SLAB
THEORY
TRACK
PRACTICE
TECHNOLOGY
COMPETENCE
COMPETENCE AT THE HIGHEST LEVEL

Rhomberg Rail’s slab track era began with the construction of the first high-speed rail projects in Germany (Hanover-Berlin and Cologne-Rhine/Main).

In order to do justice to this technology, which was new at the time, the company extended its portfolio beyond its traditional track construction remit. Innovative methods and systems were developed for the installation of the different slab track types.

Today, Rhomberg Rail is one of the leading and most innovative suppliers of ballastless superstructure. In addition to construction, the company also offers consulting services and organisational, economical and technical solutions. This means that Rhomberg’s customers benefit from 15 years of experience in evaluating and selecting the most suitable types of technology and design for new-build or renovation projects.

The company’s range of large and small projects all over the world includes well-known projects such as the high-speed link Cologne-Rhine/Main and Nuremburg-Ingolstadt (Germany), the Lötschberg base tunnel (Switzerland) and the Lower Inn Valley railway tunnel (Austria).
TECHNICAL AND ORGANISATIONAL CONCEPTS
In slab track projects, the installation of the railway superstructure usually involves close cooperation with many other trades. Quite often the main challenge is the fact that the track to be installed provides the only access to the construction site.

Rhomberg Rail has found solutions to these technical and organisational challenges on many previous occasions. As a construction firm and as a prime contractor, Rhomberg has developed concepts for installation under difficult conditions.

Some examples:
- High-speed line Cologne-Rhine/Main (Germany): 126 km track construction without additional track connections
- Lötschberg base tunnel (Switzerland): installation of nearly 53 km slab track in a single-track tunnel
- Arlberg tunnel (Austria): replacing ballast track with slab track over a distance of more than 20 km
Apart from accurately adjusting the track geometry using the track survey and alignment systems, it is the transport of concrete slabs or fresh concrete required for construction that poses one of the most complex challenges – technically and logistically. Both these conflicting requirements have to be fulfilled.

It is of utmost importance that large quantities of material are transported quickly and without interruptions – often using the already accurately and finely adjusted track, the position of which should not even minutely change. Then, just as rapidly, the in-situ concrete should be installed and be of top quality (compaction, distribution, surface accuracy, surface quality, etc.), usually over several kilometres.

With its concrete supply unit and concrete finishing machine for slab track, Rhomberg Rail can meet these requirements with state-of-the-art mechanisation.

THE CONCRETE SUPPLY UNIT
The concrete supply unit consists of a specially designed carrier truck construction with an optimised load distribution. Using this system in combination with the adjustment systems, concrete can be transported over several hundred metres of accurately adjusted track grid or freshly poured concrete – without impacting in the least on the track’s geometry.

The redundant pump system guarantees swift and continuous working. In spite of its high output capacity, this plant is very compact and robust. It is therefore perfectly suitable for the installation of slab track in single-track tunnels, as well as in all situations where restricted space and access make it impossible to use traditional means of supplying concrete to the point of installation.

THE CONCRETE FINISHING MACHINE
The concrete finishing machine has been subjected to ongoing improvement based on the experience of previous projects. The outstanding technical performance ensures a swift and continuous concrete flow. Any segregation or air inclusions occurring in the concrete during transport are eliminated using this machine. All sleepers or support points are fully embedded in concrete in an extremely controlled manner.

The concrete finishing machine was designed to operate on a finely aligned track grid or alternatively on a freshly concreted track without adversely affecting the geometry. The load distribution was designed using specially devised calculation methods. All slab track projects built to date with this machine have the benefit of guaranteed surface accuracy and top quality. Similar to the concrete supply unit – which is the perfect complement to the concrete finisher – this machine is particularly suitable for the installation of slab track in long single-track tunnels with difficult access.
Owing to its years of experience in the installation of different slab track systems and their individual components, Rhomberg Rail has at its disposal comprehensive practical and theoretical expertise in dealing with these types of superstructures. With this know-how, Rhomberg Rail's activities extend to areas that deal with structural concepts of slab track.

**TRACK ROADWAY PANELS**
Safety requirements increasingly necessitate that railway tracks can also be used by road vehicles, particularly in tunnels. Based on its own developments to date, Rhomberg Rail has produced a concept for track roadway panels, with the following objectives:
- Economically viable production and installation
- Meeting all technical requirements
- Meeting all operational requirements

**TRANSITIONAL CONSTRUCTION BETWEEN SLAB TRACK AND BALLAST TRACK**
The transition between slab and ballast tracks is a critical and often-underestimated area of the superstructure. Current solutions are complex and very expensive and do not take into account all demands set by modern track. This prompted Rhomberg Rail to develop a technically viable and at the same time economically viable solution.

**OPTIMISING SLAB TRACK**
Based on years of experience with slab track systems, individual components and comprehensive theoretical knowledge, Rhomberg Rail is developing a cost-efficient slab track solution that will be comparable to ballast track. This ambition will primarily focus on optimising the components, the installation equipment and installation methods.
In order to avoid the re-adjustment of slab tracks, the installation of these tracks is subjected to extremely accurate positioning. Furthermore, the installation methods for ballastless tracks are very different from conventional ballast track. This has prompted Rhomberg Rail to develop its own track survey system, which can be used for the construction itself as well as for reliable control and swift corrections, if required, before the final handover to the client.

These two core systems, both developed by Rhomberg Rail, are continuously improved and therefore unmatched in terms of efficiency, handling and practical application. Due to its versatility, this outstanding technology can now also be used for ballast track or the installation of turnouts (otherwise known as points, sets or switches).

**HERGIE**
The Hergie was developed as a system for track alignment and documentation of track parameters. It consists of a mobile tachymeter-supported measuring unit that measures track position, superelevation (cant), gauge and, as an option, rail inclination. The recorded data are compared to the stored target values and deviations are then displayed on the monitor in real time. This makes this system particularly suitable for the alignment of slab track systems. Hergie can also be used for checking the outer track geometry of existing track systems – irrespective of the type of superstructure, i.e. ballast or slab track.

**PLASMA**
The Plasma is an extremely compact, lightweight and very accurate long-chord measuring instrument, which can be used as an alternative to heavy and costly machines. The need to check the inner geometry of the high-speed line Cologne-Rhine/Main (Germany), which is crucial for passenger comfort, was the critical trigger for Rhomberg Rail to develop this unique system. It was originally developed for checking the construction quality of our own slab track projects. Today, the Plasma can also be used where quick and uncomplicated track assessments of a variety of track systems are required.
One of the biggest challenges in the construction of slab track systems is the achievement of exact track geometry – to the nearest millimetre, which must be maintained until installation completion. This demands accuracies that would be normally unthinkable in the field of building and civil engineering construction.

The challenge of slab track projects is the fact that this precision has to be achieved continuously over many kilometres, sometimes under very challenging construction conditions. Based on own experience, Rhomberg Rail has developed equipment for this particular task.

**GAUGE HOLDER**

The patented special gauge holders are used for reliable track grid construction, without requiring sleepers or other means of keeping the track position.

In systems with single point supports (direct fastenings) or individual blocks (e.g. LVT with rubber boots) this device, in contrast to other track adjustment systems, engages directly at the running edge of the rail head. The tracks are pulled together with a defined force.

These laser-cut and individually milled gauge holders ensure and guarantee accurate track gauge due to their patented gripping method. It is also possible to accurately re-adjust the inclination of rails using the adjustment screw.

**TRACK ADJUSTMENT DEVICE**

With Rhomberg Rail’s track adjustment system, the track grid's rails (between the rail support points) rest directly on the track adjustment elements, which in turn are all placed on concrete supports. The concrete supports stand directly on the load bearing base (tunnel floor, HSL or load bearing slab of a mass-spring system).

The exact position of the track grid can then be easily adjusted by operating the adjustment spindles provided for this purpose. In contrast to other support and adjustment concepts, the track adjustment system from Rhomberg Rail places the track grid on its supports, without any tension.

The weight of the track grid itself prevents lateral movement. No additional stabilising measures are required. The track adjustment elements together with the complete track adjustment system are highly reliable and provide sufficient support in case rail vehicles need to travel on the track grid.
Since 2001 RTE’s developments have expanded the competence profile of the Rhomberg Rail Group in the area of railway track systems and measuring technology. The team consists of a wide range of experts, which include construction engineers, surveyors, electronic engineers and software engineers. They develop and optimise complex systems for a variety of specialised disciplines.

The core competences of RTE Technologie GmbH are the development of track surveying systems and slab track railway systems. All these developments are characterised by their practical application as all systems have been tested and applied to in-house projects for the Rhomberg Rail Group. RTE Technologie GmbH also develops solutions in other technical areas (mechanical construction, software development, geometry tasks, digital image processing, and microprocessor control systems) for outside companies. Our office in Salzburg is fully equipped with a test track and the necessary infrastructure to support CAD software and electronic developments.

Rhomberg Sersa UK Limited
Sersa House, Auster Road
Clifton Moor, York Y030 4XA
T +44 (0)1904 479 968
F +44 (0)1904 479 970
info@rhomberg-sersa.co.uk

www.rhombergrail.com