INDUSTRY: TRANSPORTATION

Tecnositaf S.p.A.

www.tecnositaf.it

"We invested in the deployment of the most modern safety systems available on the market today, developing solutions enabling us to go far beyond international standards."

Giuseppe Celia Magno
Sales and Quality Manager

SCADA: An Important Help for Managing Road Infrastructure

Goals

- Ensure the highest safety levels through the deployment of a maintenance and infrastructure management system for the A32 Highway and Tunnel

Challenges

- Limit maintenance costs while ensuring maximum safety

Solutions and Products

- Wonderware ActiveFactory
- Wonderware InTouch HMI
- Wonderware InTouch HMI for Terminal Services
- Wonderware System Platform

Results

- Reduced maintenance and energy consumption of the tunnel lighting and ventilation systems
- Deployment of a fire-fighting system meeting the highest safety standards

Invensys is now Schneider Electric

Wonderware

Bussoleno (TO), Italy – Tecnositaf, an integrated engineering company founded in 2001, is a SITAF S.p.A. company that designs, develops and manages systems and tools for mobility control, road, rail and industrial safety.

An Experience Along the A32 Torino-Bardonecchia Motorway

Wonderware and Tecnositaf experience and technologies have been put together to ensure maximum safety for drivers along the A32 Torino-Bardonecchia motorway infrastructure. When traveling on a motorway, drivers are especially concerned about traffic and road conditions. But driver safety actually depends on an almost invisible technology infrastructure, which needs to always be working perfectly.

Managers of big infrastructure networks are fully aware of this issue and, in recent years, have been investing in strengthening these systems, providing them with the most efficient management and control tools. Maintenance and management of the road infrastructure is not only the main goal, but also the highest cost for the contractor.

Highways must always be open and ensure constant safety. Any maintenance intervention involves organizational changes and the need to open building sites, creating dangerous road narrowings.

In order to improve service levels, ensure safety and limit maintenance costs through exact scheduling, SITAF (Società Italiana Traforo Autostradale del Fréjus), as contractor of the A32 Torino-Bardonecchia motorway, recently invested in the expansion of the technology infrastructure of this major road connecting Italy to France.

This decision was also influenced by the fact that 18 of the total 73 km are tunnels, a potentially hazardous environment for vehicles, and the place where rescue interventions are extremely difficult.

Tecnositaf specializes in integrated systems for road safety and became involved in the project due to the expertise of their collaborators and their experience with other companies managing street and motorway systems.

Air Quality Control

"In the light of this," explained Giuseppe Celia Magno, a Sales and Quality Manager with Tecnositaf, "we invested in the deployment of the most modern systems available on the market today, developing solutions enabling us to go far beyond international standards."

In such a project, constant event monitoring and automated management systems are key requirements. Wonderware System Platform, combined with Wonderware InTouch HMI (Human Machine Interface), represented the ideal solution for supervising the entire road section.

This solution is among the most innovative on a global scale, as it allows SITAF the freedom of customizing the application in order to develop all the necessary controls, as well as to reach the integration level Tecnositaf expected, all while providing a reliable solution.

The project, personally followed by Andrea Ballatore, a Wonderware certified system designer, aimed at replacing the pre-existing and out-of-date SCADA system, with a system using the most efficient control technologies, especially for tunnel ventilation.

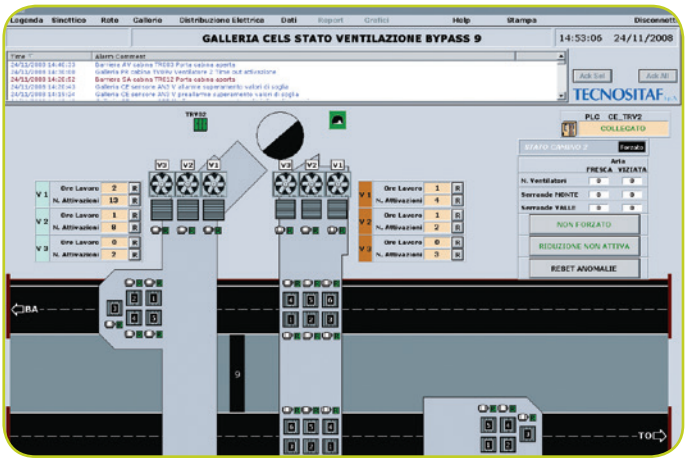
Under particular weather or traffic conditions, there can be a build up of exhaust gases inside of highway tunnels, which affect visibility, and in the severest of cases, the health of passengers. For this reason, the ventilation system must ensure suitable air makeup. Non-stop ventilation entails high energy consumption, along with rapid deterioration of fans, which makes periodic and expensive maintenance necessary.

Manual management proved demanding and inefficient, mainly because local operating personnel cannot have full visibility into the complete system. Gas concentration is not only influenced by traffic and passage of trucks or highly polluting vehicles, but also by external factors, such as weather conditions at the entrance and exit of the tunnel. In some instances, it is possible to forecast traffic conditions, which allows operators to set up the venting system based on these anticipated conditions.

The Wonderware solution has been customized to interact with the 86 PLCs controlling the single local plants which are based on a master/slave logic and are able to work autonomously, according to the information retrieved from field devices and archived data.

An optical fiber 1Gb/s network, 73 km long, and suitably backed up, allows all information to be consolidated in the central control room in Susa, where all emergency actions are coordinated. CO2 concentration monitoring is accomplished by sensors that only start the necessary fans in the longitudinal venting system, at the required speed, in case the concentration exceeds preset values.

Furthermore, based on the speed of the airflow, detected by the anemometers installed at the entrance and inside the tunnels, the system sets the number of fans needed to keep the air in the tunnels fresh.



This management system dramatically reduced needed maintenance, thereby extending the operating life of mechanical systems and reducing electricity costs.

All the Light Needed

Tunnels are critical passages in every travel. In the case of sudden lighting changes, human eyes require more than one second, the so-called “adaptation time,” in order to focus again. Considering that a driver traveling at 120 km/h covers more than 30 meters in one second, it is immediately clear that the driver’s sight is temporarily and dangerously limited for a considerable distance. Because of this, lighting at the entrance and exit of tunnels must be particularly intense in the daylight and weak during the night.

For this reason, Tecnositaf engineers leveraged the solutions’ capabilities to create an intelligent management system based both on seasonal timetables and on the brightness detected by twilight sensors. This smart management system allows for limiting costs and extending the operating life of the installed lamps.

The same control system is also able to constantly monitor the status of all switches and lamps, offering operators in the control room real-time visibility into all the plants and enabling immediate remote or local intervention if needed.

A Valuable Help in the Event of Fire

Despite its importance, venting and lighting management does not always require real-time intervention and can tolerate partial delays. However, in the event of a fire, every second counts and can make the difference for people trapped in the tunnel.

For this reason, as well as to comply with severe international regulations, Tecnositaf invested in the creation of a particularly robust and effective system. The need to ensure the highest quality standards contributed to the choice of a SCADA system based on Wonderware System Platform, combined with a proprietary system.

The SCADA system constantly diagnoses the status of the fire-fighting system, notifying operators of any malfunction or activation. Perfect efficiency and timely activation of the plant represent two crucial factors engineers took into consideration upon development of the plant.

Perfectly working pumps and valves must also be automatically activated, with no room for error. For this reason, the SCADA system, when it is activated, analyzes CO2 concentration levels and air opacity, constantly comparing them with historical data and values retrieved in tunnels.

In this way, the plant can easily distinguish between fires linked with sudden increases in values detected by sensors in a limited area, from the passage of particularly polluting vehicles, thanks to the integration with the video surveillance system that also carries out smoke detection functions.

In the case of fire-fighting system activation, smoke extractions systems come into operation according to pre-set schedules, in order to facilitate evacuation and rescue procedures to the rescuers called by the Centralized Control Room.

All of these solutions help to ensure the highest safety levels possible for drivers on the A32 motorway.

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