



Replacement of Damaged Roller Shutter Joints with MAURER Swivel Joist Joints and Girder Grid Joints at the “Plochingen Triangle”, Germany

The “Plochingen Triangle” bridges the 2 rivers Neckar and Fils, and also the highly frequented Federal Road B313 into the direction of Nürtingen. At this location, every day 80,000 vehicles use the 4 lanes of the B10 Expressway direction Stuttgart, and Ulm respectively.

After 20 years in service, and due to a general renovation of the bridge, the installed roller shutter joints were to be overhauled to a new roller shutter system that should represent the latest technical insights. In a public bidding, were other products than roller shutter joints were also permitted to be proposed, MAURER offered their watertight modular expansion joints, that enjoy the approval of the German Federal Ministry of Transportation.

Finally, the job owner decided not to prefer roller shutter joints again, but to use MAURER modular joints. Depending on the movement of the bridge, girder grid joints or swivel joist joints were applied. MAURER modular joints employ the most economic solution in long term. They are absolutely watertight and therefore protect the adjacent substructure, and are maintenance free. In addition, the bridge structure enjoys advantages like the following:

- instead of 2,000mm surface area, they only need 350mm
- the service life of the joints are greatly extended
- noise emission is greatly reduced, particularly in direction underneath the joint

The renovation can be carried out without creating problems to the existing bridge construction in a sequential way, that is in those parts where the roller shutter joint is removed.

Another reason that allowed the job owner to prefer MAURER joints was the fact that the installation could be carried out under traffic conditions.





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The following work sequence was required for the replacement::



Removing the existing roller shutter joint lane by lane



First, the upper plates of the old roller shutter joint were removed. The loosening of the anchor screws was not possible without destroying those anchor screws



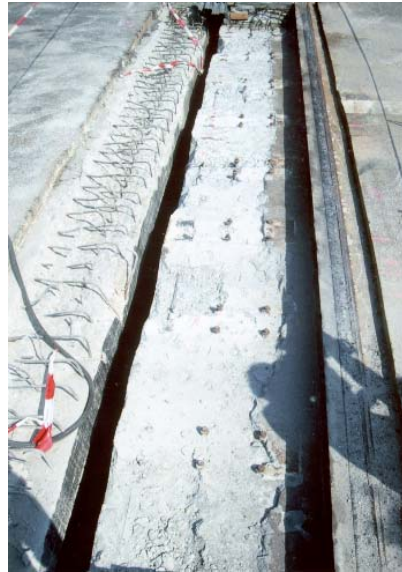
After burning away the respective anchor screws, the sliding guides were removed.



The concreted edge construction had to be chiselled out. At the abutment, the removal of the edge construction was not required.



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Preparation of the concrete recesses at the edges of the abutment and the bridge deck, to accommodate the new MAURER modular joints



Drilling works for inserting additional reinforcement that anchor the new modular joints.



Lifting the new modular joint into the structural recess.



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Levelling and adjusting the new modular joints in the recess.



Tack welding the reinforcement in the recess with the anchor loops of the joint.



Due to the condition that the installation of the modular joints could not be carried out in one full sequence (to facilitate traffic passing), the modular joints had to be installed in parts. As a consequence, the edge beams and the center beams had to be welded together on the job site. This requires a special welding technique that is patented by MAURER: the so called copper butt joint, a technique which in a similar case is adopted in welding railway rails.



With this welding technique, the modular joint enjoys the same long service life as if it would be installed in one single piece. After welding, the surfaces of the steel profiles are grinded and smoothed, and finally corrosion protection is carried out.



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At the location of the welded butt joints, the strip seals are connected by means of vulcanising. This is achieved by cutting the strip seal crosswise, preparing the cut edges, inserting a intermediate rubber piece, placing them into a heating form and vulcanising the strip seal according to a special MAURER procedure.



Alternatively to vulcanising, the strip seal can be inserted in its full length after welding. Prior to inserting the strip seals, the steel claws that accommodate the strip seal are being treated with soap water.



The special clamping mechanism of the MAURER strip seal facilitates a secure and fast insertion with simple tools.



Formwork is being installed from below, to cover the structural gap.



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After placing the formwork, concrete of German grade B35 is being applied and cured.



Accelerators for curing were not applied.



Sealing the cured concrete with epoxy concrete and final application of quartz sand.



The watersealing is applied in hot state



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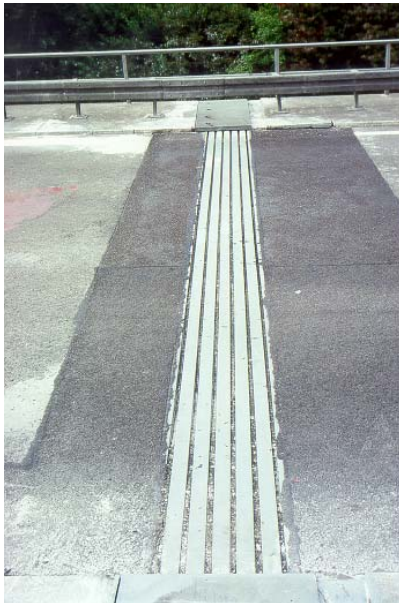
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On top of the watersealing, asphalt is being poured in 2 layers and then processed by hand.



Finally, between the new asphalt and the adjacent joint, a separating joint is being cut out, which is then sealed by means of an elastic filler.



Thus, the replacement is completed. The total replacement could be carried out without detrimental effect to the traffic that was passing by, and this was accomplished even faster than planned.

This replacement was carried out lane by lane, that is in 4 sequences, with each sequence to take about 2 weeks. In total, 4 roller shutter joints with a total length of about 40m were replaced – divided into sections of about 4.25m.