

# TIANJIN METRO LINE 1

## Fiber Optic Linear Heat Detection (LHD)



### **THE SCENARIO**

The Tianjin Metro or Tianjin Rail Transit is the rapid transit system in the city of Tianjin, which was the second city in mainland China after Beijing to operate a subway system. Opened in 1984, the system has 6 operating lines and 159 stations spanning 233.2 km

Since 2006 the network has undergone major expansion and renovation and as part of both programs the operator (Tianjin Rail Transit Group) widely introduced new technologies. Part of the renovation included the Integrated Supervisory Control System (ISCS) and the fire detection system.

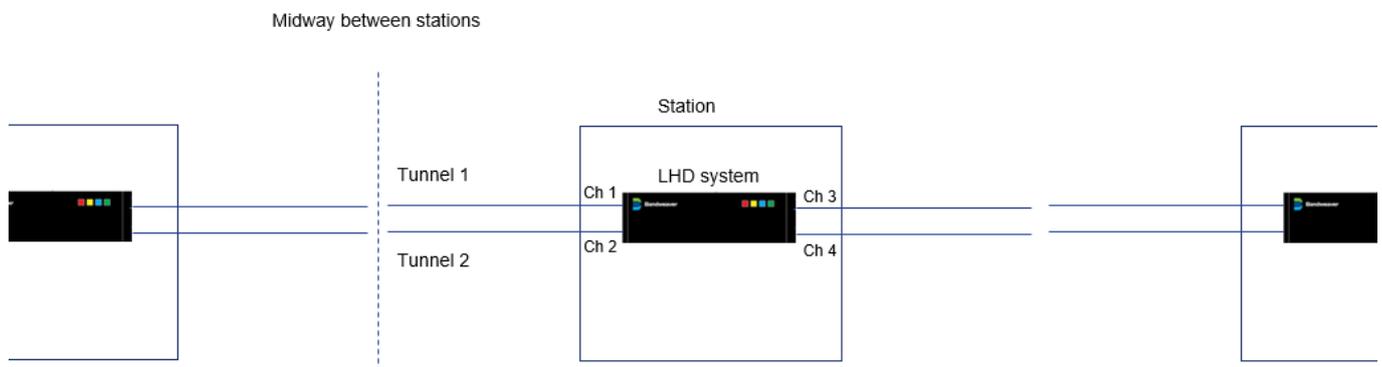
### **CLIENT REQUIREMENTS**

The client operated a 2-tier strategy for implementation, which covered both network wide deployments and also addition of single stations as respective lines are extended and new stops added.



*Figure 1 Photo of Tianjin Metro Station*

The client therefore deployed a fully distributed strategy whereby each station can be managed independently and even if the network fails then each station will still run autonomously. This is achieved by ensuring the LHD system at each station covers the tunnel up to the midway point between the adjacent stations.



*Figure 2 Example of distributed architecture*

The client required the latest linear heat detection technology for fast and accurate alarming. Particularly, they required a system with smart zones and smart alarms, with the capability for rapid detection using rate of rise and deviation alarms. The system was also required to have the CCC certifications.

## **WHAT DID WE DO?**

Bandweaver worked with the customer to design, supply, and install a fiber optic linear heat detection (LHD) system based on Bandweaver's FireLaser DTS system. Based on the requirements and the distance between the tunnels, it was decided to use a 4 channel FireLaser LHD system with a 10km range.

The FireLaser DTS used is a 4-channel system with each channel having a measurement capability of 10km in length. The FireLaser DTS Linear Heat Detection utilises both smart zones and 3 different types of smart alarms (max, rate of rise and deviation). Each zone can be individually configured with both alarms and pre-alarms also possible.

The system needed to communicate with both the Fire Alarm Control Panel (FACP) and the ISCS.

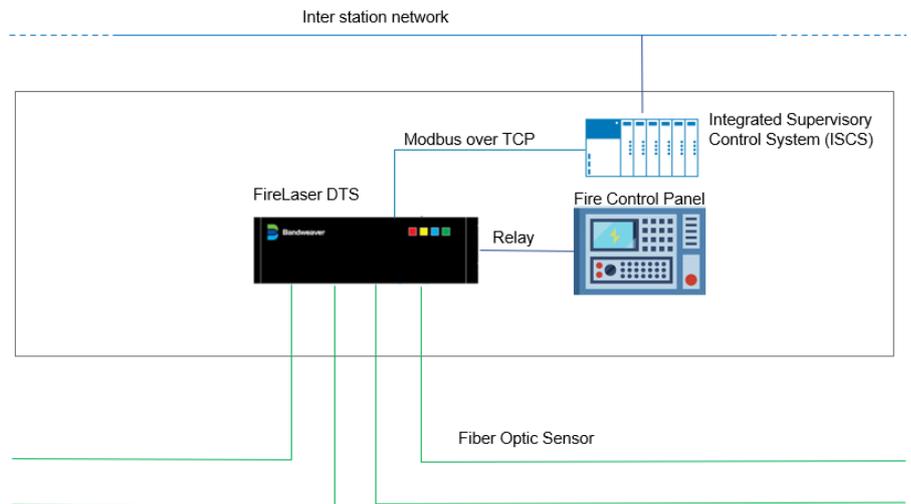


Figure 3 System Architecture



Figure 4 Equipment installed in control room

The system architecture is such that when the FireLaser LHD system detects the fire, it triggers the respective programmable dry contact outputs for the specific zone in which the fire occurs. Also, additional information regarding position and absolute temperature values is communicated via Modbus to the ISCS.

## BENEFITS TO THE CLIENT

When evaluating the system, the client reviewed several factors in making the choice to optimise cost and performance throughout the lifetime of the project. Below are the following benefits which helped persuade the client the fiber optic LHD systems were a superior choice to other technologies:

- **Low Cost of Ownership:** Fiber optic sensors are completely passive and are immune to EMC interference, not affected by dust or other environmental factors and are completely non-corrosive. Therefore, the lifetime of a fiber optic cable can be greater than 30 years, without any maintenance required.
- **High Reliability:** Another benefit of the passive, inert nature of fiber optics is that they are very reliable and so there is no downtime. In addition to the lower maintenance costs, they also provide a higher level of coverage which lowers the overall risk and improves protection levels.
- **Fully Certified to Internationally recognised standards:** The Bandweaver FireLaser DTS together with the sensing cable has been certified to the CCC standard. This gives the customer the knowledge and security that the system has been designed and tested to the highest standards in the fire detection industry.
- **Complete Coverage:** Because the sensing cable was installed along the entire length of the tunnel, it means you have complete coverage. With the fiber optic LHD you can take measurements every 50cm, meaning there are no gaps between sensing points.
- **Early detection with Smart Alarms:** The smart alarms be configured to enable the system to detect much earlier than with conventional LHD systems thus minimising any damage to the assets.

## ABOUT BANDWEAVER TECHNOLOGIES

Bandweaver has been providing advanced fiber optic monitoring sensors and integrated technologies since 2002. With an installed base of over 30,000km and 3,500 systems installed, our knowledge regarding the application of distributed temperature sensing technology and linear heat detection within the fire industry is second to none. We focus on the safe integration of FireLaser DTS technologies into clients' proprietary systems and Bandweaver and our partners provide exceptional systems design support, product support during installation and provide long term maintenance packages.

For further information please contact our global team at [info@bandweaver.com](mailto:info@bandweaver.com)