



Industry: Traffic & Tunnel
**Best in class for safe tunnel operation:
visibility measurement for early fire warning**

Waldkirch/Barcelona, Tour Stop No 18 2010 - Fires in tunnels are very scary incidents, particularly in train tunnels with many casualties. To avoid them, very high demands are made on smoke detection

Challenge: Process Monitoring & Control

Early fire detection in train tunnels is generally the same as in thousands of road tunnels. The sensors have to meet a lot of demands: they have to be suitable for outdoor use, tolerant towards contamination, corrosion-resistant and they have to measure with a high sensitivity – just to mention a few. Their freely selectable alarm levels have to allow a setting with a 10 times higher sensitivity than the usual indoor fire detectors.

However in high speed train tunnels, where trains pass through with up to 250 km/h, the measuring solution has to withstand impacts such as airstreams and vibration as well.

Conservación y Sistemas S.A. in Spain, a specialist in traffic-related projects, requested in addition to international project experience that the sensors are based on transmission measuring technology. Further, a well proven solution that is already tested in a wide range of tunnels. The task for SICK: taking care of early and reliable smoke detection with measuring devices that withstand strong airstreams and vibrations.



Solution: Well-established transmissiometers with worldwide reputation

A total of 122 VICOTEC411 units made by SICK were installed inside the two tubes of the tunnel. Each instrument consists of an optical sender and receiver unit, a reflector unit and a control unit – installed directly on the tunnel wall. All light absorbing particles such as dust, soot or smoke will be detected as reduced light intensity by the receiver. With this reduction of light intensity the extinction value k is calculated. The higher this value the worse the visibility inside the tunnel. In case of fire, the k -value will rise very fast significantly above normal levels.

VICOTEC411 is equipped with special dust protection tubes that prevent a build up of dirt on the optical lens surfaces – a very important feature. To withstand the mechanical impact of passing high speed trains, the fixation of the dust protection tubes on the VICOTEC411 was slightly modified.

Six unbeatable points at pole position

1. Significantly early and reliable smoke detection
2. Very low maintenance requirements: no moving parts / no consumables
3. Transmissiometers provide inherent self-test, i.e.: As long as the receiver detects some light, the basic function of the device is okay
4. Use of well proven equipment. Thousands of these systems are installed worldwide
5. Robust housings to withstand the harsh mechanical impacts
6. Very low number of false alarms as the VICOTEC411 was also designed for road tunnels, where far more contamination is present