

Case Study

Rhaetian Railway



» Extremely effective vibration protection at 1700 m above sea level

» Effective resilient bedding under extreme weather conditions

» Ballast mats to adjust the stiffness of the bedding at transition points

Highest Mass-Spring System using Sylomer® in Europe

Project description

The Albula and Bernina lines of the Rhaetian Railway were granted UNESCO World Heritage status in 2008. These stretches are masterpieces of construction technology and the art of the railway engineer. In Samedan in Graubünden four of the Rhaetian Railway lines come together to form the hub of rail transport in Oberengadin.

To remove the Sper l'En level-crossing in Samedan and separate the roadway and railway, the local authorities arranged to lower the track by up to 5 m. The new section is 420 m long, with a 288 m stretch laid as slab track - 100 m of which is in a tunnel. A mass-spring system was envisaged for the entire section. As Samedan is about 1700 m above sea level, its height and the unusual geological conditions - tunnel and track are located in ground water - created particularly

stringent requirements in terms of vibration protection. For example, temperatures as low as minus 30 degrees Celsius are not uncommon during the winter.

„We were able to point to our many years of experience and our successful realisation of similar high-altitude reference projects, for example the mass-spring systems in the Arlberg, Kaponig and Ochenig tunnels in Austria. All very good reasons why Getzner was awarded the contract to install a mass-spring system to suppress vibrations and structure-borne noise. This UNESCO World Heritage site is certainly something out of the ordinary. We consider it a great honour to be able to provide a section of track bedding for a railway as prestigious as this one“, stressed Getzner project manager Helmut Bertsch.

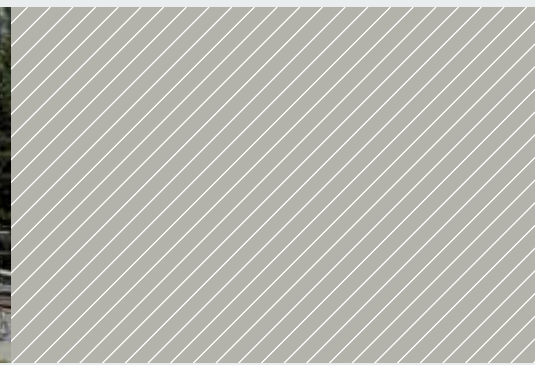
The Getzner solution

Farsighted vibration protection

Mass-spring systems are employed in situations where the highest demands are placed on vibration protection. Plots of empty land which lay alongside the track will now be able to be built on in future. With its solution in Samedan, Getzner has successfully installed the highest Sylomer® in Europe - despite the extreme weather conditions during the winter months.

The Rhaetian Railway is the first to use a slab track in the form of a mass-spring system: a 288 m long „trough“ that lies in ground water is the key element along the lowered length of track. It has been executed as a full-surface bedded mass-spring system. To provide complete drainage of the surface, lateral water channels and four pump pits were installed, two of which are heated during the winter. Getzner also installed strips of drainage matting in the corners along the entire length of the trough to catch any water entering via the joints. Together, these two measures ensure controlled and comprehensive drainage of the mass-spring system.





Feedback

Quality of life improved in the long term

To provide effective protection from vibration and structure-borne noise, it was also necessary to even out differences in the bedding caused by superstructure-related matters: „Wherever slab track comes up against ballasted track, there are going to be variations in stiffness. We were able to even these out very successfully through the targeted use of ballast mats“, explains Helmut Bertsch. Getzner’s technical team provided forecasts of rail deflection as well as the expected natural frequency of the system and calculated the types of transition point that would be required.

„A constant rail deflection at the transition points reduces the dynamic loading on the wheel-rail system and on the superstructure. The result is a significant reduction in vibrations and structure-borne noise: the use of the highly elastic Sylomer® material ensured that the natural frequency of the bedded, lower-level track was significantly below the required 20 Hz. A positive result for the region“, concludes Helmut Bertsch.

What do our clients and partners have to say about the project?

„From our perspective, the extensive know-how of Getzner’s technical team made a very valuable contribution to the successful implementation of the project. On the one hand they performed the calculations for the resilient bedding of the mass-spring system and the transition points, while on the other they delivered a solution that met the vibration requirements as set out in the IFEC specification.“

Leo Hirschbühl,
GPL - Overall project manager
for Rhätischen Bahn AG

„Getzner and its sales partner Angst + Pfister, Zurich provided us with excellent on-site support - the cooperation was very positive and unproblematic. The Getzner team knows its product extremely well, which, as far as we were concerned, greatly simplified the handling and installation. The site supervision and the coordination of the material deliveries worked perfectly - all deliveries arrived complete and on time.“

Olaf Schmidt,
Site manager,
Edy Toscano AG





Facts and figures at a glance

Mass-spring system project for the Rhaetian Railway

Developer:	Municipality of Samedan and Rhätische Bahn AG
Project design:	IG FHP Bauingenieure AG und T. Cavigelli AG, Chur und Domat/Ems
Realisation:	September/Oktober 2011
Length:	Total new track approx. 420 m, of which 288 m as mass-spring system with Sylomer®
Opened:	December 2011
Material required:	1.100 m ² Sylomer® for the base/side mats, 40 m ² ballast mats for the transition points
Expert assessment	
Vibration:	IFEC Consulenze engineering consultants, Rivera
Site management:	EDY TOSCANO AG/FHP - Foidl Hegland & Partner AG
Installation of mass-spring system:	Gleisbau Müller, Frauenfeld
Resilient bedding:	Getzner Werkstoffe GmbH, Bürs/Angst + Pfister AG, Zürich

This project was carried out in collaboration with our partner, Angst + Pfister AG of Zurich.

Getzner Werkstoffe GmbH

Foundation:	1969 (as a subsidiary of Getzner, Mutter & Cie)
Managing Director:	Ing. Jürgen Rainalter
Employees:	212 in Bürs, 87 abroad
2011 turnover:	EUR 56.2 Mio.
Business areas:	Rail, construction, industry
2011 output:	7,209 tonnes of technical PU materials
2011 recycling:	51 tonnes of residual PU materials
Locations:	Bürs (AT), Munich (DE), Berlin (DE), Amman (JO), Tokyo (JP), Pune (IN), Beijing (CN), Kunshan (CN)
Ratio of exports:	80 percent

Rail construction references (extract)

- Northern approach to the Brenner base tunnel (AT)
- Römerberg tunnel (AT)
- Zammer tunnel (AT)
- Arlberg tunnel (AT)
- Airport link Cologne/Bonn (DE)
- Zimmerberg tunnel (CH)
- Gotthard tunnel (CH)
- Weinberg tunnel, Zurich (CH)

Pictures: 1 Title image, Rhb - Peter Donatsch | 2 Edy Toscano AG | 3 Rhb - Tibert Keller | 4 Rhb - Andrea Badrutt

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