

REFERENCE CASE STORY

## ABB UPS for the Gotthard Base Tunnel

Reliable and safe energy supply for the maintenance and intervention centers



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01 Gotthard Base Tunnel

Launched in 1993, the Gotthard Base Tunnel - the longest rail tunnel in the world - finally opened in June 2016, a year ahead of schedule. ABB's contribution to this monumental construction project came in many forms – such as the over 800 medium-voltage (MV) switchgear units and transformers that power the tunnel infrastructure and 50 Hz grid; the more than five hundred REF542plus safety and control units, with multi-stage distance protection, to ensure optimal security across the entire tunnel; the several hundred ABB vacuum-impregnated dry-type transformers that ensure the 50-Hz energy supply in the tunnel as well as the energy supply for the emergency backup system; and the many kilometers of robust PMA cable protection for more than 10,000 orientation lights and 450 escape route lighting systems in the tunnel.

All these products had to meet a very high specification in order to overcome the challenges faced in the Gotthard with its harsh climatic conditions and rough terrain. The 50-Hz energy supply in the tunnel's tube,

As well as essential electrical components for the Gotthard Base Tunnel infrastructure, ABB also supplied the uninterruptible power supply (UPS) for the maintenance and intervention centers in Biasca and Erstfeld.

for instance, is exposed to aggressive salts, brake dust, soot particles, as well as track and wire particles – but, at the same time, it should require only minimal maintenance. Enormous pressure fluctuations between  $\pm 10$  kPa, caused by trains traversing the openings of cross passages at speeds of up to 250 km/h, complicate matters even more.

The ventilation system also meets the tunnel's high safety exigencies and ensures an energy-efficient operation. ABB delivered the MV and low-voltage (LV) distribution systems, including drive transformers and converters (ACS1000) for the tunnel ventilation as well as the LV components (switches and soft starters) for the 24 jet fans at the tunnel portals. Also included in the delivery is the controller (AC800M), communication, instrumentation of the ventilation system and its sensors.



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02 SBB built two maintenance and intervention centers to handle tunnel maintenance - both locations have UPSs to protect critical loads against power outages and fluctuations.

**UPS for the maintenance and intervention centers**  
The SBB, the Swiss national railway company, built two maintenance and intervention centers - in Biasca and Erstfeld - to handle tunnel maintenance and provide access should an incident occur. Clearly, the energy supply to these facilities must be highly reliable so that employees are able to undertake any actions necessary. To this end, ABB installed an uninterruptible power supply (UPS) system in Biasca and Erstfeld. Both locations have twin, three-module Conceptpower DPA 250 UPSs, each with an output power of 90 kVA, to protect critical loads against short-term power outages and fluctuations.

To further ensure power continuity, in each of the two locations one UPS is fed from the tunnel 50 Hz local grid and the other from the railway 16.7 Hz, 220 V

supply. Each UPS pair has a battery bank that will continue to supply 90 kVA for 30 minutes. The UPS units have been placed close to the LV main distribution panel, which ensures power continuity in case of short interruptions.

The modular design of ABB's DPA UPS delivers maximum availability as each UPS module contains all the hardware and software required for full system operation. If one module goes down, the others take up the load. Modules can be hot-swapped, making maintenance simple.

The UPS delivery also included the battery system, power input and output panels, and a comprehensive ABB service package

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