Bandweaver

ELOTEC
Alarm og overvåking

CASE STUDY

Fire Detection for Norway's Storvikskar Tunnel Project



Project Summary

Client	Nordland County Road Authority
Application	Road Tunnel Fire Detection
Solution	Bandweaver FireLaser Linear Heat Detection (LHD) & FireFiber AT cable
Technology	Distributed Fibre Optic Sensing
Tunnel Length	3,100 metres
Partner	Elotec (Norway)

Monitored | Secured | Safe

The Scenario

The Storvikskar Tunnel (Storvikskartunnelen) is a 3,100 m single-bore road tunnel in Norway, carrying two-way traffic through a single tube configuration. Originally built decades ago, the tunnel is now undergoing a full safety rehabilitation under the Fv.17 Storvikskar Tunnel Upgrade project, with planned completion in 2027. The project is recasting tunnel walls and replacing systems throughout, as part of a wider modernisation effort to bring older Norwegian tunnels up to current safety standards.

Norway operates under some of the strictest road tunnel safety regulations in Europe; a framework shaped in part by major incidents elsewhere on the continent, including the 1999 Mont Blanc tunnel fire. These events accelerated the development of comprehensive tunnel safety standards across Europe, and Norway's N500 handbook reflects that legacy. The fire risk profile of road tunnels continues to evolve, with the rapid growth of electric vehicles introducing new considerations for tunnel operators and safety designers alike.

With over 1,000 road tunnels, many built decades ago- Norway faces a substantial programme of modernisation work, and Storvikskar is among the first to incorporate fibre optic linear heat detection. Elotec, Bandweaver's exclusive distributor in Norway, was appointed to supply, design, and commission the fire detection system, marking the first installation of Bandweaver's distributed fibre optic LHD technology in a Norwegian road tunnel.

Client Requirements

The requirement for an automatic fire alarm system in the Storvikskar Tunnel was driven by the project owner, in line with the Norwegian road authority's N500 tunnel design handbook. Having considered the available technologies, the owner determined that linear heat detection was the superior solution for this application due to its robustness and reliability in demanding tunnel environments, and specifically requested it be included in the design. The single-bore, two-way configuration made this especially important; unlike twin-tube tunnels where each bore carries unidirectional traffic, vehicles travelling in opposite directions share the same space, making fast and accurate fire location critical.

The key requirements for the fire detection system included:

- Continuous, automatic fire detection across the full 3,100 m length of the tunnel, suitable for two-way traffic
- A detection technology proven to be reliable in a road tunnel environment; alternative smoke detectors, beam detectors or non-linear detection methods were considered unsuitable for the application
- Maximum detection time of 60 seconds from fire ignition, verified by a planned 2 MW heptane pan fire acceptance test, conducted centrally in the tunnel at air velocity above 1.5 m/s, in line with Norwegian road tunnel commissioning requirements
- Accurate fire location reporting, with the alarm position displayed directly on the DTS/LHD controller
- Full integration with the tunnel's local fire alarm system and onward connection to the Road Traffic Control Centre (Vegtrafikksentralen / VTS) via the SCADA platform
- A dedicated, EN54-compliant power supply with fault monitoring

Bandweaver's FireLaser LHD system was selected for its proven performance in demanding tunnel environments. Working through their Norwegian partner Elotec, Bandweaver's application expertise was instrumental in ensuring the technical specification accurately reflected the requirements of the project, with the FireLaser ultimately specified on merit.

What Did We Do?

Elotec specified and is commissioning a Bandweaver FireLaser 5 km, dual-channel Distributed Temperature Sensing (DTS) instrument paired with FireFiber AT sensing cable. Because the tunnel is 3,100 m long and the installed cable run is approximately 4 km in a single, one-directional configuration (rather than a looped or redundant layout), only one sensing channel and one fibre core are in active use for this installation.

The sensing cable will be mounted on the tunnel's cable bridge alongside other electrical infrastructure. The cable tray is being installed first, with the FireFiber AT sensing cable to follow in the later stages of the project.



Figure 1. Storvikskar Tunnel entrance during the ongoing safety upgrade

Installation & Integration

Bandweaver's FireLaser LHD connects via relays to Elotec's fire alarm control panel which is part of the wider tunnel fire & security system, which extends to the tunnel's technical buildings and rooms. From the fire alarm panel, signals are passed onward via Modbus TCP/IP to the Road Traffic Control Centre's SCADA system, giving operators full visibility of fire detection status without requiring a separate communications network.

Configuration of fire detection zones along the tunnel is still being finalised. At the time of writing, the system's alarm logic includes a maximum temperature threshold and a series of adaptive rate-of-rise alarms calibrated to different rates of temperature increase, allowing fires to be detected at varying stages of development.

The installation contractor is carrying out the on-site installation work, including the cable bridge that will carry the FireFiber AT sensing cable along the tunnel's full length, under the oversight of the main contractor for the wider tunnel rehabilitation project.

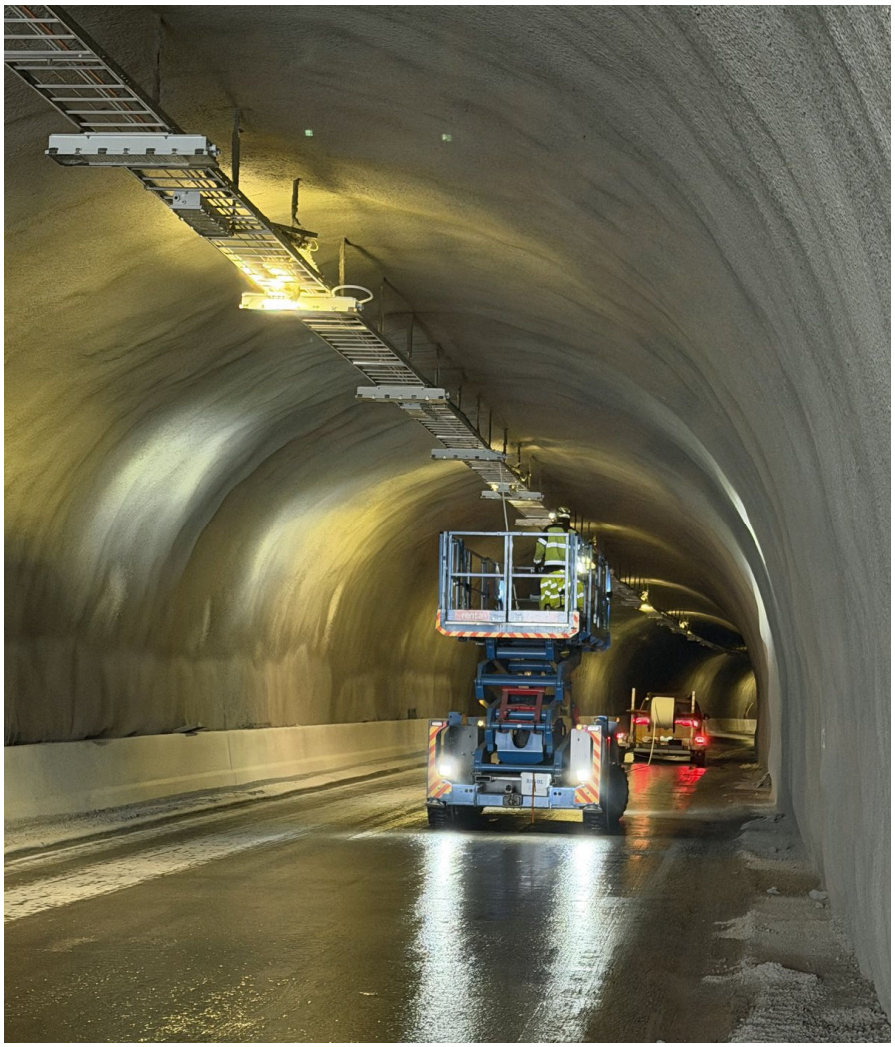


Figure 2- Cable bridge installation in progress inside the Storvikskar Tunnel

Why Fibre Optic Linear Heat Detection?

For a 3,100 m single-bore tunnel carrying two-way traffic, continuous and reliable fire detection across the full length is non-negotiable. Fibre optic linear heat detection is the only technology that delivers this without gaps, without susceptibility to the electromagnetic interference common in tunnel environments, and without the maintenance burden of point-based detector systems.

- Continuous temperature monitoring along the entire tunnel length, with no gaps in coverage
- Precise fire location reporting, enabling a targeted rather than general response
- Immunity to electromagnetic interference
- Resistance to dust, moisture, and the harsh conditions typical of a road tunnel environment
- Very low ongoing maintenance requirements
- EN54 approval
- A proven technology with a track record across numerous international tunnel projects

Like all external temperature-based detection technologies, the FireLaser responds once heat escapes into the tunnel atmosphere, at which point it provides rapid, reliable, and highly accurate detection.

Bandweaver's FireLaser system delivers EN54-certified performance with very fast detection, precise fire location, and an exceptionally low nuisance alarm rate. The Norwegian specification requires performance to be verified by a live 2 MW heptane pan fire test, one of the most rigorous commissioning standards in European tunnel practice. Based on results from comparable FireLaser installations across Europe, detection times have consistently come in well under the 60-second requirement.

Benefits To the Client

✓ **Precise fire location:**	Operators at the Road Traffic Control Centre receive the exact location of any heat event, not just a general alarm.
✓ **Full-length protection:**	4 km of FireFiber AT sensing cable provides continuous coverage along the tunnel's full length, with no point-detector gaps.
✓ **Reliable in a harsh environments:**	The fully passive fibre optic cable is immune to electromagnetic interference and unaffected by dust, moisture, or the demanding conditions of a road tunnel.
✓ **Low cost of ownership:**	Fibre optic sensing cable has no moving parts, is non-corrosive, and typically operates for over 30 years with minimal maintenance.
✓ **Seamless integration:**	Connection via the Elotec fire alarm panel and onward Modbus TCP/IP link gives the Road Traffic Control Centre full SCADA visibility without a separate communications network.
✓ **A Norwegian first:**	Storvikskar is the first road tunnel installation of Bandweaver DTS/LHD technology in Norway, establishing a local reference case for future tunnel safety upgrades across the country.

About Bandweaver Technologies

With an installed base of over 90,000 km and 9,000 systems installed worldwide, Bandweaver's vision is to be the first choice for integrated distributed fibre optic sensing solutions across the globe. Since 2002, Bandweaver has been committed to delivering reliable, innovative, client-centric and value-added products and services, via a dedicated and talented team of people.

Bandweaver manufactures and distributes advanced fibre optic monitoring sensors and integrated technologies, enabling customers to monitor, secure and keep personnel and critical assets safe.

Utilising the latest technologies, Bandweaver provides solutions for Linear Heat Detection, Intrusion Detection, Condition Monitoring, Dynamic Cable Rating and Leak Detection.

For further information please contact our global team at info@bandweaver.com

About Elotec AS

Elotec AS is a Norwegian supplier of security and fire safety equipment, founded in 1992 with a mission to develop technology that saves lives and protects assets. Headquartered in Oppdal, Norway, Elotec designs and manufactures complete solutions for fire alarms, emergency lighting, camera surveillance, radar and sensor technology - serving commercial, industrial and agricultural buildings, flats, listed buildings and residences across a wide range of sectors including industry, agriculture, healthcare and infrastructure.

With fire alarms installed in more than 100,000 buildings, over 60,000 aspiration detectors deployed, and more than one million point detectors supplied worldwide, Elotec has established itself as a market leader in safety solutions for demanding and extreme environments. Products are manufactured at their Oppdal headquarters and through a global partner network, with quality management certified to ISO 9001 by VdS Germany. Elotec supplies to customers from Iceland to Dubai.

For further information, visit www.elotec.no