Press Release

Special formwork solution for motorway bridge: A cantilever forming traveller like a transformer

Maisach, Germany, March 12, 2024. At almost 4 km in length, the "Hochstraße Elbmarsch"– K20 for short – on the BAB 7 motorway in Hamburg is the longest road bridge in Germany. It has been undergoing renovation and expansion since 2020. The space available on the construction site is so limited that the contractor STRABAG and Doka had to come up with a special formwork concept. Their bridge experts therefore developed something completely new: they converted the ParaTop cantilever formwork into a moveable formwork traveller that could also be folded in and out in all four directions.

The K20 is one of the most important traffic junctions in Europe. However, the six-lane motorway, which was completed in the early 1970s, has long been overloaded and traffic jams are a daily occurrence. This is why the motorway bridge is currently being widened to eight lanes. To ensure that the harbour and the Elbe tunnel can still be accessed, three continuous lanes in each direction will remain available during the construction period.

This is a project with a particular degree of difficulty, explains Meinolf Droste, Overall Project Manager K20 at STRABAG AG: "Our job is to widen the inside of the carriageway while preserving the existing structure. This means that between the two carriageways, a widening of approx. 4 meters is to be added to the existing structure. There were numerous formwork-related hurdles to overcome, which are anything but easy. We trusted Doka to solve this. To do this, we first analysed these special boundary conditions together. Through intensive dialogue and a multi-phase planning contract, we then developed a solution that was both new and unique, and it worked brilliantly."

Geometric restrictions

Part of the concreting work runs across the Rugenberg harbour, and therefore over water that is subject to the tides. This means that the only option was a moveable formwork solution that travels alongside the steel structure. In addition, the entire geometric space through which the formwork traveller had to pass was restricted in all four directions. "The traveller had to be height-adjustable at the top so that we could get under certain haunches. And there were interference points on both sides of the steel girder where we had to drive around them. The existing wall was on the left, so the formwork traveller also had to be retractable here. And it was clear that the formwork traveller could never stay the same at the bottom, so we might have to raise the platforms in order to drive it over various cross beams or other conditions. We actually built a kind of transformer that can taper in all four directions and then unfold again," explains Marc Bindler, Group Manager Civil Engineering Bridges at Doka Germany. "As traffic had to continue to flow in parallel, our ParaTop was the only possible solution, as because no formwork equipment was allowed to move within the clearance gauge on the existing bridge. Everything had to take place underneath the bridge. Due to the enormous length of the bridge, we had the potential and the unique opportunity to develop a formwork traveller like this."

From 30 to 100

However, the length of the bridge – twice 3.84 km – also created risks. "Originally, we had planned the formwork traveller for a span of approx. 30 meters. We were supposed to turn that into 100 meters – but how do we pull 100 meters of formwork traveller? Without damaging the coated steel structure? What about the structural stability in the different construction stages? At this point, we worked intensively with the structural engineers, inspectors and the client. An incredible amount of technical expertise and engineering came together, especially on the part of our team, with an incredibly high level of trust and appreciation from STRABAG and, in particular, the project managers Meinolf Droste and Christian Niemietz," enthuses Bindler.

Multifunctional use

At times, the formwork traveller was also used for other purposes. In the first step, it was used to concrete the carriageway. A few weeks later, after the structure had settled, the next step was to create the compression joint to connect the old and new carriageways. This meant that the formwork traveller also had to be able to drive backwards and function as a kind of edge-beam traveller. The construction site team and Doka came up with the idea of modifying the formwork traveller because such a great deal of distance had to be covered via the Rugenberg harbour. Under these circumstances – with fluctuating water levels below and traffic continuing above – the bridge work using Doka formwork traveller was actually the only option.

Excellent progress has already been made with the renovation and expansion in the direction of Flensburg: Traffic is already travelling over the first sections of the new superstructure. Construction work in the opposite direction, towards Hanover, is due to continue in the middle of the year. The planned completion date for the entire project is 2027, with the actual aim of completion in 2026. Until then, many Hamburg residents and transit traffic will have to continue to be patient.

In the Spotlight:
Project: Extension of the “Hochstraße Elbmarsch” (K20) / BAB 7 – Germany's longest road bridge
Location: Hamburg
Building Type: Motorway bridge
Construction: STRABAG AG
Total construction time: 2020 to 2027
Doka Services: Project Management, Formwork Planning, Formwork Instructor, Pre-assembly Service & Assembly
Doka Products: ParaTop, Doka Xsafe, Concremote

Photos:
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Due to the extremely limited space available, the only option was to use a 100 meter-long moveable ParaTop formwork traveller, which is moved by means of winches over roller heads (assembly situation).
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The K20, Germany's longest road bridge at 3.8 km, and the access route to the Elbe Tunnel, is currently being refurbished and extended.
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Part of the almost 4 km-long K20 passes through the Rugenberg harbour.
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About Doka:
Doka is a world leader in providing innovative formwork, solutions and services in all areas of construction. The company is also a global supplier of well-thought-out scaffolding solutions for a varied spectrum of applications. With more than 178 sales and logistics facilities in over 60 countries, Doka has a high-performing distribution network for advice, customer service and technical support on the spot and ensures that equipment is swiftly provided – no matter how big and complex the project. Doka employs 7,000 people worldwide and is a company of the Umdasch Group, which has stood for reliability, experience and trustworthiness for more than 150 years.

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