



The Durability and SHM System of Hong Kong-Zhuhai-Macao Bridge

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Abstract

The Hong Kong–Zhuhai–Macao Bridge (HZMB) located at the Pearl River Estuary on the south coast of China, links Hong Kong in the east with Zhuhai-Macao in the west with a total length of 55 km; It is the longest sea-crossing made of artificial island, immersed tunnel and steel bridge in the world, and was opened to traffic in October 2018. The environment where HZMB located is almost the most severe subtropical marine corrosive environments in China, the durability, maintenance and operation are undoubtedly amongst the major work of this project. In the view of the prominence of this bridge, it is a huge challenge for the engineers to achieve this. This paper describes the durability and integrated structure health monitoring system of HZMB.

Keywords: Hong Kong-Zhuhai-Macao Bridge; durability; integrated SHM; monitoring results.

1 Introduction

The 55-km-long Hong Kong-Zhuhai-Macao Bridge is the longest sea-crossing bridge in the world, which consists of a six-lane highway connecting Hong Kong with Zhuhai and Macao at the mouth of the Pearl River Estuary in China, as shown in Figure 1.

The HZMB main bridge made of bridge, immersed tunnel and artificial island, has a length of 29.6 km, The tunnel is approximately 6.7km in length, with 2 artificial islands approx. 625m long and the immersed tunnel approx. 5.7km long. The immersed tunnel comprises of 3-cell, 180m long

precast concrete segments. The bridge has a length of 22.9 km, including three navigation channel cable-stayed bridges, approx. 15-km-long steel box girder marine viaducts with 110-m spans and 5-km-long concrete-steel composite box girder viaducts with 85-m spans. which is the largest scale of sea-crossing steel bridge in the world, over 2-million m³ concrete and 425 000 tons steel structures. A design service life of 120 years was first used in China Mainland. The project was completed in February 2018 and was opened to traffic in October 2018.

The HZMB is situated in the southern subtropical marine monsoon region of China, subjected to