Research on Prefabricated Building Based on BIM Technology in Computer Environment

Zhongliang Zhang\textsuperscript{1,2,*}, Yanan Tang\textsuperscript{3}

\textsuperscript{1}Yibin University, Sichuan, Chengdu, China, 610400

\textsuperscript{2}Sichuan Hengbo Construction Project Management Co., Ltd, Sichuan, Chengdu, China, 610400

\textsuperscript{3}University for Science & Technology Sichuan, Sichuan, Chengdu, China, 620500

*Corresponding author e-mail: zzl5490@sina.com

\textbf{Abstract.} From the reform and opening up to now, China's economic strength has made rapid progress in the current economic system. With the improvement of the computer environment and the improvement of China's economic strength, they have promoted the speed of China's urbanization. The state of rapid expansion is the main situation of urban coverage in China. In this case, the development of the city will inevitably drive the development of the construction industry under the computer technology in the city. In order to meet people's different architectural needs, prefabricated building mode appeared\textsuperscript{[1]}. According to a large number of studies, this construction method effectively solves the tense trend of housing problems in the city. This paper introduces the technology of computer BIM and its technical form. This paper also describes the main application of computer BIM Technology in prefabricated buildings, and finally draws the corresponding conclusions.

\textbf{Keywords:} BIM, Prefabricated Building

\textbf{1. Introduction}

At present, the development of China's construction industry is very fast. However, the traditional technical methods and forms of construction industry have brought serious energy burden to the social progress of our country. It also causes great pollution to the environment. It can be said that the traditional manufacturing methods of the construction industry have seriously restricted the social and economic progress and the improvement of people's living standards. According to scientific statistics, China's building energy consumption accounts for 40\% of China's total resource consumption. On this basis, scholars all over the world have been looking for a new form of technology and architecture\textsuperscript{[2]}. 
Through continuous practice and experiment, the prefabricated building form of BIM Technology Based on computer environment appears.

BIM greatly improves the efficiency of the application of BIM in the construction environment. BIM Technology can simulate all the information in the actual project through the construction of computer model. Under the background of the current era, many enterprises lack of effective control means for prefabricated construction engineering. The quality of prefabricated construction engineering can not be greatly guaranteed. Through the application of BIM Technology of computer technology in the construction link, people can realize the information management of construction engineering. This method can improve the overall effect of the project.

2. Brief introduction of BIM Technology in computer environment

2.1. Development of BIM Technology in computer environment

As we all know, the rise of construction industry is earlier than the rise of computer science. Based on the above understanding, we can find that BIM Technology can be understood as a construction technology that estimates resources and costs in advance. In the middle stage of the development of computer technology, the concept of 3D modeling has been put forward. However, 3D modeling needs a lot of information and parameters of solid objects. With the development of modeling parameters, computer 3D modeling software appears. Since then, in order to facilitate the calculation of some unknown engineering results, scholars have proposed computer simulation technology. Later, it was found that the simulation technology can be used in the construction industry. On this basis, BIM Technology based on computer environment is developed (see Figure 1).

![Figure 1. Pre-estimated pictures of prefabricated buildings](image)

2.2. Basic definition of BIM Technology

BIM Technology is a new computer building information modeling technology. These three letters are abbreviations of the full English name of building information modeling. The modeling of BIM Technology is based on various information of construction projects. When the building model is set
up, the real information of urban buildings is simulated through digital information simulation[3]. The core technology of BIM is a database composed of three-dimensional computer models. Database information can be dynamically adjusted in the process of architectural design according to the designer's ideas. Moreover, at different stages of the project life cycle, different participants can also use BIM Technology through computer system.

3. Advantages of BIM Technology Based on computer in prefabricated building

3.1. Comprehensive consideration of Technology

BIM has been found several times in the practical application of computer technology. The main task of assembly building management is to collect and sort out all the information of construction engineering. Through the comprehensive application of computer BIM Technology, we can improve the efficiency of engineering information collection. At the same time, it can effectively improve the comprehensive and systematic of the collection work. It also helps to realize the reasonable optimization of engineering design and the effective control of enterprise's budget cost.

3.2. Information relevance of Technology

The application of computer BIM Technology in prefabricated building shows a strong correlation. In different links of prefabricated building engineering, it can be associated with related links through the construction of information model. The establishment of computer model correlation can also effectively avoid the repeated collection of engineering information. This situation is helpful to improve the design level. However, once the data of building information model is modified, its related information will be automatically updated with the updated information. This is also an error prone link in the relevance of technical information.

3.3. The vividness of design

The basis of computer BIM Technology is the traditional plane drawing design. The traditional architectural engineering design completely relies on manual drawing. Until now, the BIM Technology of computer equipment can realize the combination of lines. It can display the design of architectural engineering to customers in the form of 3D graphics through computer electronic equipment[4]. Vivid and three-dimensional graphics let customers feel the beauty of design. The vividness of computer design is also the concrete embodiment of the commercial value of BIM Technology.

3.4. Coordination before construction

The preparation process before the construction of traditional buildings is relatively rough. Because there is no BIM computer technology in the original era, people can only rely on their own experience to estimate the material loss and cost consumption in the process of architectural design. Today's BIM Technology can use the ability of computer to simulate the whole process of building construction. Customers can see the budget of various data through computer data. If the computer budget exceeds the actual budget cost, the designer can make appropriate modifications through BIM Technology (see Table 1). This method can provide sufficient scientific basis for the construction scheme.
| Stage                        | Technology                          |
|-----------------------------|-------------------------------------|
| The first stage: modeling   | Modeling technique                  |
|                             | Software technology                  |
| Related hardware and software requirements |                               |
| The second stage: coordination | Collaborative technology             |
|                             | Shared model                        |
|                             | Intermediate model                  |
| The third stage: integrate  | Integration technology              |
|                             | Model data sharing                  |
|                             | A collection of networks             |

### 4. Application of BIM Technology in prefabricated building under computer environment

#### 4.1. Application of BIM Technology in architectural design stage

In fact, the application of BIM in architectural design stage refers to the construction of 3D model of image through computer. Through the comparison between the model data and the actual data, the information model is finally formed. This design method can provide necessary reference for construction projects. In the traditional architectural design, it is difficult for people to see the detailed data through the artificial drawings. Compared with the traditional architectural design, BIM Technology makes up for the shortage of traditional design data retrieval. The establishment of the three-dimensional model of the computer provides a great convenience for the operation of the staff.

#### 4.2. Application of BIM Technology in production stage

Before the production of materials, enterprises should upload the parameters and sizes of materials to BIM database. The manufacturer can carry on the fast actual production according to the information in the database. After the material production, through the comparison of material parameters of BIM Technology, producers can easily find out the deficiencies of materials\(^5\). This way can greatly guarantee the quality standard of production materials. The application of this production stage can lay a foundation for the quality improvement of assembly engineering.

#### 4.3. Application of BIM Technology in construction stage

The main application types of BIM Technology in the construction stage of prefabricated buildings are relatively few. It is mainly reflected in the application of strict management form in the construction site. Due to the construction of the need for the number of materials is relatively large, and the type of
materials is very different. If the performance of materials is affected by external conditions, the quality of prefabricated buildings will also decline rapidly. Therefore, it is very difficult to manage BIM in the construction stage. Therefore, few people use BIM Technology in the construction phase of the application to the actual construction environment. A lot of costs are wasted this time.

5. Practical use strategy of prefabricated building based on BIM Technology in computer environment

Compared with the traditional prefabricated building mode, as a relatively new computer simulation technology, the advantages of BIM Technology are very obvious. However, its disadvantages are also obvious. If the building specifications of a construction project are very small, then its construction budget cost is also very low. In this case, we can not completely use BIM Technology to design prefabricated buildings[6].

In appropriate circumstances, the use of traditional prefabricated architectural design can be very good cost savings. Therefore, I think that if the accuracy of a project is not high, we can use the combination of computer BIM Technology and traditional design to complete the actual design process. We can not say that the traditional assembly design method is completely bad technology, we can not say that BIM Technology is a perfect design technology. Everything has two sides. BIM Technology is the same. In the actual design process, we should learn to use the advantages of computer BIM Technology and abandon its disadvantages.

6. Conclusion

In fact, BIM Technology not only involves computer technology, it also includes a lot of engineering technology knowledge. According to the actual design practice of prefabricated building, there is no doubt that the application effect of BIM Technology in prefabricated building under the computer environment is very obvious.

References

[1] Baoku Q, Changfu L, Management S O, et al. Research on the Whole Lifecycle of Prefabricated Construction Management Based on BIM Technology[J]. Construction Technology, 2014.

[2] Min L, Jia-Ling X U, Xiang-Wei Z, et al. Research on Intelligent Manufacturing of Low Risk Assembled Building Based on RFID and BIM Technology[J]. Journal of Guangdong Polytechnic Normal University, 2019.

[3] Qi B K, Li C F. Whole Life Cycle Management of Prefabricated Construction Research Based on BIM Technology[J]. Applied Mechanics & Materials, 2014, 536-537:1705-1708.

[4] Rong N. Research on Optimization of Prefabricated Construction Building Process Based on BIM Technology[J]. IOP Conference Series Earth and Environmental ence, 2019, 300:022057.

[5] He Q. Research on the Application of BIM Technology in Prefabricated Building
Construction[C]// 0.

[6] Baichun, Wang. Research on the Application of BIM Technology in Assembly Building Management[C]// 2018.