RELIABLE SMOKE DETECTION IN METRO TUNNELS AND STATIONS

Sensing the future

Underground metro tunnels are difficult to access for firefighting, so a small fire in this environment can lead to disaster. The panic of passengers trapped underground adds to the complexity and significance of a fire event. For example, a fire due to an electrical fault on a train in Baku Metro in Azerbaijan killed 285 and injured 265 people — 245 people were killed on the train and 40 were killed in the tunnel.

Fire Detection Challenges

- Limited time for installation
- Difficult access for detector maintenance, testing and replacement
- Risk of fire from sparks on oil, grease and paper
- Electric wiring and switchgear
- Minimum downtime
- Rapid air movement when trains pass
- Difficult evacuation due to narrow tunnels and large crowd
- Poor ventilation and visibility
- Risk of asphyxiation by smoke in confined tunnel space
- False alarms due to vibrations and building/tunnel movement from moving trains

Conventional Detection Technologies

Various fire detection technologies have been deployed in tunnels. Aspirating smoke detectors (ASDs) provide the fastest and most reliable detection in tunnels and other harsh environments, but they may not be cost-effective if very early warning is not the priority. Heat cable is false alarm free but only operates in the late stage of a fire. Beam detectors have provided an adequate compromise for smoke detection in long and narrow tunnels, but IR-only projected-beam smoke detectors are susceptible to building movement and prone to false alarms due to dust and object intrusion. They also are difficult to align and therefore time consuming to install.

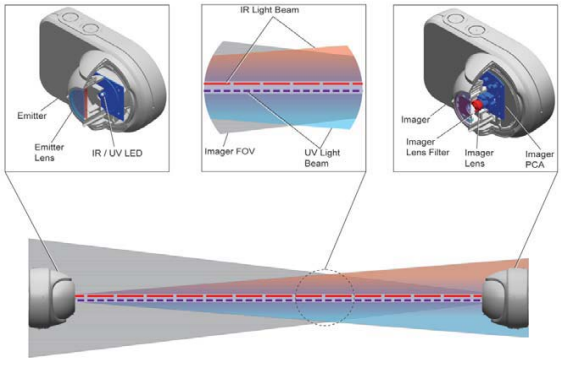
Reinventing Detection for Large, Open Spaces — Open-area Smoke Imaging Detection

The OSID overcomes common fire detection challenges faced in metro tunnels and stations with its unique, patented dual-wavelength multi-beam technology. In its simplest configuration, a system consists of one Emitter and one Imager placed on opposite walls, roughly aligned with one another.

OSID offers many advantages over traditional beam and spot detectors, the primary one being the use of dual light frequencies. Ultraviolet (UV) and infrared (IR) wavelengths, which are outside the range visible to humans, assist in the identification of real smoke compared to larger objects such as insects and dust, thus reducing false alarms. Furthermore, OSID is equipped with a CMOS imaging chip with many pixels rather than a single photodiode.

This concept allows the Imager to provide simple alignment as well as excellent tolerance to building movement and vibration, without the use of moving parts.

Alignment of the Emitter is simple, achieved by using a low-cost laser alignment tool to rotate the optical spheres until the laser beam from the alignment tool is within proximity to the Imager. No futher alignment is required, resulting in extremely fast installation and set-up, which is a major benefit in tunnels where access for installation is often limited to just a few hours at night.



The imaging chip also allows for the deployment of up to seven Emitters per Imager in large train halls. Only the Imager has to be wired versus every receiver as is the case with traditional beam detectors. Various Emitters also can be placed on different floors, providing detection both at the metro station's entrance level as well as above the train on the level below.

eurofyre LIMITED
Unit C1, Knowle Village Business Park, Mayles Lane, Wickham, Fareham, PO17 5DY, Tel: 01329 835024, Fax: 01329 830462, Email: info@eurofyre.co.uk