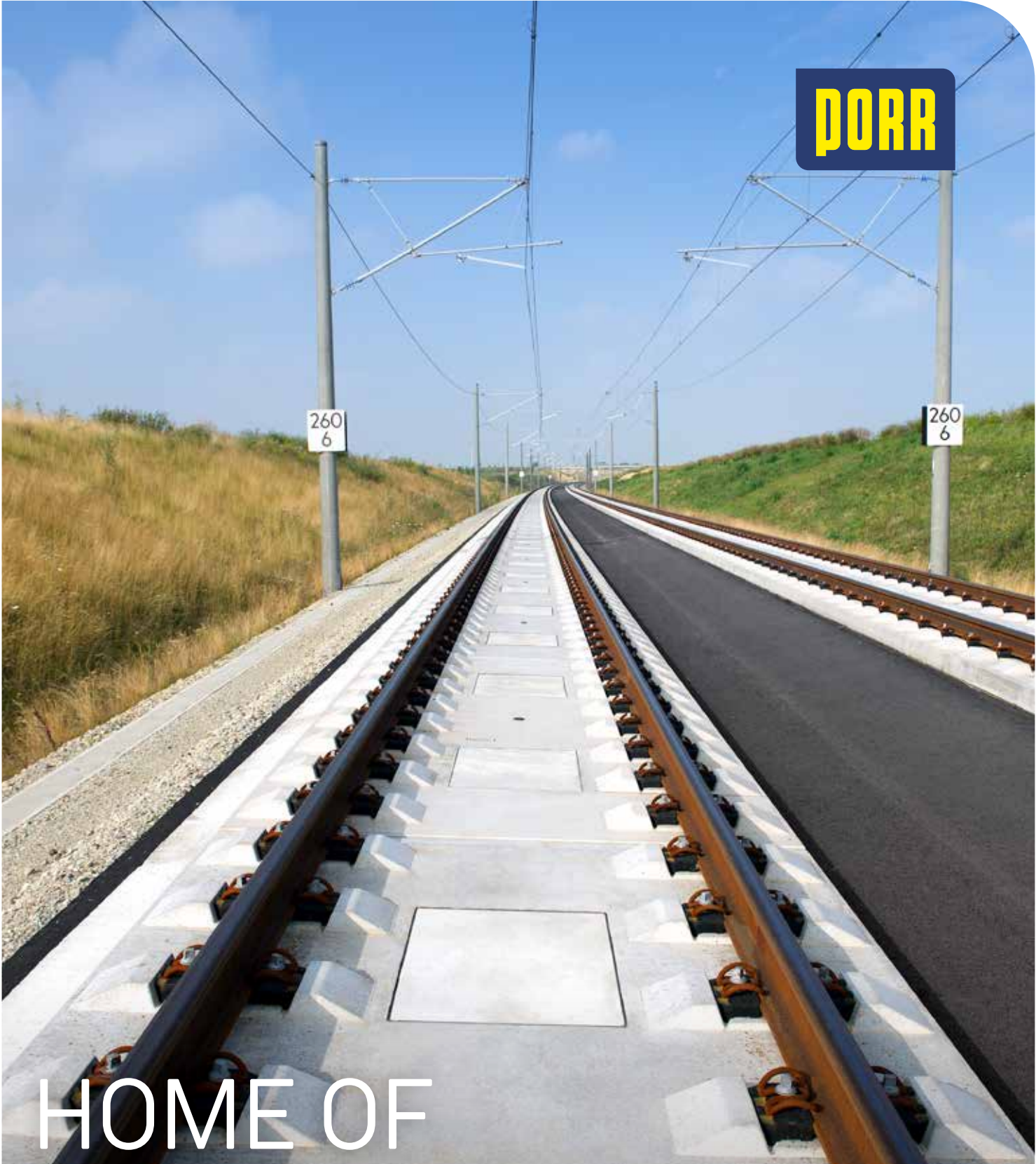




PORR

HOME OF SLAB TRACK AUSTRIA

Elastically supported slab track system

Building Construction
Design & Engineering

Civil Engineering & Infrastructure
BIM Healthcare

Environmental Engineering
Special Competencies



Lainz tunnel
Vienna, Austria

THE SYSTEM SLAB TRACK AUSTRIA

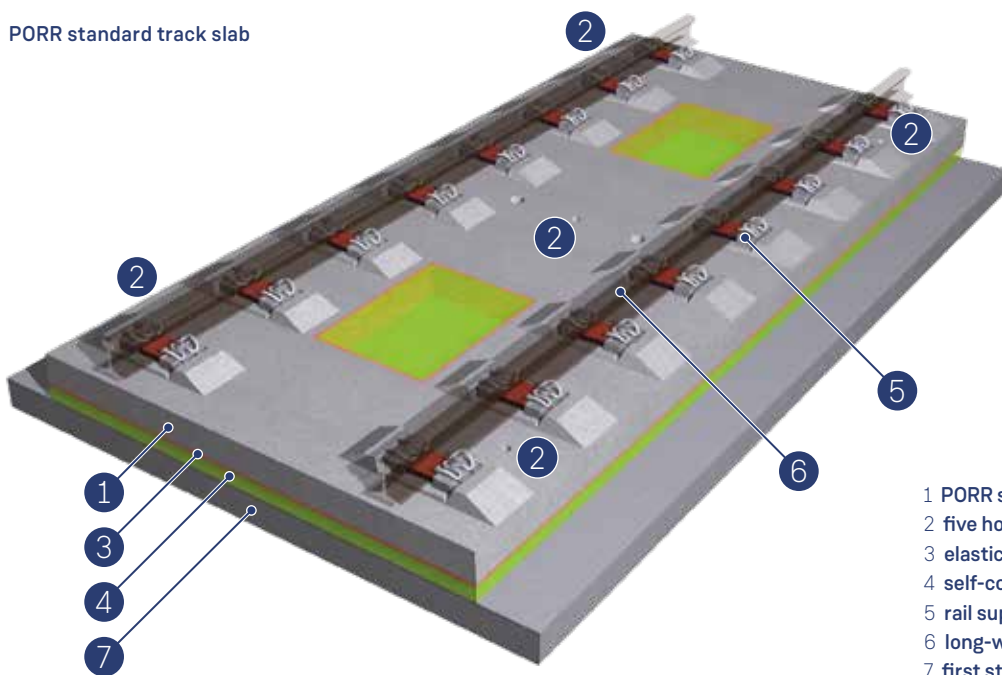
Slab Track Austria (STA), also known as PORR elastically supported system, was jointly developed by the Austrian Railway Corporation (ÖBB) and PORR AG. The oldest section has been in operation since 1989 without maintenance and service costs. STA continues to be demanded and has served successfully on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

The technology in detail

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 compensates 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.



PORR standard track slab



- 1 PORR slab
- 2 five holes for spindles
- 3 elastic layer
- 4 self-compacting concrete
- 5 rail support seat with fastening
- 6 long-welded rail
- 7 first stage concrete

Metro Doha
Doha, Qatar,

Proven quality and precision

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.

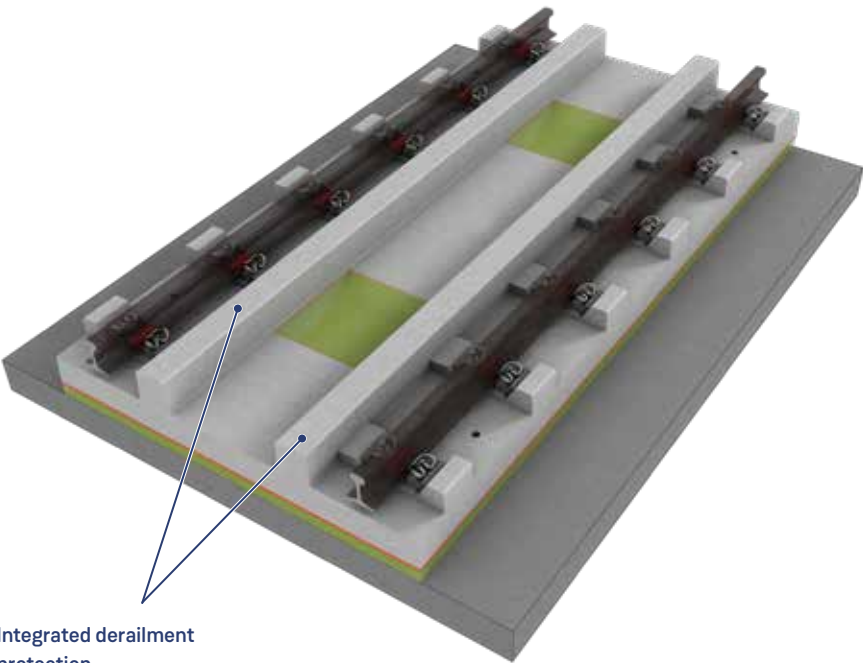
Optimized costs and installation time

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.

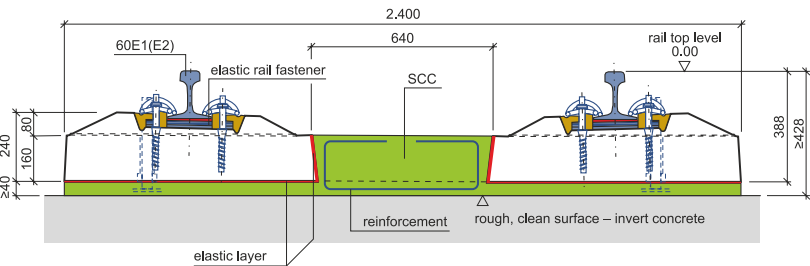




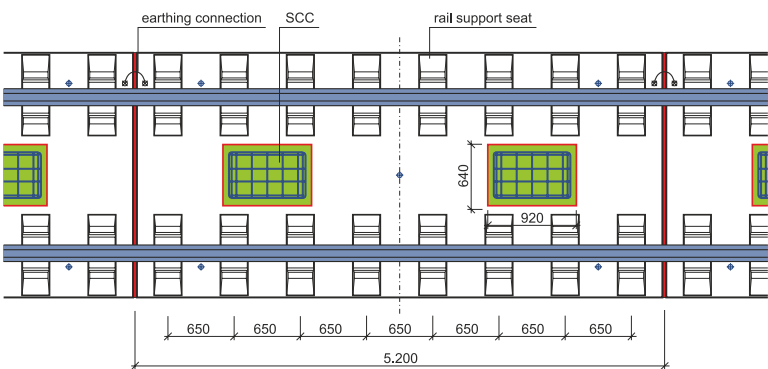
PORR slab with integrated derailment protection



PORR Slab Track Austria cross-section



PORR Slab Track Austria top view



A large industrial factory interior with a high ceiling and red steel beams. Workers in blue and orange uniforms are working on large, light-colored metal components. A yellow overhead crane is visible in the background.

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

Figure 1 is a cross-sectional diagram of a bridge deck and track. The bridge deck is shown with a 1.5% slope on the left and a 2% slope on the right. The track is positioned on the bridge deck, with ballast and a track axis indicated. The bridge deck is labeled with 'PORR precast slab', 'SCC', and 'bridge deck'. The track is labeled with 'ballast' and 'track axis'.

Diagram illustrating the cross-section of a drainage system for a railway track, showing the following components and dimensions:

- Components:**
 - reinforced concrete distribution slab
 - drainage material
 - ballast
 - partial drainage pipe made of concrete DN 200
 - track axis
 - SCC (Sealing Concrete)
 - first stage concrete
 - shoulder
 - sealing concrete (C25/30)
 - elastically supported slab
- Dimensions:**
 - 20 (width of the left sealing concrete section)
 - 2.40 (width of the central drainage area)
 - 20 (width of the right sealing concrete section)
- Other Labels:**
 - 6% (slope of the reinforced concrete distribution slab)
 - ±0.00 (elevation level)



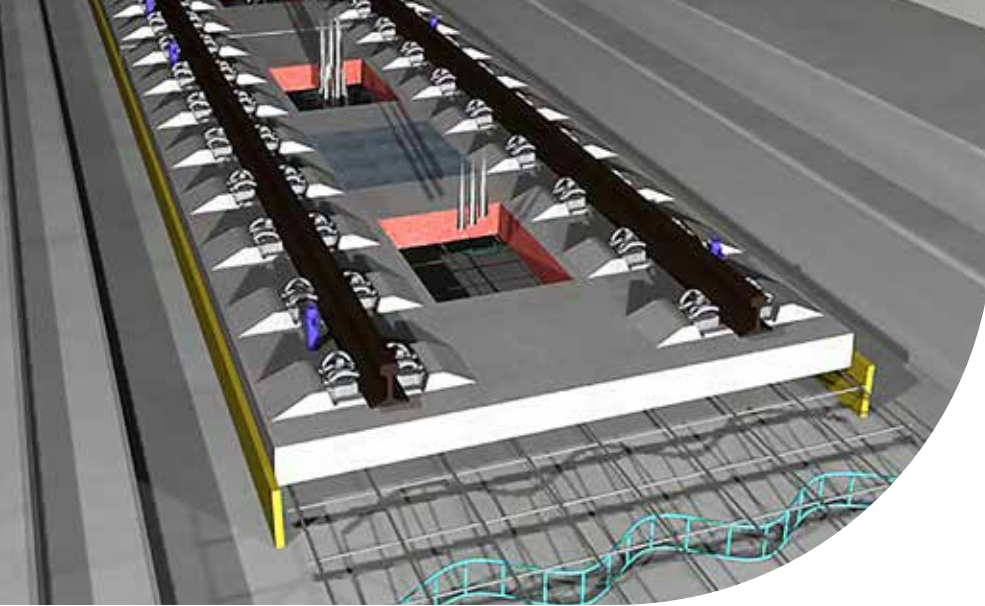
SLAB PRODUCTION

Weather-independent 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.

Millimetre-precision and traceable

- 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.



Installation with final rails

INSTALLATION AND TRACK ADJUSTMENT

Possibilities of track adjustment

The track installation can be done with or without final rails.

Installation with final rails

Best-case scenario is installation using the final rail. The very precise track position is thus achieved without additional adjustment steps. This reduces the time required by up to 50% compared to other slab track systems.

Installation and adjustment without final rails

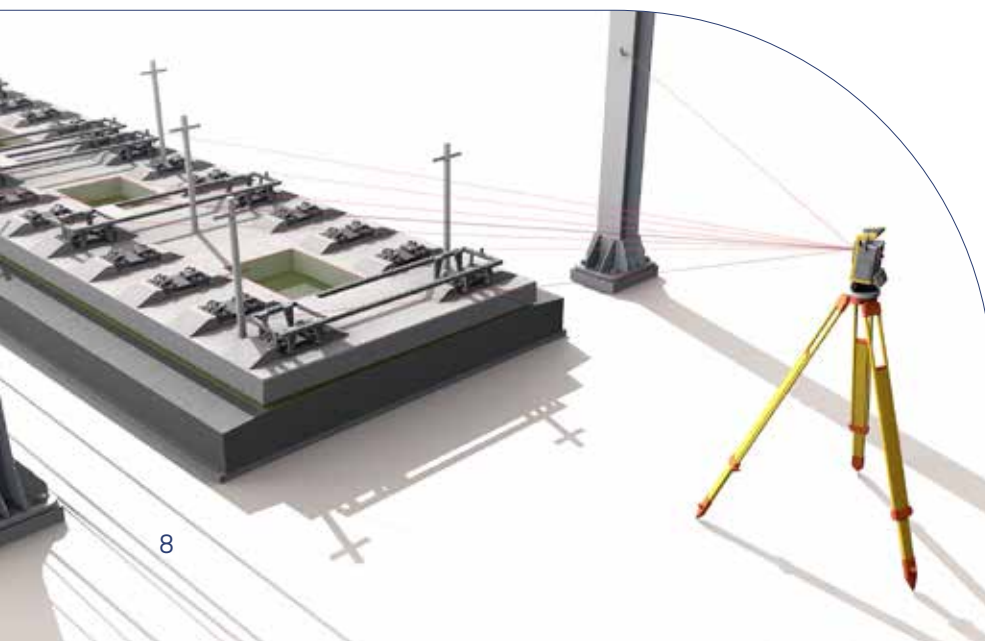
If required, installation without final rails is possible thanks to the high-precision of the precast slab. In this case, after the long-welded rails have been delivered to the construction site, the final rail installation is carried out as the last construction step.

Installation without final rails



6 STEPS FOR EFFICIENT INSTALLATION ON SITE

- 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



Track laying
Simple laying of the precast track slabs at the installation site

VDE 8 (The German Unity Transport Project 8)
Nürnberg – Berlin, Germany



© Dirk Brzoska

Track surveying and adjustment
The highly precise precast slab enables measurement and fine adjustment with minimal time and manpower to achieve the final track position.

VDE 8 (The German Unity Transport Project 8)
Nürnberg – Berlin, Germany



© Dirk Brzoska

Concreting
Concreting through grouting openings on the slab is fast and easy, with minimal time and labor

Metro Doha
Doha, Qatar



© PORR



Rail extension device on the bridge over the Argeş river
Grădiştea, Romania

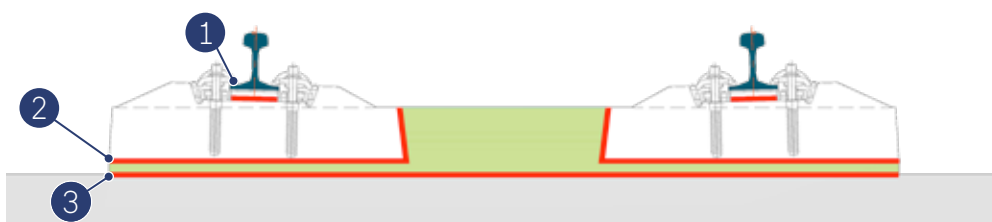
SYSTEM EXTENSIONS AND ADDITIONAL EQUIPMENT

Reduction of 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.

Ways to reduce noise and vibrations:

- 1 in the fastening system
- 2 in the integrated elastic layer
- 3 on top of the first-stage concrete

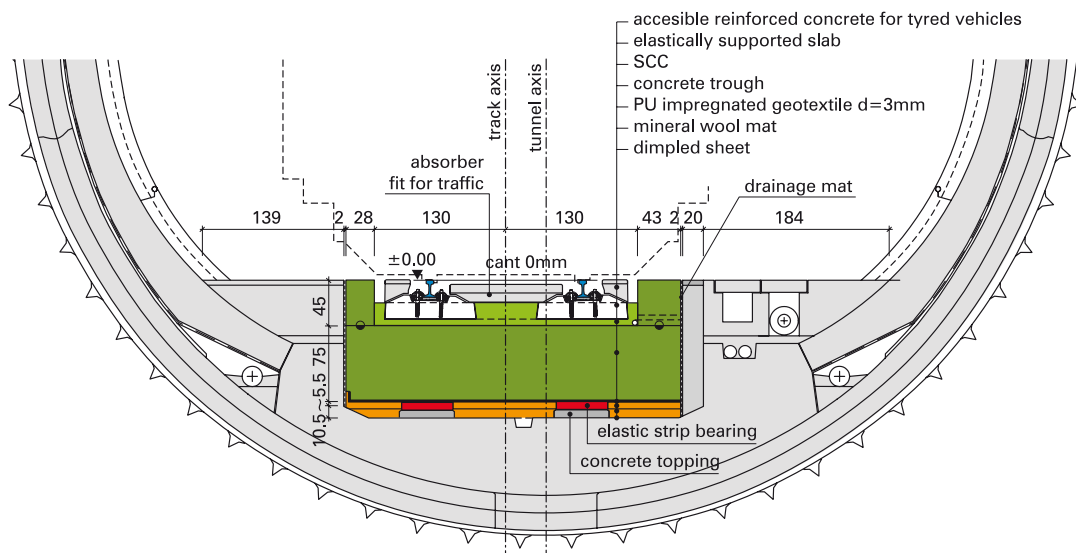




Combination with mass-spring system

In the case of high requirements for secondary sound and vibration reduction, the system can be combined with a mass-spring system. The design can be varied from lightweight to heavyweight mass spring systems through installing elastomeric sheeting layer, elastomeric strips or point-loaded bearings.

Cross-section PORR slab track with mass-spring system

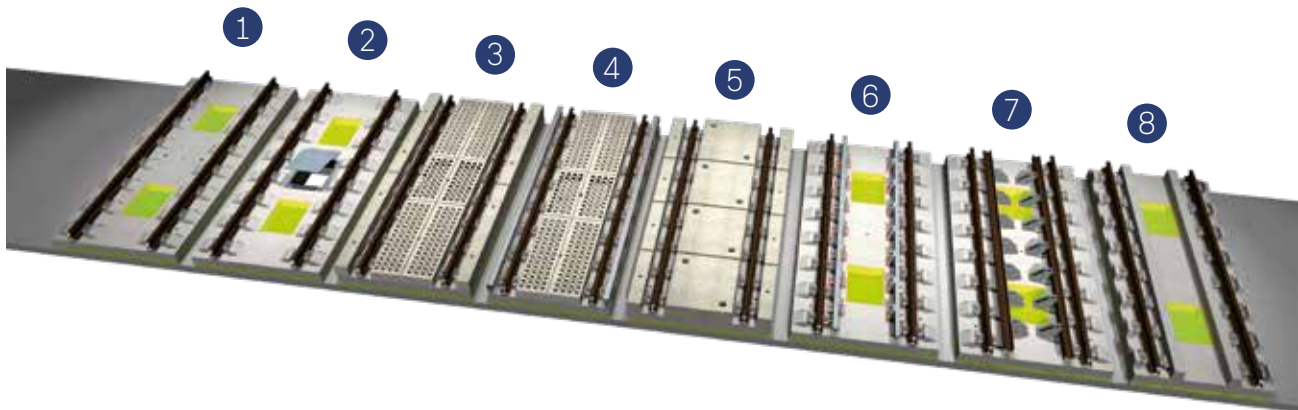


System options

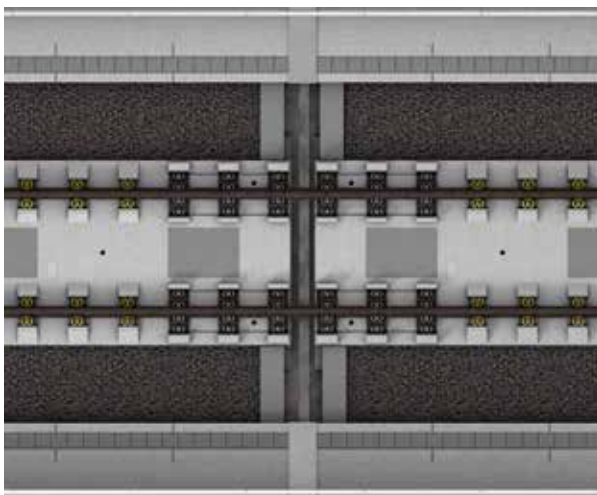
The PORR slab provides a finishing surface with millimetre accuracy. This allows easy and accurate installation without on-site drilling of additional equipment such as noise absorbing slabs, trafficability slabs, buffer stops, track magnets and guard rails.

Additional equipment:

- 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



Slab Track Austria solution for bridge expansion joints, featuring special rail fasteners to compensate for bridge deformations



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

Rail Expansion Joints/ Device (REJ/ RED)

The precast slabs form the track support structure for the Rail Expansion Device (RED) and are based on the same proven design principles that are already successfully used in track and switches and crossings areas. All interfaces with rails, fastening systems and other RED components are fully coordinated and defined in the design phase, eliminating the need for time-consuming factory or on-site pre-assembly.

PORR slab track turnout



Metro Doha
Doha, Qatar





Metro Doha
Doha, Qatar

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 precast 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.

SERVICES WE OFFER

- **Technology provider**

PORR slab track technology, Design & Engineering, BIM, supervision for production and installation for the Slab Track Austria system. Operating instructions for the infrastructure owner from conception to operation, maintenance, and including lifecycle considerations

- **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



WOULD YOU LIKE TO KNOW MORE?

We provide consulting for the best performance and most cost-effective approach for your project.

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