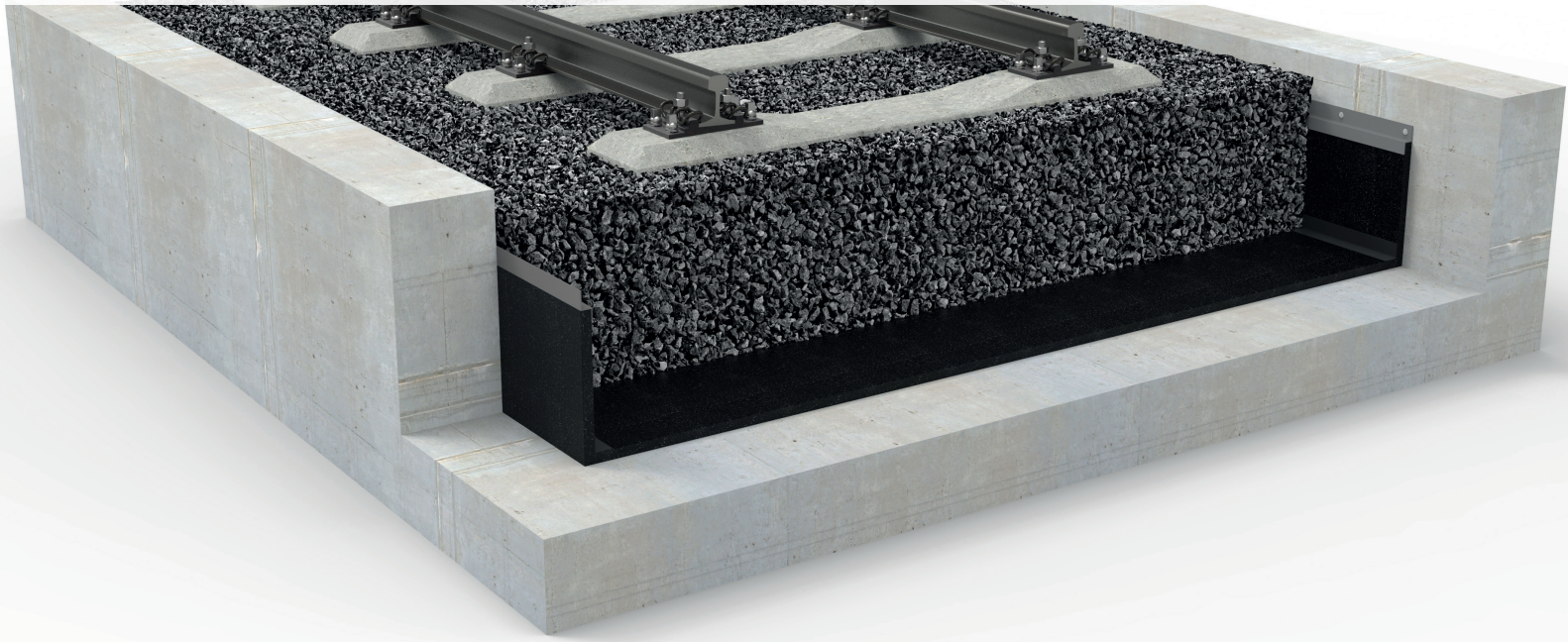


## Various technical solutions to protect the structures



## Effective vibration and structure-borne sound protection

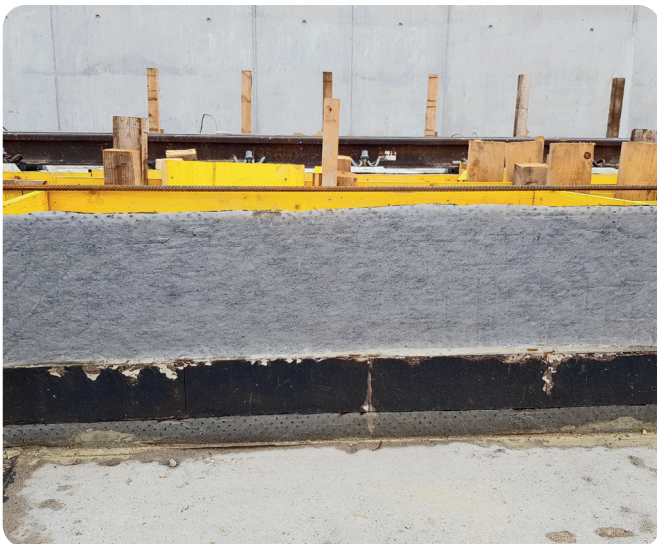
Rail traffic causes airborne noise as well as vibrations or structure-borne sound. Residential and commercial locations are normally the sufferers of these emissions. Calenberg Ingenieure use elastomeric products for their rail

track program. They are produced from high grade natural and synthetic rubbers. Due to the different variants within the product range, individual solutions for nearly every vibration and noise problem can be offered.

## Recent projects

**Wendlingen** The new „Wendlingen - Ulm“ line in Baden-Württemberg, Germany, will create an infrastructure designed for 250 km/h. Slab track will be used for the superstructure.

To cope with the particular challenges of trains riding over bridges and crossings at high speeds, various technical solutions must be brought into use to protect the structures.



Among other things, Calenberg directional control bearings are used on the bridges. The directional control bearing consists of a stainless-steel support with anchorages onto which a high-quality rubber compound is vulcanized. These are then fitted in a vertical position to the side bench of the bridge and - in combination with other measures - absorb horizontal forces and help stabilize the slab track position.

The directional control bearings are also used on the „Filstal Bridge“, which will be the third-highest railroad bridge with a height of 85 m after completion. A special feature of the bridge is that it connects two tunnel tubes and the ICE will later speed over it at more than 200 km/h.

Calenberg Ingenieure offers special solutions adapted to the project.

## Recent projects

**Australia** In Australia, the ARTC is planning numerous renovations and renewals of the railroad network to ensure safe heavy duty transport. To effectively protect the transition areas of the bridges by absorbing vibrations, our USM 4015 has been used in places. The lenticular studs act like small springs and absorb part of the energy generated by passing trains. This reduces the impact of damaging forces to the structure. In addition, the USM 4015 has the following advantages:

- The upper part of the mat consists of a sandwich construction of rubber and textile layers that proves to be robust and resistant to under ballast applications.
- High elasticity protects the ballast from premature wear.
- Use of renewable raw materials: the spring elements are made of high-quality natural rubber.
- No water absorption of the sub-ballast mat and the geometry allows for full-surface drainage underneath the mat.
- High-quality rubber raw materials guarantee a long service life of at least 60 years.



**Karlsruhe** In Karlsruhe's city center, many projects have been started and partially implemented as part of comprehensive measures to control inner-city traffic. In the course of the „Kombilösung Karlsruhe“, the „Kriegsstraße“ is being redesigned to a considerable extent. Thus, the car traffic will be led underground in a tunnel and the tram traffic will be led above ground. At the same time, plans are being made for the renovation and expansion of the „Badisches Staatstheater“ which is located directly on „Kriegsstraße“. To avoid feared restrictions on the serviceability of the buildings with regard to the discharge of harmful vibrations and secondary airborne noise, an effective solution was sought.

A grass track is planned for the tramway on Kriegsstraße. Furthermore, the track system will be decoupled from the subgrade by means of an elastomeric intermediate layer. The Calenberg USM 1000 W has been used as the elastic element. In addition to its excellent technical properties, the choice is also economical and efficient in terms of implementation:

- An area of approx. 2450 m<sup>2</sup> has been covered with the USM 1000 W. Due to the longitudinal laying and the fact that the floor mat does not have to be glued, a lot of time could be saved in the laying process.

