CASE STUDY

Kolkata Underground Metro Monitoring

Kolkata, India

Project Overview

The Kolkata Metro is within the top five longest operational metro systems in India with over 38 kilometers in combined length. Along with two operational rail lines and four others in different stages of construction, it represents an essential component of public transportation in West Bengal. Within the railway line, there are underground, at-grade and elevated stations.

In cooperation with our partner TECHFAB Systems, AP Sensing was chosen to commission our Linear Heat Detection (LHD) technology on a 6649 meter underground railroad line between the stations of Phoolbagan and Sealdah. As Phoolbagan is the first underground metro station of this line and has trains running at 1.5 minute intervals during peak hours, there are great risks to passengers and personnel and costly risks to the railway infrastructure. A fire in an underground metro, for example, can result in life-threatening smoke if detected late. In addition, it is important to locate the fire as accurately as possible to ensure that responders get to the closest station and evacuate quickly.

Solution

To ensure maximum safety in the underground metro tunnel, two Linear Heat Detection (LHD) systems were installed in a fully redundant design utilizing their first channel in collaboration with our partner TECHFAB. Even in the case of a system outage or cable fault, this installation provides a continuous ability to monitor the temperature of the metro line along the entirety of the fiber optic cable. Each LHD system provides five configurable criteria (maximum,

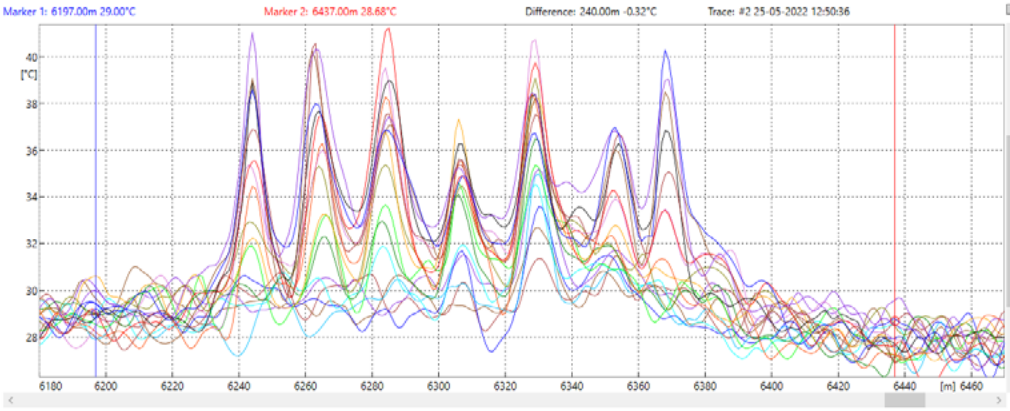
Background

- Kolkata Metro is an essential to public transportation in West Bengal
- Precise, sensitive and early fire detection needed to protect underground railway line with high humidity and heavy traffic

Solution & Benefits

- Two 1-channel Linear Heat Detection (LHD) units used in collaboration with our partner TECHFAB
- Well-suited for hazardous environments, where quick and accurate detection is paramount
- AP Sensing's LHD offers gapless monitoring, complete certifications and the lowest false alarm rate in the industry

3x rate-of-rise, adaptive) for setting up alarm thresholds for each zone. A total of six alarm zones with temperatures varying between 20 °C to 45 °C on average and a maximum temperature of 60 °C were defined, and three alarm gradients with rates of rise of 14 °C in 120 seconds, 20 °C in 240 seconds and 26 °C in 360 seconds were measured and determined. Additionally, the system utilizes SCADA via Modbus TCP.



Depiction of temperature changes of a stopped train with seven metro coaches

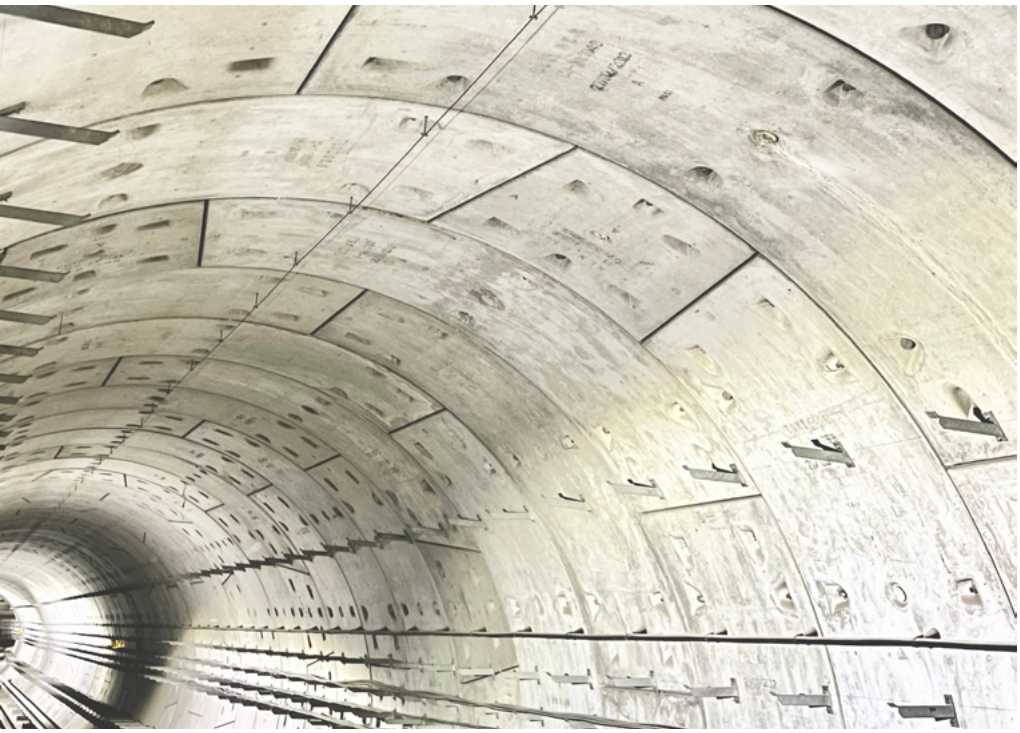
Additional Requirements

Due to the high humidity in Kolkata, the customer required a sensitive detection system that enables accurate and early fire detection with a low false alarm rate. AP Sensing's system fulfills these requirements fully, as proven by our certifications (VdS EN 54-22, UL521, ULC S530, FM 3210, ATEX II(1) GD M2, KFI, CCC, SIL2).

Technology

AP Sensing's LHD system utilizes Optical Time Domain Reflectometry (OTDR) to determine the position of the temperature reading, measuring the arrival time of the returning light pulse similar to a radar echo. By using AP Sensing's patented Code Correlation OTDR, worry-free and long-term measurement stability is provided.

Our unique CCODTR technique utilizes an industry-low laser power which makes the system inherently safe, even under the harshest conditions. Additionally, it prolongs the lifetime of optoelectronic components. AP Sensing's fiber optic sensing technology uses the Raman OTDR principle, enhanced with our CCOTDR, making our LHD a perfect fit for metro line monitoring.



Conclusion

With on-site training and local support available, the customer chose AP Sensing due to our outstanding reliability and expertise in fire detection. Offering accurate measurements even under severe circumstances, our LHD systems succesfully passed multiple tests in different locations inside the tunnel. Due to the satisfying results of our technology, the customer will be able to move the project to the next phase in the upcoming months.

For more information:
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