

## Case study.

### **Trouble-free travel for Munich tram**

#### **Schöck Combar: Track reinforcement without steel**

**More space for the tram: The Municipal utilities in Munich, Germany, and the transport company are investing in the expansion and maintenance of the Munich tram network. The extensive construction work has been taking place at the main train station since April 2020. There, a third track will be added to the current double-track stop on Bahnhofplatz. This will create more space for the tram and will make operations smoother and more flexible in the future. In order to avoid signal interference, it was decided to use the electrically non-conductive glass fiber composite material Combar from the construction product manufacturer Schöck for the reinforcement of the track support slabs.**

The tram network at Munich Central Station is one of the oldest in the city and is particularly busy due to the number of lines that run there and the tight schedule. During rush hour, up to six lines run here in ten minutes. The extensive construction project was started in spring 2020, which will ensure the preservation of Munich's tram network and include an expansion. The double-track stop on Bahnhofplatz was extended by a third track - to create more space for the tram and to make operations more fluid in the future. The new tram track should also make it easier to react to disruptions. At the same time, track sections that have reached the end of their service life are being replaced.

### **Trouble-free turnout switching**

Concrete elements in the rail area are usually reinforced with steel. In the area of the points, however, electronic blocking circuits are used to determine whether and how many tram axles are driving over the points. If a tram drives into the points area, the oscillating circuit is changed by the large steel mass of the rail axis and thus the control of the point is influenced. The conventional steel reinforcement in the ground slab affects the electronics in a similar way and would lead to faults in the point blocking circuits. The solution is comes in the form of Schöck's Combar glass fiber composite material: a high-strength reinforcement bar consisting of corrosion-resistant glass fibres bonded with a vinyl ester resin.

### **Improved sound insulation**

The decision to use reinforcing bars made of fiberglass composite material also has positive effects on noise protection: One of the most effective measures against the development of structure-borne noise and vibrations in connection with a solid roadway is mass-spring systems. These systems dampen the transmission of vibrations to the environment. The use of mass-spring systems makes sense, especially in densely built-up areas such as Munich city center. In order to be able to use these noise protection measures also in the area of the points, it is imperative to use non-magnetic reinforcement in the concrete components so that a fully electronic control of the points is possible. The Combar reinforcement bars made of fiberglass composite material are ideally suited for this type of application thanks to their special material properties as well as the building authority approval and ease of processing.

### **Schöck Combar**

For decades, steel has been used as the most common reinforcement material in concrete construction. However, in certain areas of application, such as specialist civil engineering, research construction or the construction of energy generation plants, the material properties of the steel bars do not meet the given requirements. In these cases, Schöck Combar

opens up new application possibilities thanks to its extraordinary properties: In addition to corrosion resistance and electromagnetic neutrality, they include easy machinability, minimal thermal conductivity and particularly high tensile strength. This makes Combar a superior alternative to reinforcing steel when it comes to reinforcement. When it comes to installation on the construction site, however, Combar does not differ from conventional reinforcing steel - no special training is therefore required before processing.

<https://www.schoeck.com/en/combar>

### **Construction board**

Construction company:	G. Hinteregger & Söhne Baugesellschaft m. b. H., Salzburg, Austria
Owner:	Municipal utilities Munich (SWM)
Structural engineer:	Ingenieurbüro Grassl GmbH, Munich
Location:	Munich, Germany
Completion:	December 2020 (1st construction phase)
Size:	About 1.000 Quadratmeter square meters
Schöck products	Schöck Combar

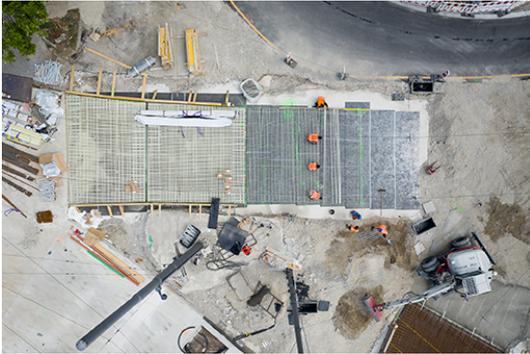
### **Video**

Installation of the reinforcement bars Combar at the construction site in

Munich: <https://www.youtube.com/watch?v=IMEdb-Ar9z8>

## Captions

### [Schoeck Gleistragplatten MUC 01]



*Top view of the Combar reinforcement. Photo: Moritz Bernouilly*

### [Schoeck Gleistragplatten MUC 02]



*Laying the spacers for compliance with the concrete cover. Photo: Moritz Bernouilly*

### [Schoeck Gleistragplatten MUC 03]



*Align the longitudinal bars according to the spacing prescribed in the reinforcement plan. Photo: Moritz Bernouilly*

[Schoeck Gleistragplatten MUC 04]



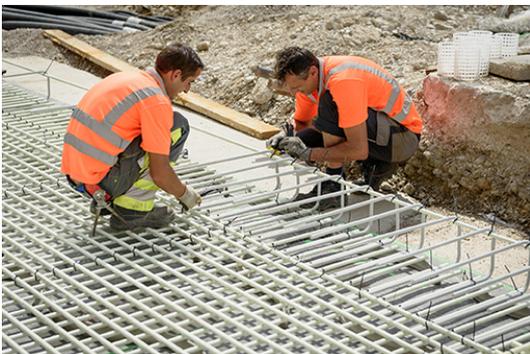
*Fixing the reinforcement with cable ties. Photo: Moritz Bernouilly*

[Schoeck Gleistragplatten MUC 05]



*Align the longitudinal bars according to the spacing prescribed in the reinforcement plan. Photo: Moritz Bernouilly*

[Schoeck Gleistragplatten MUC 06]



*Laying the bent bars. Photo: Moritz Bernouilly*

[Schoeck Gleistragplatten MUC 07]



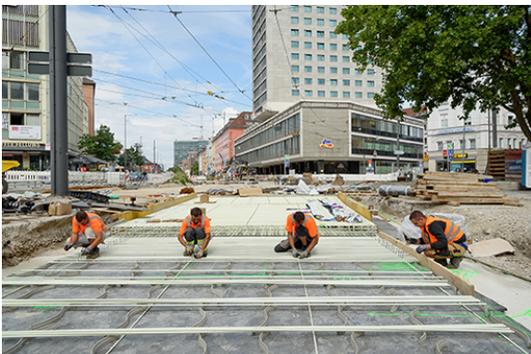
*Fixing with the straight rods. Photo: Moritz Bernouilly*

[Schoeck Gleistragplatten MUC 08]



*The Combar reinforcing bars are cut to the correct length. Photo: Moritz Bernouilly*

[Schoeck Gleistragplatten MUC 09]



*Work on the "lower layer" of the reinforcement. Photo: Moritz Bernouilly*

[Schoeck Gleistragplatten MUC 10]



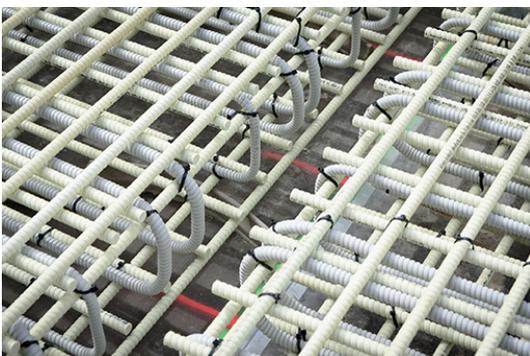
*The "lower layer" of the reinforcement immediately before completion.  
Photo: Moritz Bernouilly*

[Schoeck Gleistragplatten MUC 11]



*View of a floor slab reinforced with Combar. Photo: Moritz Bernouilly*

[Schoeck Gleistragplatten MUC 12]



*View of a floor slab reinforced with Combar (detail). Photo: Moritz Bernouilly*

[Schoeck Gleistragplatten MUC 13]



*In special application areas, conventional reinforcing steel does not meet the given requirements. In these cases, the Schöck Combar glass fiber reinforcement opens up new possibilities. Photo: Schöck Bauteile GmbH*