

**SIEMENS**

*Ingenuity for life*

# Tunneling is better than moving mountains

Systematic tunnel automation – intelligent and highly available

[siemens.com/tunnelautomation](https://www.siemens.com/tunnelautomation)

# Universally scalable, tried and tested worldwide: One system for all automation tasks in tunnels



## Measurements

Simple connection of measuring instruments through standardized interfaces for further processing in the control system.



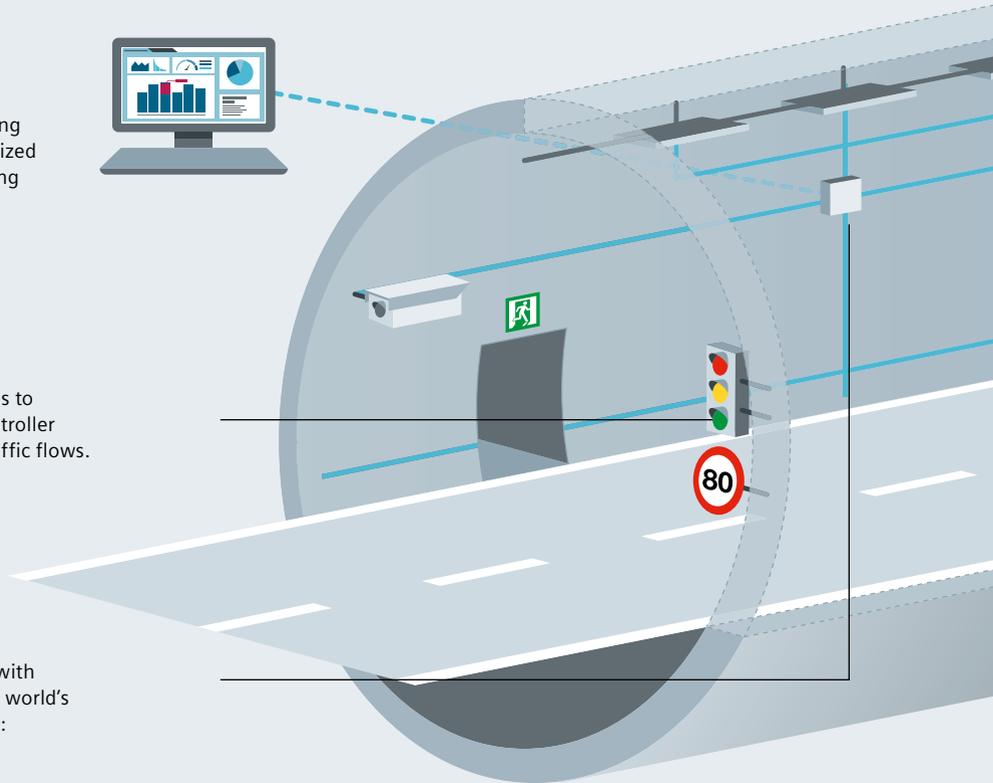
## Road signs

Direct connection of road signs to the control system via the controller which facilitates optimized traffic flows.



## Networking

Future-proof communication with products and solutions for the world's leading industrial bus systems: PROFIBUS and PROFINET.



## Efficient engineering

for significant time and cost savings,  
with the TIA Portal as the engineering  
platform for automation.

## Highest availability

of the automation solution through the  
use of highly available systems from the  
SIMATIC product family.

# Digitalization in tunnel automation

Progressive digitalization has many clear advantages in the field of tunnel automation. It pays off in efficiency improvement that can be achieved with virtualization, especially when it comes to planning, engineering and commissioning aspects. The gains in safety and availability are the most important operational advantages. Totally Integrated Automation (TIA) offers a universal, open product and system basis for this. The TIA Portal provides an enormously powerful, integrated engineering framework.



## Efficient engineering through standardization

Many applications are used repeatedly in the engineering of tunnel automation projects. Such tried and tested applications can be saved as standards in a library in the TIA Portal. For a new project, they just have to be adapted to the individual situation. This considerably shortens the time required for the engineering, while at the same time reducing the risk of errors.



## Quicker commissioning through virtualization

The virtual copy of a tunnel, including all its characteristics, known as the digital twin, enormously speeds up the engineering and commissioning processes. Controller functionalities can be tested and optimized in the development environment. After successful tests, the result is simply transferred into the real world. Time-consuming and expensive tests on the real object are eliminated.

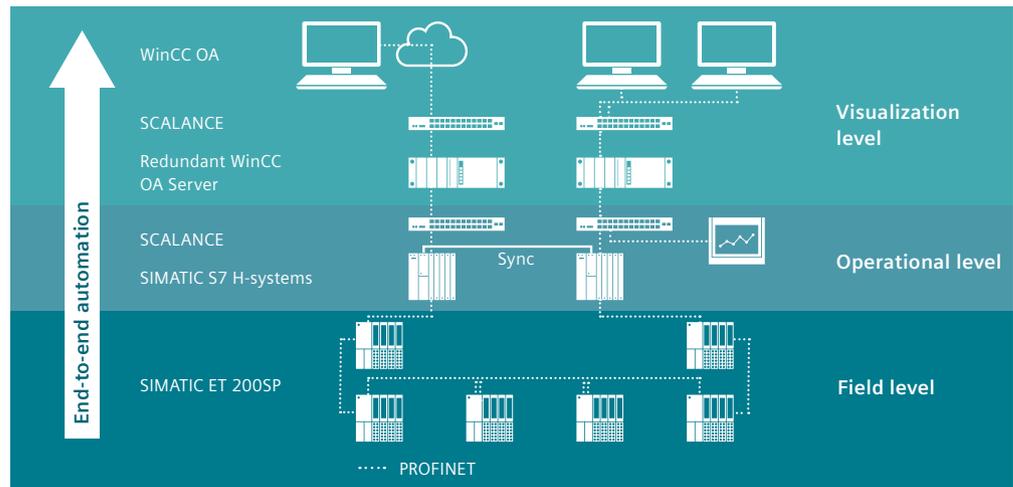


## Greater safety and higher availability during ongoing operations

Digitalization opens up the possibility of systematic, predictive servicing and maintenance. The incoming data can be analyzed and converted into significant "smart data" in MindSphere, the cloud platform from Siemens. On this basis, the operating personnel can initiate specific preventive maintenance measures – an important contribution toward consistently high tunnel availability.

# A unique product and system basis for tunnel automation

End-to-end tunnel automation from the field level right through to the visualization level with products and solutions from Siemens.



The most flexible implementation of customer-specific automation solutions for tunnels based on a complete, end-to-end system pays off – in the planning and engineering phases as well as during operation. If the control system, controller and I/O devices come from one single source, all automation tasks in the tunnel can be efficiently and reliably planned, developed and ultimately controlled. This saves time and money, while at the same time ensuring a highly available tunnel system. Totally Integrated Automation (TIA) has a unique product and system base that opens up just these possibilities.

WinCC OA is a control system optimized for tunnel management that facilitates distributed, redundant systems. The system redundancy of the SIMATIC S7 controllers enables an extraordinarily high level of availability for tunnel systems. Furthermore SIMATIC ET 200SP provides a multifunctional, modular, finely scalable system for the distributed I/O devices that allows the on-site connection of signals.

The SCALANCE product line includes powerful, future-proof network components, that allow the creation of reliable tunnel networks and communication solutions. Local operating and observation stations can be installed in the tunnel with rugged, durable SIMATIC industrial PCs and HMI panels.

The TIA Portal allows full access to the entire digitalized automation, from the planning through integrated engineering to transparent operation. It offers not only simulation tools but also diagnostic and energy management functions.

The interaction of these harmonized components speeds up the engineering and commissioning, and ensures reliable, economic operation. Both system integrators and tunnel operators benefit from a consistent automation product portfolio.



## High availability

Redundant control structures ensure higher availability and allow reliable surveillance and control of tunnel facilities even if components fail. Automation components from Siemens offer a reliable basis for this.

**All the important details about high-availability controllers can be found at [siemens.com/high-availability](https://www.siemens.com/high-availability)**



## Industrial security

Systematic protection against unauthorized access and manipulation, as well as against internal and external cyber attacks is essential, especially for critical infrastructure. The security mechanisms integrated into SIMATIC products provide maximum protection, for example through secure remote access with VPN and a configurable firewall.

**You can find additional information at [siemens.com/industrial-security](https://www.siemens.com/industrial-security)**



## Digitalization

The advantages of digitalization – efficient planning, time-saving engineering and precise simulation activities with a digital twin, as well as safe operation both today and tomorrow – are also available for tunnel projects with automation technology from Siemens.

**Find out more about product and software solutions from Siemens at: [siemens.com/digitalenterprise](https://www.siemens.com/digitalenterprise)**



## Global support

Reliable technical support based on technological and industrial know-how is key to the success of a project. You are on the safe side with the unique, global service and support offering from Siemens.

**Find out more at [siemens.com/industry-services](https://www.siemens.com/industry-services)**



## Control systems from a single source: San Fedele Tunnel, Grisons, Switzerland

In November 2016, a 5.7 km bypass was completed to relieve traffic congestion in the village of Roveredo in the Swiss Canton of Grisons, that had been cut in two by a through road for 40 years. The heart of the bypass is the 2,400-meter-long, two-lane San Fedele Tunnel, which is equipped with state-of-the-art technology from Siemens.

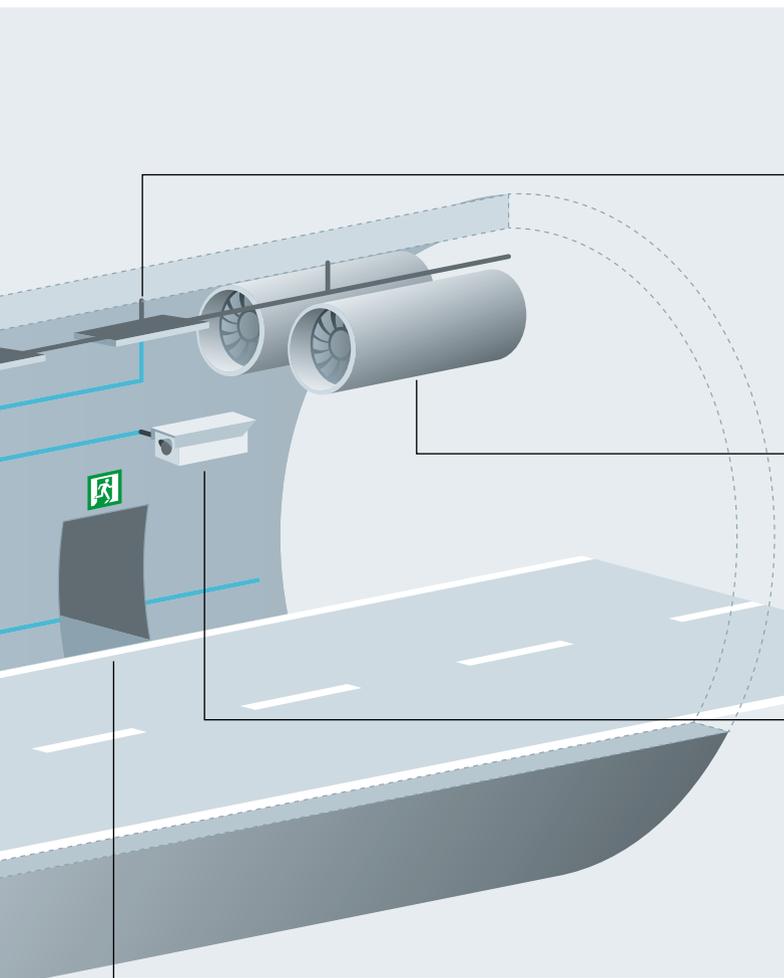
The lighting, traffic signals, ventilation and some additional facilities are controlled by SIMATIC S7-1500 controllers, and have been fully automated with the TIA Portal.

The system controllers are operated and monitored using SIMATIC HMI TP1200 Comfort Panels. SIMATIC ET 200SP and ET 200MP were selected as the distributed I/O devices. The system controllers have been connected via OPC UA to give the highest possible levels of integration and transparency in the overall system. Using TIA Portal V14, the SIMATIC S7-1500 controller can be accessed directly on the OPC UA server.



*"The ready-made commands that can be called from the TIA Portal library make time-consuming programming with 'if-then-else' commands superfluous. Testing, commissioning and adaptations can be performed significantly more easily."*

**Alfredo Rigamonti**  
Managing director of Rigamonti SA, Contone, Switzerland, and Siemens Solution Partner



### Lighting

Function monitoring and lighting control can be adjusted for optimal visibility to match the traffic situation.



### Ventilation

High-availability controllers allow the reliable operation of complex ventilation programs to protect people and structures in every situation.



### Video surveillance

Hazardous situations are detected at an early stage thanks to the simple integration of the video surveillance into the SCADA system with end-to-end functionality.



### Escape routes

The integration of all signals into the automation system ensures that escape routes and emergency call niches are reliably signposted at all times.

# Maximum interaction

of the components thanks to  
Totally Integrated Automation (TIA).

Find out more!  
[siemens.com/tunnelautomation](https://www.siemens.com/tunnelautomation)

**Published by  
Siemens AG 2017**

Digital Factory  
Postfach 48 48  
90026 Nuremberg, Germany

Article No.: DFFA-B10431-00-7600  
Printed in Germany  
DISPO 06303  
WS 11171.0

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Siemens provides products and solutions with industrial security functions that support the secure operation of plants, systems, machines and networks.

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens products and solutions only form one element of such a concept.

The customer is responsible for preventing unauthorized access to his plants, systems, machines and networks. Systems, machines, and components should only be connected to the enterprise network or the internet if and to the extent that it is necessary and with appropriate security measures in place (such as the use of firewalls and network segmentation).

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