

# Research on Energy Consumption Calculation Model of Prefabricated Building Envelope System Based on BIM Technology and 6G Technology

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**Abstract:** There are foreign software that can directly connect design data to factory equipment for automatic production. However, in China, due to the lack of unified data transmission standards, intelligent production management software and supporting automation Production equipment, resulting in the inability of design data to connect with industrial software-driven components for automated production. Most of the components are still produced manually by workers according to the design drawings. The use of intelligent design software, intelligent manufacturing management system and numerical control equipment can realize design data-driven factory automation production, improve the design and production efficiency of prefabricated buildings, reduce the dependence on labor, and reduce the cost of prefabricated buildings.

**Keywords:** Energy Consumption, Prefabricated Building, Envelope System, BIM Technology

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## 1. INTRODUCTION

Buildings are classified according to the physical characteristics of basic materials, and materials can be divided into two types: heavy and light. \*Concrete King is a typical heavy material, it is mostly used in composite materials together with other materials. The traditional concrete structure wall (as shown in Figure 2-3) cannot be well insulated, so it is necessary to set a layer of insulation layer or decorative layer on the outside of the wall, and the construction procedure is complicated at this time, and the construction time will be very long. On the basis of the exterior design of the No. 1 office building model, its size is calculated and produced at a scale of 1:10. According to the building construction drawings 16G101-1, 16G101-2, 16G101-3, concrete structure design specifications and construction engineering construction specifications, etc. [1-7].

In the construction of prefabricated buildings, the building components and accessories are uniformly produced by the factory equipment, and then the quality inspection is completed within the production enterprise to determine whether the products have quality problems and whether the specifications meet the construction standards, and then use professional transportation equipment to transport the building components and The accessories are transported to the construction site, and various components and accessories are assembled by professional construction personnel, and finally put into use. Today's society is a technology-based society. As technologies such as big data and artificial intelligence become more mature, more and more industries begin to combine high-tech technologies. Building information technology (BIM technology) has the advantages of visualization, integration, parameterization, etc., and has gradually replaced traditional CAD technology, because it can be applied in different stages of assembly projects. [7-14].

The most important thing is that in some product design processes, there are many problems that are non-quantitative, not based on mathematical formulas or mathematical models, but need to rely on the designer's own practical experience to

think and judge. In the entire life cycle of the product, the design plan plays the most critical role. The quality of the designer's plan will determine the quality of the final product packaging design plan. Packaging is a product of the development of human civilization. It is integrated into a variety of disciplines. It contains, protects and stores products, and conveys content information to consumers. It needs to have both aesthetics and technology. In today's fierce business environment, packaging designers face not only understanding packaging appearance and technology, but also understanding the needs of society, people's requirements and customer wishes. In the design process of traditional packaging products, designers formulate design concepts, draw sketches, and finally use computers to draw out the effect drawings of the packaging products. Designers use several packaging effect drawings to communicate with customers, listen to customer requirements, and then modify the design. Scheme until the completion of the finished packaging [15-21].

CAD drawing design and revit modeling of Office Building No. 1 are carried out. The total length of the office building is 126.5cm, the total width is 54cm, and the height is 15cm. The digital technology applied in the design stage of prefabricated buildings is mainly based on BIM technology, which is widely used in the detailed design stage of prefabricated components, mainly including prefabricated component scheme design, prefabrication rate statistics, prefabricated component reinforcement, collision checking and drawing output, etc. ; The production stage is limited by the low intelligence of domestic equipment, the high price of foreign equipment, and few applications, resulting in a low degree of application of digital technology in production at this stage, and the production of components in most factories is based on manual production scheduling combined with manual production and processing. the main way. After the designer completes part of the design work based on BIM technology, it is transmitted to the PC factory through the BIM cloud platform sharing method. The designer and the factory share a set of BIM models, which can be designed and delivered at any time [22-24].

## 2. THE PROPOSED METHODOLOGY

### 2.1 The Discussion of BIM

The factory uses automated disassembly tool software to disassemble the BIM model into single buildings, floors, and areas, until it is finally disassembled into a component-based BIM model. The BIM unit model outputs the manufacturing drawing according to the drawing template parameters, and provides basic data for the subsequent production scheduling task list, manufacturing plan, steel bar cutting and image progress.

For prefabricated buildings, the walls and maintenance materials are generally combined in the factory in advance, and then the load-bearing units are assembled on the construction site through components to organically combine building maintenance and thermal insulation materials.

### 2.2 The Discussion of 6G

Compared with the traditional construction mode, prefabricated buildings have higher construction efficiency, can complete construction tasks quickly, and will not cause resource waste and environmental pollution problems during construction, and have broad application prospects. Prefabricated buildings and BIM technology are the products of the construction industry advancing with the times. Both can improve the construction efficiency of buildings, and the application of BIM technology in prefabricated buildings can give full play to the role of both.

Compared with traditional buildings, prefabricated buildings have more in-depth design links, which play a link between design and component production. Traditional construction drawings only contain information at the design stage, without the disassembly and specific dimensions of some relevant components, and component factories cannot use them. Directly direct production. With the continuous improvement of people's living standards in our country, the concept of environmental protection has gradually gained popularity, and the weight value of each element relative to the top index of the control layer can be obtained by using  $\bar{w}$ , that is, the weight value of the three-level indicator's influence on the decision goal. Although the ANP solution process is relatively cumbersome. Due to the superior environmental performance of prefabricated buildings, this kind of building structure system has received more and more attention, and my country has also issued corresponding rules and regulations to standardize the construction links and acceptance standards of prefabricated buildings, which makes prefabricated buildings. The scope of influence is growing. BIM technology can reduce the modeling time of designers, whether it is to change the plane model to a three-dimensional model, or to provide previous relevant information about such buildings, it can reduce the work pressure of designers. The in-depth design of prefabricated components is a key link in the implementation of industrialized residences, and it is also the most concentrated embodiment of the superiority of industrialized residences over traditional residences, which integrates different professional needs. In the process of prefabricated building design, the frame structure system design work and the shear wall structure system design work should be done well.

### 2.3 The Energy Consumption Calculation Model of Prefabricated Building Maintenance System

The combination of GIS and BIM can create a new work platform to solve problems at the city level. When using BIM+GIS technology in architectural design, related geometric data can be separated, which realizes the combination of effective information in architectural design. This is also the most fundamental reason why the BIM+GIS management system can be established. BIM+AR (augmented reality technology) can make the project better show to the constructors and managers during the construction phase, so that they can more intuitively understand the feasibility of project implementation.

AR technology can realize the visualization of architectural details, facilitate management to a certain extent, eliminate potential safety hazards in the course of the project, and greatly reduce the construction period. The system prepares the manufacturing plan according to the general scheduling parameters, structure list data and manufacturing change plan, determines the specific manufacturing date and completion time node of each component, and finally forms the scheduling task list after manual verification, and finally pushes the data to the workshop team. Person's mobile device.

Compared with fully prefabricated buildings, some of the structures involved in the design and construction of semi-prefabricated buildings are uniformly manufactured by the factory, and the other part needs to be constructed on site at the construction site, which is directly constructed by the construction site.

## 3. CONCLUSIONS

The actual situation of the construction site optimizes the construction process, so it is more adaptable than fully prefabricated buildings. There are some differences between the design of a construction project and the actual operation. For example, some structural components may conflict with the layout of the line in the actual operation. After such problems occurred in the past, the designers and the construction parties conducted research and discussion. The in-depth design of the project needs to be completed by multiple majors such as architecture, structure, water and electricity, equipment, etc., and the same major also requires the participation of multiple designers.

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