Sustainable refurbishment on the A4 over the Rhine

MAURER replaces expansion joint construction on the Rodenkirchen Bridge.

Cologne. **The historic Rodenkirchen Bridge over the river Rhine in Cologne was fitted with new expansion joint constructions this summer. What made this project special was how the centre beam package at the heart of the joint was cut out and replaced, while the bridge structure was left intact. This required precise planning and preliminary work, but represents a much more sustainable and cost-effective solution than replacing the entire joint.**

The Rodenkirchen Bridge was opened in 1941 in the south of Cologne as a true suspension bridge connected to the earth. It has a main span of 378 m and was the first motorway bridge (A4) over the Rhine, before it was destroyed in an air raid just four years after opening. The bridge was then reconstructed using the original pylons and reopened to traffic in 1954. An expansion to the north with an identical design and two additional pylons was approved in 1994, meaning that the bridge now measures 52.80 m in width, with three lanes in each direction as well as paths for bicycles and pedestrians.



The Rodenkirchen Bridge over the river Rhine in Cologne in the typical "Cologne bridge green" colour.
Photo: istock/Thomas Stockhausen

The 567-m-long structure was given listed status in 1996. Although it is due to be replaced in around 20 years' time by a wider new construction that can carry more traffic (planning ongoing), it was necessary to replace the existing expansion joint constructions, which themselves were over 20 years old.

Fitted at the abutments at the ends of the bridge, these expansion joints flexibly compensate for structural movements caused above all by traffic, wind and temperature fluctuations. The joints are installed perpendicular to the direction of travel. Traffic must be able to pass over these junctures safely and unimpeded, regardless of the expansion joint's displacement.



The fully installed new expansion joint construction.
Photo: MAURER

Edge profiles remain in the structure

Both the old and new transition constructions in the Rodenkirchen Bridge are swivel joist expansion joints, which have become the standard for demanding bridge projects worldwide. In Cologne, they allow for movements of up to 800 mm and rotations in all directions. On large bridges like this, the longitudinal movements can be as much as 3 m and more. The swivel joists run from the superstructure to the abutment and support the nine parallel centre beams sitting on top. The joists run against each other and at a slight angle to the direction of traffic. With their shearing kinematics, they maintain an even distance between the centre beams at all times when the expansion

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joint opens and closes due to structural movements. The edge profiles are anchored in the bridge and provide a secure connection to the superstructure. The joist boxes enclose the construction and provide additional stability.

Centre beam package replaced

The old centre beam package was released from the joist boxes and removed. But instead of also being removed, the edge profiles and joist boxes were cleaned, blasted and given an anti-corrosive coating. A new centre beam package, consisting of the centre beams, joists, bearings and springs, was then lifted into place and welded to the remaining components in the structure. Naturally, the new centre beam packages required precise planning and production so that they would fit in the existing joist boxes.

This approach brings multiple advantages. As there is no intervention in the concrete, there is no need to chisel and re-concrete the structure. Similarly, it is not necessary to transport the old concrete away and have around 60 m^3 of new concrete delivered. The same applies to the steel in the edge profiles and joist boxes. This makes this type of refurbishment twice as fast and much more cost effective than a conventional project. It is also more sustainable, as it uses less material.

One small challenge was planning and coordinating the construction work on the busy A4 motorway. To prevent full road closures, the work was divided into four sections, each with an average of eight persons working on them. In each section, one half of each direction was closed while half of the expansion joint, each measuring around 13 m, was replaced at the two abutments.

After being lifted into position, the centre beams had to be connected to each other in each section, before the noise reduction was welded on at the end of the construction site.

Welded noise reduction

MAURER delivers noise reduction in the form of specially profiled rhomboid plates welded onto the surface, a solution that has proven itself for decades. These reduce noise levels by 30 to 50 %. Welded plates last much longer than screwed elements that can become loose within 20 – 30 years from the dynamic forces of being driven over millions of times.



Left: A photo that demands a closer look. In the centre is the gleaming new swivel joist beam, fitted in the old joist box with anti-corrosive coating.
Right: A new centre beam package fitted in section 3. Visible in the foreground are the black rubber seals and open centre beams that are connected to the other half in section 4. At the very bottom is a piece of the old expansion joint construction, which has just been cut through.

Photos: MAURER



A centre beam package is lifted into the existing joist boxes.

Photo: MAURER

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A total of 104.2 m of type DS 800 GO expansion joints were fitted on the bridge over the Rhine. They meet the German engineering specifications ZTV-ING and TL/TP-FÜ. Just like all modern MAURER swivel joist expansion joints, they are fitted with MSM®, a high-performance sliding material for bearings and springs. MSM® guarantees smooth, constraint-free movements. This low-wear material also protects the bridge structure and ensures the durability of the expansion joint.

The four construction sections lasted from Autumn 2025 to Summer 2026. The client was Leonhard Weiss and the bridge is owned by Autobahn GmbH.

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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 the market leader in structural protection systems (bridge bearings, expansion joints, seismic protection devices, tuned mass dampers and monitoring systems). It also develops and produces vibration isolation solutions for structures and machines, roller coasters and Ferris wheels, as well as special structures in steel construction.

MAURER has been characterised by strong values and reliable people since 1876. In 2026, the company celebrates 150 years of teamwork, innovation and engineering prowess.

MAURER has been involved in many spectacular large-scale projects. These include the world's largest bridge bearings in Wazirabad, Pakistan, earthquake-resistant expansion joints for the world's longest suspension bridge, the 1915Çanakkale in Turkey, tuned mass dampers in the Baku and Socar Towers in Azerbaijan, and the unique guided cross-ties with derailing protection on the Champlain railway bridge in Montreal. Complete structural isolation projects range from the Acropolis Museum in Athens to the new airport in Mexico. MAURER has also worked on spectacular amusement rides, such as the Umadum Ferris wheel in Munich, BOLT™ – the first roller coaster on a cruise ship, and the world's first duelling roller coaster at the Mirabilandia Park in Ravenna, Italy.

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