

Database establishment and application based on BIM technology in assembly construction

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Abstract: Since the new century, people's ecological and environmental awareness awakening, promote the green, low noise and other advantages of the assembly-type building applications. In addition, under the impetus of the wave of scientific and technological innovation, BIM technology has been gradually applied to assembly construction, and achieved good results. At present, however, a high-quality database of assembly construction projects has not yet been established. To this end, on the basis of analyzing the advantages of BIM technology in assembly construction, this paper discusses the establishment and application of assembly construction database, with a view to promoting the construction industry to tell and sustainable development.

1. Research background

1.1 Literature review

At this stage, the research on the application of BIM technology in the field of assembly construction has been issued on a scale. Zhang Bin and others believe that BIM technology is an important part of the informationization of the construction industry, so the focus is on the application of BIM technology in assembly buildings to analyze (Zhang, et al, 2017). Liu Chunhua and others analyzed the application status of BIM technology in the quality management of assembled buildings, and then pointed out the specific management measures from the four aspects of information management, technical measures, organizational measures and economic measures (Liu, et al, 2017). Jiang Dongmin and others first analyzed the main construction hazards of assembly-type buildings, and then analyzed the practicality of BIM technology in assembly construction from the aspects of lifting safety, site storage safety, collision problem and support system hazards (Jiang, et al, 2017). Zhang Aileen and others put forward the integrated information dynamic management system (Zhang, et al, 2017) based on BIM technology for the effective improvement of quality management in the construction phase of assembled buildings. Taking the expansion project of The Shenzhen Campus of Harbin Engineering University as an example, Zeng Shaolin and others introduced the technical measures taken by the project in the application of BIM technology, with a view to shortening the duration, saving costs and improving the quality of construction (Zeng, et al, 2018). Tong Weiwei and Li Caixia first analyzed the current situation of construction quality management of assembly construction, then expounded the importance of BIM technology application, and finally explored the specific application strategy of BIM technology (Tong and Li, 2018).

1.2 Purpose of research

With the increasing awareness of environmental protection, the construction industry, which belongs to the high energy consumption industry, has been more and more denounced by public opinion. Compared with the traditional construction industry, assembly building has the advantages of high resource utilization, green environment and low noise. Therefore, in recent years,

assembly-type construction projects gradually rise and develop. In the process of assembly construction development, the most widely used technology is BIM technology. It integrates the database and the 3D model, which improves the visualization and coordination of the construction project. Since the introduction of BIM technology in China, this technology has been applied to the field of construction, and has achieved good application results. However, at present, in the process of assembly construction, there are still problems such as the complexity of building construction, the dispersion of participants, and the inability of information resources to be transmitted in time. As for the possible problems mentioned in these questions, domestic scholars have done some research, but most of the research has been focused on the specific application level of BIM technology, and very little research has been done on the establishment of databases. Only Jin jin and Huang Manganese Steel introduced Korea's traditional building database based on open BIM technology and highlighted the exchange of information in the project (Jin and Huang, 2010). Therefore, based on the basis of previous research, this paper mainly discusses the database establishment and application of BIM technology in assembly construction.

2. Analysis of the advantages of BIM technology in assembly construction

2.1 Improve the design efficiency of assembled buildings

The design of assembly building can not be separated from the close contact and cooperation between the professionals of various departments. Using BIM technology to build a design platform can improve the design efficiency of assembly buildings and realize the efficient transmission and sharing of information between professionals in various departments. For example, members of various departments can upload their own design models to the network on the design platform of BIM technology buildings, and members of other departments can troubleshoot, look for safety hazards, etc., and then correct and adjust them in a timely manner (Wang et al, 2017). Other members of other departments can browse and view the design model at any time on the design platform, and then adjust the work in a timely manner after seeing the corrected design model. In this way, through the high coordination and synchronization between departments and members, reduce the design time, improve the overall efficiency of assembly building design.

2.2 Improve the production process for assembly buildings

Assembly construction production is an important part of construction projects. Unlike the production process of traditional buildings in the building site, assembled buildings are based on design models, in which the structure shape and structure are produced and shipped to the building site. It can be said that assembly construction production is the key link of construction projects, with the role of docking design stage and construction stage. Using BIM technology, manufacturers can directly extract standard information from assembled buildings to ensure the smooth progress of construction processing and the accuracy of production. At the same time, the BIM model contains the feasible production plan of the assembly building, the manufacturer can further determine the building material, size, shape and so on according to the practicality of the building. In addition, BIM technology can be used to send the production progress of assembly buildings to other parts of the supply chain to improve the production process of construction projects (Xiao and Liu, 2018).

2.3 Optimizing the management of construction period

After the production of the assembly building, it will enter the construction phase, that is, the construction project to the required place, for specific installation, construction. In this process, because of the many components, assembly process is cumbersome, construction management is very important. BIM technology can optimize the management of construction period, greatly saving human, financial and material resources. Specifically, before the project is officially entered into construction, the construction party can use BIM technology to simulate and simulate the feasibility plan, so as to find, analyze and solve the problem. For example, the simulation of sudden

safety accidents, the solution strategy of potential problems, etc., can improve the accident response capacity during the construction period and reduce the probability of construction safety problems.

2.4 Promoting the establishment of the operating database of the engineering system

The combination of Internet and BIM technology can promote the establishment of the construction system operation database, thus promoting the sharing of information on construction resources and the rapid response of assembly construction projects. Specifically, assembly construction departments of the staff, can be the department's design information, uploaded to the assembly-type construction project cloud, there are relevant personnel to carry out a variety of programs of finishing and integration of resources, the formation of a design database. Similar to this, manufacturers, construction units can also design the various data, data uploaded to the cloud, by the relevant staff organized into the corresponding cloud database. For example, the assembly building by the use of similarity, sorting, building the corresponding database, and form a standardized, unified process specifications and methods. In general, BIM technology can promote the establishment of the engineering system operation database, which is conducive to saving the overall time of construction projects and meeting the diverse construction needs of the owners.

3. Establishment and application of assembly construction database

The use of BIM technology to establish an assembly-type construction database, from the architectural design, production, construction and operation of maintenance four stages to start. In this process, we can make comprehensive use of all kinds of modern telephone networking information technology to ensure the efficient operation of the database system. Specifically, biM technology can be used to build an assembly construction database and apply it.

3.1 Combining BIM technology and GIS system, the site model information database is established

Pre-planning and design play an important role in the whole project of assembly construction. Therefore, enterprises should combine BIM technology and GIS system, establish site model information database, for the production enterprises to point out the overall construction direction. In particular, design agencies can search the web for actual information data on the location of buildings and use GIS for preliminary data analysis. The data will then be analyzed using BIM technology for modeling and processing to help designers make the most scientific and rational site planning and design. In this process, the design organization can obtain all kinds of design data, materials, information integration, with parametric way to establish the site model information database. Designers can enter the database at any time to see relevant information, data and control parameters, and reduce the inconsistency of information about assembly architectural design, thereby improving the efficiency of modeling and modification of architectural design. In addition, through the system integration and expression of the assembled building model, the BIM component database of the assembly building is established. In the continuous improvement of the assembly building component types, quantities and specifications, improve and construct the standard component database, further optimize and supplement the site model information database.

3.2 Combined with BIM and 3D printing technology, the production model information database is established

Assembly construction production is an important part of assembly construction projects. In the production of traditional construction projects, because the transmission of information between the timely, construction production, processing is easy to appear in line with the design of the situation, resulting in production does not meet the actual demand. Therefore, assembly building manufacturers should combine BIM and 3D printing technology to establish a production model information database. Specifically, in the production process of specific buildings, the production enterprises should record the materials, size, rebar grade and other information, and use the Internet to upload to the cloud platform built by BIM technology. Then through the integration of the

project's comprehensive information, the use of 3D printing technology and pre-assembled, the establishment of assembly-type building production model. And send this model to the construction site, to achieve the direct match of production and construction information. Construction units can scan the design parameters of the way, want to tear down the building blocks like the demolition of production model information, real-time control of the assembly building production progress, so as to more efficient schedule. At the same time, the construction enterprise can be assembled out of the building model printed out, used to test whether the design is reasonable.

3.3 Combined with BIM and RFID technology, the construction management and operation information database is established

The combination of BIM technology and RFID technology, the establishment of construction management and operation information database, can improve the management efficiency of assembly buildings and operational maintenance quality. Specifically, enterprises can add a progress attribute and a position attribute in the database system of the BIM model to help the main body of the supply link master the design, production, and construction progress of the assembly building in real time. RFID chips can be implanted into the design institutions, production enterprises, operating platforms and construction enterprises, continuously read the assembly building processing, storage, storage and other processes of information. In addition, the collected information is transmitted to the database in a timely manner, and with the pre-defined location and progress attributes to match, to achieve efficient tracking and management of construction projects, improve efficiency. At the same time, if the quality problem is found in the late stage of assembly construction, the information database can also be used to trace the problem from the operation and maintenance stage to the production stage, to clarify the responsibility of the main body, to achieve the green operation and maintenance management of assembly-type building. In addition, staff can also use BIM technology energy monitoring and analysis function, accurately locate the assembly building's high energy generation location, and find the corresponding solution to the problem, while reducing energy consumption at the same time shorten the duration, cost savings.

4. Conclusion

To sum up, in the green, environmental protection when the agent to promote the assembly-type construction projects gradually developed. In addition, the application of BIM technology to assembly construction projects can improve the design efficiency of buildings, improve production processes, optimize construction management, promote the establishment of system operation database, and effectively improve the overall construction efficiency of construction projects. In this process, enterprises should pay attention to the establishment of assembly construction database system. In particular, it is necessary to establish the site model information database in combination with BIM technology and GIS system, to use 3D printing technology, to establish the production model information database, to establish the construction management and operation information database, and to promote the efficient development of the assembly construction industry.

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