

Elastically supported slab track system

Slab Track Austria

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PORR

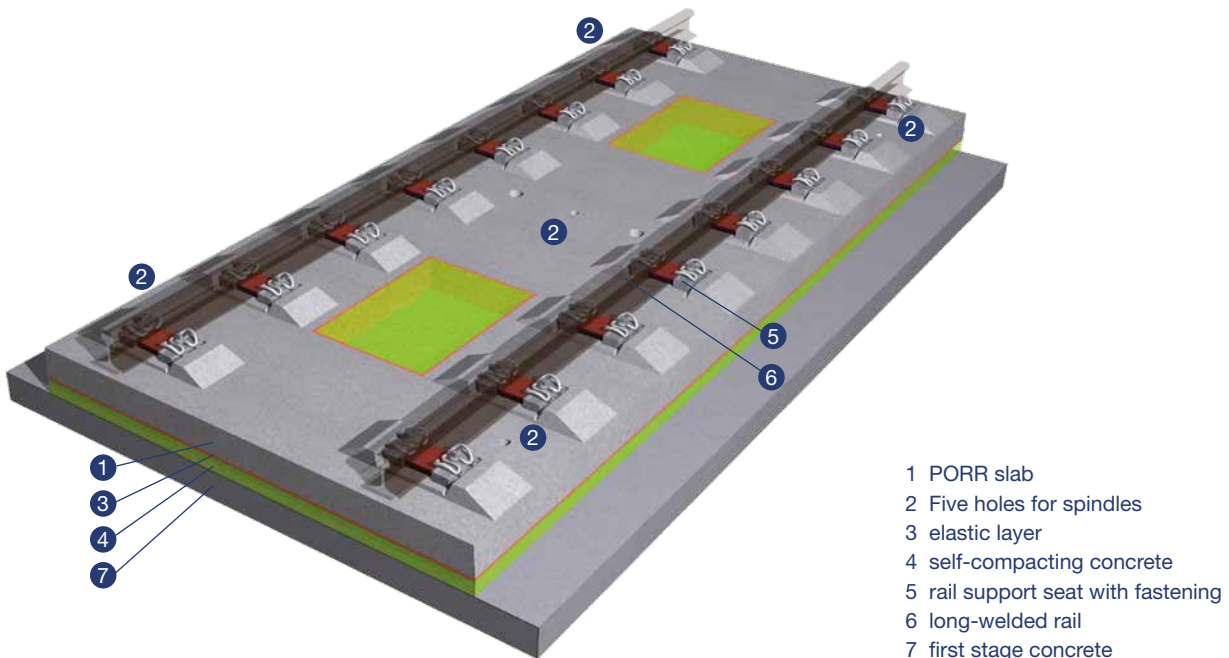
1 System Description

Slab Track Austria (STA), also known as PORR elastically supported system, was jointly developed by the Austrian Railway Corporation (ÖBB) and PORR AG. The oldest section has been in operation since 1989 without maintenance and service costs. STA continues to be demanded and has served successfully on high speed, conventional railway and metro lines and is also suitable for heavy-haul applications.

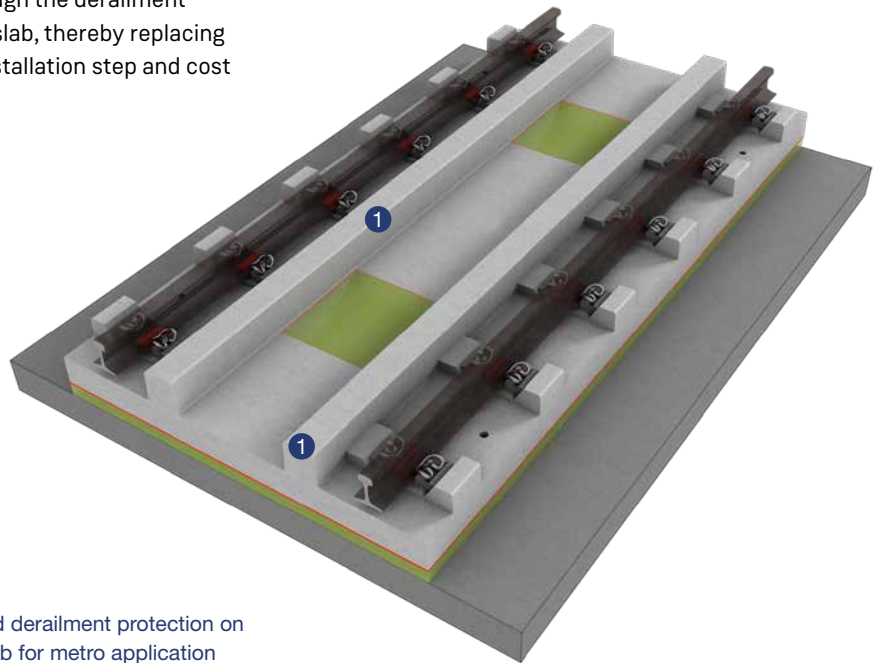
The main element of this system is the elastically supported slab. The PORR slab is an untensioned reinforced precast slab with integrated rail support seats. An elastic layer is integrated at the bottom of the slab, as well as inside the tapered grouting openings. The result is double-layered elasticity,

reduction in the vibrations or structural-borne noise, and decoupling from its structural supports. A joint width of minimum 40mm separates two slabs and compensate any deformations caused by creeping, shrinking or temperature changes. The joints between the slabs also serve as surface water drainage or spaces for cable-crossing.

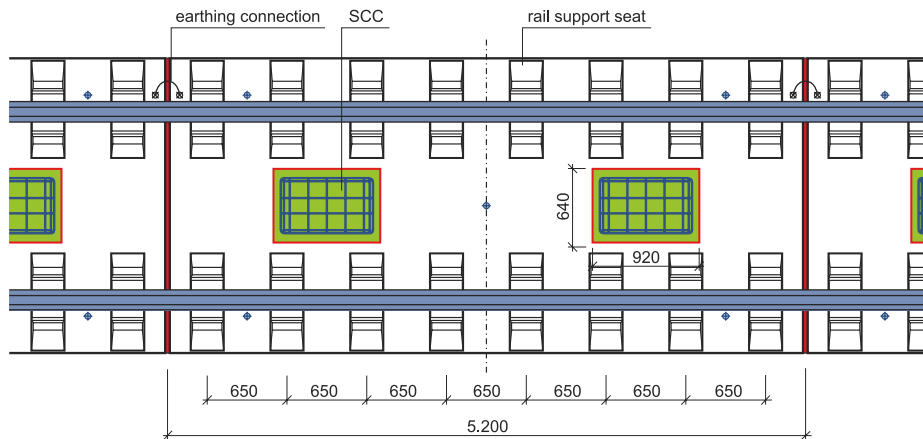
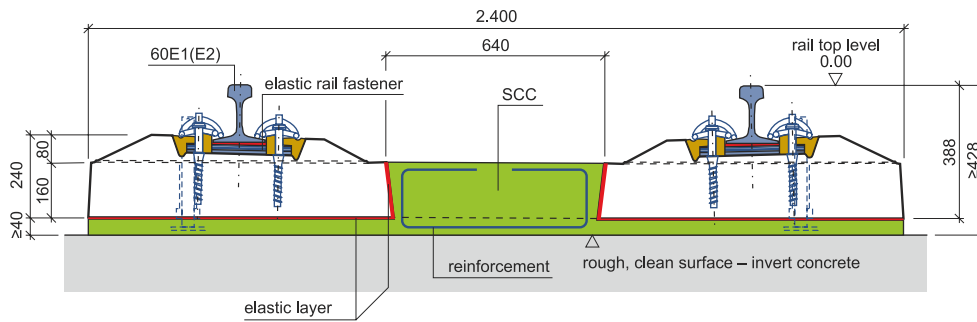
The PORR slabs are supported and fixed on a thin base layer of self-compacting concrete (SCC). This allows homogeneous setting, and without the need to vibrate the concrete reduces disturbances of final track alignment to a minimum. Upon concrete hardening, the concrete in the tapered openings works as anchor to vertically and horizontally keep the slab in place.



PORR metro slab can be designed with integrated derailment protection. Fast installation and cost saving can be achieved through the derailment protection integrated in the slab, thereby replacing the need for an additional installation step and cost for the steel guide rail.



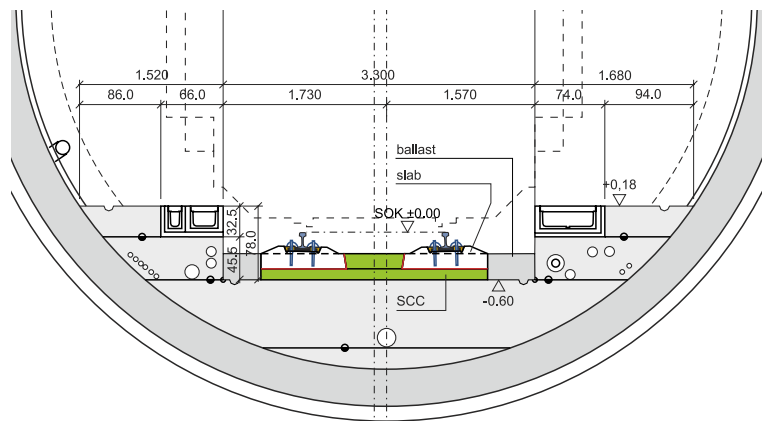
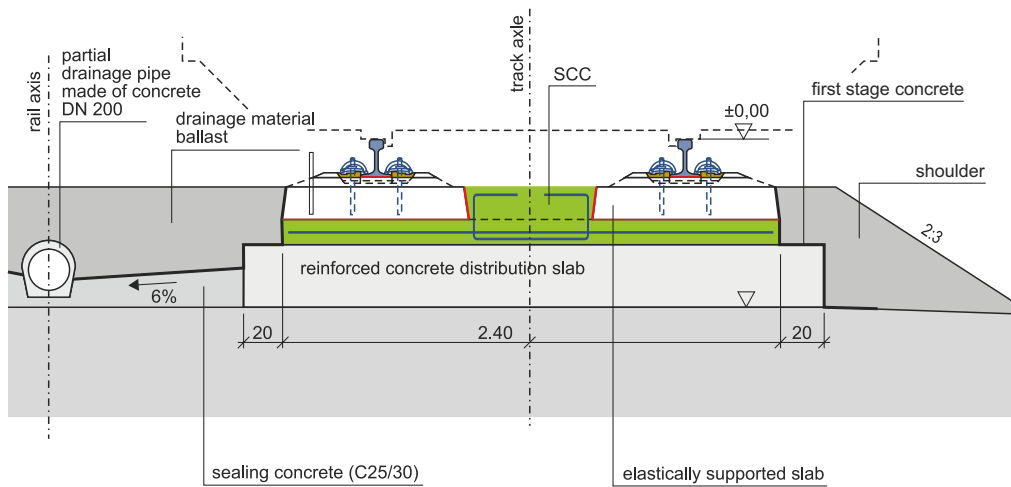
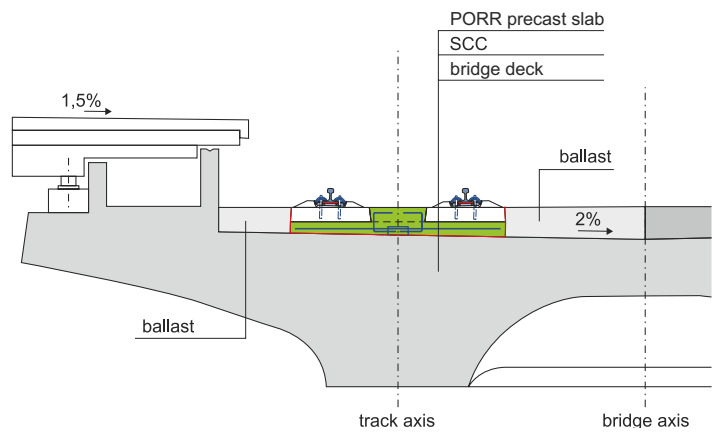
1 Integrated derailment protection on PORR slab for metro application

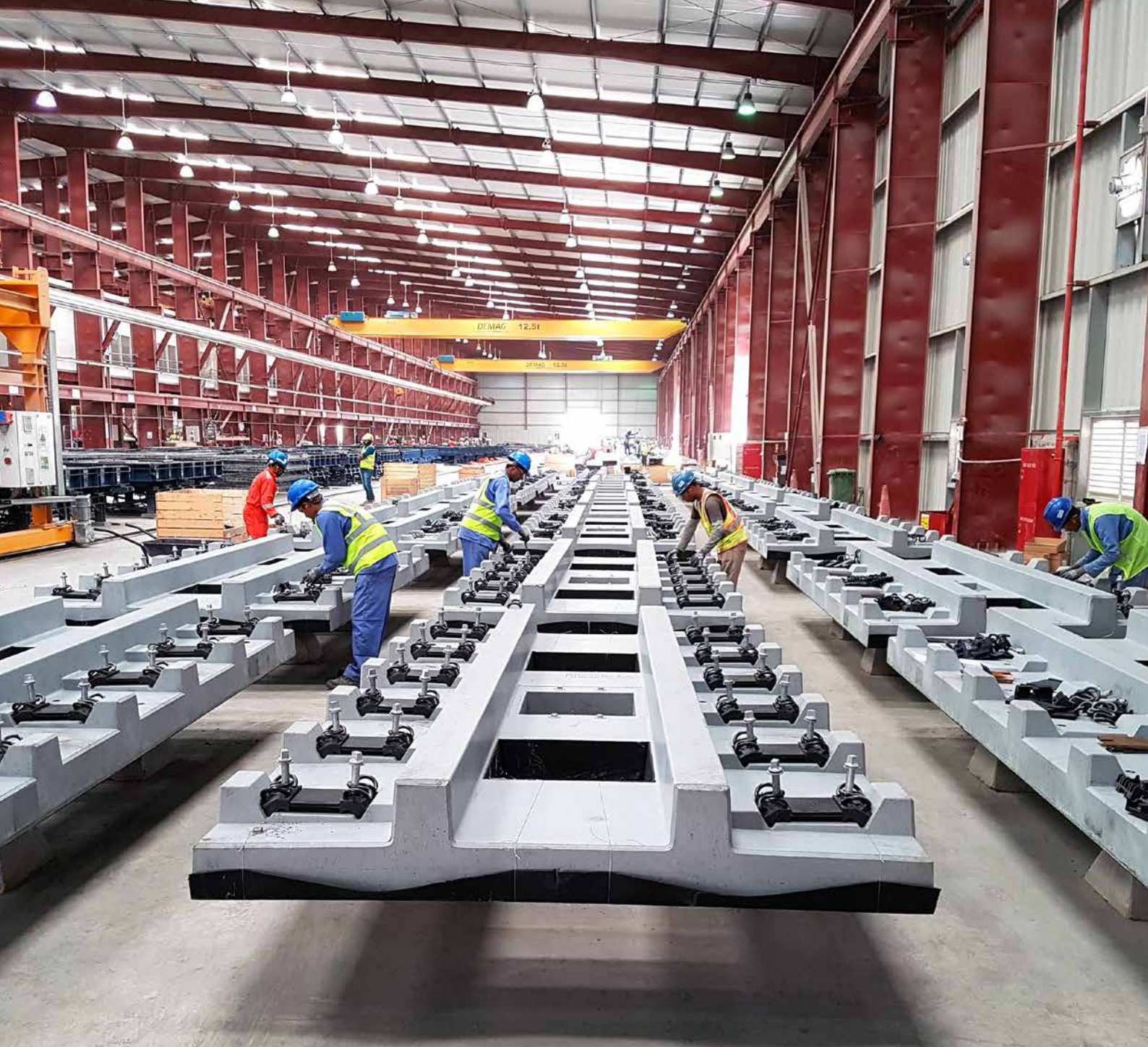


2 System application cross-sections

Slab Track Austria can be built on various solid base structures such as:

- on elevated sections (on bridges and viaducts)
- at grade
- in tunnel sections





3 Slab production

Independent of weather conditions, the slabs are made in the country's precast plant or project's site plant. The slab production is executed under complete quality assurance system and guarantees the delivery of continuously high quality products.

The highly-modular steel formworks are adjustable to cover all radius ranges with high precision.

Variations such as length reductions, revisions or additional dowels for track equipment can be realised.

Each slab type can be identified and is unmistakably marked with a corresponding bar code for logistics and track recording. Due to the "just-in-time" principle, storage place is provided in the plant to be transported to the construction site.

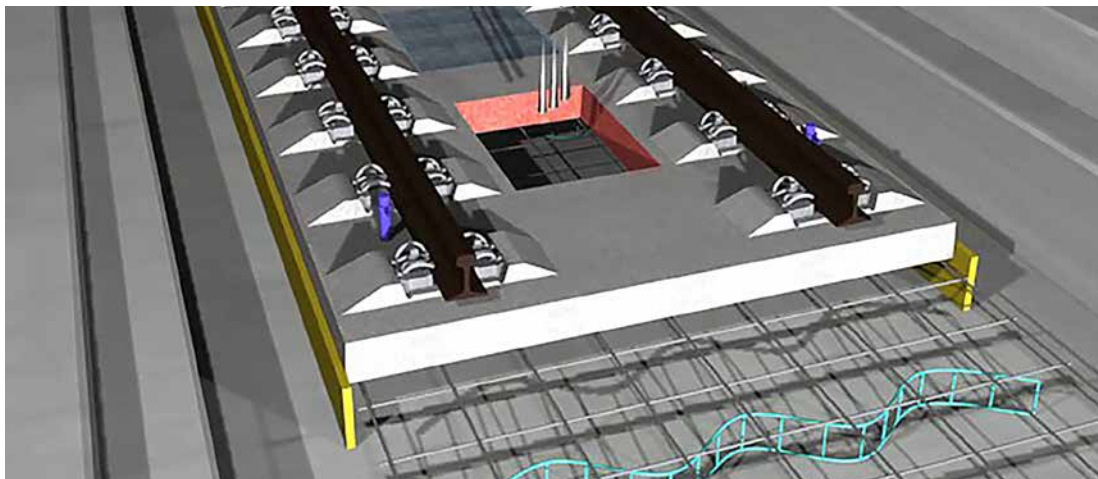
4 Installation of PORR slab track

Fast installation of PORR slab track is made possible with the following major steps using top-down installation methodology:

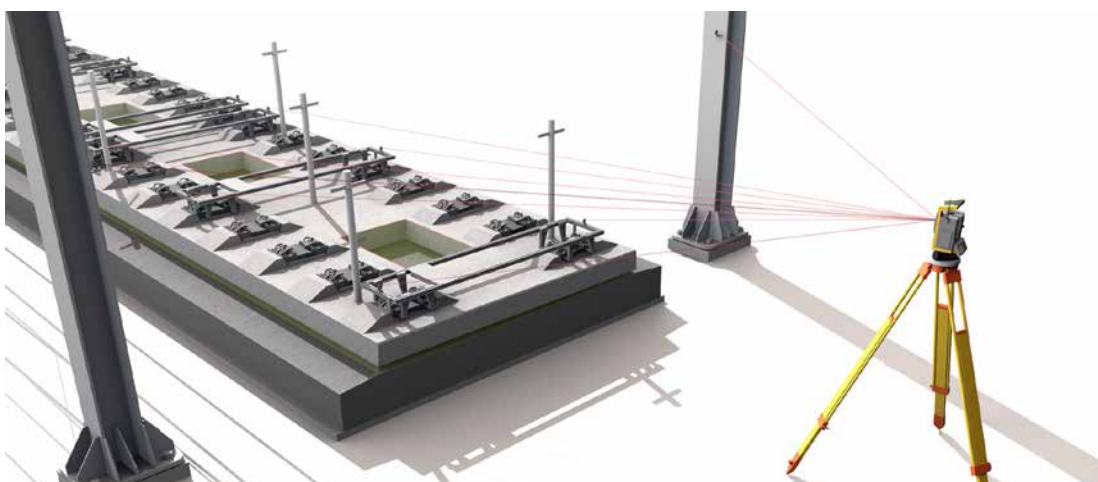
- **Surveying of setting out points**
- **Placement of reinforcement and cross drainage pipes on the track foundation, as needed**
- **Transportation of slabs to installation site to intermediate placement to accuracy of ± 1 cm**
- **Placement of long rails and track adjustment**
- **Installation of side formwork**
- **Concreting with SCC – self compacting concrete**
- **Post-concreting validation**

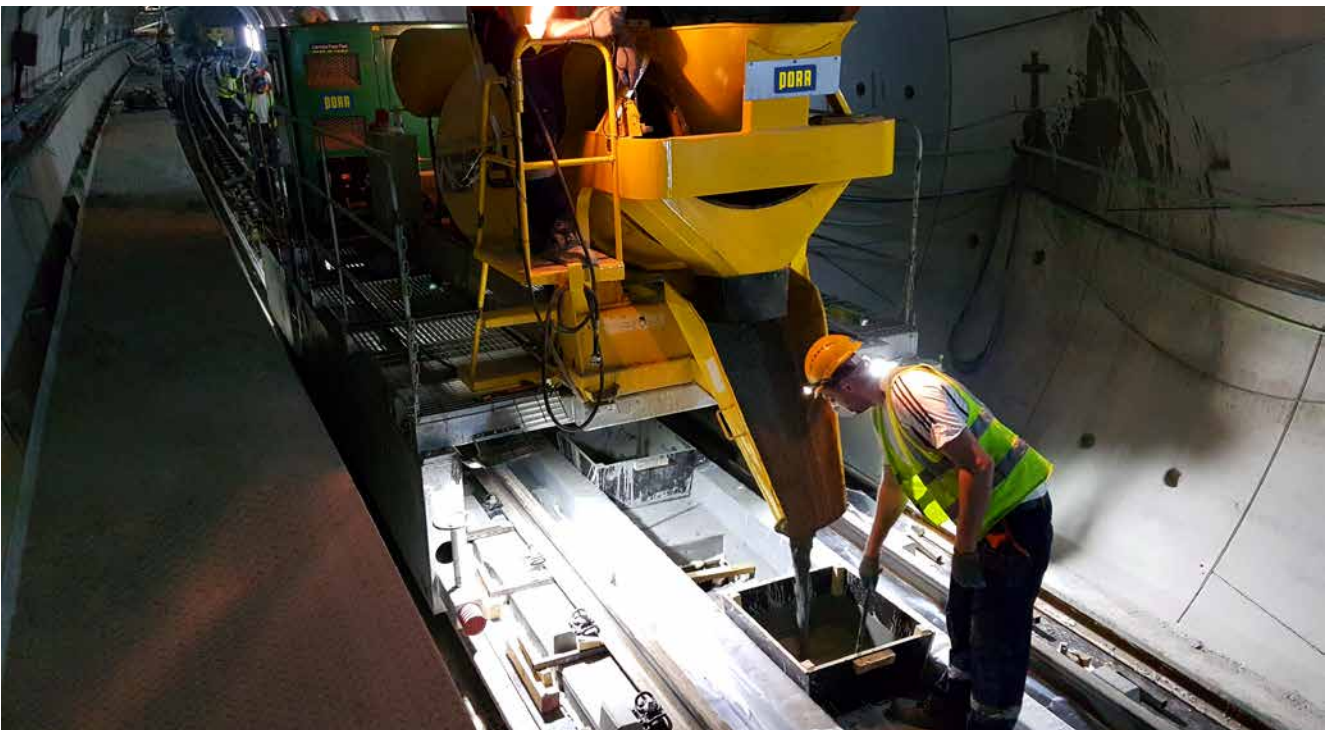
Long welded rail (LWR) is not always available for the entire alignment of the large scale projects at the start of the slab track construction. Slab Track Austria construction methodology allows installation with or without the long welded rail. It is recommended to install with the final rail in order to achieve the best possible alignment without additional adjustment steps required. However, when necessary, the highly precise PORR precast slabs enable construction without rail, which is then installed at the very end, when the LWR can be delivered to all the areas.

Installation with rail



Installation without rail



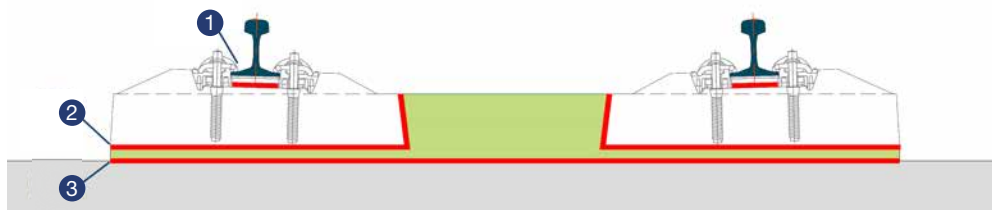


5 System extensions and additional equipment

Noise and Vibration

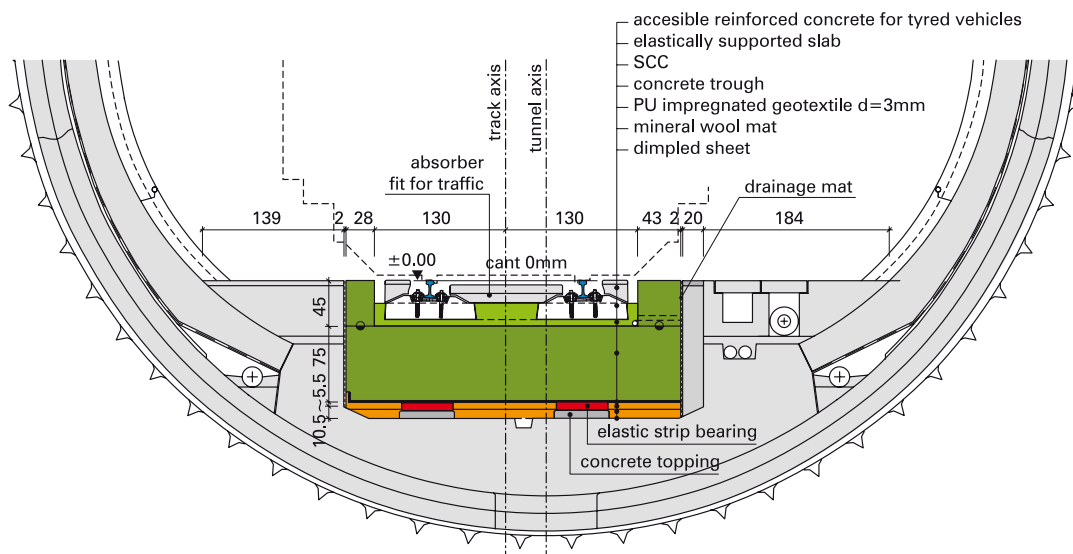
System Slab Track Austria can be provided as a resilient system with N&V mitigation possibilities. The resilience can be implemented in the fastening

system, in the integrated elastic layer or on top of the first-stage concrete.



- 1 fastening system
- 2 integrated elastic layer
- 3 first-stage concrete

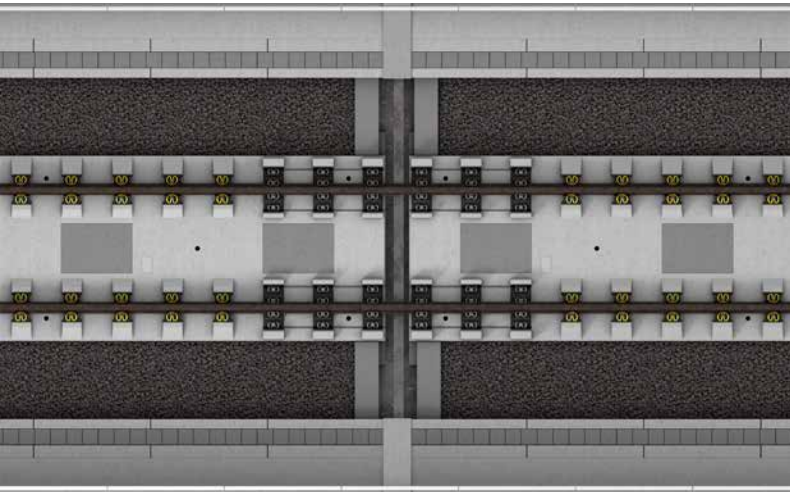
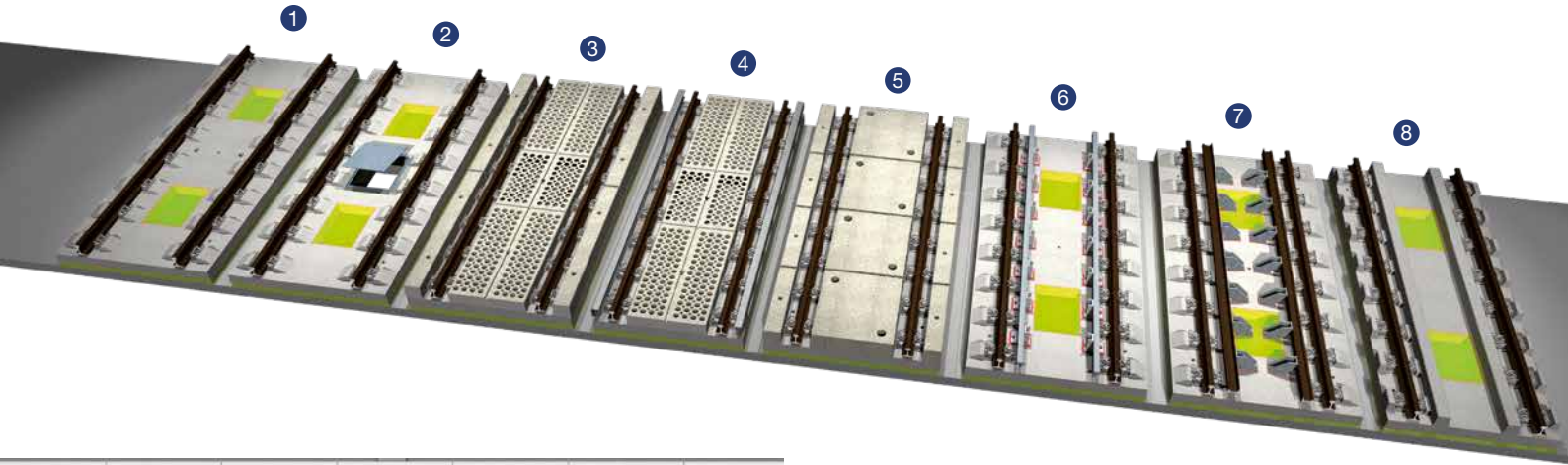
or combined with mass spring systems (floating track slab), which further increases attenuation and vibration protection. The design can be varied from lightweight to heavyweight mass spring systems through installing elastomeric sheeting layer, elastomeric strips or point-loaded bearings.



System options

The PORR slab provides a finishing surface with millimetre accuracy. This allows easy and accurate installation without on-site drilling of additional equipment such as noise absorbing slabs, trafficability slabs, buffer stops, track magnets and guard rails.

- 1 standard construction
- 2 revision in track axle
- 3 slab with accessible noise absorber
- 4 small slab accessible
- 5 accessible slab with and without guide rail function
- 6 slab with guard rails (46 E2)
- 7 slab with guard rails (60 E1)
- 8 metro slab with guide rail function and provision for 3rd rail if needed



Special solutions for bridges

Movements in the bridge joints can be absorbed up to a certain level through solutions provided in the slab track. Slab Track Austria solutions with special fastenings have been developed for these special areas for high-speed, metro and commuter railway.

Turnouts, Switches & Crossings

The PORR precast slabs for turnout areas are tailor-designed to fit the required S&C geometry.

Slab Track Austria precast slabs are also used for building Switches and Crossings (S&C) areas for both high speed and metro operations. Maintenance and operations are therefore optimised with

trains running on one continuous slab track system for the entire railway line.

Installations time required on-site is only a fraction of time when compared to cast in-situ turnout installation.



6 System advantages

- **Low maintenance**

Slab Track Austria system is maintenance-free.

- **Vibration protection**

The 2-level-elasticity of the fastenings and elastomeric layer reduces structural-borne noise and works as a lightweight mass spring with one ton per running meter.

- **Low track width and height**

Slabs can be reduced to 2.1 m width and 428 mm track height from top of rail based on 60 E1, allowing installation in limited space conditions.

- **Fast, accurate installation and less labour**

Installation of slab track is fast. Due to the high degree of pre-fabrication the construction method requires less labour and reworking. Construction during track shutdowns is possible using early strength self-compacting concrete.

- **Repair and replacement**

Slab's design allows track level adjustment and total replacement in case of damage or emergency.

- **Revisions for access and storage shafts**

In comparison to normal sleeper systems, revisions or openings are possible in the track axle allowing access.

- **Independent of weather conditions**

The precast system of Slab Track Austria minimizes quality influences due to weather conditions compared to in-situ concrete systems.

- **System reliability**

Mistakes due to tight working schedule and other external influences on-site are kept to a minimum by using slabs precasted under controlled factory conditions.

- **High quality concrete finish**

The end product gives a high quality precast finish that will impress. The surface also allow precise installation of additional track equipment.



7 Services we offer

- **Technology Provider**

PORR slab track technology, design & engineering, supervision for production and installation

- **Technology partner and subcontractor**

Design engineering, training and supervision for production and installation, PORR precast slab supply

- **All in One Solution**

Design engineering, slab production, installation

With all these service options, we provide consulting to the client for the best performance and most cost-effective approach to the project.

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