

German Unification Transport Project Nr. 8

Cutting-edge Concept for the Deutsche Bahn

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Project data

Client	DB Netz AG
Contractor	PORR Bau GmbH
Project type	Infrastructure . Railway. Design & Build
Scope	New construction of 320 km of high speed line with Slab Track Austria system
Construction start	June 2012
Construction End	December 2017
Country	Germany



VDE 8.2 has been in operation since December 2015.
Image: PORR AG

General information

In 1991 the German federal government decided to build the German Unification Transport Project Nr. 8, VDE 8 for short, in order to improve transport links between the old and the new German federal states with a total of 17 projects. PORR BAU GmbH in Vienna was tasked with construction of three lots of the largest railway project in Germany, VDE 8. In 2011, DB Netz AG, a subsidiary of Deutsche Bahn AG, awarded the contract in the form of a "Design & Build" contract. More than 320 km of the PORR patented slab track system, also known as Slab Track Austria, were installed, which can be driven on at a speed of up to 300 km/h. This allows a reduction in travel time between Munich and Berlin from six to about four hours. The last section of the high speed line will start operation in December 2017.

Background

The "German Unity Transport Project" was decided in the course of reunification to improve the overall German transport network. The largest rail project VDE 8 covers the new construction and upgrade of railway lines with a total length of 515 km between Nuremberg, Erfurt, Halle, Leipzig/Halle and Berlin. In addition, the new high speed line has another purpose: closing the gap in

the European high speed rail network. In the future it will be possible to travel from south to north Europe without changing locomotives, train stops or changing the train control system.

Design and construction

Three of the total of four new construction lots were awarded to PORR. Specifically, these were the sections Coburg - Illmenau (VDE 8.1.2), Bad Staffelstein - Coburg (VDE 8.1.3) and Erfurt - Leipzig / Halle (VDE 8.2). The PORR slab track system was used on all the lines.

The contract included detailed design, construction, coordination of third parties, support for the high-speed test drives, as well as for the commissioning, and was associated with an enormous planning effort. Over 8,000 plans were prepared for the railway superstructure, the noise barriers and the railway technology, as well as 74 company-internal approvals and technical notifications obtained. In addition, seven approvals for operational testing were applied for and granted.



PORR was also commissioned to design and build noise and wind protection barriers for the operating speed of up to 300 km/h.
Image: PORR AG

Slab Track Austria

Slab Track Austria (STA) system, a joint development of ÖBB and PORR, was installed in all three construction lots. The main element of the system is an elastically supported slab. Some of the greatest advantages include maximum availability and ride comfort, integrated structure-borne noise protection, short construction phases due to a high degree of prefabrication and low maintenance. The system was first implemented in 1989 and has since been in operation without maintenance necessary.

Overall, PORR produced some 60,000 track slabs for the construction of the line. Starting in 2012, 75 of these track slabs were produced per day in a production facility set near the construction site for this purpose.



The high degree of prefabrication in the factory allows quick installation and little rework on site.
Image: PORR AG

Complex logistics concept

Logistics played a central role on this project due to the long linear construction site. In particular, the timely transport of all STA track slabs and in-situ concrete had to work smoothly, regardless of whether it was built on bridges, earthworks or tunnels along the line. PORR developed its own logistics concept for this purpose.



Well fleshed out logistics concepts for long linear construction sites were of the utmost importance for the successful implementation of a total of around 320 km of PORR slab track.
Image: PORR AG

Further developments and innovations

The construction measures included not only the superstructure work, but also the railway technology (VDE 8.2), the construction of noise and wind protection walls, foundations for overhead line masts and the "accessibility of the slab track". For this purpose, a test section was built in advance and a new accessibility plate was developed. Thus, tunnel and bridge areas are easily accessible and can be driven on by tire-wheeled emergency vehicles in case of emergency. A dual function - accessibility with guide rail function - was implemented in the southern sections VDE 8.1.2 and VDE 8.1.3



PORR's Slab Track Austria system was implemented on a total of three sections of the new VDE 8 high-speed line.
Image: PORR AG



Accessibility for emergency vehicles with a guide rail function is a new development of the PORR slab track system.
Image: PORR AG

PORR has developed and installed track slabs with special support points for the bridge joint area. The bridge movements can be absorbed without damage and the required highly precise track position can be ensured using these special slabs.

In addition, the newly developed PORR slab track turnouts, which are also suitable for high-speed traffic, were installed in the construction lot VDE 8.1.3 for the first time. With this system extension, PORR has been able to build its system for all track areas with its elastically supported track slabs. Due to the high quality of prefabrication, cracks in concrete can be avoided. The advantages of the elastically supported slab also come into play here.



Installation of the PORR slabs in tight areas.
Image: PORR AG

Full service provider

PORR was responsible for coordination of the design, construction, and commissioning, as well as the documentation of several railway engineering systems during the construction of this standard gauge, double-track, electrified railway line.

Project data VDE 8.2

Design speed	300 km/h
Total length of the Slab Track Austria (ÖBB-PORR) system	179,352 km
Ballast track	11 km
Turnouts in slab track	42
Turnouts in ballasted track	20
Tunnels	3
Total length of slab track in tunnel	31 km
Bridges	6
Total length of slab track on bridges	29 km
Total length of slab track in open section	121 km
Noise and wind protection walls with foundations	22 km
Foundation for overhead lines	60 km
Accessibility of the slab track for tire-wheeled vehicles	31 km

PORR also designed and constructed electrical systems and telecommunication facilities such as emergency call, emergency lighting and energy supply in several tunnel sections with a total length of about 31 km on the construction lot VDE 8.2:

- 50-Hz-systems and telecommunications equipment such as the tunnel emergency call and the tunnel security lighting.

- 50-Hz- transformer stations and 50 Hz tunnel power supply for the low voltage cable system and intruder detection system / fire alarm system.

The concept, design, construction, production and installation of the fire doors in the tunnels was also the responsibility of PORR:

- 60 pieces of double-wing swing doors T-30, 8 of which in the Osterberg Tunnel; 26 pieces in the Bibra Tunnel and 26 pieces in the Finne Tunnel
- 6 pieces of single-wing tunnel – fire protection closures T-120 in Finne Tunnel
- 47 pieces single-wing fire protection doors T-90, of which 4 pieces in Osterberg Tunnel; 37 pieces in Bibra Tunnel and 6 pieces in Finne Tunnel were installed.
- 7 pieces of double-wing swing door T-30 without pressure. 2 of them were installed in Finne Tunnel and 5 pieces in Osterberg Tunnel.

Project data VDE 8.1.2

Design speed	300 km/h
Total length of the Slab Track Austria (ÖBB-PORR) system	87,860 km
Ballast track	2,360 km
Turnouts in slab track	18
Turnouts in ballasted track	4
Tunnels	12
Total length of slab track in tunnel	55,458 km
Bridges	17
Total length of slab track on bridges	12,524 km
Total length of slab track in open section	19,878 km
Noise and wind protection walls with foundations	13 km
Foundation for overhead lines	39,8 km
Accessibility of the slab track for tire-wheeled vehicles	54 km

Project data VDE 8.1.3

Design speed	300 km/h
Total length of the Slab Track Austria (ÖBB-PORR) system	46,075 km
Ballast track	2,148 km
Turnouts in slab track	9
Turnouts in ballasted track	5
Tunnels	7
Total length of slab track in tunnel	19,027 km
Bridges	6
Total length of slab track on bridges	5,734 km
Total length of slab track in open section	20,470 km
Noise and wind protection walls with foundations	10,7 km
Foundation for overhead lines	41 km
Accessibility of the slab track for tire-wheeled vehicles	10.8

Summary

Since the commissioning of the 90 km section VDE 8.2 in December 2015, passengers and freight trains have been driving on the PORR slab track. For all three construction lots, detailed test drives were carried out before commissioning with a gradual increase in driving speed up to 330 km/h. Full operation will start at speeds of up to 300 km / h over the entire VDE 8 route in December 2017.