

# Tunnel of Montenegrone



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## Industry:

Transportation

## End User:

Province of Bergamo – Tunnel of Montenegro

On January 7, 2008, the last part of the Seriate-Nembro-Albino-Gazzaniga road network, between the no. 42 state highway and the no. 35 provincial highway, was opened in the province of Bergamo. On this stretch of road, the Montenegrone tunnel, which is approximately 3.3 km (2 miles) long and the fourth-longest in the whole of Lombardy, constituted the main piece of construction work. Following the Italian Legislative Decree of October 5, 2006, the tunnel's original project had to be revised and adapted. The tunnel now includes a junction leading to Nembro, Bergamo, Selvino, Gavarno, and finally Cà Bianca.

## Business Objective:

As described by the Italian Legislative Decree of October 5, 2006, work needs to be carried out on many tunnels to make them safe, from both a structural and a technological point of view. Video surveillance systems are designed to film, analyze, record, and transmit images to a remote control center, which evaluates the actions to be taken in the event of serious dangers.

Video surveillance systems must be able to recognize when fires have started, queues have formed, vehicles have broken down, and be able to count vehicles etc.

## Solution:

The lighting conditions in a tunnel pose a particular problem for traditional cameras. In particular, sodium lights create an annoying "yellow" effect, and consequently the colors of passing vehicles cannot be distinguished. Traffic flow management and monitoring must also be able to cope with a high number of vehicles in transit, different speeds of travel, and problems caused by headlights being pointed at the lens.

To overcome these types of difficulties in the Montenegrone tunnel, more than 95 of Bosch's Dinion XF cameras (LTC0485), with 15-bit technology and Default Shutter function, were installed. Bosch's Dinion XF cameras have in fact proven to be the perfect solution to application needs.

The surveillance cameras are approximately 100 m (325 ft) apart in straight parts of the tunnel and 50 m apart around the tunnel's bends. Bosch's AutoDome 26x cameras have been installed to monitor the three entrances to the tunnel. The whole system guarantees a complete overview of the tunnel.

Since closing the tunnel to traffic is difficult, another critical aspect that had to be considered when designing the project was configuration and maintenance of the system. For this reason, all of the products suggested can be configured directly from the tunnel's technical rooms using Bosch's Bilinx protocol, which allows for the surveillance cameras to be configured via a coaxial cable.

Each image is relayed to a central control room via fiber optic cables. The images are compressed into MPEG-4 using multichannel encoders that are able to pick up a maximum of 16 video channels in a single rack base unit. (VIPX1600).



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Video signals are analyzed using Citilog's video analysis software that is able to identify accidents, queues, smoke, or vehicles and persons traveling in the wrong direction using image analysis algorithms, as well as being able to calculate travel times, count and classify vehicles.

This application solution was devised by Distelco, an expert in automation and control systems for applications in the transport sector and for government agencies.

## Result:

The CCTV system is managed by the Central Control Room, and is also used to automatically detect road accidents (D.A.I.).

The monitoring and control of traffic is carried out using functions similar to a video surveillance system, allowing the reconstruction of events inside the tunnel and in emergency and evacuation areas. In addition, in the event of an alarm, the system is capable of providing a response within 10 seconds and activating the smoke extraction system in the event of fire.

During 2008 and 2009 the system proved extremely useful in controlling traffic and detecting accidents in the tunnel.

## Installed by:

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