

CASE STUDY 'RAILWAY', PMA CABLE PROTECTION SOLUTIONS

## PMA Cable Protection Solutions

Developed to meet the most stringent requirements for rail operations in breathtakingly beautiful mountainous regions



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01 The Rätische Bahn  
in the Swiss Alps,  
a fascinating and  
challenging UNESCO  
world heritage rail route

RhB operates a 384-kilometre long rail network in the heart of the Swiss high mountainous region. Some of the regional trains and freight trains plus the vehicle transporter service in tunnels through the mountains operate at altitudes of over 1,500 metres above sea level. Against a background of breathtakingly beautiful scenery, the RhB trains cross 612 bridges and pass through 115 tunnels, some of which are UNESCO world heritage sites – a fascinating railway landscape which demands the utmost of personnel and equipment.

### **Exposed to wind and weather throughout the whole year**

Railway staff and equipment are severely tested by very strong sunshine and stone chip damage in summer and by icy temperatures and deep snow in winter. This demands reliability, flexibility and the courage to come up with innovative solutions. Which is why RhB relies on partners and suppliers

The Rhaetian Railway (RhB) knows why it has relied for over ten years on ABB PMA's well-proven cable protection solutions – it's because only the best and the most reliable materials are worth considering whenever and wherever the most stringent demands are made of the infrastructure, the rolling stock and the people who work on the railway.

who share these values. It will soon be ten years that ABB and its PMA cable protection solutions have been meeting these criteria.

RhB's rolling stock ranges from car transporter wagons to panorama cars for tourist services and to trains for commuter traffic. From among its several thousand cable protection products, PMA, the leading supplier of highquality cable protection solutions for the rail industry, can offer the appropriate solution however challenging the situation – whether for passageways between coaches, roof and underfloor installations, couplings, bogies or signalling systems. Thanks to the positive experiences over the last years, RhB is now installing PMA cable protection products in its entire rolling stock and its rail infrastructure. Reliability of supply and exemplary technical support help RhB's employees to protect the electric cables in rolling stock and rail infrastructure efficiently and for the long term.



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01 Major requirements for flexibility, impact resistance and corrosion protection. Car transporter wagons are retrofitted with PMA cable protection solutions.

02 The PCS polyamide conduit replaces the metal cable protection when running cables beneath the vehicle transporter wagons.

03 An angled threaded connection and conduits with abrasion protection sleeves. A total solution for protecting couplings using PMA products.

### **PMA nylon conduits instead of metal pipes for optimum protection against corrosion and stone chip damage**

Because RhB's experience of PMA nylon conduits and fittings has been so positive, these products are frequently employed in the central repair workshop in Landquart both during maintenance work and when upgrading and retrofitting. The vehicle transporter wagons which operate in the Vereina tunnel were equipped with PMA nylon conduits during their recent retrofit in the central workshop in Landquart. All the end-to-end cables to the left and right under the coaches are now run in PCS conduits.

“PMA's nylon cable protection offers many advantages over other materials.”

These replace the metal pipe solution used so far which is not sustainable over the long term because of corrosion, friction and vibration. The PCS conduits are highly impact resistant and extremely flexible.

Even when exposed to the extreme temperature differences which occur in tunnels in the high mountains, the conduit, which is designed for continuous operation at between  $-50^{\circ}\text{C}$  and  $+105^{\circ}\text{C}$ , retains its mechanical strength. “Tunnels like the Vereina vehicle transporter service operate continuously 24 hours a day, 7 days a week, making absolute cable protection hugely important. Especially in winter, the air in the tunnel gets very salty due to vehicles driving straight onto the transporter wagons from salted roads and bringing salt in on their tyres. Added to this is the difference in temperature between the inside of the tunnel and outside which can be as much as  $30^{\circ}\text{C}$ ”, according to Placi Coray, head of the RhB electrical engineering workshop in Landquart.



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### Wagon couplings severely tested

For its wagon couplings, RhB has now opted to use PMA nylon products instead of metal. These nylon products are better able to absorb the forces and the friction generated by slewing movements. Thanks to PMA's cable protection solution involving angled threaded connections and abrasion protection sleeves, vibration, dynamic forces and mechanical stress from ice strike and stone chips are all greatly reduced, allowing the couplings to function perfectly.

### The challenges posed by the new fire prevention standard

These days, fire prevention is becoming an increasingly important factor for manufacturers and operators of rail vehicles. The introduction and ratification of the EN 45545 standard has brought uniformity to European fire prevention standards. RhB intends to follow this new standard when

equipping its rolling stock. PMA is similarly prepared for these new rail industry requirements and its products conform to all the relevant fire prevention standards. ABB's PMA cable protection range for the rail industry already meets the EN 45545 specifications.

### Rail infrastructure solutions for the most exacting requirements

During the long winter months, the temperature across the rail network can fall to -20°C. This is critical for points which will not function properly when frozen, leading to disruptions to the network. To prevent this from happening, RhB uses points heating systems in order to ensure smooth operations in the critical winter months. The highly-flexible, medium-duty PHT conduit, temperature-tolerant down to -50°C, is the perfect choice for protecting the heating systems' electric cables.

04 / 05 The Rhaetian Railway's central workshop in Landquart with PMA conduits ready for installing. What's required of PMA is the ability to ensure deliveries whenever required and to offer competent technical service support.

06 Cable protection systems being installed in an RhB wagon. Countless electrical cable connections need to be protected. PMA's comprehensive product portfolio always has the appropriate solution.





#### **A partnership which has proven its worth for decades**

The collaboration between the Rhaetian Railway and ABB, which has lasted for more than a hundred years, is a story of successful cooperation between two partners who place the greatest possible value on quality and service. "The Rhaetian Railway is a very professional company which has extremely exacting requirements with regard to products, quality, support and reliability of supply. We are proud to have been able to satisfy these requirements for close to ten years.

"Reliability of supply and technical support are important for us."

From materials research to the finished products, we invest all our powers of innovation so as to be able to offer the rail industry, both now and in the future, the best solutions for cable protection", says Roger Spuler, ABB's PMA contact person for RhB.

#### **A 100-year long success story; ABB and the Rhaetian Railway**

As a pioneering railway company, the Rhätische Bahn recognized more than 100 years ago that the future belonged to electric drive systems. As early as 1913, when it was known as Brown, Boveri & Cie, ABB delivered the first locomotives for electrified routes – and also, subsequently, the efficient and reliable power supply for the entire rail network. Today, too, ABB's technology works with the Rhätische Bahn on one of the most beautiful routes in Switzerland running through magical winter and summer landscapes. The trains are equipped with very powerful, robust and energy-efficient power packs and high-quality PMA cable protection products.

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