Automatic Incident Detection in Tunnels
Case Study - Mastrafjord tunnel, Rennesøy, Norway

- Complete situational awareness
- Detection through glare, darkness and any light conditions
- Fast detection, low false alarm
- Reliable detection in the event of a tunnel fire
- Integrated rules-based software
- Low maintenance, no cleaning needed
accurate detection of incidents and also be cost-efficient, which was a major requirement. In countries with a climate such as Norway, one of the fundamental requirements was the ability for the system to be unaffected by light and extreme weather conditions.

Tunnels come with the inevitable challenge of lighting. The sharp contrast between darkness and brightness by the entrance of a tunnel is an issue for even the most advanced video technologies.

Trafsys required a solution that would not only function in low to no lighting but could also be used effectively outside the tunnel entrances. This meant that the system had to be reliable in rain, fog, or snow environments, where laser and video technologies fail to perform in.

Mastrafjord Tunnel

As a country with a rugged coastline broken up by huge fjords and thousands of mountainous islands, it comes as no surprise that Norway is host to over 900 tunnels. These tunnels, as with any road infrastructure, need to be continuously monitored for collisions, stopped vehicles and debris. By detecting and dealing with them as quickly as possible, further incidents and delays are prevented. The Mastrafjord and the Byfjord subsea tunnels make up part of the Rennfast road connection from the mainland to the island of Rennesoy. In total both tunnels cover up to 10km in distance and deal with a daily average of 8000 vehicles.

A large tunnel refurbishment project was approved in 2013 and it was determined that an advanced level of tunnel security was needed. An automatic incident detection (AID) system would provide the most
The Solution
Automatic Incident Detection

A system that enables fast response to incidents

Navtech Radar’s ClearWay was short-listed by Trafsys as a solution for automatic incident detection at Mastrafjord tunnel, following a recommendation from the Swedish road authority, Traffikverket. Trafsys did a site visit to Hindhead tunnel in the south of England, where ClearWay was in place providing complete situational awareness.

ClearWay’s radar sensors were installed covering the full length of the tunnel over a combination of three and four running lanes. The radar sensors were integrated into the SCADA solution in the control room where they were configured to automatically direct existing PTZ cameras in the tunnel.

A sophisticated rules-based software tracks and monitors traffic flow, providing real-time information for a number of different requirements. Whilst laser and video technologies are prone to false alarms, ClearWay’s advanced algorithms have enabled the system to only create a warning when a true risk is detected, giving operators an unrivalled level of reliability with a false alarm rate of less than one per day.
About ClearWay

Due to the confined nature of tunnels, many complications associated with ordinary traffic incidents are magnified in the enclosed space. Complete situational awareness is critical in such an environment. ClearWay’s ability to track, detect, monitor and provide alerts for an unlimited number of targets, enables the operators to make faster decisions that will prevent more serious accidents.

The solution provides the exact location of people and vehicles in a tunnel in real-time and displays their position on an overhead map. ClearWay automatically detects incidents and raises alerts to operators in as little as 10 seconds, giving them maximum time to manage the situation effectively and coordinate a response with emergency services.

The system is not affected by extreme temperature or light conditions and can still work effectively during tunnel fires to provide the operator with real-time information when they need it most.

ClearWay can be used to control lighting and ventilation in the tunnel which will help with reducing the impact of tunnel fires. The system has traffic counting and classification capabilities as it can detect the exact location, direction, speed and type of vehicle.

Benefits

- **Complete situational awareness**
  Real-time location of vehicles and people to coordinate emergency response.

- **All weather performance**
  High performance even in extreme weather or lighting conditions.

- **Early warning system**
  Alarms within 10 seconds of a detected event.

- **Rules-based software**
  Set detection parameters and suppress alarms for specified conditions.

- **Future-proofed road network**
  Connected corridor features for autonomous vehicles.

- **Third-party integration**
  Automatically controls multiple cameras and sensors for complete situational awareness.

- **Very low false alarm rate**
  Finely tuned to provide a maximum of one false alarm per sensor per day.

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