

B.T. innovation GmbH, 39116 Magdeburg, Germany

# Modular bridge construction with carbon concrete precast element and innovative joint sealing strips

The demands on transport infrastructure are constantly evolving and present those involved with ever new challenges. The need to modernise existing bridges and also find innovative solutions for sustainable infrastructure has led to a pioneering project - the construction of a new bridge on the B173 federal road near Freiberg in Saxony, Germany.

The bridge construction took just one day using precast elements. Hentschke Bau GmbH has not only risen to this challenge, but has also focussed on modern materials such as carbon concrete and advanced sealing technologies such as RubberElast® from B.T. innovation GmbH. This venture into

forward-looking construction methods and sustainable infrastructure development not only promises an efficient solution to current transport problems, but also presents a pioneering model for modular bridge construction. The project combines current innovations in the construction industry and the trend towards sustainability in this construction project.

## A safe solution - modular bridge construction with 16 m long precast elements

Two old bridges had to be renovated on the busy B173 federal road south of Kleinschirma near Freiberg. The construction of a temporary bridge in the immediate vicinity and a



The first precast element is lifted onto the abutments



Applying the RubberElast crush joint tape



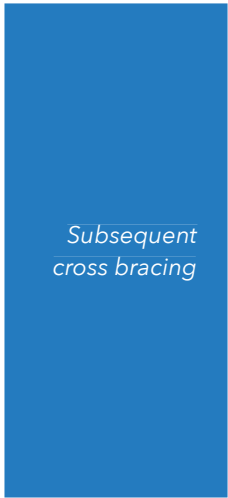
Positioning the next precast element



Pre-assembly with chain hoist



*Attaching the last precast element*



*Subsequent cross bracing*



bypass were intended to realise this. The innovative temporary bridge made of carbon concrete precast elements was built by Hentschke Bau GmbH as part of the PAMB (Pilot Application for Modular Bridge Construction) research project.

Initially, five 16 metre long carbon concrete precast elements were prefabricated in the precast plant. For assembly, the precast elements were lifted one after the other onto precast element abutments using two cranes and then assembled to complete the bridge.

**Optimisation of time sequences with RubberElast for sealing in under 3 hours**

After the first precast element was placed on the abutments with the cranes, a joint tape ensured sealing to the next component during assembly. The Hentschke team used RubberElast joint tape to seal the precast elements to each other. For this purpose, the carbon concrete precast elements were provided with 8 mm deep recesses on both sides in the area of the joints. RubberElast 17x17 was placed and pressed onto the concrete in each of these recesses. The new precast element still hanging from the cranes was attached to the already assembled components. Chain hoists at both ends of the bridge were used to compress the two strips of RubberElast in the joint to a distance of just a few millimetres between the precast elements. This process was repeated for the next component. This entire pre-assembly, which involved unloading the five precast elements from the HGV, gluing on the RubberElast and compressing the joint tape, took just 2.5 hours.

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RubberElast

The five carbon concrete precast elements were finally cross-braced to make the B173 bridge passable. Finally, the precast elements were cross-braced to each other using unbonded DSI bar tendons. The cross bracing ensured that the bridge reached full load capacity immediately and that the compression of the RubberElast was also completed.



RuberElast before transverse bracing

**Connection technology and RubberElast:  
This combination is convincing across the board**

If waterproofing against pressing water is required instead of rainproof joints in a building, then the RubberElast's full capacity comes into play. This is regularly used for hydraulic structures, waterproof cellars, white tanks or sewer systems. With RubberElast, BT innovation offers a self-adhesive crush joint sealing tape for such requirements that combines assembly and sealing in a single work step: When the elements are clamped, for example with the BT turnbuckle, the compression of the crimping tape in the component joint immediately achieves impermeability up to 5 m water column. Permanently elastic and resistant to weathering, acids, alkalis and salt, there are hardly any restrictions on its use. The ability to process RubberElast at temperatures from -10° to 40° Celsius also helps to minimise schedules on any construction site, even in times of rising temperatures in the summer months and low temperatures in winter. After releasing the bar tendons, the prefabricated elements of the bridge can be completely dismantled and thus reused at a new location.

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PAMB: Pilot application for modular bridge construction (FKZ 03KB2031). The project partners are HTW Dresden, RWTH Aachen, Curbach-Bösche-Ingenieurpartner and Hentschke Bau

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