

POWER CABLE TUNNEL PROTECTION

Fiber Optic Linear Heat Detection (LHD)



In conjunction with:



The Scenario

The customer was based in the AOSB Adana industrial region in the south of Turkey. As with any industrial zone, electrical infrastructure and power supply is one of the critical factors to the success of the manufacturing and other industrial plants and often involves medium to high voltage power cables.

The risk of fires in such cable tunnels is a growing concern for electric utilities and connected facilities. Any fire incident in these spaces can be numerous and serious and the aftermath of a fire may result in serious damage to the installation. As well as direct costs this also can cause disruptions to process and business leading to significant economic losses and, in the worst cases, even loss of life.

Common causes of cable tunnel fires include short-circuits, sparks, overloading, static electricity, accumulation of dust dirt and failure due to lack of maintenance. It is therefore difficult to predict the location of the fire and so complete coverage for early detection is also important. Due to the high levels of electromagnetic interference (EMI), this also introduces other specific requirements.

Personnel are also typically restricted from entering tunnels and so having a fully comprehensive and automated system is critical.

Monitored | Secured | Safe

CLIENT REQUIREMENTS

The cable galleries for this particular project were located in an underground tunnel in the AOSB facility. As the tunnel was an underground facility there was ongoing issues with high levels of humidity and water ingress. As can be seen from the photo below, the floor of the cable gallery is filled with water. This introduces higher risks to the power cable with fluid ingress as a potential failure mechanism. The high humidity and water content also meant that the client had a strict requirement that the sensing system was restricted from using any active electrical components (which is a common requirement in high EMI environments).



Figure 1 Photo of cable tunnel

The owner was therefore looking for a robust technology which offers comprehensive coverage throughout the tunnel and with high reliability but no electrical components and also that was certified to the EN54 part 22 standard.

WHAT DID WE DO?

BTS Yangin worked with the customer to design, supply, and install a fiber optic Linear Heat Detection (LHD) system based on Bandweaver's FireLaser DTS system.

BTS chose to install the FireFiber sensor cable on the ceiling of the cable gallery in the middle of the tunnel ceiling. This provided maximum coverage of the full width of the tunnel with 2 x 2 m (h x w) dimension. The fiber is completely passive with no moving parts and is nonmetal and so is not affected in any way by any potential humidity and corrosive effects that conventional sensors such as point smoke and/or heat detectors, beam detector, aspirating smoke detector, etc. might experience. For this installation, a total of 5,000m FireFiber sensor cables mounted on the cable gallery ceiling were used.



Figure 2 Working with the AOSB team in the monitoring center

The FireLaser DTS used is a 2-channel system with each channel having a measurement capability of 5km in length. The FireLaser DTS Linear Heat Detection has the ability to utilise 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. In this case the zones were segregated into 150m sections, resulting in a total of 33 fire zones.

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. In this case the fire control panel was the Zettler MZX fire control panel and utilised the ZETTLER TXG graphic monitoring software. Based on BTS Yangin's design and system configuration, the entire system and the status of the fire zones can be visually easily checked from AOSB's control and monitoring centre. The FireLaser DTS communicates with AOSB's SCADA system by using its on-board ModBus TCP/IP output so that all the signals and events (fire alarm, fault and status) are all monitored automatically too.

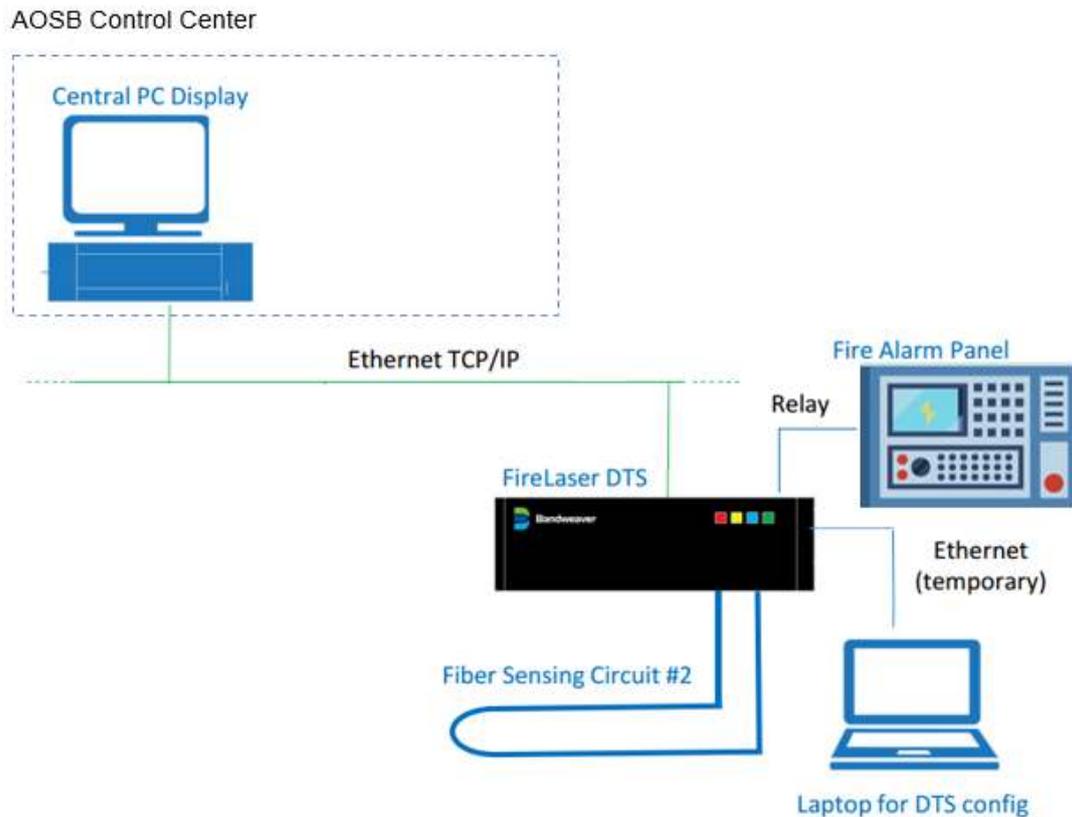


Figure 3 Example of system architecture

BENEFITS TO THE CLIENT

When evaluating the system, the client used a number of factors to make the choice across 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 EN54 part 22. 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 are able to take measurements every 50cm, meaning there are no gaps between sensing points.
- **Early detection with Smart Alarms:** The smart alarms that can be configured with the fiber optic LHD system 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

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