

Tehnomobil and LIOS Technology, the Motor for Tunnel Innovation and Safety in Croatia

Tunnels are sensitive traffic bottlenecks and consequently extraordinary vulnerable in case of accidents or fire blasts. Danger for life and enormous economic consequences ask also for technical solutions of prevention and limitation of damage.

LIOS Technology and its Croatian partner Tehnomobil have set a new standard for modern fire safety solutions for the road tunnel network in Croatia.

Croatia is located in South-Central Europe and shows diverse terrain, including: rolling hills in the continental north and northeast, densely wooded mountains and rocky coastlines on the Adriatic Sea. The highlight of Croatia's recent infrastructure developments is its rapidly growing highway network which puts focus on tunnels as well.

Tehnomobil's excellent engineering and contracting background in traffic infrastructure and fire fighting industries perfectly match with LIOS Technology's comprehensive experience in fire detection applications for tunnels and special hazard buildings with an impressive track record of more than 2000 installed fibre optic temperature sensing systems worldwide.

Best fire surveillance for more than 90 % of the road tunnels in Croatia

At present an impressive share of more than 90 % of the Croatian road tunnels are equipped with the fibre optic fire detection system by LIOS Technology. In 28 tunnels with in total 55 tunnel tubes the purely passive LIOS fibre optic line sensor cable has been installed by Tehnomobil for reliable and fast fire detection. Those tunnels with tube lengths ranging from 500m to almost 6000m were newly opened in recent years or re-opened after full refurbishments where the conventional line type fire detection system could be replaced by the fibre optic LIOS system. Within LIOS Technology's long list of tunnel projects in Croatia it is worth to stress the tunnels Veliki Glozac and Brinje which received best scores at recent European tunnel safety rankings.



North entrance tunnel "Mala Kapela" before opening second tube

EuroTAP: Brinje Tunnel on Dalmatina highway tops Europe's safety ranking

The European Tunnel Assessment programme (EuroTAP) place a Croatian tunnel, the "Brinje" at the top of the list, as the best tunnel in Europe in 2007. EuroTAP 2007 inspected 51 major road tunnels important for transeuropean road traffic located in 13 countries across Europe and concluded that none could beat this Croatian tunnel despite the fact the since 2004 tunnels in the European Union must comply with a Directive prescribing minimum safety standards for road tunnels. The Brinje, a 1570m tunnel opened in 2004, located on the A1 between the cities of Zagreb and Split displayed top scores for the fire protection and winning features in all safety categories: low risk traffic flows using two tubes, 24 hour monitoring from a tunnel control centre manned by trained staff; immediate notification of traffic disruptions, use of lay-bys or emergency facilities; additional escape and rescue routes well marked by evacuation lighting and good indications of the escape direction and the distance to the nearest exit.

State of the art fire safety

A proper fire protection concept is not simple when the protection area is affected by harsh environmental conditions. Conventional sensor technologies often fail and tend to produce false alarms. Great efforts are needed to keep the conventional fire detection system properly maintained. LIOS Technol-

ogy's unique Linear Heat Detection Systems are designed to reduce the operational costs and offer maximum reliability even under severe tunnel conditions with dirt, dust and corrosive atmospheres as well as high humidity and dynamic temperature fluctuations.



North portal of tunnel Veliki Glozac during fire test

Safety systems demand reliable and quick fire detection. Furthermore, in harsh environments modern solutions require immunity to any interference, false alarm safety and easy handling. LIOS Technology offers a protection concept based on a simple fibre optic cable as a high-precision addressable heat sensor which is easy to install, maintenance free and certified for several thousand meters. It leaves no space unmonitored and displays in real-time temperature development and heat transport along the entire tunnel. LIOS Linear Heat Detection Systems provide optimum safety for fire detection in tunnels and special hazard areas due to their ability to cope with extreme environmental conditions.

The line sensor is based on optical waveguides,

which are immune to electromagnetic disturbances. Based on years of experience within the field of fibre-optic measuring techniques as well as the input of research partners and customers, multiple characteristics were added to offer reliable and adaptable measurement features for locally linear heat detection profiles.

Technologies creating values

Temperatures are recorded as a continuous profile along the entire sensor cable compared to a conventional setup using single point-type sensors. The benefit of achieving highly accurate temperatures over great distances at short measuring times is combined with the ease in installation and data acquisition.

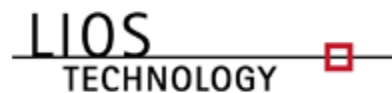
The LIOS Linear Heat Detection Systems have been developed for serving one purpose – sophisticated fire detection equilibrating response time, false alarm safety and system reliability on an unbeatable level. Based on the LIOS OTS evaluation unit and an appropriate sensor cable the system fulfils the demands of modern fire detection technology.

- A purely passive sensor unaffected by rough conditions and electromagnetic disturbances
- A system architecture that allows stand-alone operation
- Precise information about fire location, size and propagation
- Easy to install
- Easy to integrate in fire management systems



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