Huge Expansion Joint for the Shenzhong Link

MAURER helps to protect the main bridge and its 1,666-metre span against typhoons.

Shenzhen-Zhongshan. **The Shenzhong Bridge is part of the 24-km Shenzhen-Zhongshan Link and is the largest bridge of its kind in the world. It is located in China's Pearl River Delta, an area heavily affected by dangerous typhoons. The requirements for the expansion joints were therefore daunting. MAURER responded with four cleverly designed constructions.**

The Shenzhong Link bridges the Pearl River Delta and connects the Chinese cities of Shenzhen and Zhongshan. It consists of two large suspension bridges, a 6.8-km-long tunnel with artificial islands at both ends, and several girder bridges. With its four lanes, the Link shortens the journey time from Shenzhen to Zhongshan from two hours to under 30 minutes.

Taking on the typhoons

All bridges are designed to withstand extreme weather conditions, particularly the kind of strong winds caused by the typhoons in this region. Structures here are exposed to incredibly high wind speeds of up to 88 m/sec.

The Shenzhong Bridge, the largest of the two suspension bridges, is no exception. It is 2.7 km long and has a main span of 1,666 m, making it the world's longest steel-box-girder suspension bridge crossing the sea. The pylons measure 213.5 m in height, while the bridge deck is suspended at 91 m above the water with a clearance of 76.5 m, the largest across the sea.

As a result, the requirements for the expansion joints were demanding. Fitted at both ends of the suspension bridge, these flexible elements compensate for movements that the bridge makes due to traffic, wind and temperature fluctuations in relation to the connecting bridges. 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.

The main bridge of the Shenzhong Link, with its 1,666 m main span and bridge deck 91 m above the sea.

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The massive expansion joint waits to be transported to China at the MAURER yard in Munich.

Photo: MAURER

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For this record-breaking bridge, MAURER supplied four of its MSM® expansion joints (type MSM® DS 28-80), with 28 profiles and a potential longitudinal displacement of 2,240 mm. Each of these joints is around 20 m long, equivalent to the width of the bridge deck: "These are by far the largest expansion joints that MAURER has ever produced", says Luca Paroli, Regional Sales Director Europe and Asia at MAURER. "Simply dealing with the massive size is an incredible feat of engineering in itself."

MSM® swivel joists the solution of choice for demanding bridges

Expansion joint constructions with swivel joists have been used successfully in demanding bridge projects around the world for decades. They allow for movements of up to three metres and more in some cases, as well as rotations in all directions. The parallel profiles rest on top of the swivel joists. These run at a slight angle to the direction of travel, therefore ensuring that the bridge's expansions and contractions are spread evenly across the sealing elements between the steel profiles.

Among the things that make MAURER's swivel joist systems special are the bearings for the profiles. Instead of simple elastomeric bearings, the profiles run in newly developed w-shaped MSM® bearings. This so-called catamaran support allows the profiles to glide over the joists more easily and precisely. This prevents restraints and increases the service life to over 50 years.

The expansion joints were manufactured in Munich, before being installed in China at the start of 2024. After seven years of construction, the Shenzhong Link was approved for use by traffic at the end of June. It is part of the development of the Greater Bay Area, the world's largest metropolitan region that includes cities like Hong Kong, Guangzhou and Macau. The massive project received the George Richardson Award from the International Bridge Conference, and was selected as one of the world's 50 most iconic tunnelling projects by the International Tunneling Association.

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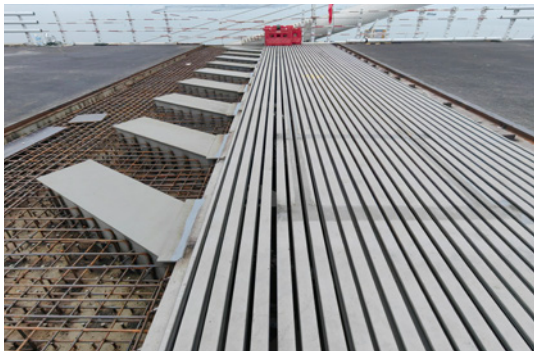

The expansion joint in place ready to be encased in concrete. The boxes containing the swivel joists are visible on the left.

Photo: MAURER

The installed expansion joint with traffic passing over.

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 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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