

Industrialized construction technology of three-tower light composite beam cable-stayed bridge

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ABSTRACT

The Fifth Nanjing Yangtze River Bridge is a three-tower cable-stayed bridge with a main span of 600 m. The Steel Shell-Concrete Composite Pylon and steel-UHPC panel light composite girder are adopted. Aiming at the high-quality construction requirements of super-large projects, the research and practice of industrial construction technology including new structures, new processes, new materials and new equipment are carried out. The main innovations are as follows: ①Based on the design-construction coordination concept of factory processing and modular installation, a new structure of steel shell-concrete composite bridge tower is developed, which has the advantages of good mechanical performance, fast construction and reliable quality. ②The manufacturing process of making steel shell and main steel bar at the same time in the factory is developed. Only the steel shell is installed and the concrete is poured on site, which greatly improves the construction efficiency and quality of the site. ③The lightweight self-climbing platform and precision adjustable spreader were developed, which improved the steel shell hoisting, platform climbing efficiency and appearance quality of bridge tower. ④The lightweight composite beam structure of steel box-UHPC prefabricated panel and the wet joint connection structure of UHPC are developed, which have the advantages of light weight and fast assembly. ⑤An automatic UHPC panel production line integrating multiple sets of equipment was developed, which realized the transformation of prefabricated component production from labor-intensive construction to technology-integrated manufacturing.

Keywords: Industrial construction of bridges; Steel shell-concrete composite bridge pylon; steel shell manufacturing with reinforcement; steel-UHPC panel light composite girder; bridge deck automated production line.