

MAURER designed sliding lamella-expansion joints for the Hong Kong-Zhuhai-Macau-Bridge

The installation of the expansion joints has to be fast and uncomplicated.

Zhuhai, Munich. Presently, the 35 km long Hong Kong-Zhuhai-Macao Bridge (HZMB) is being constructed over the Pearl River Delta. One of many technical challenges is the Jianghai Bridge, a cable stayed bridge of 700 m main span. For the expansion joints, the designers had foreseen recesses in the end steel girder, which are the location where the joints shall be anchored. MAURER designed expansion joints that could be easily inserted into the prefabricated recesses and connected to the bridge deck.

Since 2009 the HZMB is under construction and planned to be opened for traffic in the autumn of 2017. Thereby the steel bridge segments were prefabricated in a factory on land, in order to minimize steel works in situ to the extent possible. This also applies for the Jianghai cable stayed bridge which spans the main shipping lane. While the HZMB usually consists of prefabricated segments of a length of 110 m, the Jianghai Bridge displayed of field lengths of up to 258 m, which called for correspondingly large expansion joints. In order to anchor the expansion joints into the steel bridge segments, at the front ends of the steel end girder openings had to be designed for the purpose of accommodating the support beams of the expansion joints.

Complete preparation for the connection

For the Jianghai Bridge, MAURER designed large expansion joints that were already completely prepared for the steel to steel connection into the bridge deck. In other words, the support beams of the expansion joints not only had to fit into the openings of the steel end girder, but they had to be inserted in one go from the front. The standard procedure of lowering of the expansion joints from above into a block-out was not possible. So for this bridge MAURER designed an expansion joint for a steel connection, which allowed the expansion joint to be inserted in one go.

So, the bars of the expansion joint were inserted in a "tilted" manner into one end of the bridge deck, then lowered into horizontal position, and finally inserted horizontally into the opposite openings of the adjacent bridge deck. Thereafter, the supports just had to be welded to their respective steel deck. This process took only 2 – 3 days, which for an expansion joint of this size is rather fast.



Inserting a tilted expansion joint into the prefabricated openings .

Photo: MAURER



Exactly equal gaps between the lamellas demonstrate the exactness of the control system of the sliding lamella expansion joint.

Photo: MAURER

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Fast installation

In the autumn of 2016, each four expansion joints of type DS1760 and type DS1200 were installed at the Jianghai Bridge, that is, expansion joints with a displacement capacity of 1,760 mm and 1,200 mm, respectively. Each of the expansion joints has a width of 16.3 m, weighing around 36 tons. They bridge the structural gaps of the 33 m wide bridge in pairs.

The installation of the 8 expansion joints took only 20 days. With standard design, that is, skew support beams, the installation time would have taken at least double that long.

It goes without saying that the control system of the lamella gaps worked perfectly from day one, because it is irrelevant whether the movement of the bridge is being caused by temperature, wind, or later by traffic. This is a precondition of freedom of maintenance as well as long service life.

Text: 3280 keystrokes



The new sliding-lamella expansion joints were inserted at the main segments of the Jianghai cable stayed bridge.

Photo: MAURER



The new design of the control system of the sliding lamella expansion joints.

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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 the market leader in the areas of structural protection systems, (bridge bearings, expansion joints, seismic devices). It also develops and produces professional roller coasters and Ferris wheels as well as special structures in steelwork.

Among the most notable large projects are the entire technological bridging equipment for the Russky Bridge in Wladiwostok, the world's largest cable-stayed bridge. When it comes to steelwork, our showpieces include the BMW World and Munich's Airport Terminal 2. Spectacular amusement rides include for example the Rip Ride Rockit Roller Coaster in Universal Studios Orlando, Dragon Legend, the first Green Coaster at Romon U-Park in Ningbo China, and the Fiorano GT Challenge in Abu Dhabi.

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