

## Expansion Joints for the Friendship Bridge

### Latin America's longest main span connects Brazil and Paraguay.

Brazil/Paraguay. The completion of the Ponte da Integração Brasil-Paraguai, the friendship bridge linking Brazil and Paraguay, represents a dream come true for the region that has been 40 years in the making. The long-awaited second connection between the two countries has a main span of 470 m, making it the longest in Latin America. A project of this size required suitably large expansion joints, which were delivered by the structural protection specialists at MAURER.

The Ponte da Integração Brasil-Paraguai is an asymmetric cable-stayed bridge with a total length of 760 m. The pylons reach up 190.17 m in Brazil and 185.04 m on the Paraguayan side. The bridge crosses the Paranà river and connects the Paraguayan city of Presidente Franco with Foz do Iguaçu in Brazil.

The bridge has an average width of 17.8 m, with lanes measuring 3.6 m wide in each direction. It also has a 3-m-wide hard shoulder and a pavement measuring 1.7 m in width. It will relieve the strain on the friendship bridge inaugurated in 1965 between Foz do Iguaçu and Ciudad del Este. This older bridge will then be closed to heavy goods vehicles, which will only be allowed to use the new bridge.

### Large swivel joist expansion joints

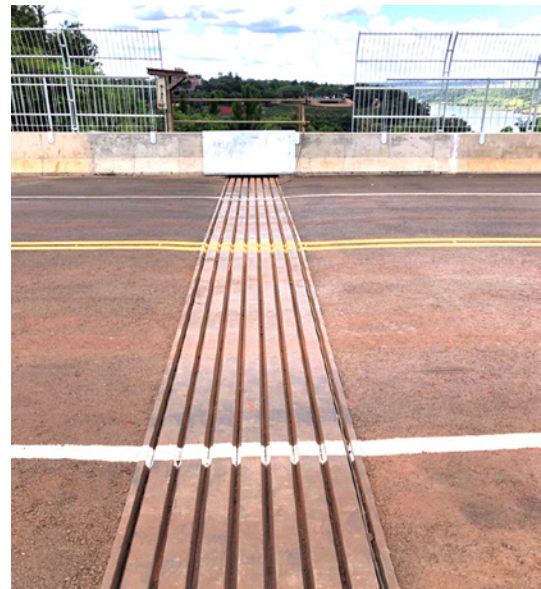
The record span required the largest expansion joint constructions ever built in either country. Fitted at the abutments at both ends of the bridge, these flexible elements compensate for movements that the bridge makes due to traffic, wind and temperature fluctuations in relation to the mainland. Expansion joints also ensure that vehicles can drive across this juncture unimpeded, regardless of the transition construction's displacement. The joints are installed perpendicular to the direction of travel.

Bridges in both countries are usually built with simple rubber profiles and narrow rubber expansion joints. But this was not sufficient for the friendship bridge. The project called for sophisticated, low-maintenance swivel joist expansion joints. MAURER Munich therefore collaborated closely with local subsidiary MAURER do Brasil to provide the contractor with technical support.



The friendship bridge between Brazil and Paraguay is due to be inaugurated in 2024.

*Photo: Consórcio Ponte Foz*



The bridge boasts the largest expansion joints ever installed in either country. These were delivered in two parts and welded together on site.

*Photo: Consórcio Ponte Foz*

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What makes the swivel joist expansion joints special is the way they allow for movements in all directions without damage or significant resistance. They permit lateral, longitudinal and vertical movements in relation to the direction of travel, as well as any rotations. The profiles rest on top of the parallel swivel joists, which, with the exception of those at the edges, run at a slight angle to the direction of the road. This spreads the bridge's tensile and shear movements evenly and without fatigue across the gaps between the profiles. As a result, the expansion joints are set to do their job for at least 50 years.

#### **Welded on site**

MAURER installed one each of its DS 640/800 and DS 320/400 expansion joints, allowing compensation for bridge movements of 800 and 400mm respectively. The components are 13.6m long and have two footpath sections each measuring 2.3m. Due to transport limitations, they were delivered in two parts before being welded together under MAURER's supervision at the end of 2022.

#### **Elastomeric bearings from MAURER do Brasil**

MAURER also supplied 67 elastomeric bearings for the friendship bridge, with dimensions of up to 1,100 x 1,100 x 102 mm. These were all produced by MAURER do Brasil in Sao Paulo.

Construction of the bridge began in 2019. The main bridge section was completed in August 2023, with work on the ancillary structures still ongoing. The bridge is scheduled to be opened to traffic by the end of 2024. The project is being led by the consortium Construbase-Cidade-Paulitec. Three more partners are involved in the cross-border project: the Itaipu Binational hydroelectric power station (a cooperation between Brazil and Paraguay), the Brazilian state of Paraná, and the Paraná Road Authority (DER-PR), which monitors all road construction projects in the state.

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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, rollercoasters and Ferris wheels, as well as special structures in steel construction.

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 rollercoaster on a cruise ship, and the world's first duelling rollercoaster at the Mirabilandia Park in Ravenna, Italy.

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