

InnoTrans 2022 Report



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FOCUS ON

TUNNEL CONSTRUCTION

Finding the safest path

Tunnels create the shortest routes to connect cities, regions and countries – finding the safest path is a lengthy and demanding process.

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Dishes washed and dried

From 2023, reusable dishes will be required in train galleys. The appropriate dishwashing technology will leave plastic cups and crockery cupboard-dry.

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Not boring at all

How Elon Musk gets students all over the world excited about tunnel boring – and the German team TUM Boring takes the win.

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On a single rail into the future

Monorails are a space-saving and quick-to-build alternative as they use prefabricated components and can easily adapt to topography and urban development.

First surveys for railway tunnels on the new Dresden-Prague line



Taking samples of soil for planning of the new Dresden-Prague railway line.

Photo: DB AG/Natalie Klein

Germany's longest railway tunnel is to be built across the Ore Mountains to better connect the metropolises of Dresden and Prague. In order to find the ideal tunnel alignment, Deutsche Bahn AG (DB) is now conducting its second drilling campaign.

Initial results for possible tunnel routings have already been deduced from earth drillings in the Ore Mountains. DB project manager Kay Müller emphasised the importance of progress in the project for the ecological transport turnaround. In future, there should be much faster and more frequent passenger and freight trains between Dresden and Prague. They would then link the metropolises in just an hour, and it should become possible to relieve the much frequented Elbe valley.

The first exploratory drillings evaluated

Before the tunnel itself can be planned, geological test-drilling has to be carried out in the Ore Mountains. DB has been carrying out such measurements and drilling since 2020. The first boreholes to examine the geological formations reached down to a depth of 400 metres below ground. In total, around 130 boreholes were examined at nine points. In the Central Saxon Mountains, the soil and rock

samples taken are of good rock quality. Only very few adverse factors were found, and on the basis of these findings it is expected that the tunnel could be built without any major difficulties. In the Gottleuba valley, on the other hand, several fractures and irregularities in the rock structure were found, and these will have to be taken into account for tunnel alignment planning. The structure in the Börnersdorf area was also examined in detail; however, it is not yet possible to determine an alignment from the current findings. In the second drilling campaign, from November 2021 to May 2023, 14 up to 500 metre deep boreholes are expected to be drilled.

Planning status

The Dresden-Prague upgrading project is currently in the early planning phase. DB has worked out several possible variants for the future layout of the additional and adapted tracks in Heidenau. The options to build part of the section in a tunnel with the other

part above ground as well as a continuous tunnel are being investigated. The aim is to identify a so-called preferred variant. "This must be compatible with the entire region and the environment and also take into account economic and regulatory approval aspects. In addition, the solution must comply with the specifications and criteria of the German Federal Government," said a railway spokesperson. "The decision for the preferred variant will only be made at the end of the preliminary planning process, probably in 2024."

New Dresden-Prague line

The rail link between Dresden and Prague is part of the trans-European Orient / East-Mediterranean corridor. It connects the German North and Baltic Sea ports with the economic centres in south-eastern Europe and passes through nine member states of the European Union. The route is of strategic importance for freight transport. The necessary cross-border tunnel through the Ore Mountains will be at

least 25 kilometres long, 15 kilometres of which will be on the German side, making it the longest railway tunnel in Germany.

DB City Cube Berlin | 410



Drill core of a sample from Gersdorf (Bahretal).

Photo: DB AG/Natalie Klein

COMMENT

More trains to move Europe



Prof. Dr.-Ing. Roland Leucker, Managing director of STUVA e. V.
Photo: STUVA

Travelling by train from Dresden to Prague through the beautiful Elbe valley is something for romantic railway enthusiasts. The only electrified line between Germany and the Czech Republic meanders leisurely through the Ore Mountains. Two and a half hours are needed for the 250 kilometres long line – yet the two cities are only 120 kilometres apart. Currently, the closer national rail networks in Europe come to their country's borders, the more sparse they become. Any cross-border lines which exist are not electrified, so in most cases they can only be operated using diesel locomotives. The upgrading with international high speed lines as decided and promoted by the European Union (EU) as early as 1990 is only progressing slowly. In some cases, fast direct train connections fail as a consequence of differing national signalling systems. In other cases, the shortage of professionals and therefore of train drivers is further complicated by the lack of knowledge of foreign languages. Language proficiency level B1 is requested to operate in a neighbouring country, and the fear of foreign competition might be a further obstacle. A mere 125 trains cross intra-European borders each day. With the "Green Deal", however, the EU moved things to the next level two years ago by increasing funding for the upgrading of the nine core network corridors of the Trans-European Transport Network. Since then, things have started to move for the planned Ore Mountains tunnel. DB Netz AG and its Czech partner Správa železnic are now pushing ahead at high speed to build the tunnel which will be at least 25 kilometres long. It is the core element of the new line from Dresden to Prague and thus the key structure of the core network corridor "Orient-East-Mediterranean" which is due to enable direct high-speed connections for freight and passengers from the North and Baltic Seas to Athens and Istanbul. It will then be possible to cover the distance from Dresden to Prague in one hour. The hope for a performing railway future in Europe is thus still alive. It is high time for climate protection.

STUVA Hall 5.2 | 940

FOCUS ON

■ TUNNEL
CONSTRUCTION

Safe connection

The issue of safety in tunnel construction begins with the identification of its alignment. With core sample bores and their evaluations, the preferred variant can be identified. Specifically targeted construction materials help to stabilise the ground during the construction phase. Operations are safeguarded by using adapted electrical installations to cope with the tunnel climate, as well as a clear and reliable emergency and safety lighting system and an effective fire-fighting system.

Water mist fire fighting systems safeguard human lives and tunnel structures

Full fire test of a water mist fire-fighting system with a reconstructed lorry.

Photo: FOGTEC Brandschutz GmbH

The devastating tunnel fires of the past which claimed numerous lives have shown that large fires can occur even in modern tunnels, and they may have the potential to develop in a dramatic way. As the fire grew rapidly in size and radiated heat, a manual intervention by fire brigades was often not possible any more. Motorists and also the operational capability of the fire brigades were at considerable risk. In many cases, the fires damaged the tunnel structure so severely that the subsequent repair work required long closure times. FOGTEC Brandschutz GmbH has carried out research projects to investigate the effectiveness of water mist fire fighting systems.

■ The fire risks in connection with the safety of human lives, the safety of fire brigades and the protection of tunnel structures are sufficiently well known and the specifications, especially with regard to the safety of persons and the protection of structures, are recorded in sets of rules. In order to fulfil these, various concepts and fire protection measures can be implemented.

For about 20 years, water mist fire fighting systems (WM-FFS) have been used in selected tunnels to fight large fires. One of the fire fighting agents is usually pure water. Within the framework of research projects funded by the German government and the European Union, FOGTEC has carried out real fire tests in specially designed test tunnels to investigate the effectiveness of the systems.

Reducing life cycle costs

It was shown that WM-FFS significantly reduce the risk of fire by limiting the size of the fire and preventing the spread of the fire from

one vehicle to another. In the event of a fire, the cooling effect of the water mist in particular significantly reduces the temperatures around the fire and limits heat radiation. This increases the safety of motorists and firefighters significantly. Increasingly, these advantages of FFS are also being used to protect the tunnel structure.

The availability of tunnels is becoming more and more important. Fires sometimes lead to considerable damage, significant repair costs and long closure times of important traffic arteries. They drive up the life cycle costs of such a structure. FOGTEC's fire fighting systems can shorten the closure times quite considerably.

Tunnels can be reopened to traffic in the shortest time possible. The comparison between maintenance and initial costs of such a system and the increased life cycle costs caused by a fire shows that in many cases the investment in a FOGTEC FFS pays for itself after only a few years.

FOGTEC Brandschutz GmbH ■ Hall 5.2 | 733

Light for rail tunnels

In an emergency, handrail systems optimally illuminate the escape route - both in high-speed and rapid-transit tunnels.

Photo: NORKA Norddeutsche Kunststoff- und Elektro-Gesellschaft mbH & Co. KG

NORKA Norddeutsche Kunststoff- und Elektro-Gesellschaft mbH & Co. KG offers special solutions for emergency and safety lighting in rail tunnels in addition to the emergency luminaires in its standard range. In doing so, the company draws on its many years of experience as a luminaire manufacturer for difficult ambient conditions and emergency lighting.

■ In the trans-European high-speed rail system, all tunnels longer than 500 metres must be equipped with a handrail for

the self-rescue of persons. Such handrail systems are also increasingly being used in rapid transit and metro systems. In this

way, the escape route is optimally illuminated in the event of an emergency and enables people to safely leave the danger

zone - in tunnels along both high-speed lines and also in rapid transit systems. It is a particular challenge to ensure the compatibility of the luminaire, the supply unit and the monitoring technology. High vertical manufacturing integration and technical background knowledge enable NORKA to respond to specific requirements and to develop tunnel safety lighting according to customer needs.

Single centrally controlled battery supply

NORKA has specially developed a single battery system for the requirements of public transport applications. In an emergency, single-battery emergency lighting supply units will feed the integrated LED safety lights in the handrail, so that passengers can safely get to the next exit point. The integration into the existing control and monitoring technology enables the central monitoring of the entire system. The functionality and operational availability of the emergency lighting can thus be ensured from a central location.

Lighting optimised for the surroundings

NORKA, a family-owned company founded in 1948 and based in Hamburg and Dörverden-Hülsen, specialises in technically sophisticated lighting solutions tailored to very specific environmental conditions. The main areas of application for NORKA luminaires include industrial and production halls, railway platforms and traffic structures, workshops, multi-storey car parks, façades, port facilities and maintenance pits. The company also produces special luminaires for washing plants, swimming pools, logistics centres and cold stores.

With its new business division for traffic and tunnel lighting, NORKA also offers a broad product portfolio for improving traffic safety. This includes luminaires for entrance and drive-through lighting of tunnels as well as solutions for traffic routing and marking of escape routes. NORKA products are durable, energy-efficient and have a high degree of availability.

NORKA Norddeutsche Kunststoff- und Elektro-Gesellschaft mbH & Co. KG ■ Hall 5.2 | 800