

All directional movable expansion joint bears 40 tons

86 m long und 1.25 m wide MAURER Expansion Joint protects the Triumphal Arch of Bucharest.

Munich/Bucharest. The industrial monument "Triumphal Arch of Bucharest" was subject to a complete overhaul and protected by means of seismic isolation against earthquake. An expansion joint that is 86 m long, 1.25 m wide and moveable into all directions encircles the total structure. This joint had to be designed in a way to bear the load of a 40 ton axle load.

The Triumphal Arch of Bucharest is full of histories, both in respect to its construction (it had two predecessors) and in respect to its sculptural elements, which were designed by several artists in 1935/36. The structure however also displays a long history in its damages, which, like its Parisian role model, is encircled by traffic, and thus subject to constant vibrations. To be added on the damage list are seven earthquakes since 1940, of a magnitude of up to 7.4 on the Richter scale. Humidity inside of the structure did the rest, such that the structural stability was seriously affected. The complete overhaul began in 2014.

Exceptional Requests

The overhaul covered both the artistic restauration and the seismic isolation of the foundations. Yet, the completely overhauled and isolated Triumphal Arch should be passable, in particular also for the heavy vehicles parading at the Nations Day on December 1st.

This required an expansion joint which could meet the following requirements:

- 86 m long, in a rectangular shape encircling the total structure
- Moveable in all directions by ± 500 mm
- Structural gap of up to 1.25 m, because the expansion joint had to be accessed from below
- Accommodating not only horizontal, but also major vertical displacements
- To be passed by vehicles of up to 40 tons
- Aesthetically appealing, to seamlessly fit into the garden landscape.

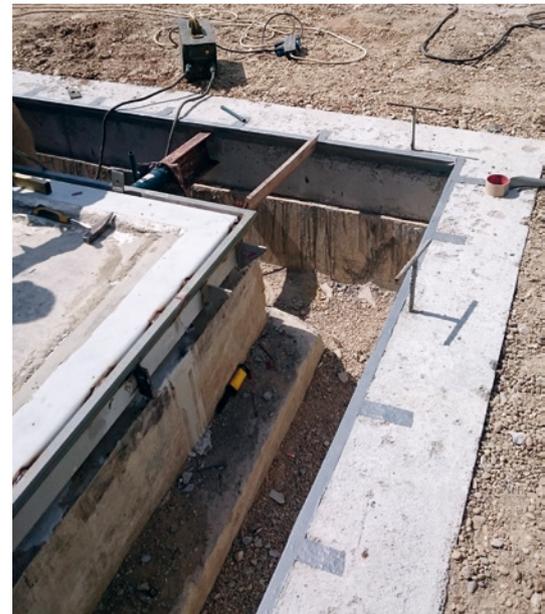
Special bolts with joint function

This set of requests was met by MAURER by way of a special design. Steel plates cover the expansion joint. They are fixed with special bolts and ball discs as well as with conical cups at the edge beam. Thus the bolts display of a joint



At the National Day on 1st December, the traditional parade finally could again move through the freshly renovated Triumphal Arch.

Photo: Ministerului apararii nationale/Petrica Mihalache



The open gap at one corner of the Triumphal Arch.

Photo: MAURER/RETTER

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function, which facilitate the steel plates to unfold in case of vertical movements. This unfolding function is also required for strong horizontal displacements, because in case of a closing movement the steel plates will be shifted onto and over the stone paving.

The horizontal movement capacity of ± 500 mm (as compared to the usual 80 mm) required a special sealing element which was produced extra for the Triumphal Arch.

Mitre in the corners

The edges of the encircling expansion joint called for a special solution. Like a picture frame, the steel plates were mitered, and can open if movements require so.

All special forms, individual solutions and materials are designed to be able to bear a vertical load of 40 tons. This corresponds to a 40ton truck on just one axle.

The total overhaul costing 6.6 Mio. € was predominantly financed by European funds. In respect to the expansion joints, the RETTER GROUP and MAURER cooperated. The two companies share already common experiences from several projects in Romania. "We are proud to have refurbished this for Romania so important national symbol together with our partners, thus facilitating the ceremonies on National Day under the Triumphal Arch", the project manager of RETTER SRL stated.

Text: 3,405 keystrokes



The expansion joint integrates almost invisibly into the design. Only the seams of the joint at the corner give room for speculation that there is something hidden underneath.

Photo: MAURER/RETTER

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Quick facts about MAURER SE

The MAURER Group is a leading specialist in mechanical engineering and steel construction with over 1,000 employees worldwide. The company is market leader in the area of structural protection systems (bridge bearings, expansion joints, seismic devices, tuned mass dampers, monitoring systems). It also develops and produces vibration isolation of structures and machines, roller coasters and ferris wheels as well as special structures in steel.

Maurer participates at many spectacular projects world wide, like for example the world's biggest structural bearings for the Signature Bridge in Wazirabad, Delhi, earthquake resistant expansion joints for the Bosphorus bridges in Turkey, semi-active tuned mass dampers for the Danube City tower in Vienna, or uplift bearings for the Zenit-Football-Arena in St. Petersburg. As for steel structures, the BMW World in Munich or the Terminal 2 of Munich Airport count among the reputed projects. In terms of spectacular amusement rides, to be mentioned are the world's biggest transportable Ferris Wheel R80 in Mexico, the Rip Ride Rockit Roller Coaster in the Universal Studios Orlando or the Fiorano GT Challenge in Abu Dhabi.

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