

RAILWAYS



# RAIL.ONE – THE WAY TO GO

We develop innovative track systems, to help you get ahead – fast and safely. And what are your plans?

## **YOUR OBJECTIVE IS OUR CHALLENGE**

RAIL.ONE delivers innovative track systems for railway transport in Germany and around the world: we offer engineering, production, supply, logistics, and quality management – all on a one-stop basis. Our systems require very little maintenance over the course of time and allow stable track geometry and excellent ride comfort, even at high speeds and under extremely rigorous conditions. And since every track should be optimized for its individual operational area, RAIL.ONE places special emphasis on close collaboration with customers and business partners. With its extensive sales network – as well as locations in Germany, Europe, America, and Asia – RAIL.ONE occupies a leading position in track-system technology and in the manufacturing of concrete sleepers. Continuous research and further development assure our technological lead.

## **RAIL.ONE – DEVELOPMENT BASED ON EXPERIENCE**

RAIL.ONE has become well established as a comprehensively oriented systems and engineering provider for the entire field of railway track, with its great number and diversity of requirements. In the high-speed area, the company has achieved an internationally leading position. RAIL.ONE furthermore offers the production of concrete main-track and turnout sleepers. All of this means that RAIL.ONE, in close cooperation with customers and business partners, performs complete services for product development, manufacture, and application on a one-stop basis – beginning with engineering; including production, supply, and logistics; and extending to quality management.





# WE ARE READY

Track systems represent the future way to go. But markets are changing, and new concepts are in urgent demand. The first step involves communication – so let's talk about what you need.

## ON THE RIGHT TRACK

When it comes to economy, reliability, and environmental compatibility, railways are miles ahead of their competitors on the highways, on water, and in the air. And even as far as speed is concerned, air travel over short and medium distances can hardly compete now with the new offerings in European rail transport. Road transportation has long since reached the limits of its capacity – despite ongoing high investment. Especially with a view to European cargo transport of the future, railways obviously offer the only escape. Europe, after all, presents promising chances: unification in the EU has opened up completely new possibilities for cross-border rail-infrastructure construction and joint development projects for passenger and cargo transportation.

## WITH NEW CONCEPTS TOWARD NEW HORIZONS

A revolution in railway culture was necessary to move it successfully into the future. Harmonization of technical standards and new forms of awarding contracts have quickly led to new quality in customer-provider relationships. Communications plays a key role here – and this is where RAIL.ONE comes into action. Track systems and infrastructure must now as before – and, in the future, even more extensively – be designed for advanced transportation systems. And a great deal remains to be done: e.g., transportation networks are still not fully compatible at borders between countries. Research for innovative products and manufacturing techniques must be continuously and vigorously promoted. Planning and implementation work must be more effectively focussed and coordinated. The key to successful project work lies in the integration of the system provider into the engineering and construction processes.





### **WE HAVE GRASPED WHAT IS REQUIRED**

As systems provider, RAIL.ONE occupies the interface between planners, general contractors, and construction companies. A complex construction project – such as the new high-speed lines from Nuremberg to Ingolstadt, from Amsterdam to Brussels (HSL Zuid), and from Taipei to Kaohsiung in Taiwan – demands far more than mere delivery of hardware. RAIL.ONE accordingly understands its mission as a service and competence provider. Leadership in technology is assured not only through advanced production facilities and innovative process technology, but primarily through experience and know-how in engineering. The strict quality criteria of railway authorities play a key role here – and with respect to safety, innovation, reliability, profitability, aesthetics, comfort, and environmental friendliness, RAIL.ONE is ready indeed for the rail market of the future.



## YOUR CAPABLE PARTNER

Complex projects demand clarity in control. After all: rail transport involves great responsibility. As system providers, we are well accustomed to working systematically. Try us and see!

### ENGINEERING

When the ground is broken for a construction project, half the work is already finished. The more predictive the planning, of course, the less problematic the actual execution. RAIL.ONE provides engineering services to construction companies as early as the bid-invitation and tendering phase. A complete detail design is the basis for all following steps – which enables precise calculation of costs. From rough to detail planning, RAIL.ONE is actively integrated into the design process. The track system is modified if necessary, collaboration between the partner companies is coordinated, the site is examined, materials tests are conducted, and the logistics concepts and installation processes are tailored to the specific project.

### PRODUCTION – SUPPLY – LOGISTICS

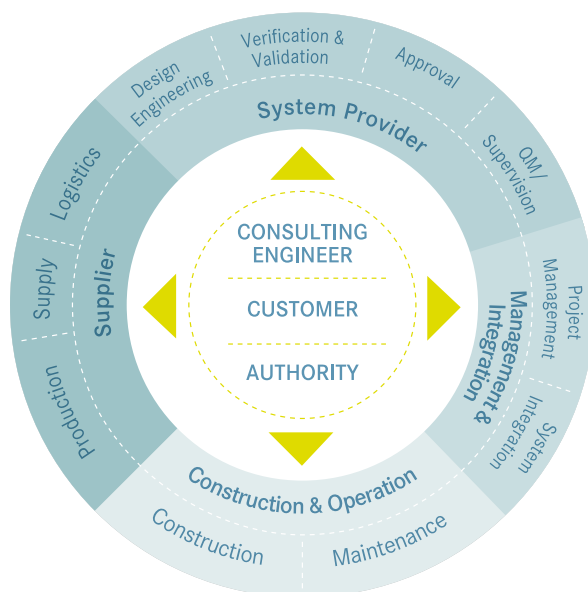
RAIL.ONE profits from more than 50 years of experience in the manufacture of concrete sleepers. Supply of complete track systems, however, demands far more: the entire process chain – starting with planning; including production, delivery, and logistics; and extending to quality management – must be holistically understood and effectively supported. For example, it can be advisable from logistics or cost-effectiveness standpoints to set up a sleeper production plant near the track construction site – or to award manufacturer's licenses to local partner companies. RAIL.ONE remains responsible for the coordination: because effective supervision makes sure that everything properly rolls.





**QUALITY MANAGEMENT**

Safety of course enjoys absolute top priority, especially where passenger transport is involved. RAIL.ONE provides the entire performance spectrum – from supervision to quality management – in its work with owners, operators, and partners. Integrated process management assures that the installed systems satisfy the required quality criteria in all stages of production and installation. Although it is precisely ballastless track systems that have proven extensively maintenance-free, RAIL.ONE together with customers and partners develops concepts for long-term quality assurance. In addition, a RAMS analysis was successfully conducted, in accordance with international standards for the RHEDA 2000® ballastless.



From planning to quality assurance: the entire spectrum of services from one source.

# SYSTEMATICALLY TOWARD SUCCESS

Which track system is the best for you? Sometimes, a simple application will solve your problem faster – but sometimes a sophisticated solution actually represents the simplest alternative. Whatever, we'll help you find the best way.

## MANY ROADS LEAD TO ROME

Every new project poses new challenges for engineers and planners. With respect to long service life, top speed, comfort, and load-carrying capability, ballastless track basically has a lot to speak for it – especially in the construction of new rail lines. Where refurbishment of existing lines is involved, however, a system that allows traffic to continue, even during construction, offers key benefits. In many applications, conventional ballasted tracks fully satisfy all requirements. Wide sleepers on a ballast substructure can offer significant benefits where availability is crucial. Life-cycle costs have also become increasingly important in planning a track route. It is essential to consider whether a virtually maintenance-free track is the most favourable long-term solution, or whether the choice should go to a system that can be installed on a flexible and cost-reducing basis, without traffic interruption.

## THE ROUTE FOLLOWS THE TERRAIN, AND NOT VICE-VERSA

A track system by RAIL.ONE is always a tailored solution, especially in which systems must be adapted to special requirements. Certain track sections such as curves, bridges, embankments, tunnels, and turnouts place strict requirements on route design. The characteristics of the subgrade have decisive consequences for planning: What physical forces and environmental influences can be expected? How will the soil react to operational loads over the long run? And – what logistics requirements must be considered during construction? After all: optimization of the process chain is our primary goal, and this includes construction-site access, transport paths, and material supply.



## FROM THE ENVIRONMENTAL STANDPOINT

As future-oriented means of transport, rail systems are eminently capable of fulfilling their responsibilities to the environment. Where strict limit values for airborne noise and vibration apply, especially in densely populated areas, innovative mass-spring systems and noise-absorbing products assure good neighbourliness. Increasingly, aesthetic criteria are applied to track systems, particularly in urban environments. Parasitic current must be dissipated below stipulated limits, and intelligent disposal of waste water and other liquids must be guaranteed. RAIL.ONE places great importance on these problems. Careful selection of the solution consequently determines the service and maintenance expenses of a track system: foresight in planning eventually amounts to considerable money savings.







### ALL SYSTEMS AT A GLANCE

When requirements go beyond conventional ballasted systems, RAIL.ONE has the appropriate solution for all demands of railway transportation. Besides to operating speed and axle

load, many additional factors are essential in selection of rail systems. Among these factors, long-term availability and maintenance costs play increasingly significant roles.





# OUR CLASSICAL TRACK: SIMPLE AND FLEXIBLE

Now as before, concrete sleepers on ballast represent the classical, fundamental version of track systems: in Germany and around the world. The general opinion is that these sleepers could not possibly be improved: but we're working on it.

**Type B 70 concrete sleepers are the simplest way to a complete railway track.** Their chief advantage is their great flexibility. These sleepers are a fast and reliable solution for almost any application: whether for a newly constructed route or for refurbishment of existing lines, for railways or urban transit, for trunk or secondary lines, and for freight or passenger traffic. And their simple installation ensures high availability levels. The B 70 concrete sleeper can also be manufactured and delivered in great numbers within a very short period of time. In Germany, RAIL.ONE delivers annually up to one million concrete main-track sleepers, primarily Type B 70. Every year, the company produces approximately 1.5 million sleepers in Romania, Saudi Arabia, Spain, South Korea, Turkey, and Hungary, primarily in the models favoured for use in the respective countries.

**Also for turnouts, concrete sleepers have become widely and successfully accepted.** Their economic and technical advantages are the results of longer life cycles, less maintenance, and mechanized installation techniques. Production of these sleepers in several plants, with capacity of up to 680,000 linear metres annually, takes place in close technical and logistical coordination with the manufacturers of the turnouts with which they will be installed. Only in this way is it possible to guarantee on-time support of track construction sites at the superior quality levels characteristic of RAIL.ONE.



## THE B 70 CONCRETE SLEEPER: A CLEAR-CUT SOLUTION

Highly convenient and cost-effective production and installation, long service life, and no impregnation with toxic agents: all this makes the concrete sleeper an environmentally friendly and cost-effective solution over the long run.



## TURNOUT SLEEPERS: STURDY AND SAFE

With their great weight, concrete turnout sleepers assure optimal track-position permanence and stability – even for turnouts that take traffic at high speed.





## CONCRETE SLEEPER B 70

- High performance capability, even under conditions of great operational loads
- Cost-effective optimization of the track system, together with full maintenance of long-term technical and safety characteristics
- Guarantee of operational continuity
- Standardization of operational and maintenance work sequences
- Possibility of fully mechanical installation of sleepers on the building site
- Adaptation of track elasticity to special sub-base conditions by installation of elastic pads

# WIDER, FASTER: MORE SOPHISTICATED

Wide-sleeper track systems combine the benefits of ballastless track with conventional ballasted systems. As a result, this sleeper system satisfies the most demanding of requirements – and it manages to look good at the same time.

**Wide sleepers are used in regional and mainline railway applications.** The system is suitable for all gauges, for tilting technology, and for either freight or passenger traffic. As a result of its appealing design and ease of maintenance for its surface, it is also well suited for tracks in train stations. Wide sleepers enable considerable reduction of loads applied to the ballast: the larger support area ensures uniform distribution of applied loads. The wide sleeper solution furthermore lowers vibration values, lengthens maintenance intervals, and extends the service life of the track system. Wide-sleeper track systems enhance riding comfort, environmental compatibility, and the cost effectiveness of railway operations.

**Installation of elastic footing for concrete sleepers represents a further measure for upgrading classical ballasted track systems.** Emplacement of the elastic base pad into the fresh concrete creates a direct bond to the sleeper: a technique that protects the ballast and achieves enhanced track elasticity. Sleepers with elastic support are particularly effective for installation on difficult, non-uniform subgrade. Applications that have proven especially effective include high-performance track systems and sensitive transitions of the rail line between embankments and tunnels or bridges.



**PRESSURE COMPENSATION BELOW THE SLEEPERS** The benefits of wide sleepers are also quite evident at grade crossings: all loads acting at the surface are transferred uniformly into the ballast layer. The ballast, in turn, remains in stable and unchanged position as a result of the use of wide sleepers.



**SLEEPERS WITH ELASTIC FOOTING - TOP PERFORMANCE ON QUIET FEET** Use of an elastic footing can considerably upgrade a system with concrete sleepers on ballast. Maintenance costs are reduced, and track positioning is improved for the long term.





## WIDE SLEEPERS

- Simple installation with conventional track-construction technology
- Constant quality and stability, and avoidance of continuous displacements in the ballast structure
- Up to 70 % greater resistance to lateral displacement, in addition to less settlement
- Significantly increased track availability
- Great safety factor from the large mass of the sleepers and from continuous bearing-surface support
- Simple vegetation control and minimal cleaning work, as a result of the closed surface of the track; no need for herbicides
- Systematic drainage of surface water and other liquids
- Considerably reduced emission of vibrations into the soil foundation, owing to the greater mass of the sleepers



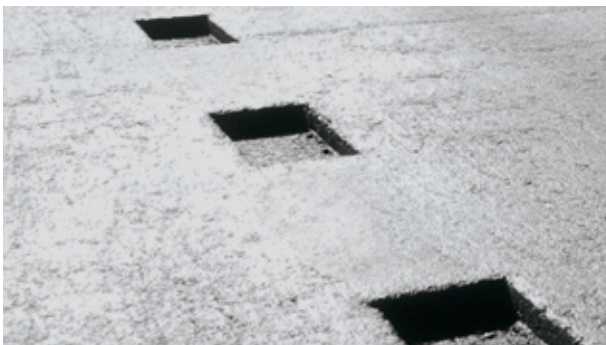
# ASPHALT IN TOP FORM

Asphalt track systems offer all the advantages of a ballastless system – they are fast and uncomplicated to install. A precondition, however, is highly developed asphalt technology – and we are quite proud of our engineering expertise here.

**The fundamental characteristic of GETRAC® track systems results from asphalt supporting layers on which concrete sleepers directly rest.** GETRAC® sleepers are elastically connected to the asphalt layer by special concrete anchor blocks. This technique assures effective fixing of the track panel in longitudinal and lateral directions. This method of anchoring concrete sleepers onto asphalt supporting layers achieves great system stability, even under heavy dynamic loading of the track. A major advantage of this product is its fast and simple installation techniques with conventional track-laying technology, and with high daily track-laying output. In recent years, the GETRAC® A1 system variation has become well

known in our segment for its outstanding operational characteristics. The GETRAC® A3 ballastless track system is the newest and highest-performance product in the GETRAC® line. The wide sleepers, an intrinsic part of this system, enable significant reduction in track structural height.

**In 2004, the German Federal Railway Authority (EBA) provided official approvals, without speed limitation, for various track innovations in the form of GETRAC® model variations.** This approval accordingly signifies clearance of GETRAC® for high-speed track applications as well.



**GREATER CONVENIENCE OVER THE LONG RUN** Ballastless track systems require practically no maintenance. Once in place, they ensure system availability of virtually 100 %. When used as supporting layer, asphalt offers the unique advantage that geometry can further improve with time.

**OPTIMAL COST-BENEFIT RATIO** In assessment of the service life of such track systems, it has become increasingly plain that overall system costs – i.e., life-cycle costs – have become a widely accepted and essential criterion. In addition to the long-term savings that they offer in maintenance costs, GETRAC® systems are especially cost-friendly as a result of the high productivity they enable in track installation, and in the very short overall construction times required for their emplacement.





## SYSTEM GETRAC®

- Long-term stability of the required track geometry, through elastic bonding of the track panel to the asphalt
- Short construction time
- Capability of using conventional road and track-construction equipment
- Great degree of mechanization and small number of work steps in track construction
- Pre-assembly of the anchor blocks and the rail-fastening elements in the production plant
- Long life cycle with little maintenance
- Possibility of track cant up to 180 mm
- Great stability
- Unrestrained drainage of water from the track
- Fast availability of the track after repairs

# HIGH SPEED TO PERFECTION

Our contribution to high-performance trains: the RHEDA 2000® system is the direct way into the future. For top operational loads. For extremely high speed. For safety's sake.

**The monolithic, ballastless RHEDA 2000® system represents the most advanced stage of development in the RHEDA family.** This system is used for mainline tracks, especially on high-speed lines. Chief characteristics of the supporting concrete slab include its lack of a trough, and its use of a modified bi-block sleeper with a lattice truss. The development of special turnout sleepers for the RHEDA 2000® system means that track and turnout are totally compatible. Great capability of adaptation to all track substructures enables a maximum of planning flexibility. In addition, low overall structural height and reduction in weight result in significant time and cost savings during installation. As a result of the monolithic structure of the track concrete layer, this system is outstandingly suited for applications for embankment systems, tunnels, and bridges – also at speeds over 300 km/h.

**Rail traffic causes vibrations. RHEDA 2000® can also be executed as a mass-spring system for application in areas sensitive to noise and vibrations.** Elastic pads installed between the track system and a tunnel absorb vibrations to such an extent that they are imperceptible to persons in adjacent buildings. The mass-spring system can be effectively adapted to a range of various local requirements.



**THE MODULAR PRINCIPLE** Uniform track concrete layers with low structural height ensure simplified rail-line planning and installation. The lightweight mode of construction, with the possibility of installation of pre-assembled track sections, enables optimization of construction schedules. A high degree of mechanization in fastening the track to the substructure, and in track adjustment: this saves time and money.

**THE FLEXIBLE WAY FOR EVERY APPLICATION** The RHEDA 2000® ballastless track system is ideal for application on embankments, on bridges, in tunnels, for turnouts, as well as with mass-spring systems with optimized vibration characteristics. Installation of noise absorbers dampens wheel and propulsion noise.





## SYSTEM RHEDA 2000®

- A maximum of cost effectiveness and reliability by utilisation of concrete sleepers as superior-quality precast concrete building components in the critical area of the rail-seat zone
- Great precision of track-geometry parameters by application of precast concrete sleepers
- Great adaptability to all types of substructure and track models executed, by application of cast-in-place concrete for the concrete track-supporting layer
- Great reliability as a result of technologically mature concrete engineering of the track-supporting layer for a great diversity of climatic conditions and concrete standards
- Flexible, high-performance installation procedures on the basis of simple installation steps that are reproducible for both manual as well as automated procedures
- Great added value by local production possibilities



# RAIL.ONE – YOUR ONE-STOP PROVIDER

We offer a broad portfolio of products and services involving all aspects of railways and infrastructure, tailored to individual requirements.





## RAILWAYS



For construction of track systems and for the upgrading of existing rail lines, RAIL.ONE develops track solutions individually matched to the customer's requirements: and RAIL.ONE offers all these services on a one-stop basis. In the field of high-speed railways, patented RHEDA 2000® ballastless track technology has already achieved an internationally leading position. RHEDA 2000® has developed into standard technology for main-line routes with high-speed transport and heavy-haul conditions. In the classical market segment for monoblock sleepers as well, RAIL.ONE offers a unique product portfolio for all requirements.

## URBAN TRANSIT



Underground, surface, and tram rapid transit not only relieves metropolitan areas from the burdens of private vehicle traffic and assures tolerable living conditions in residential regions: it also contributes appreciably to reduction of emissions and energy consumption. For track installation on concrete, ballast, or asphalt, RAIL.ONE offers high-performance and reliable railway systems that are optimally integrated into their surroundings.

## FREIGHT AND HEAVY-HAUL



With high energy prices and increased demand for raw materials, freight and heavy-haul railway transport has assumed a key function in inter-modal competition. For these exceptional demands placed on track technology, RAIL.ONE has developed special concrete sleepers designed for static axle loads up to more than 40 metric tonnes.

## ENGINEERING



Requirements placed on the cost effectiveness of advanced track systems have become more demanding: engineering innovations are expected to assure the quality and the productivity of the overall system. Low maintenance expense and reduction of life-cycle costs will become increasingly important. For planning of all solutions for rail lines – whether at grade, over bridges, or in tunnels – RAIL.ONE engineers effectively adapt overall track design to local requirements: from the design development phase up to detailed planning.

## SLEEPER PLANTS



RAIL.ONE is the only planner and builder of track production plants to offer a choice among four specific production processes – which, in addition, can be modified according to special requirements. This combination of plant-facilities engineering and production expertise further guarantees the high quality standard required for all customers.



