

Research and application of key technology for construction of large open caisson foundation of bridge

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ABSTRACT

The size of the north anchorage caisson of Wufengshan Yangtze River Bridge is $100.7 \times 72.1 \times 56\text{m}$, which is the largest caisson project in the world. The size of the south anchorage caisson of Oujiang North Estuary Bridge is $70.4 \times 63.4 \times 67.5\text{m}$, which is the first large caisson project

built in deep soft soil in the world. During the construction of the above two large open caisson projects, the research and practice of new theories, new methods, new processes, new equipment and

other construction technologies have been carried out. The main innovative technologies are as follows: (1) The mechanism model of "effective stress-water content-bearing capacity" has been proposed, and the optimization algorithm of sand pile composite foundation based on change of water content is proposed, which has solved the problem of temporary foundation treatment of large open

caisson. (2) The deflection control method of large open caisson is put forward to realize the quantitative safety control of large open caisson structure. The excavation and sinking technology of

"semi rigid -multi node -full node - partition" multi-support system transformation has been developed to ensure the safety of the caisson construction structure. (3) Four cutters suitable for high viscosity and high bearing capacity strata, mobile rapid soil taking equipment and graded cutting anti-paste drill bit are invented to realize efficient soil taking construction. (4) The double index early warning method of soil gushing control and rapid sinking of caisson is proposed, which reduces the risk of caisson construction.

Keywords: Open caisson foundation, foundation reinforcement method, sinking process, soil taking equipment, soil gushing control.