

## Application Analysis of BIM Technology in Green Building

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### Abstract

Because BIM technology and green building all focus on the development and management of the whole life cycle of building, fully understanding the application of BIM technology in green building will effectively promote the upgrading and progress of green building industry. This paper studies the energy consumption analysis and energy saving of green building participated by BIM technology, and comprehensively expounds the advantages of BIM technology in promoting energy saving of green building. The application of BIM technology in green building management is studied. The specific implementation of BIM technology in the construction design and operation stages of green building is analyzed. It is proved that BIM technology provides a complete data information basis for improving the full-cycle management of green building.

### Keywords

**BIM technology, green building, building energy consumption.**

### 1. Introduction

With the gradual development of BIM technology, the actual construction projects involving BIM technology are gradually increasing. Due to the concept of building a resource-saving and environment-friendly society put forward by the state, the development of green buildings has gradually been taken seriously by people. Due to the favorable application prospect of BIM abroad, the application of BIM model is being widely promoted. In the United States, more than 50% of green buildings will use BIM technology [1]. However, due to the late start of BIM in China, there are fewer actual cases of using BIM technology to participate in the design of green buildings in China, so the system of BIM technology to participate in the construction and management of green buildings in China is not mature enough. Deeply discussing the application of BIM technology in green building will give full play to the comprehensive information integration capability of BIM technology, and provide strong technical support for the implementation of green building projects.

### 2. Development Prospect of BIM Technology

BIM's powerful ability of data analysis and integration of full-cycle information and three-dimensional modeling is an important reason for its vigorous development[2]. But precisely because of the strong ability of BIM technology, a large part of its development space and potential has not been fully tapped, so in the future development stage, better BIM applications will be developed, and BIM technology will be more practical in the construction field. In short, the popularity of BIM technology in the construction industry will be a major trend in the development of the construction industry.

### 3. The Meaning of Green Building

Green building does not simply mean that the color is green. Planning green plants on the top floor and around the building. China's "Green Building Evaluation Criteria" (GBT50378-2006) defines green building as: in the life cycle of a building, to maximize the saving of resources (energy, land, water and material), to protect the environment and reduce pollution, to provide people with healthy, applicable and efficient use space, and provide a building that coexists harmoniously with nature [1].

## **4. BIM Technology Participates in Energy Analysis of Green Buildings**

### **4.1 Analysis of sunlight.**

Revit software can be used to build a three-dimensional model of the building. After the completion of the model, the simulation animation can be generated by sunshine simulation. According to the animation, the sunshine situation of the building under the influence of local climate can be visually displayed, so as to further analyze the lighting scheme of the green building. Through Ecotect Analysis software, we can analyze the shading, sunshine and lighting of buildings. Through the shading analysis function, the optimized shading system can be generated, and further simulation and analysis of the generated shading system can accurately carry out effective shading treatment for actual buildings. Lighting analysis can make statistics on lighting coefficient at any point of building model, and then arrange the position of solar panels reasonably according to lighting intensity, so as to better improve the utilization of building light energy [3].

### **4.2 Analysis of Ventilation Air Flow**

To understand the monsoon climate of the building location, the ventilation and airflow analysis functions of Ecotect Analysis software or other BIM software are used to simulate the monsoon climate characteristics. In view of the characteristics of wind direction, natural ventilation is adopted to orient the windows to the direction of prevailing wind when climate conditions permit. Natural ventilation can not only satisfy certain indoor comfort requirements, but also save energy consumption, reduce the demand for air-conditioning equipment, and reduce the cost of equipment investment and operation. The local wind conditions are measured and analyzed, and the three-dimensional simulation is carried out by BIM. The flow direction and flow of the wind direction inside and outside the building are observed, and the optimum position and direction of the building are summarized and judged.

## **5. BIM Technology Promotes Energy Conservation in Green Buildings**

### **5.1 Water saving**

This paper mainly elaborates the purpose of saving water by collecting and utilizing rainwater. Rainwater collection will be affected by the volume and shape of buildings. The reasonable design of building volume can increase the amount of rainwater collection, and then meet the requirements of water resources recycling. The volume of building is modeled by BIM software. The completed volume model is imported into the energy analysis program, and the program is run. By modifying the volume and area of building volume, the most suitable form of building volume for rainwater collection can be achieved. Making a reasonable rainwater collection plan according to the data will achieve the purpose of saving water more efficiently. Through BIM, the water-using equipment is counted, and the water consumption of water-using equipment is calculated and analyzed. The water-using data list is counted. The non-drinking water is classified according to the list, and the recycling after rainwater collection is reasonably arranged.

### **5.2 Electricity saving**

The use of energy-saving electrical appliances in green buildings will promote the saving of power resources. According to BIM technology, the three-dimensional model of electric power equipment is built, the electrical equipment in the building model is counted, and then the energy consumption is analyzed according to the BIM energy analysis software. Measures such as replacing energy-saving equipment with energy-consuming equipment are taken. The conversion of wind energy to electric energy can also effectively promote the saving of electric power resources. Through the data of wind energy analysis, the most reasonable location of wind power equipment installation is studied, and the maximum energy conversion rate is generated with the least equipment.

## 6. BIM Technology Participates in the Management of Green Buildings

### 6.1 Management in Construction Design Stage

The design stage of green building affects the consumption of materials in the construction process and the energy consumption after the completion of the building[4]. In the design stage of the early stage of construction, BIM technology will centralize the scattered and non-intelligent file information system, and can complete the analysis of parameter model data in a very short time. Therefore, before the construction design, a complete, coordinated and unified three-dimensional model and corresponding data information can be formed by BIM, and then unified management and modification of the construction design can be carried out by combining the requirements of the construction scheme [5]. Using BIM technology, the information of different components in the model can be exchanged to facilitate engineers to master all kinds of information comprehensively, and then take better measures to manage the green building construction design stage.

### 6.2 Management of Operation Phase after Completion

In the operation stage of green building, we should not only pay attention to the energy conservation standards of individual components, but also coordinate the operation of various parts of the building, so that the whole cycle of green building can meet the standards of low energy consumption, low carbon and low consumption. BIM can integrate the relevant equipment information of each specialty in a building[6], and display the building information through data. The data information of each specialty in the three-dimensional model of BIM can be coordinated and shared. It has the characteristics of providing real-time data information sustainably. Therefore, the data information of BIM technology integration can well meet the requirements of information needed in the operation and management stage after the completion of green building.

## 7. Conclusion

BIM, as a technical concept to realize full-cycle design and management of buildings, contains excellent features such as visualization and coordination, which improves the production efficiency of green building projects and saves a lot of resources. Through the characteristics of information interchange between BIM software, the analysis data of air ventilation and sunshine lighting in green buildings can be fully applied to energy management and utilization of green buildings, so as to maximize building energy saving. Through the characteristics of BIM technology with comprehensive information integration ability, it can realize the management of green building construction stage and operation stage, speed up the construction process of green building, and improve operation efficiency. To realize the full utilization of BIM technology in green building will be conducive to promoting green building towards the direction of more science and technology, more energy saving and more ecological.

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