

# **Research on the Application of BIM Technology in Assembly Building Management**

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**Keywords:** BIM; Prefabricated buildings; Whole-process management; Application

**Abstract:** How to effectively solve the quality management problems caused by the increase of construction sites has become a hot research topic in recent years. The research on the whole process management of the assembled building from the management Angle of BIM is relatively small, yet further study is needed. Based on the author's learning and practical experience, this paper discusses the application of BIM technology in the management of prefabricated buildings, and puts forward its application in the design, production, construction and operation maintenance period respectively.

## **1. The Application of BIM in the Design Period**

### **1.1 It is conducive to improving the design efficiency.**

In the design process of prefabricated buildings, because the prefabricated components need to pre-treated, so the personnel of each department and each specialty need to contact closely and cooperate with each other. Based on BIM technology, prefabricated buildings can construct and design platforms. In architectural engineering projects, personnel from different departments and majors can timely and effectively convey the information they have designed, which is of good coordination and synchronization. Combined with BIM technology and Internet technology, people in various departments and professions can upload the BIM model which designed and constructed by themselves to the BIM design platform through the Internet[1]. The system checks and finds out the possible conflicts or design pitfalls among different departments and majors through their own functions, and helps the personnel of different departments to adjust and correct errors in time. Industry insiders in the construction industry know that prefabricated components are not only diverse, but also have a considerable number of drawings. In view of this feature, BIM technology can play its own synergistic role. For example, a department of prefabricated construction project or a design personnel to modify a certain link in engineering project adjustment, then the modification can be uploaded timely to the BIM design platform. When other related designers see the adjustment, they will make the corresponding adjustment in a short time effectively. To a certain extent, it has improved the design efficiency, reduced the design time and saved the designer's energy.

### **1.2 It is conducive to the standardized design of prefabricated components.**

After combined the Internet technology with BIM, it can realize the sharing of resource information and the rapid response of construction projects. Personnel from different departments and professions can upload their designs scheme to the cloud server of the construction project, and the design platform can integrate the resources of various schemes. In addition, all prefabricated components are classified according to their similarity and corresponding database is constructed. With the accumulation of construction projects, the database will be more and more complete. Designers can optimize it through comparative analysis to make it a prefabricated construction projects. Database is conducive to standardization and unification of prefabricated components. Standardization and unification of the prefabricated components can help designers to save design time, to allocate more time for diversified layout design of architectural pattern, and to increase the possibility of meeting diversified demands of owners[2].

## **2. Application of BIM in Production**

### **2.1 Improve the production processes for prefabricated components.**

As a key part of the production cycle of prefabricated building projects, the component production process plays a pivotal role in connecting with the following that is to undertake the design stage and the transition to the construction stage. In order to ensure the accuracy of the processing information obtained by the prefabricated components in the production stage to the greatest extent, the manufacturers of the prefabricated components can invoke the standard information of the required prefabricated components directly from the BIM model. Thus, the feasible production plan can be worked out in accordance with the actual situation. At the same time, the construction contractor of the construction project can transmit the production progress of the components at all times. In order to follow up on the quality of prefabricated components and assembly buildings in real time, manufacturers can choose to include component materials and dimensions in their production stages. The chips with identification function are installed into the prefabricated components. The RFID technology is used to effectively manage the logistics of the corresponding prefabricated components to improve the efficiency of real-time management and enhance the level of transportation.

### **2.2 Shorten the development progress of BIM model for prefabricated building.**

In order to ensure the progress and quality of the construction, after the completion of the prefabricated building design scheme, the information sharing of components in the BIM model database is realized between the designer of the construction project and the manufacturer of prefabricated components. Manufacturers can find out the relevant information of the product according to the requirements of designers at any time. All the standardized parameters in the database can be quickly and effectively converted into the processing parameters of construction projects. The standardized parameter information of prefabricated components in BIM model of prefabricated buildings and the corresponding production system are directly interlinked, and some tedious intermediate links are eliminated. It improves the automation ability of prefabricated buildings indirectly, shortens the production time greatly and improves the production efficiency effectively. In addition, some advanced manufacturing technologies, such as 3D printing, can be used to print the BIM model of prefabricated buildings into physical objects[3]. The feasibility of the scheme can be discussed based on the printed products, thus accelerating the development progress of prefabricated building construction projects to a certain extent.

## **3. Application of BIM Technology in Construction Period**

### **3.1 Optimize the inventory of prefabricated components and strengthen their management capability.**

During the production of prefabricated building components, it is necessary to manage and reserve prefabricated components in different categories. These consumed quite a lot of manpower, material resources and financial resources. It is inevitable that human management will be negligent and cause some problems. Combining BIM with RFID (radio frequency identification) technology as described above, during the production stage, the manufacturer has installed the chips with identification function including the component material, size, shape and other relevant information into the prefabricated components. After entering the construction stage, the inspection personnel and logistics personnel can all use scanning code and other ways to clearly understand the relevant information of prefabricated components[4]. Compared with the traditional inspection mode and the logistics transportation mode, it is not difficult to find that using of BIM technology can effectively avoid human error in the quantity of the acceptance check and the inappropriate component location as well as logistics transportation process information is not updated in time. There are also obvious improvements in terms of manpower, material and financial resources. When entering the construction of prefabricated buildings, the relevant building personnel can use radio frequency

identification technology to view the relevant parameter information of the prefabricated components in real time and can also check whether the installation position of the components is correct or not. From the perspective of reality, BIM technology does optimize the inventory of prefabricated components and strengthen its management capabilities.

### **3.2 Strengthen the management of construction site.**

There are numerous components in the prefabricated building, and the assembly process is complicated, which requires a good mechanical construction ability. We should attach great importance to the security of the construction site at the same time. Before formally entering the project construction, the construction party may make several sets of plans with higher feasibility, select carefully and decide the final plan. Using BIM technology for simulation, optimize the construction process of the project. Seriously analyze the simulation of the failure and other adverse problems, and solve the actual implementation of the potential problem as far as possible. It can also simulate the sudden safety accident of the project construction project, improve the pre-arranged plan for possible safety risks in reality, improve the contingency ability to solve accidents, and reduce the probability of possible safety accidents in reality. From the above, BIM technology has shortened the construction time of prefabricated buildings and improved the construction efficiency to some extent.

## **4. Application of BIM technology in operation and maintenance period**

### **4.1 Enhance the ability of equipment maintenance management during operation and maintenance.**

Based on BI technology and RFID technology, an assembly building information interaction management platform is established, through which designers can develop a maintenance management cloud system for prefabricated components and running equipment. Take this simple example below -- Management of equipment and data and emergency response based on BIM technology. In terms of dealing with the emergencies, if there is a sudden fire during the time of construction, firefighters can quickly and effectively find out the exact location of the fire site with the help of the assembled building information interactive management platform. And it can find the type of equipment or the material properties of the components in the vicinity of the fire site, select the specific fire-extinguishing materials accurately, extinguish the fire in the shortest time, and reduce the loss of financial and material resources to the greatest extent. For the management of equipment and data, when equipment operation and maintenance are carried out, the equipment operation maintenance engineer can browse the relevant information of a certain equipment in a short time through the prefabricated construction BIM model. For example, the specification of the equipment, the material selected for the assembly equipment, the working mechanism of the equipment and so on. to a certain extent, it improves the efficiency of maintenance and reduces the working pressure of the engineer.

### **4.2 Strengthen the quality of operation and maintenance period and reduce energy consumption.**

Throughout the period from the start of the prefabricated building to its final abandonment, BIM technology can be monitored in the whole process. The equipment operation and maintenance engineer can identify the chips that have been installed in the prefabricated components in the production stage. Information about invoking a prefabricated component can be obtained in real time. When any problem occurs in the process of using and discarding this prefabricated component, it can be traced back to the source, to the root of the problem, to find out what is the cause and which aspect of the problem, and who should be responsible for the problem. In the period of vigorously promoting the five development concepts in the 13th five-year plan, BIM technology can also conform to the trend of development. Through the platform constructed by BIM technology, the whole operation process of prefabricated buildings can be monitored throughout. Based on the

scientific and reasonable analysis of the energy loss, the energy loss can be reduced as much as possible on the basis of ensuring the stability of the whole operation of the prefabricated building.

## **5. Summary**

From the above analysis, we can see that with the help of BIM technology, the design, production and construction level of prefabricated buildings can be effectively improved. It makes the production chain from design to operation and maintenance of prefabricated buildings more compact and reasonable. In the process of energy saving and emission reduction, reducing pollution and promoting the development and transformation of construction industry in our country can play a very active role. However, to achieve a closer combination of BIM technology and prefabricated buildings, further running-in and perfection are needed in practice, which still needs the joint efforts of the construction industry practitioners.

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