RSRS
RAILWAY INFRASTRUCTURE PROJECTS

COMPETENCE BRINGS SPEED

We bring advanced technology to your railway project: tailored to your needs, neutral and independent

RSRS GmbH Railway Infrastructure Projects

Your complete railway engineering service provider

Mr. Evgeny Dorot, Managing Director

Abu Dhabi, 22.03.2022
Austrian Emirati Technology Day

TECXPORT

About

RSRS GmbH Railway Infrastructure Projects is an Austrian engineering and construction company.

Key characteristics of **RSRS GmbH:**

- Combination of two leading railway engineering companies under one roof
- Comprehensive railway engineering and construction management competence
- Complement technological know how and worldwide construction experience

RSRS GmbH Management:

Evgeny Dorot
Managing Director

Jan Harder
Member of Supervisory Board /
International Sales Executive

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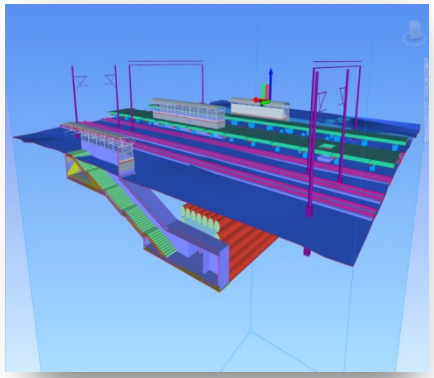
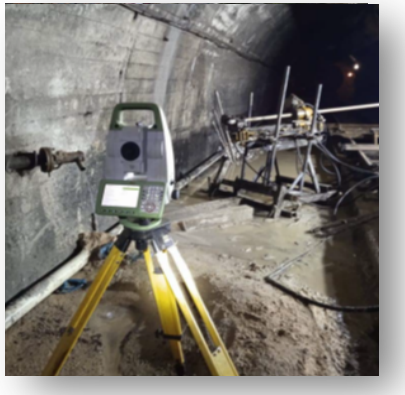
RAILWAY INFRASTRUCTURE PROJECTS

What We Do
Key Areas of Activity

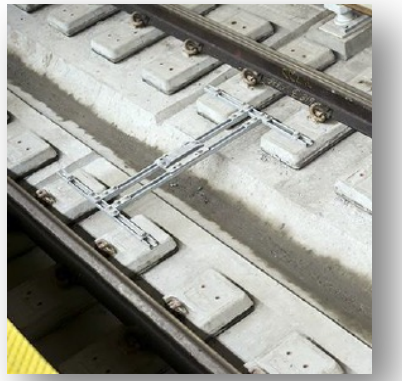


Design and Construction of Transport Infrastructure Based on BIM-Modeling

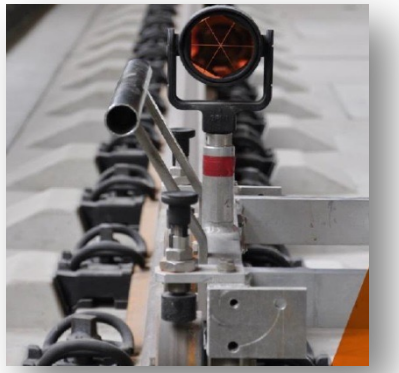


Complex Engineering Surveys

Structures Assessment

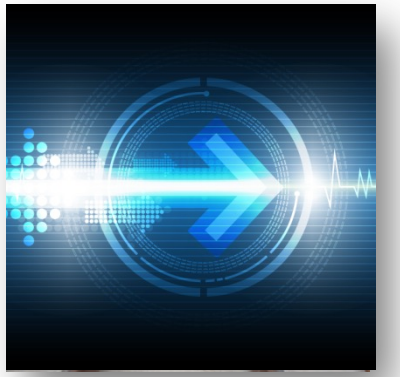


Ballastless Track Technologies



High-Precision Railway Track Alignment

Ecological Projects



Cross-Border Transfer of Innovative Technologies

Design and Construction based on BIM-Modeling

Conversion of design, reconstruction and construction of infrastructure facilities to the use of **information modeling (BIM) technologies** is one of the key areas of innovative development.

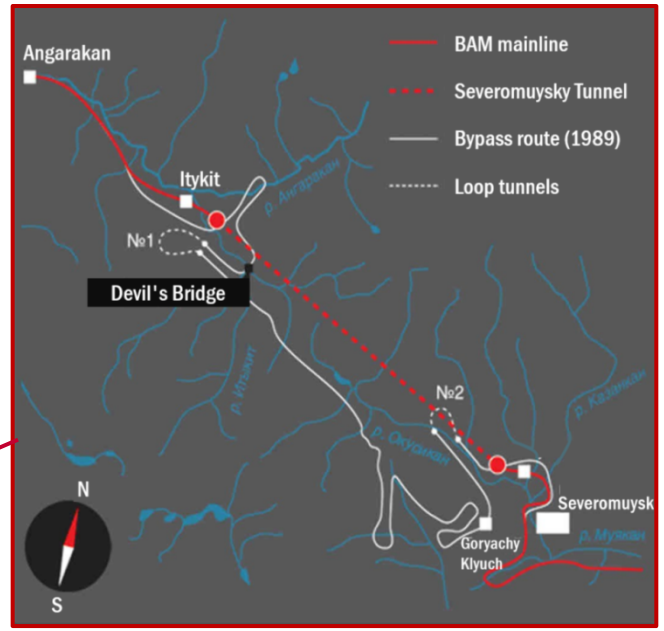
BIM-modeling is of particular relevance in relation to the construction and operation of railway tunnels, which are complex and expensive engineering structures.

RSRS GmbH Railway Infrastructure Projects is actively involved in the implementation of this ambitious task.

Reference Project: Reconstruction of Severomujsky Tunnel, Buryatia Region, Russian Federation

❑ **Facts:**

- The longest tunnel on the territory of Russia (15,3 km) and the most complicated section of Bajkalo-Amurskaya railway
- Located in active geodynamic zone with complex engineering-geological and hydrogeological conditions



Location: Russian Federation, Republic of Buryatia, Muysky district, Itykit-Okusikan running line, East Siberian Railway

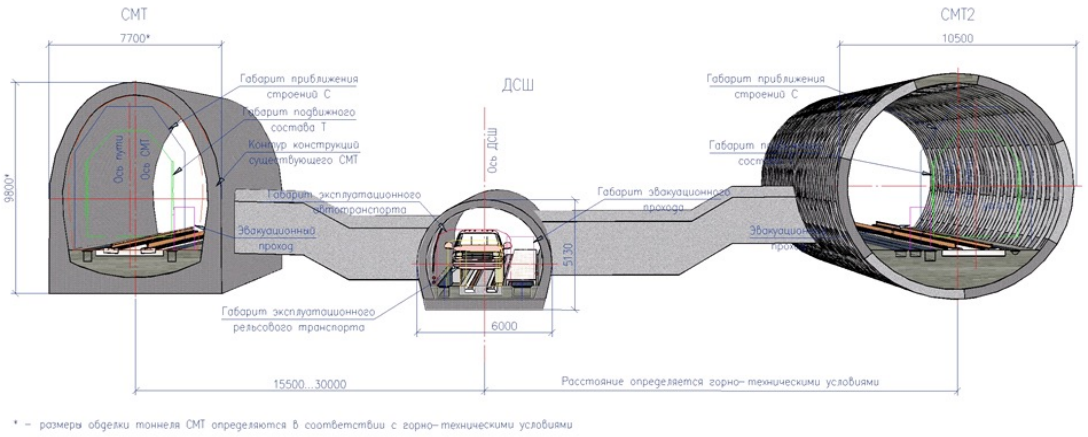
Western portal

Eastern portal

Design and Construction based on BIM-Modeling

- **The design project for reconstruction of Severomujsky Tunnel is being carried out in BIM-environment:**
  - Digital model of the tunnel, track structure and communications, using 3D-scanning laser equipment;
  - Compiled database, including geoinformation data (geodynamic activity, geology and hydrogeology), archive materials (design, detailed and as-built documentation, research and scientific reports, service providers' data), current regulatory documents;
  - Carrying out permanent update of geoinformation data and regulatory requirements for safe operation and functionality of the tunnel;
  - Forming a BIM-model of the whole engineering structure

- **BIM-Modeling of Severomujsky Tunnel allows to:**
  - Create a comprehensive database of the actual state of the tunnel passage as a whole;
  - Monitor the execution of construction and installation works during the reconstruction period;
  - Timely determine the necessary amount of construction work for repair and ensuring reliable operation of the facility;
  - Form automatic control of the main life support systems of the tunnel passage;
  - Promptly assess the need for capital investment for repair and modernization of the facility, as well as the total amount of financing over the years.

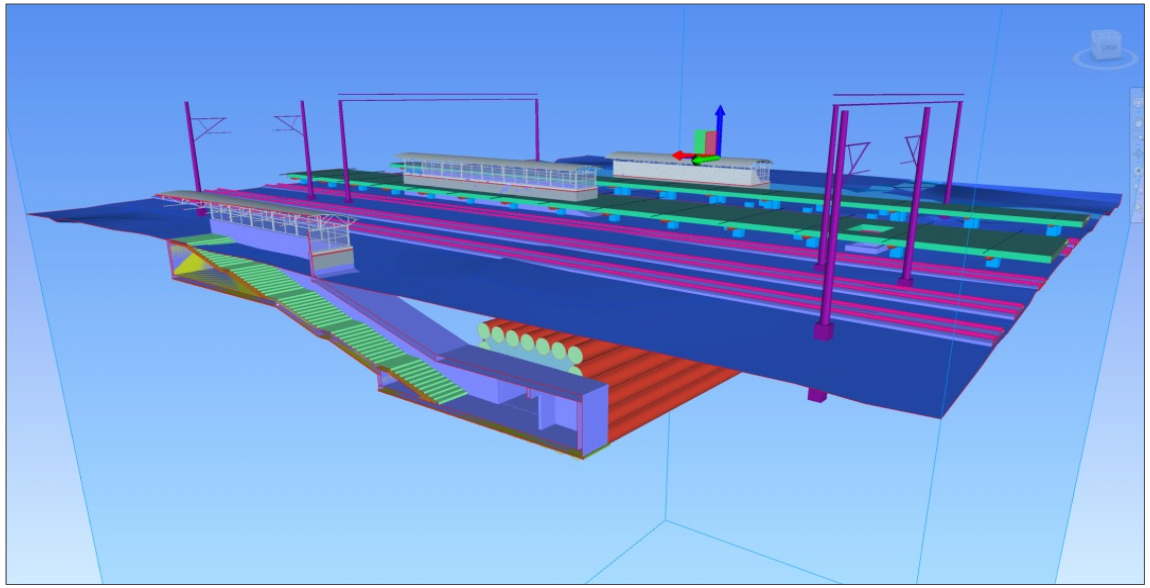


Structural scheme of the tunnel cross-section through Severo-Mujsky mountain range

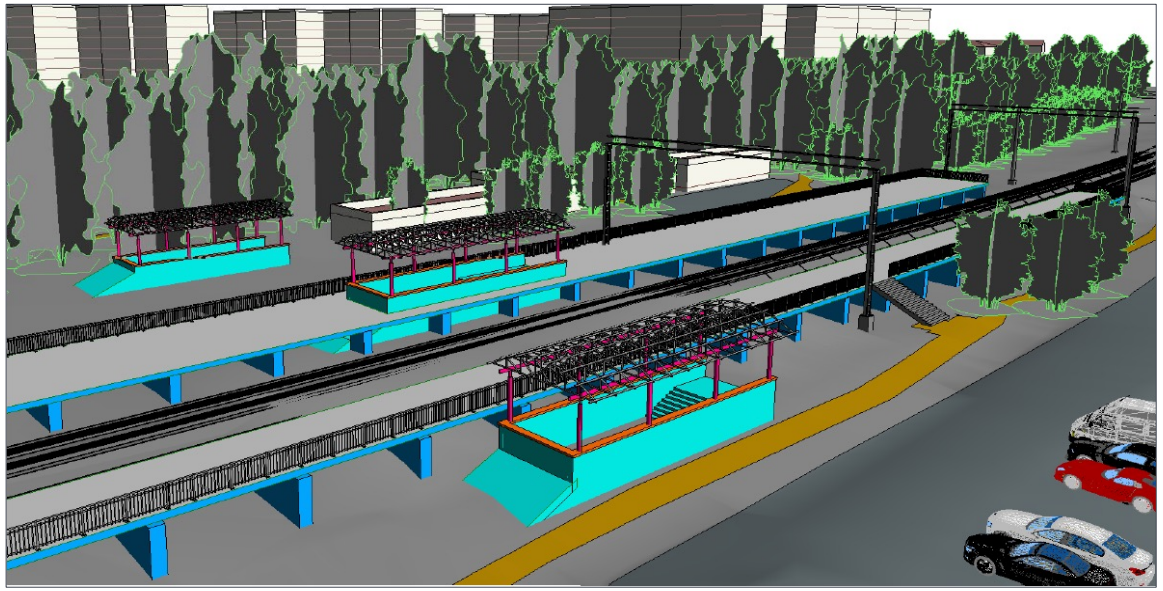
Design and Construction based on BIM-Modeling

❑ Design and construction of passenger underpasses on the operational lines

- **RSRS** projects at **st. Kupavna** and **st. Slavyanka** are included in the list of pilot infrastructure projects of JSC “Russian Railways” with usage of BIM-instruments. The uniqueness of these projects is that the integrated implementation of information modeling technologies is carried out in the objects of underground infrastructure.
- Currently the first stage of engineering and geodetic surveys has been completed with the formation of a surface model and a situational model. Common data environment has been formed for document flow and interaction between design participants.



Station Slavyanka. BIM-visualization of the design position of the underpass at different levels



Station Kupavna. General view of the digital model (general design solutions)

Design and Construction of Transport Infrastructure Based on BIM-Modeling

- Based on the experience gained in the construction of tunnels of various profiles under existing lines on the German railways network Deutsche Bahn, **RSRS GmbH** has developed a technology for the production and installation of safety devices for the construction of artificial structures for various functional purposes under the existing railway tracks.
- For the period of construction and installation works on the construction of the tunnel, a safety device is being installed in the body of the railway embankment, which protects against possible depression of the track during the period of tunneling. Around the entire perimeter along the axis of the tunnel, a screen is made of steel pipes, under the protection of which the excavation, loading and removal of soil is subsequently carried out.
- The applied technology makes it possible to ensure the throughput of the construction site and maintain speed indicators within certain limits (for high-speed and passenger trains - 120 km / h, for freight trains - 80 km / h), as well as reduce the duration of possession windows in order to reduce the costs of Russian Railways.
- In these projects the **BIM-technology for monitoring the state of the railway track superstructure** is used: using a system of robotic total stations, the state of the track superstructure is monitored in real time during tunneling in the area below it.

Reference Projects:

Construction of pedestrian underpasses at station Podsolnechnaya and Povarovo of the Moscow Railway (design&construction, supervision, 2018-2021), Russian Federation

Reconstruction of Long-Haul Tunnels

RSRS GmbH carries out comprehensive projects for rehabilitation of long-haul railway tunnels, including the following measures:

- elimination of water seepages (water pressuring and water lowering) using modern corrosion-resistant building materials
- stabilization of the thermal ventilation regime of the transport zone of the tunnel with a revision of the conceptual design scheme of ventilation
- rehabilitation by modern methods of permanent load-bearing structures damaged by leaks, icing, aggressive environment
- replacement of the track superstructure with ballastless LVT structure, which allows to mechanize the laying process as much as possible in a short time during construction and minimize operating costs

While execution of complex underground projects, **RSRS GmbH** is providing for usage of advanced equipment and operational technics, including:

- usage of laser three-dimensional scanning equipment for creation a digital model of the tunnel and all tunnel structures
- transfer of advanced technologies in the field of drilling and geological surveys
- laboratory-based core analysis

Reference Projects:

Reconstruction of drainage-transport shaft of Severomujskij tunnel (design, 2016 –currently), reconstruction of the tunnels of the North Caucasian railway (design&construction, 2013-2020)

Complex Engineering Surveys

RSRS GmbH has deployed a comprehensive platform for execution of engineering surveys:

- Engineering-Geodetic
- Engineering-Geologic
- Engineering-Geotechnic
- Engineering-Hydrometeorologic

As part of execution of design works at Severomujsky tunnel, RSRS GmbH is carrying out drilling of geological and geotechnical wells, different types of monitoring (hydrogeologic, meteorologic, seismic) and laboratory research of physical and mechanical properties of soils, tests of rock samples and determination of chemical composition of groundwater.

RSRS research laboratory in Severomujsk

Process of geotechnical well drilling

Assessment of Artificial Structures

RSRS GmbH carries out work on the inspection of bridge structures and culverts.

The list of works includes an assessment of the general condition and individual elements of bridges: supports; marginal beams; spans; covering; bridge floor covering; fences; expansion joints; bridge deck; approaches to the bridge.
Inspection of reinforced concrete structures includes:

- Determination of the depth of cracks in concrete;
- Revealing hidden defects in concrete and reinforced concrete structures by ultrasonic method;
- Determination of the protective layer by georadar profiling;
- Determination of the strength of concrete in structures by non-destructive methods;
- Determination of the moisture and degree of carbonization of concrete and reinforced concrete structures.

Inspection works for steel and steel-reinforced concrete structures include:
Revealing the presence of metal corrosion, defects and damage to elements and joints;

- Revealing internal defects of welded seams by non-destructive inspection methods;
- Detection of cracks, determination of the causes of their formation, assessment of the hazard for the bearing capacity.
- All works on the examination of structures are carried out using modern methods and equipment, in particular: 1) Georadar "Proceq GP8000"; 2) Tomographic ultrasonic "A1020 MIRA Lite"; 3) Measuring instrument of concrete strength "ONIKS-1.OS.100";4) Ultrasonic device for strength "PULSAR-2.2".

Reference Projects: *Railway bridge PK 1436 of the section Vykhodnoj – Kola of the Oktyabrskaya Railway, Russian Federation; Railway bridge over the river Onon of the Zabajkalskaya Railway, Russian Federation (432 m); Railway bridge at the Russian-Chinese border (Nizhneleninskoe station) of the Jewish Autonomous Region, Russian Federation*

Ballastless Track Technologies

The **Low Vibration Track (LVT)** technology by Sonneville AG (Switzerland) is one of the advanced infrastructure solutions delivered by RSRS GmbH Railway Infrastructure Projects.

The Company possesses unique competences and substantial railway project experience to organize LVT block laying works, including those for railway tunnel reconstruction projects.

Reference Projects:
Moscow Metro, Saint-Petersburg Metro,
Reconstruction of the tunnels of the North Caucasian railway (2013 – 2020)

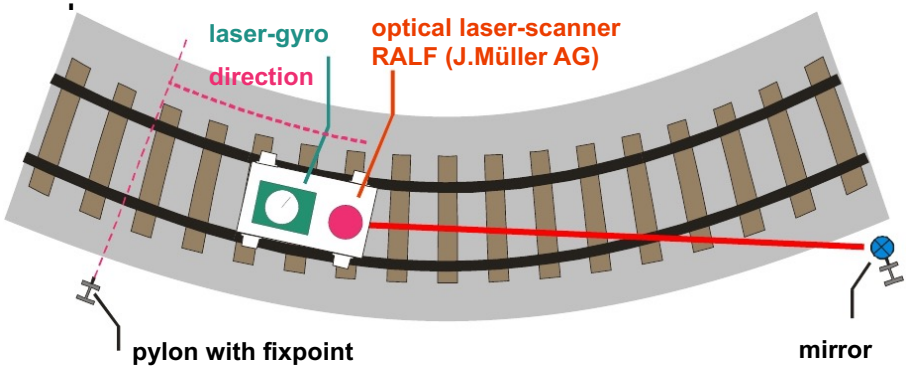
Currently RSRS GmbH is taking part in the project for implementation of **Ballastless Slab Track for High-Speed Rail Lines** in Russia:

- Elaborated design of the test section
- Developed design solutions for stiffness samples when changing from a ballast base to a ballastless base
- In 2021 company is planning to elaborate design of reinforced concrete plant for the production of ballastless slabs for high-speed railways

High-Precision Railway Track Alignment

RSRS GmbH Railway Infrastructure Projects possesses sufficient expertise in executing infrastructure projects for improving the state of railway track superstructure by putting it into optimal design position.
For these purposes we use Swiss railway track positioning technology — **PALAS**, which allows to build and maintain a railway track with the original geometric design parameters.

The system provides the absolute accuracy of the tamping machine operations, which allows to perform track final positioning automatically and achieve a tangible improvement in passenger comfort level at higher train speeds. **PALAS** is a fully automatic measuring and targeting system aimed at continuous rail track final positioning. **PALAS** reproduces the absolute track geometry on the railway tracks turnouts by means of triangulation and absolute measuring systems.



Reference Projects: *Luzhskij railway junction, Leningrad Region, Russia.Design & Construction, 2016 – 2017*

Uvarovka – Gagarin section of Moscow Railway, Moscow Region, Russia.Construction, 2016

Ecological Projects

As part of its EPC-projects **RSRS GmbH** is taking measures to assess the life cycle of buildings, energy modeling and implementation of the requirements provided for by the BREEAM environmental standard in design solutions. The application of this standard during the design process allows not only to optimize design solutions, bring them to the international level, but also to introduce the best practices of energy efficient and environmentally friendly design, which is especially important for a construction site that is sensitive to anthropogenic impact of the coastal zone.

The implementation of the BREEAM standard contributes to:

- reduction of operating costs by 20-30%;
- increasing the energy efficiency of projects by 10-50%;
- reducing the rate of asset obsolescence, increasing the optimal operational characteristics of the facility;
- increasing comfort and creating a favorable environment in the building;
- design taking into account the life cycle of the object helps to significantly reduce costs and avoid significant operating costs

Reference Project:

Construction of a rest house for locomotive crews at station Adler, Krasnodar Region, Russian Federation. EPC, 2018 - currently

Ecological Projects
Design and Construction of Water Treatment Facilities

Main activities:

- **Elaboration of project and detailed documentation**
- **Equipment sourcing and supply**
- **Monitoring and control over construction and installation activities**
- **Commissioning and further operation**

Applied technologies and types of constructed treatment facilities:

1. Biological treatment facilities:

- Standard Aerotank/secondary settling tank technology;
- SBR-technologies;
- Membrane bioreactors with submersible membranes.

2. Treatment facilities at dairy and meat farms

3. Oily waste treatment facilities:

- Gravity oil separator;
- Lamellar separator;
- Reagent flotation;
- Mechanical filtration;
- Sorption filter;
- Dewatering of accumulated sludge and flotation sludge.

Reference Projects: *Sewage facilities in Kursk (EPC, 2015-2018), Smolensk (construction, 2017-2020), Novosibirsk (design, 2017-2019), Vyazma (design, 2019-2020).*

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