Detachable Anchorage for Expansion Joints

The Duisburg-Neuenkamp Rhine Bridge including expansion joints is transversely displaced.

Duisburg. **The first section of the new Duisburg-Neuenkamp Rhine Bridge is already open to traffic, but it will not stay where it currently is. A spectacular transverse displacement is planned for 2026, which will also include the expansion joints. MAURER therefore designed special detachable anchorages.**

As part of the A40 motorway, the Rhine bridge in the Neuenkamp district of Duisburg connects the Ruhr region with the Netherlands. In the 1990s, it had been expanded from four to six lanes due to heavy traffic; but this had such a severe impact on the bridge's steel structure that fatigue of the steel superstructure endangered the structural stability. In the late 2010s, the bridge was closed to trucks and new construction became inevitable.

The Neuenkamp Rhine Bridge near Duisburg with completed southern superstructure (at the front).
Photo: MAURER

First section of the bridge has been inaugurated

A ten-lane cable-stayed bridge is being built with two separate superstructures and dedicated foot and cycle paths alongside them. With a total length of 803 metres, the bridge features a main span of 428 m over the Rhine. The eight pylons located in the flood areas of the Rhine meadows are 68 m tall and support ten double stay cables in each case.

As the bridge is ultimately intended to realign with the axis of the existing A40, the southern superstructure was initially built in a lateral position and inaugurated at the end of 2023. It now supports the entire traffic load including trucks on six lanes.

14.4 m transverse displacement

Currently, the old bridge is being dismantled and then the second, northern superstructure will be built. In the final stage, the southern bridge is likely to be moved to its final position in 2026. The transverse displacement by 14.4 m is carried out including the pylons.

Lifting a large expansion joint into position in August 2023.
Photo: MAURER

Detachable expansion joints

This transverse displacement poses a particular challenge: as the southern superstructure is already open to the traffic, it has fully functional expansion joints. Expansion joints are installed at the ends of the bridge to compensate for longitudinal movements of the bridge deck as well as dynamic structure movements.

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MAURER has designed special expansion joints for the southern superstructure so that they can be moved with the transverse displacement in 2026. The anchorage of the expansion joints was equipped with a special steel construction which can be detached prior to the transverse displacement. In addition, the expansion joint was embedded into concrete using lean concrete which will be removed prior to the transverse displacement. In its final position, the expansion joint is then installed with the usual rapid-hardening concrete.

There has never been a transverse displacement of expansion joints of this size before. Here, the challenge did not lie in the movement of up to 900 mm. MAURER has already built and displaced expansion joints before, which allowed for much larger movements. It was the special geometry of the expansion joints that proved to be rather intricate: they have a varying transverse slope and an enormous length at up to 48 m.

MAURER supplies a total of eight expansion joints for the new Rhine bridges: XLS 900 and XLS 400 for the main lanes as well as XLS 900 and DB 130 for the dedicated foot and cycle paths alongside them.

A video of DEGES illustrates the procedure of the transverse displacement on https://www.youtube.com/watch?v=fXCaKPjaxG0 (from 4:48 min.).

Text: 3.340 Keystrokes

Detachable expansion joint: on the right, already integrated; on the left, still open – as here, the special detachable connection will be created and the lean concrete has not yet been installed.
Photo: MAURER

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Quick facts about MAURER SE

MAURER SE is a leading specialist in mechanical engineering and steel construction with over 1,500 employees worldwide. The company is a market leader in the fields of structural protection systems (bridge bearings, expansion joints, seismic devices, vibration absorbers, and monitoring systems). It also develops and manufactures vibration isolation for buildings and machinery, roller coasters, Ferris wheels and special structures in steel construction.

MAURER is involved in many spectacular large-scale projects, such as the world's largest bridge bearings in Wazirabad, earthquake-resistant expansion joints on the world's longest suspension bridge (1915Çanakkale), tuned mass dampers in the Baku and Socar Tower or the unique guided cross-ties with derailment protection on the Champlain railway bridge in Montreal. Complete building isolation ranges from the Acropolis Museum in Athens to the new major airport in Mexico. Spectacular amusement rides include the Munich Ferris wheel Umadum, BOLT™ as the first roller coaster on a cruise ship or the world's first duelling roller coaster at Mirabilandia Park in Ravenna.

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