

Original research article

Research on the quality control of civil engineering of high-rise buildings

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Abstract: With the rapid development of economy in China, building technology has been improved and innovated in recent years. Urban development cannot be separated from buildings. However, China's land resources are limited and cannot meet the increasing housing needs. More and more real estate companies have shifted their investment focus to high-rise building projects, which are more complex and require a lot of building materials than lower-rise building projects. In recent years, with the optimization and upgrading of technology, the requirements of high-rise buildings are getting higher and higher, and the technical operation is becoming more and more difficult. In this case, appropriate methods must be taken to control the technical quality of civil engineering.

Keywords: high-rise buildings; civil engineering technology; quality control

Received: 22 June 2023; Accepted: 26 July 2023; Available online: 4 September 2023

In the constantly optimized social and economic environment, people's quality of life is improving day by day, and their purchasing conditions for food and clothes are getting higher and higher, with increasing requirements for engineering quality. The quality of the project directly affects the reputation of the construction unit, which requires the construction unit to strictly control the technical quality of the project and improve the rationality of the construction of civil high-rise buildings.

1. Construction points of civil engineering of high-rise buildings

1.1. Construction points of concrete

Concrete plays a very important role in the whole building and civil engineering. During construction, the long-term contact between concrete and air will easily lead to the decline of concrete quality, so the construction unit should pay attention to the key points of concrete construction. In order to ensure that there is no quality problem during the construction of concrete, the construction team should formulate a reasonable construction plan according to the site environment, and strictly control the building thickness of concrete to ensure that the hydration heat of concrete is normally dispersed. In the specific construction link, the construction unit should consider the following problems, and choose the appropriate thickness and hydration heat for the concrete mixture. In terms of the lamination of concrete, the thickness must be to ensure that the hydration heat energy can be effectively scattered. The upper layer must be coated before pouring, and the concrete must be fully mixed before use. Usually, the construction personnel can mix the mechanical vibration with the steel bar shaft, and control the vibration within 40 cm. The interval between the other two vibrations should not exceed 30 min.

1.2. Construction points of steel structure

A good steel structure can effectively support the whole high-rise structure and prolong its service life. The connecting parts of the external frame include a central wall and an inclined support, which directly affect the stability of the reinforcement structure. Steel bar has a strong supporting function, and it is an essential material for building high-rise buildings^[1]. The adjustment of steel structure should be consistent with that of superstructure. The construction of superstructure should strictly follow the procedures and requirements. The external frame is preferably made of a complete steel material, which is connected by the bottom wall and steel bars. To ensure the stability of the project, technicians should strictly examine the central part of the building before construction, and check the quality and quantity of steel bars. Before using steel bars, the oil and rust spots in the steel bar structure must be removed to avoid partial bending of the steel bar shape. The surface mark of the steel structure should not exceed 5% of the diameter. The steel cutting work should be carried out according to the length.

1.3. Construction points of foundation

Building foundation is important in building high-rise buildings, and its engineering quality directly affects the safety and stability of the whole building. Engineers should study the surrounding environment in detail to avoid landslides and irregular sediments. In addition, engineers should do a good job of foundation anticorrosion, and backfill the soil when necessary, so as to improve the density of the foundation and help to reduce the adverse effects of external environmental factors on the building foundation.

1.4. Control points of measuring technique of civil engineering

1.4.1. Settlement observation

With the passage of time, there will be certain deposits in high-rise buildings. In order to ensure the quality of high-rise buildings, deformation points or rear casting belts must be set during construction. While controlling the casting time, the construction personnel need to install a sediment observation station at a convenient place for observation, and regularly observe and record the deformation of the building foundation in time. The position of sediment observation station should not be changed at will during the sediment observation period to ensure the accuracy of the observation results. On this basis, the sediment observation plan should be made regularly to effectively control the building sediment.

1.4.2. Measurement control

The measurement of discharge line is important for high-rise buildings, and it is necessary to measure the plane position and height according to the project schedule and design requirements. Construction personnel must make corresponding preparations, and on this basis, reasonably adjust the data, control the coordinates and height of the site inspection station, and work out a feasible measurement plan. It is necessary to do a good job of controlling the back part. Because the measurement usually relies on an endoscope, it does not need external control. Since the scaffold is installed outside the high-rise building and the L axis is guided through the predetermined holes, the two predetermined holes can be kept at the same position on each floor for measurement.

2. Characteristics of high-rise building civil engineering

2.1. High requirements for foundation construction

At present, in the process of urban construction, the number of building floors is increasing. In order to improve the safety and stability of buildings, construction units have higher and higher requirements for the

stability of foundations. Generally speaking, the level of foundation construction is directly proportional to the proportion of pile foundation. If the foundation construction level is low, the pile foundation will be shallow, on the contrary, if the foundation construction level is high, the pile foundation will be deep. The foundation height of high-rise buildings is no more than 20 m, but the foundation types of high-rise building civil engineering are various. In order to ensure the stability of building structure, it is best to choose some box foundations with superior performance.

2.2. High requirements for construction machinery and equipment

Any project is inseparable from construction equipment. The lack of advanced construction equipment not only affects the overall quality of the project, but also affects the normal operation of the project. Therefore, appropriate construction equipment must be selected in high-rise civil engineering. Considering the long duration of the project, the construction equipment and transportation equipment can be reasonably allocated. Because of the low cost of machinery, the construction cost can be appropriately reduced and the economic benefits of enterprises can be improved. Generally, three kinds of equipment are used in building structures, namely a compulsory concrete mixer, a crane and a fixed concrete delivery pump. During the construction period, the construction unit should select appropriate construction equipment according to the actual situation of the project.

3. Quality control methods of civil engineering of high-rise buildings

3.1. Pay attention to the monitoring of engineering quality

Irregularities must be corrected in time once they are found during construction. In order to ensure the quality, it is necessary to strictly carry out the daily inspection work, and combine advanced inspection devices with correct inspection methods to ensure the accuracy of inspection results.

3.2. Build a sound quality management system

Perfect supervision mechanism of construction technology quality is based on construction quality standards, which can be carried out from the following two aspects. First, to implement the responsibility mechanism. In the construction of high-rise buildings, the responsibility should be carried out to specific construction personnel according to different projects and links. If any link goes wrong, the responsibility should be borne by the person in charge, so as to avoid the problem of not finding the responsible person after the occurrence, which will help to avoid delaying the construction progress and strengthen the management of construction enterprise personnel. The second is to strengthen supervision. Supervision is an important link to ensure the construction quality of the whole project, so it is necessary to strengthen supervision, establish a supervision mechanism with clear rewards and punishments, and deal with relevant personnel seriously no matter which link goes wrong.

3.3. Effectively avoid the occurrence of cracks

Cracks are common in high-rise buildings, which will directly affect the quality of buildings. Appropriate measures must be taken to avoid this phenomenon. Generally speaking, in high-level civil engineering, technical methods can be adopted to avoid crack expansion, which means taking appropriate measures to prevent cracks from changing without complete deformation. For example, when constructing the infill wall, incomplete construction can be adopted, that is to say, wait for a week, and leave a little space before the crack completes the whole movement.

3.4. Optimize the construction design of high-rise buildings

Compared with traditional multi-story buildings, high-rise buildings have higher requirements for structural design, especially the choice of structural system. High-rise buildings mainly include frame structure, shear wall, membrane structure and tube structure^[2]. According to the specific situation of high-rise buildings, it is necessary to make a reasonable choice for the structural system of buildings. At the same time, in the aspect of high-rise building construction design, in order to ensure the effective development of high-rise building construction, the drawing design must be scientific and practical, and the drawings of construction technical scheme should be compiled according to relevant requirements, and every small link should be implemented. After the completion of drawing preparation, the design drawings shall be comprehensively reviewed according to the "Procedure of Blue Review of Drawings", and those in doubt may be recorded and then changed.

3.5. Strengthen the quality control in the construction stage

As the material basis of high-rise building construction, engineering materials play a very important role, mainly including raw materials, finished products and related office supplies. Moreover, engineering materials have certain influence on the whole project cost. Therefore, when purchasing engineering materials, it is necessary to strictly control the quality of materials, select scientific and reasonable methods for classified storage according to the types of materials; moreover, it is necessary to strictly control the sending and receiving of materials, and prevent unqualified materials from entering the construction and further affecting the construction quality. In addition, the control of mechanical equipment is another important goal of high-rise building construction. The construction of high-rise buildings can not be separated from mechanical equipment and technical support, so it is necessary to strengthen the management and maintenance of mechanical equipment in the construction process.

4. Measures to improve the technical quality of civil engineering in high-rise buildings

4.1. Strengthen the quality control of construction technology in the preparation stage of high-rise buildings

In order to ensure high-quality civil engineering, it is necessary to control the quality of the technology used during construction. The construction unit shall provide vocational and technical training to all staff to continuously improve their construction level; secondly, the contractor shall analyze the technologies that may be used during the construction according to the scheme and specifications, and make reasonable allocation according to the situation. In order to meet the technical needs of the project and not exceed the construction level of the project itself.

4.2. Improve the detection means of construction technical quality

In view of the scale and time limit of high-rise building project, the technical quality management of high-rise building project is one of the most important factors to ensure the project quality. It is strictly forbidden to outsource work under special circumstances, and further improve qualification verification when necessary. Service managers should formulate scientific and reasonable working methods to strictly manage each stage of the construction process, reduce the risk of quality control, and implement quality control measures in all details.

4.3. Strengthen the technical quality control and management at the completion stage

After the construction of high-rise buildings is completed, the quality of high-rise buildings must be inspected. This is the final stage of all quality control measures. This work is usually undertaken by receiving and inspecting personnel organized by the employer or the host country, who are responsible for inspecting the overall quality of high-quality buildings. If building quality problems are found during the receiving process, the receiving supervisor may ask the contractor to solve the problem, and at the same time, it is necessary to agree on the receiving period, so as to ensure that the problem is solved reasonably within the period to ensure the quality of the project. The receiving institution shall act according to the procedures of the quality control system. First, the receiving party should set up a receiving and inspection team to regularly supervise the work of the project site. If any problems are found in the supervision process, the construction unit must be contacted immediately, and the engineer should be required to deal with these problems immediately until the standards are met.

5. Conclusion

High-rise buildings are characterized by great difficulty in construction, complex structure and great technical difficulty. Therefore, the key points of high-rise building construction must be made clear to ensure the construction quality. At the same time, it is necessary to establish and improve the technical quality monitoring mechanism of high-rise buildings, optimize the construction design of high-rise buildings, and strictly implement the quality control measures in the construction stage, so as to improve the quality supervision efficiency.

Conflict of interest

The author declares no conflict of interest.

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