

'Compelling success' for China, world

Chief engineer says HZMB project 'has met all expectations' in every technical standard

By HE SHUSI and LUIS LIU

Su Quanke, chief engineer at the Hong Kong-Zhuhai-Macao Bridge (HZMB) Authority, which operates the structure that spans the Pearl River Delta, ushered his team inside the bridge for a final check of its structural integrity.

The assessment was a part of the final acceptance process for the massive 120 billion yuan (\$17 billion) project, which opened to traffic on Oct 24.

Getting to the inner workings of the bridge was no easy task. It required team members to clamber over barriers between traffic lanes and descend a narrow steel ladder, looking straight down at the choppy waves 40 meters below. Every step required caution and a strong head.

Once inside, the team had to walk on narrow, jagged steel meshes to cross from one section to another. No lighting was installed during construction, so Su and his team had to rely on portable lights as they examined the work.

The inspection started at noon, but was not completed until late afternoon. Su halted every five paces, checking almost everything from the smoothness of a section of troweled cement to the arrangement of a set of wires. His eyes darted around, seeking what he called "imperfections".

"The water pipes have to be double checked. Not even slight leakage can be allowed in the area," he instructed colleagues.

Once the interior inspection was complete, Su returned to the road to examine the anti-collision barriers along the bridge, intended to prevent vehicles involved in mishaps from plummeting into the waters of the estuary. Su wouldn't tolerate a single misplaced section.

"These are the real factors that determine the bridge's integrity," he said.

Su had made checks like this on his own every day, inspecting different sections of the bridge. After the final check, he felt assured at last. The project "has met all expectations" in every technical standard, he told *China Daily* in an exclusive interview.

He credits the success to the

efforts of about 50,000 construction workers and engineers. The HZMB, the world's longest sea crossing at 55 meters, is capable of "standing the test of time", Su said.

The 56-year-old engineer sees the bridge as the highlight of his career, and has devoted more than a decade to the once-in-a-lifetime project: "After years of work, I would say the bridge is a compelling success for the people of China and the world."

Su has worked on bridge projects for almost 30 years. "I have close bonds of affection with bridges — quality is the most important element. It's as important as my life," he said.

"If I failed to build something well enough, my efforts would be worthless."

In the 1990s, Su was responsible for quality inspections of bridges in South China's Guangdong province. Back then, he saw many poor-quality projects, and that made him anxious about the future of bridge engineering in China.

"The country had a very limited budget due to its developing economy. At the same time, solid infrastructure was needed in a hurry," he said.

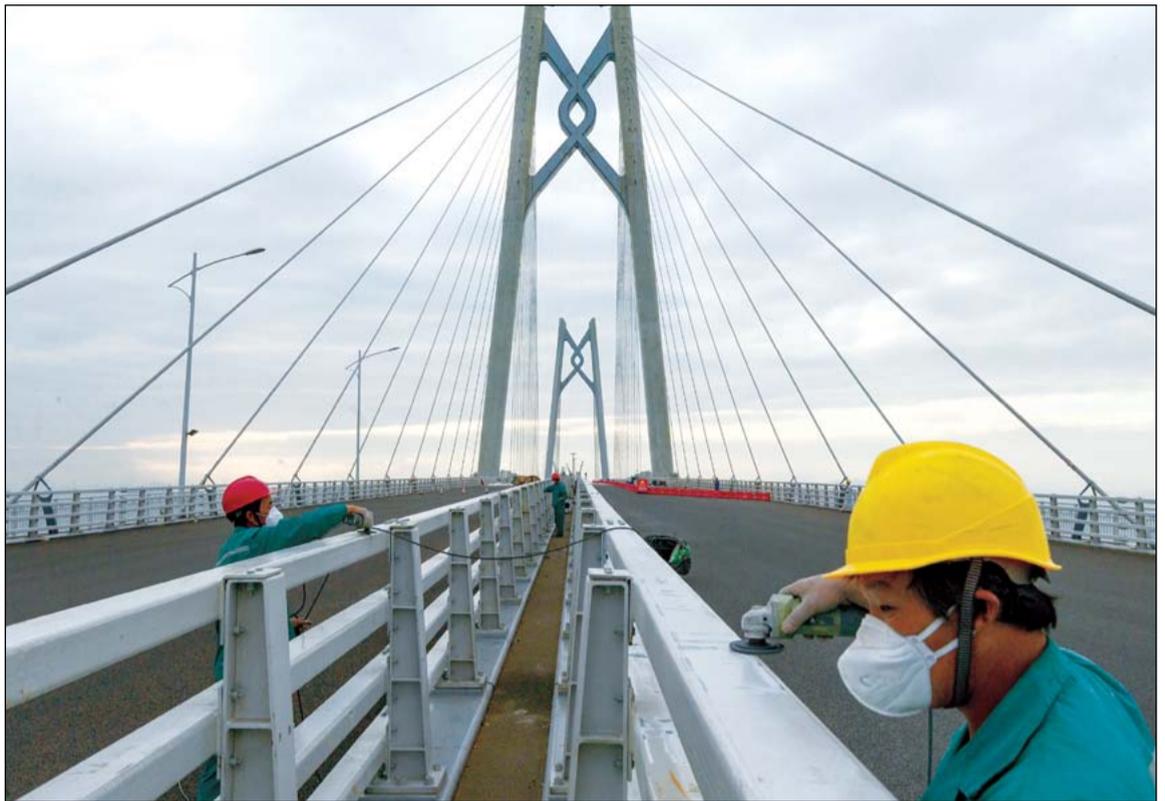
As a result, a whole generation of construction workers had to complete a large number of bridges at top speed, despite a lack of top-class equipment or quality materials. Instead, they relied on knowledge and perspiration.

Su recalled the time an expert from Hong Kong compared different parts of the Shenzhen Bay Bridge — half built by workers from the Chinese mainland and half by workers from Hong Kong — slide by slide, showing the rougher edges of the section built by the mainlanders.

Moreover, international criticism of the poor quality of some of China's infrastructure made him determined to make each project he worked on a world-class venture.

"We went back to the basics; you can never joke when lives are at stake," he said.

After 40 years of reform and opening-up, China has made great progress in engineering, materials manufacture and technical expertise. Many outstanding engineers have come to the fore during the process, Su said.



Construction workers finalize their work at the Hong Kong-Zhuhai-Macao Bridge last November before the final acceptance check. The bridge operator emphasized a focus on quality throughout the whole construction process. ROY LIU / CHINA DAILY



An aerial view of the Hong Kong-Zhuhai-Macao Bridge. At 55 kilometers, the bridge is the world's longest sea-spanning structure. HZMB AUTHORITY



Su Quanke, chief engineer at the HZMB Authority, chats during an inspection of the bridge's interior.

"Now we build our projects not only based on the need for transportation, but also to meet the demand for high-quality, long-lasting, aesthetically pleasing projects that are easy to maintain," he said.

There were difficulties, of course, and when some contractors asked Su to lower the standards, he refused. He has never regretted his decision.

"With previous failures in mind, the team members (of the HZMB)

had their ambitions bottled up, and they were determined to build something to restore the reputation of Chinese engineering," he said.

Even with the world's leading technologies at their disposal, Su and his team faced unknown factors while building the world's longest bridge-island-tunnel complex.

The 6.7-km subsea tunnel alone is China's first-ever offshore immersed tunnel — the longest in the world for vehicular traffic. The construction team had to work with limited data about the Pearl River estuary, because there had been no marine work in the area prior to the HZMB project.

Asked how many experiments the team had undertaken to assess factors such as resistance to wind and water pressure, and earthquakes, Su reviewed 14 years of preparatory work and construction.

"Conservatively, at least 300," he said, adding that usually just a couple of dozen experiments are necessary to build a sea crossing in China.

"To build the HZMB, we carried out the highest number of experiments in the nation's bridge-building

history, which is a remarkable feat in terms of global engineering."

He praised the role Hong Kong played in the construction process.

"Hong Kong's international ties and close relationship with the mainland helped us to integrate global resources to achieve something great in the HZMB project," he said.

Taking the project as a whole, he is confident that the bridge will be an unrivaled success and will not disappoint expectations.

However, he cautioned China's engineers not to become complacent, because the country still faces many developmental challenges. One or two world-class bridges can serve as models, he said, but fundamental improvement will rely on the country's progress in overall economic and industrial development.

The HZMB can be regarded as reflecting the Chinese people's desire for a better life.

Economic development, allied to rising productivity, has resulted in Chinese people paying more attention to quality of life, said Su, quoting the report delivered by General Secretary Xi Jinping at the 19th National Congress of the Communist Party of China in October last year, which highlighted efforts to build a better life.

"The HZMB is the result of such pursuits," he said. "I'm confident that in 10 to 20 years, bridges built in the least-developed areas in China will rival the best in the world."

Stressing that the efforts of several generations will be needed to improve the overall quality of bridges in China, Su said he felt lucky to be a bridge engineer in the 21st century — a time where he and his team have been given the opportunity and resources to build the world's longest sea crossing.

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