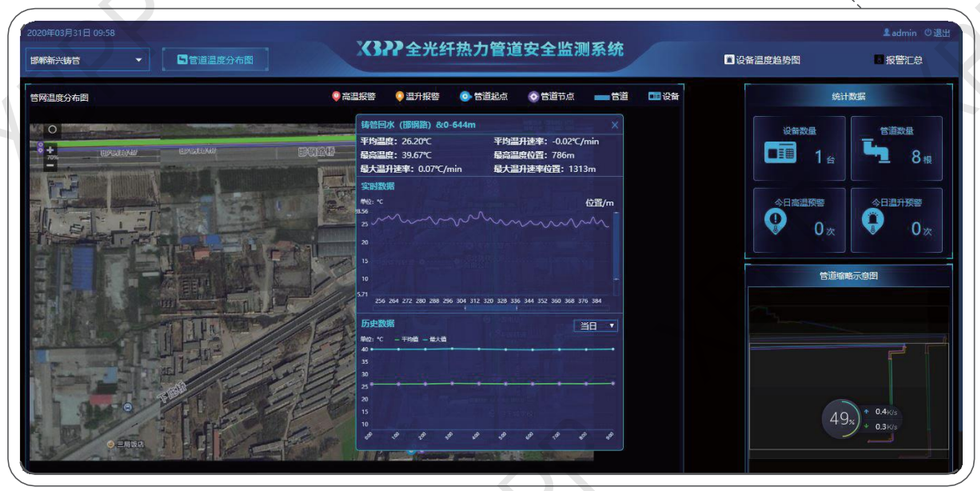
Precision management

Do solid work Provide wholehearted service to people

Handan Shihua Street heating project

This project starts from Hansteel road and bridge and terminates at Shihuajie residential district, with overall length of pipeline trench being about 1300m. The well-functioning XINGBANG DTS pipeline leakage monitoring system not only monitors leakage and insulation property of pipelines in real time, but also helps with decisions on operation management of pipelines.

Visualized data display



Real scenes of project