

Application of BIM Technology in New Assembly Type Green Building

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Abstract: With the acceleration of urbanization in China, ecological construction has become an increasing concern. In order to achieve sustainable development, we must establish green buildings, which requires green buildings to continuously innovate and optimize technologies and techniques, and consciously adopt new technologies and means, so that they can better adapt to the development of today's society. In addition, BIM technology is an emerging technology that has been widely used in various fields such as engineering project design, construction progress, construction building and operation management. Therefore, the application of BIM technology in the new green assembly building is discussed, which is an important reference value for the construction and building of modern building projects.

Keywords: BIM technology, New type of assembly, Green building

1. Introduction

With the rapid development of social economy, the construction industry has brought more negative problems, among which the lack of resources and environmental pollution are the main problems. As one of the important industries to ensure people's normal daily life, the construction industry, using the construction of new assembly type green building is more important, in the process of construction requires the cooperation of relevant technology. The use of BIM technology is natural, and the use of BIM technology can significantly improve the efficiency of the actual work, the combination of the two can make this new form of construction to get better development[1].

2. Overview of BIM Technology and New Assembly Type Green Building

BIM technology is the use of three-dimensional digital technology for all acquisitions in the life cycle of a building, thus creating a three-dimensional building model. The use of BIM technology in modern architecture can facilitate design, construction and supervision. BIM technology, its essence is to permeate the process of building with the use of digital information, and then establish an integrated management environment, efficient construction monitoring and resource organization to minimize project risks, its architectural design is shown in Figure 1. Due to the visualization and coordination of BIM technology, it makes construction project management more informative, thus reducing construction costs and shortening the construction cycle. Finally, construction simulation using BIM technology can enhance coordination and communication among project participants. With the continuous improvement of building energy saving and environment, assembled construction has gradually become the mainstream of industrial development, and compared with the traditional construction method, construction by prefabrication method has greater superiority[2].

As China's urbanization process continues to advance, the construction market is also increasingly demanding, how to improve construction efficiency, innovative construction production methods, which is an important issue facing the construction industry. The drawbacks of traditional construction methods are becoming more and more prominent, and energy saving and reduction of environmental pollution become an urgent problem to be solved. The new assembled structure does not need to be poured on site, its just assembled into prefabricated parts, which not only can simplify the construction process, reduce noise, but also can prevent the generation of large amounts of construction waste, with environmental characteristics[3].

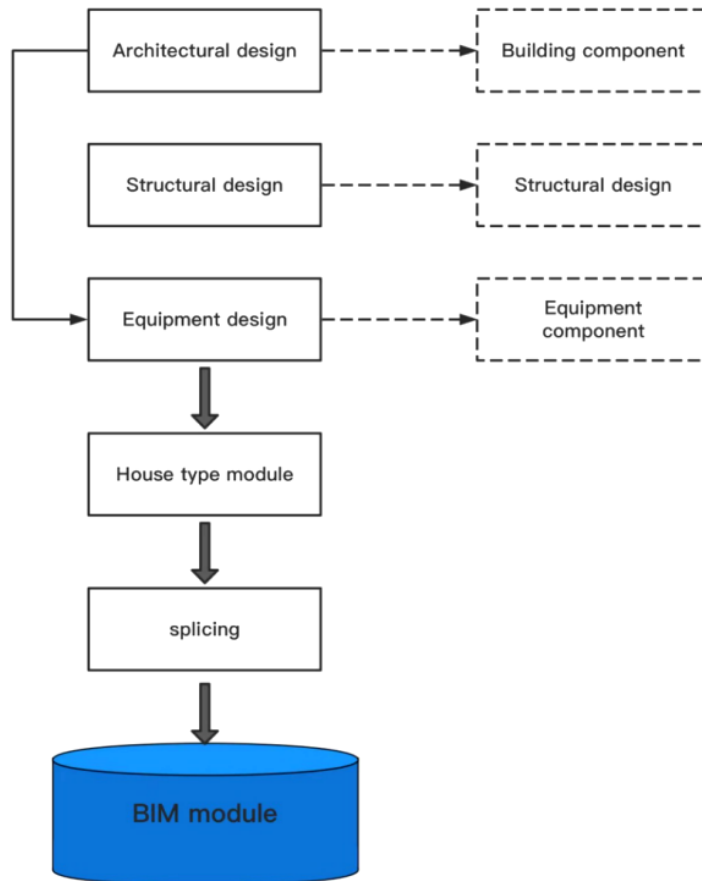


Figure 1: Architectural design of BIM technology

3. The Significance of BIM Technology in the New Assembly Type Green Building

In the current situation, the application of BIM technology in new type of assembled green buildings has received a lot of attention. Through scientific analysis of relevant cases, the feasibility of both is determined, so that the main development trend of BIM technology in new assembled green buildings can be identified. By combining RFID technology on the basis of BIM technology, these two technologies can be combined for the construction of new assembled green buildings and form a relatively perfect system structure. In addition, through the analysis of BIM technology, it can be found that the application of BIM technology in new type of assembled green building includes planning, production, construction, operation and other aspects, and its use in all stages has achieved good results and has certain value, which provides a more reliable technical support for the implementation of new type of assembled green building[4].

3.1. Helps Enhance Quality and Energy Management During the Operation and Maintenance Phase

In the new assembly-type green building design and construction, strengthening quality monitoring and energy management is a very important task. In assembled building design and construction, its input in classification, manufacturing and storage often consumes a lot of human and material resources, and the work is tedious and error-prone. Therefore, the staff strengthens the use of BIM technology in the new assembly type green building, so that it can analyze the component information in detail in real time, so that the staff can quickly obtain the relevant information and compare it with the conventional engineering scheme and requirements, so as to help people analyze the errors in the quality and position of various components in construction, and provide strong support for the quality and management of construction projects. This provides a strong support for construction quality and management[5].

3.2. Reduction of Environmental Pollution in the Region

The construction process of assembled building engineering is more complex, with a high degree of automation and informationization, and involves a wide range of work areas. Applying BIM technology to new assembled green building design and construction, this enables one to simulate the construction process and objectives under the premise of fully analyzing the surrounding environment and construction needs, just like a prefabricated component, which is modeled in detail. It can effectively promote the organic integration of the assembly building and the surrounding environment, greatly reducing the impact on the surrounding environment, thus achieving a green assembly building with low pollution, low emission and low energy consumption, which provides strong support for the protection of the environment[6].

4. Advantages of BIM Technology in New Assembly Type Green Building

The new assembled green building is a different kind of construction project from the traditional one, which can divide different building projects into certain specification scales according to their own characteristics, then prefabricate the components and finally combine them. Since there are many subjects involved, the engineering design is also more complicated. Firstly, the new assembled green building is mainly used in the practical application of BIM technology, tools and features to integrate the life-cycle information data of the building into a three-dimensional building model, thus promoting the efficient application of the new assembled green building in design, schedule, construction, cost and operation management. Secondly, BIM technology is introduced into the new assembled green building, so that it can effectively improve the construction quality of the new assembled green building, and it can effectively reduce the investment to maximize the investment return of the project[7].

4.1. Effective Energy and Resource Conservation

Before the green building design, BIM technology is used to model various resources, so that the project can be constructed in such a way as to save as much material as possible and avoid unnecessary waste. Using BIM technology can analyze various possible problems, so as to achieve the maximum saving of resources and reduce the generation of waste, which is also in line with the basic concept of green building. Using this technology has a certain guiding effect on the construction of the project, so as to prevent poor engineering results and better meet the requirements of the new assembly type green building[8].

4.2. For the Building Land also Gets the Corresponding Saving

The new assembled green building achieves space saving on top of the original one. BIM technology can be used for new assembled green buildings, which can improve the planability of the land and increase the utilization rate of the building site. Before construction, the staff can use BIM technology to design the land continuously, and only after the best results are achieved can the corresponding construction be carried out, thus providing a scientific basis for a reasonable land use concept[9].

5. Application of BIM Technology in New Assembly Type Green Building

5.1. BIM Technology Applied to the Production of Prefabricated Components

Firstly, it optimizes the manufacturing process of prefabricated parts. The manufacturing process of prefabricated parts for assembled buildings is both a construction process and a design process. To ensure the reliability of part manufacturing information, manufacturers can make accurate dimensional analysis of various parts based on BIM models, thus forming scientific manufacturing solutions. At the same time, the process status is sent to the construction unit in real time during the production process. In addition, manufacturers in the manufacturing process, they installed RFID chips for various buildings and stored their size, material, installation location and other information, which brings convenience to the future construction and management of the project. Secondly, the analysis and optimization of the model test of the assembled building is carried out. After the assembly construction is completed, each construction unit should share the information of various prefabricated components

in the BIM model with each enterprise, so that the enterprise can quickly carry out construction operations and ensure the construction quality. In addition, the barcode form is used to store process parameters to realize automatic control of the process and facilitate efficient docking of data information with the prefabricated parts system. Meanwhile, the use of 3D printing technology can realize the production of BIM model[10].

5.2. BIM Technology Applied to Assembly Building Construction

First, the staff uses BIM technology combined with RFID technology, which can effectively improve the quality of precast parts, and realize automated electronic acceptance, thus reducing the errors brought by manual acceptance. At the same time, construction personnel can access information about precast parts, and locate them at any time during the inspection process. Secondly, in terms of on-site integration management, the use of BIM technology can simulate the construction process of assembly building, so that the construction personnel can master the essentials of technical operation, especially the installation of prefabricated parts in key parts, which are generally complex. At the same time, using BIM technology, the line arrangement of the construction site can be reasonably arranged, so as to improve the efficiency of transportation. Again, to optimize the workflow of construction projects, the use of BIM technology three-dimensional modeling technology can convert three-dimensional modeling technology into three-dimensional modeling, so that construction enterprises can effectively simulate the consumption of project resources according to BIM technology, so as to form a dynamic construction plan, and then fully control the construction process, so as to maximize the use of BIM technology in the new assembly type green building[11].

5.3. BIM Technology Applied to Post-operation and Maintenance of Assembled Buildings

First of all, BIM technology is used to operate and maintain the equipment. For example, when a fire occurs, staff use BIM technology to manage the data of the building project, and combined with the emergency management system, they can accurately determine the specific location of the fire source, and decide the materials needed to put out the fire. When maintaining equipment, users can quickly get the required parts and equipment-related information from the BIM model, and get in touch with the manufacturer. Second, the quality of equipment and energy consumption are effectively managed. BIM technology can provide support for the informationized operation of assembled green buildings. Using RFID technology, we can quickly grasp the production, transportation and installation personnel of components, so as to achieve accurate and fast responsibility for product quality. Again, BIM technology can also realize green operation and maintenance of the building, it can also monitor the consumables of the building project in real time through RFID technology, or analyze and process the building location through BIM software, so as to find the optimal solution[12].

5.4. Application of BIM Technology in Cost Control

The fundamental goal of the new assembly type green building is to minimize the consumption of resources and energy in China, so as to be able to ensure the quality of the project. At the same time, the core competitiveness of the enterprise is also constrained by the cost, construction enterprises to strengthen their competitiveness and occupy a place in the market, which must strengthen the delivery and access to materials, and then combined with the specific requirements of the construction of the project, the development of a reasonable construction plan to determine the progress of the various stages of construction. Minimize the cost of the construction period. At the same time, each department can also keep abreast of the progress of the BIM platform and related information, so as to realize the project construction and achieve cost control. The use of BIM technology can reduce the work pressure of cost estimating personnel, the actual material quantity of each node is calculated using the 3D model, and then coded accordingly. In addition, by using the query code during the construction phase, the specific location of each component can be quickly mapped, thus avoiding blind construction by the construction personnel. In this way, the construction efficiency can be effectively improved and the coordination, and consistency among the nodes can be enhanced, thus promoting the development of China's assembled green buildings[13].

5.5. Application of BIM Technology in Construction Management

The assembled green building project is a rather large project, which includes structure, electricity, water and heating, construction techniques and technical methods, if not well coordinated, it will create

a variety of safety hazards in the future construction process, which will not only adversely affect the quality of the project, but also rework and other problems, which will not only reduce the efficiency of the construction project, but also bring greater economic loss. By using BIM technology, we can make virtual design of each node, and realize the simulation of the construction process of each node, so that the staff can find the problems in time and make corresponding adjustment and improvement, which can ensure the quality of the project and avoid bringing safety hazards to the project at the same time. In addition, on the basis of BIM technology, the use of BIM technology to modify the model can automatically generate new construction plans and planning, providing convenience for future construction of building projects. In the assembled green building, due to the difference of building materials used in the past, all kinds of raw materials are piled up randomly on the construction site, causing the site to be too messy and the environment too dirty, thus posing a great threat to the safety of construction personnel. In addition, offices, temporary storage areas for materials and other areas are divided, so that construction works that adversely affect the environment can be built as much as possible, which not only effectively improves the utilization rate of the construction site, but also saves a lot of resources and reduces dust, thus achieving the goal of environmental protection[14].

5.6. Application of BIM Technology in Site Construction Safety

Safety management of construction site is the key to ensure the quality of the project, it focuses on the unsafe behavior of personnel during construction, it can better reduce all kinds of possible safety hazards, prevent all kinds of accidents on people and things, and ensure the normal implementation of the project. In the construction of the project, the use of various types of large machinery and equipment, these are vulnerable to safety problems. If the managers do not manage effectively, it will add unnecessary costs to the company. Using BIM technology, various conditions of the construction site can be simulated and information, such as quality inspection and safety can be entered into the project. Accurate positioning and simulation of large machinery, as well as analysis of problems in the construction of building projects, thereby ensuring the safety of the lives and property of construction workers[15].

5.7. Design Stage Applications

In the construction project, the design quality is a very critical link, and its quality is directly related to the safety and cost of the project. The advantages of BIM technology applied to new assembly type green building are as follows. First, in the engineering scheme design, BIM technology is applied to simulate civil engineering, electromechanical engineering, steel structure and other engineering, and the corresponding parameters and information are given, then the staff adopts the parametric and visualization methods to optimize and improve the design scheme, followed by the optimization and adjustment on the structure and performance of the building engineering to adapt to the requirements of the construction, timely find and correct the existing. Then the staff used parametric and visualization methods to optimize and improve the design scheme, followed by the optimization and adjustment of the structure and performance of the building project, in order to meet the requirements of the project construction, timely detection and correction of problems, so that the design scheme can better meet the needs of the owner, thus the design scheme has a high economic.

Secondly, before the construction of the project, a three-dimensional building information model is established to realize a virtual presentation of it to reflect the engineering civil, plumbing, fire protection and installation in an intuitive way. On this basis, the building structure is effectively coordinated with decoration, installation and steel structure, and the coordinated information is provided to designers and constructors to reduce changes and conflicts in the project. Thirdly, through BIM technology, project design changes can be tracked and managed, and the actual condition of the project can be grasped timely and accurately, the BIM model can be reviewed, solved problems, and scientifically adjusted and optimized in a timely manner. At the same time, this can also save the modified data, as well as the rationality of design changes, and reduce unnecessary losses in the construction of building projects.

Fourth, in accordance with the demand of construction engineering design, multiple data information bases are constructed to record, analyze, manage, access and maintain data in a comprehensive and detailed manner, and effectively integrate and use data to provide a basis for design plan optimization. For example, visual simulation of construction progress, site layout, materials, etc. Scientifically predict and analyze the possible problems in the construction process. On this basis, simulate building energy saving, emergency evacuation, daylighting, etc., and select safe, reliable and

economically feasible solutions through the comparison of multiple design solutions. Fifth, the use of BIM model for the simulation of engineering construction, which can help designers to better grasp the basis and scope of design, so as to ensure the scientific engineering decision-making, reduce extra-contractual costs, prevent the use of unreasonable building materials, housing construction layout confusion, the overall design effect outstanding and a series of problems, so as to better meet the needs of people.

6. Conclusion

To sum up, in the new assembled green building, the application of BIM technology not only can improve the construction efficiency, but also can solve some problems in construction, and at the same time can link the engineering design and use process, which is very meaningful for China's current construction industry. However, in order to combine BIM technology and new assembly type green building, then the staff must make use of BIM technology in new assembly type green building, so that the development of the construction industry can be taken to the next level. With the continuous maturity of BIM technology and the integration between the two, China's construction industry will become better and better.

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