

# Research on Whole Process Engineering Consulting Mode of Green Prefabricated Building based on BIM

Lin Liu

China Construction Technology Group Co., China

## Abstract

Since 2013, China 's economy has entered a new normal development stage of growth shift. With the acceleration of the new urbanization process, high-quality development requires real estate transformation, upgrading and innovation. The real estate industry is an important force to promote the rapid development of China 's economy, which has changed the situation of urban housing shortage and made historic achievements. However, with the rapid development, the disadvantages of the traditional construction industry are also constantly highlighted, such as extensive development, not focusing on green development. Vigorously promoting the industrialization, informatization and greening of construction industry is an important way to realize the modernization of China 's construction industry. Therefore, based on the current BIM technology, this paper aims to build an intelligent construction system for prefabricated buildings, combined with the whole process of engineering consulting, in order to play a positive role in promoting the transformation and development of China 's construction industry.

## Keywords

Green Development; Prefabricated Buildings; Engineering Consulting; BIM Technology.

## 1. Introduction

Since the reform and opening up, China 's economic structure has undergone rapid changes, the construction industry has become one of the important economic pillars. However, problems in the construction industry have also emerged. To build a complete project[1], the materials and energy required are very huge, and there will be some pollution problems in the construction. In order to protect our living environment, the country began to implement the concept of green building, find effective ways to save building energy, reduce pollution, and make people live in harmony with nature. At the same time, the production and on-site installation of prefabricated component manufacturers ensure resource conservation and the construction site is cleaner and tidier. Combined with the country 's vigorous promotion of BIM technology[2-5], it can speed up the on-site construction speed, improve the accuracy of the residential construction process, reduce the problems that are easy to occur in the traditional construction methods, and strengthen the controllability of construction management. Finally, with the continuous improvement of laws and regulations related to prefabricated buildings and the continuous innovation of technology, the sustainability and technical prospects of prefabricated buildings are becoming more and more obvious, which improves the safety and durability of residential buildings and makes residential costs easier to control[6]. The use of BIM technology can help people solve this problem. With the help of computer, this technology can show the on-site construction situation to designers in three-dimensional form, fundamentally solve these problems, and provide a good guarantee for the implementation of sustainable development strategy in China. The architectural design of the new era is different from the previous design. Architectural design in the new era should pay attention to green environmental protection[7-11]. In addition, with the deterioration of China 's ecological environment, the implementation of green design concept imminent. After a long period of

analysis, it is found that the use of BIM technology can help construction enterprises solve environmental problems in construction, so that their energy can be used within the scope of environmental protection stipulated by the state. This paper studies the application of BIM technology in green prefabricated building design, and puts forward some suggestions.

## **2. Features of BIM Technology**

BIM is a new technology based on drawing software. The 3D composition software has many characteristics such as coordination and visibility, which can help enterprises improve efficiency in the design stage of green prefabricated buildings. Designers can use BIM technology to replace the previous graphic design when designing green prefabricated buildings. Designers can feel the on-site building in a more three-dimensional way in the design process. Designers can understand the design problems at a glance and solve the problems in time. Further improve the efficiency of green prefabricated building design and fundamentally solve the problem of deviation. In addition, BIM technology can also help designers to establish a scientific and rational design system to help construction personnel according to different types of green building to establish different models to ensure the rationality of the model[12], reduce the workload of green prefabricated building designers, while ensuring design efficiency.

## **3. Significance of BIM Technology Application in Green Prefabricated Building Design**

At this stage, China has an important understanding of environmental protection, so there are requirements for industries that can cause environmental pollution. Among them, the construction industry is one of the main industries with serious environmental pollution. In order to develop in the future, construction enterprises must conform to the trend of our country, attach importance to the construction of green prefabricated buildings, reduce the pollution waste generated in the construction process[13-16], and finally implement the concept of green prefabricated buildings. Nowadays, with the steady development of social economy, China's demand for green prefabricated buildings is also increasing. More and more people see the development prospects of the construction industry, from their own industry to the construction industry, which will hinder the development of green prefabricated buildings to a certain extent. If you can integrate BIM technology into the construction industry can avoid these problems, improve the reliability of construction enterprises, greatly reduce the waste of building materials, to ensure the construction profits of construction enterprises.

## **4. Common Concept of BIM Technology and Green Prefabricated Building**

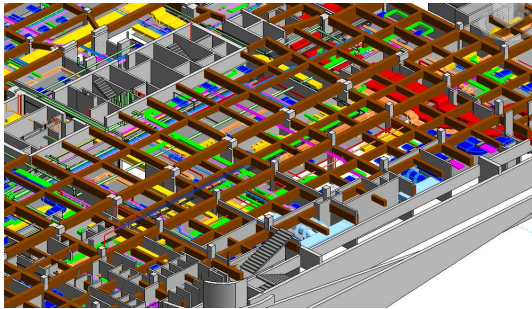
### **4.1. Concept of Green Prefabricated Building**

A lot of materials are used in the construction process, which may lead to waste of resources. In order to implement the national green environmental protection policy, construction enterprises must save non-renewable energy used in construction. In order to reduce pollution and protect the natural environment, BIM technology is the only technology that can adapt to the development trend of our country[17]. Therefore, it is necessary to apply BIM technology to the design of green prefabricated buildings.

### **4.2. The Meaning of BIM Technology**

BIM technology can analyze the relevant data of design, construction, supervision and a series of work in green engineering. Both to ensure the quality of construction, but also to reduce the pressure on the work of construction workers, is twofold. The data obtained during

construction needs to be accurate, which also improves the construction efficiency of construction enterprises to a certain extent.



**Figure 1.** An example of a green prefabricated building BIM model



**Figure 2.** Rendering effect of a green fabricated building

## 5. The Role of Applying BIM Technology to Green Prefabricated Buildings

### 5.1. More Intuitive Design

Integrating BIM technology into green prefabricated building design can turn rigid drawings into three-dimensional animations and help designers improve the accuracy of data operations. At the same time, the use of BIM technology can also help managers fully understand the overall construction structure of construction projects[18], improve construction efficiency, and help designers expand their thinking. When a project changes in some areas, designers can easily handle problems based on BIM technology to ensure the accuracy of drawings.

### 5.2. Ensuring Coordination of Green Prefabricated Building Design

The previous construction project is different from the present. Before the project construction technology and equipment are not mature, there are some limitations. The way for designers to obtain construction information on site is limited to the original way such as oral narration, which is not conducive to the analysis of the site situation by designers. In order to solve these problems, enterprises can integrate BIM technology into the design of green prefabricated buildings. The application of this technology can better improve the efficiency of the designer's investigation of the scene, even very small details can be reflected[19-21], greatly improving the accuracy of the design drawings, thus ensuring the quality of green prefabricated buildings.

## 6. Application of BIM Technology in Green Prefabricated Building Design

### 6.1. Increase the Efficiency of New Energy

In order to implement China's sustainable development policy, construction enterprises should build more green public buildings, which can not only provide a good living environment for people, but also pave the way for the city's architectural style and economic development. Therefore, in the construction of buildings, more new energy building materials can promote the existing building system, and the change of building form has the advantage of comprehensive construction for BIM technology. During this period[22], the construction of 3D models in construction also provides a good design basis for construction companies to transform into green prefabricated buildings.

### 6.2. Improve Lighting, Reduce Light Pollution

Residents living near the building are more or less affected by the reflection of the glass curtain wall, which brings some troubles to the lives of residents. In general, the country has certain requirements for residential sunshine time, generally no more than two hours. Therefore,

construction enterprises should use BIM technology in the construction process to observe whether outdoor lighting can reach indoors. When using BIM technology, the construction unit should provide various information of the building, such as the design drawings of the building. And transmit this information to the computer to build a 3D rendering, the third party will audit the building 's lighting. After the test is completed[23], the analyzed data will be compiled into a data report. In this process, it should be noted that the report must contain a detailed record of sunshine time, which is the key data. After the information is input into the BIM software, attention should be paid to changing its format to ensure the readability of the relevant personnel. This helps to timely adjust the problems found in the construction, but also effectively avoid the construction of man-made data calculation errors caused by adverse effects on the project.

### **6.3. Indoor Environment Design**

For the design of green prefabricated buildings, the most important thing is interior design, because interior design is one of the important factors to ensure green prefabricated buildings. Therefore, designers should strictly control the interior design, continuously optimize the design scheme according to the actual situation, and comprehensively consider the occurrence of various situations to minimize the difficulty of construction. Based on this problem, designers can use BIM technology to build a three-dimensional green assembly building overall effect diagram to check in advance whether there is a conflict between the various activity areas. If there is a problem, the designer can correct it in time to avoid economic loss.

### **6.4. Energy Saving Design and Energy Optimization**

BIM technology is presented by computer, so it has the characteristics of informatization, which is helpful for designers to analyze data. The information provided by BIM technology is more accurate than that provided by traditional methods, which also ensures the rationality and scientificity of green prefabricated building design. In the design process, designers should take the energy saving characteristics of the building as a reference, effectively divide the ' thermal performance ', and use BIM technology instead of manual calculation to reduce the waste of human resources.

### **6.5. Construction Activities**

Most construction companies have applied BIM technology to the construction of green projects to assist the smooth establishment of green prefabricated buildings. This has brought great convenience to the relevant construction personnel to control and operate the project. With the support of BIM technology, project stakeholders can predict possible problems in the project, and then take protective measures to ensure the safety of construction workers, while ensuring the quality of green prefabricated buildings. The effective use of BIM technology can also audit models of green prefabricated buildings to help construction workers understand the spatial overlap of buildings. With the development of green prefabricated building construction, more and more equipment is used in construction, which increases the difficulty of construction to a certain extent. To solve these problems, site managers can use BIM technology to analyze the location of the site pipeline, get accurate data, and then optimize the design.

### **6.6. Control of Hot and Humid Environment and Control of Indoor Light**

China 's total land area is relatively large, so also led to China 's different geographical location and weather conditions vary greatly. In the south, to build green buildings, you have to find ways to control the internal hot and humid environment, but this may reduce the light requirements. Therefore, designers can take full advantage of BIM technology to accurately

calculate indoor lighting data and reasonably design the indoor environment of green prefabricated buildings.

## 7. Conclusion

In the final analysis, BIM technology is a new computer technology based on traditional building environment, which can effectively solve some problems existing in traditional design. Nowadays, China has begun to implement environmental protection strategy. Integrating BIM technology into the construction industry can help enterprises improve their core competitiveness. The integration of BIM technology can help designers fully observe the construction site and construction information, and prevent designers from making mistakes in design. In addition, for the development of green prefabricated buildings, the characteristics of BIM technology can play an active role in the 'interior design, new energy utilization' and other aspects of green prefabricated buildings, thereby improving the design efficiency of green prefabricated buildings.

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