

Research on Energy Saving Application of Small High-rise Office Building Based on BIM Model

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Abstract: With the development of society and the shortage of natural energy, the concept of energy saving has penetrated into various industries, especially the construction industry. Building energy consumption accounts for about 35% of the total energy consumption in China, ranking first among all energy consumption industries. The problem that energy saving technology is facing in the construction industry of our country at present is: the application research of building energy saving technology based on BIM model. This paper is based on the BIM model of small high-rise office building energy-saving application research to carry out analysis and summary.

1. Introduction

The construction industry is the pillar industry of the country, and it is also the industry with large energy consumption. In recent years, the construction area of the houses built in our country has exceeded the sum of the building area built every year in all developed countries, and most of the energy consumption in these new buildings is very high, now our country has paid enough attention to the building energy saving. However, many energy-saving buildings refer to the previous building energy saving case and construction technology, and the energy saving is not analyzed in detail and the suitable scheme is formulated in the process of design and construction. The traditional computing software is analyzed by the professional design of the data manually into the software, and the amount of data is very large, the input work becomes particularly difficult, and artificial input of a large number of data process can not avoid errors. Nowadays, the development of digital information intelligence technology in our country has been very mature, 3D technology is also gradually well known, and all kinds of building software with BIM technology as the core is gradually popularized, and the wide use of BIM technology is undoubtedly an important platform for the further development of building energy saving.[1]

2. BIM Technology Overview

BIM technology, the architectural information model technology, was first proposed by American scholar Chuck Eastman. He makes full use of computer technology to expose the problems in architectural design, integrates the information of geometric model, building performance, use function and so on in architectural design, and then presents it through computer, which leads to a three-dimensional model with comprehensive information, on the basis of which he simulates the time of design, construction and so on. [2]

3. Application of 3 BIM Model in Energy Saving of Small High-rise Office Building

3.1. Advantages of Applying BIM to Building Energy Conservation

BIM technology is very powerful, it has the super data integration ability, can let the information, the environment, the parameter setting and so on each aspect coordinated cooperation, applies the BIM model to the building energy saving superiority mainly manifests in:

Makes a good connection between modeling software and energy-saving software. Energy-saving

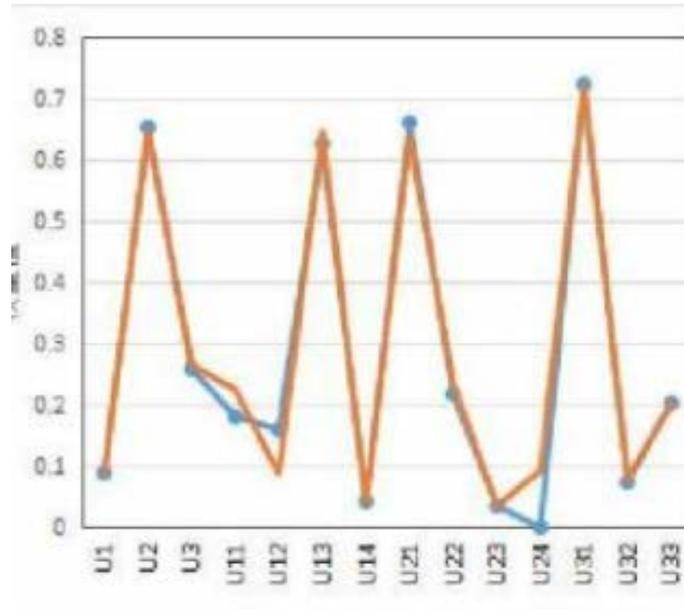


Figure 2 Before and after data revision

3.2. Engineering Information

The background of this paper is a 10-story high characteristic office building in a certain area of Wuhan, with a total floor area of 12260 square meters and a building height of 39.6 meters. The whole main structure is in the form of reinforced concrete frame structure. In the energy saving design of the building, the BIM model of the office building is first established, and the energy saving software is used to import the BIM model of the office building for detailed analysis. From the analysis data of the software, the utilization of solar energy in the office building and the energy consumption of the whole air conditioning system can be studied.

3.3. Analysis and Design of Bim Model

The basis of BIM modeling is the architectural design drawing of the office building, the model built according to the drawing must have authenticity and correctness, to conform to the actual situation of the building, to ensure that the model matches the drawing, including the appearance shape, size, material type, material performance, cost and other aspects, as shown in figure 3.

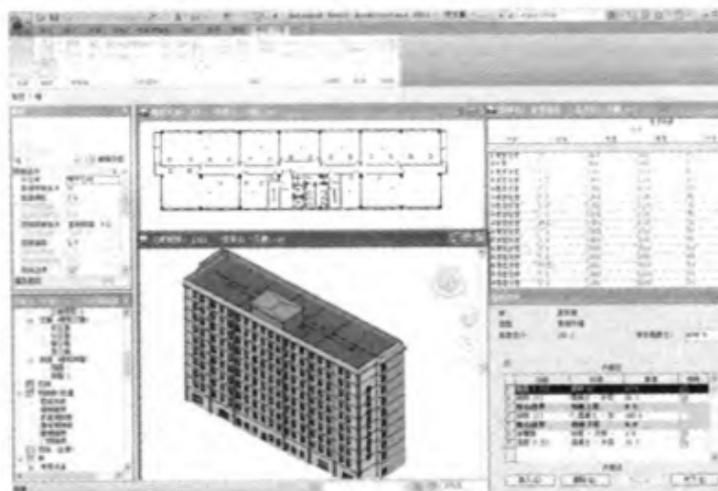


Figure 3 BIM-based architectural design

When building a model, the component is an integral part of the foundation. The application of BIM technology to architectural design, using data and code names to replace model components, is different from the previous digital model, BIM technology is to present the building as a 3D three-

dimensional model, which can understand the construction of the whole building more clearly and intuitively. Most of the current models are based on the use of BIM technology to parameterize building information. This technology is based on the nature and function of the input building components, the structure system of the whole building is divided into sub-regional pixels, the corresponding parameters of each pixel are set, and then the corresponding correction is made according to the actual situation of the small high-rise office building, and finally the whole model of the small high-rise office building is constructed, and the dimensions, symbols and characters are marked in detail, which can show the final effect of the small high-rise office building more intuitively, and provide an accurate and effective reference for the subsequent construction management to ensure the efficiency and quality of the project.

3.4. Data Exchange Processing

In BIM model analysis, the applied data processing technology is Revit and Ecomtect, according to the existing engineering construction related data processing regulations, analyze and plan data analysis in a scientific way, and make adjustments for the generation of building models. After the data is entered into the software, it is established in the 3D coordinate system, which presents the final 3D model effect. It is also possible to analyze a certain part in the process of modeling, and more detailed and intuitively present the analysis effect of the model.

3.5. Collision Check

In the process of building energy saving technology implementation management, collision inspection is very necessary. In the construction site management work to avoid or even prevent the occurrence of collision phenomenon, it is necessary to analyze every working procedure and every detail of the whole project in advance to avoid any hidden danger in the construction process. Based on the BIM technology, in the BIM modeling and analysis, it is to build the model in the three-dimensional coordinate system, and the engineering managers can use the model analysis to check the possible collision phenomenon uniformly, reduce the risk in the construction process, improve the efficiency of the construction site management work, and achieve the best results.

3.6. Quality Inspection

Quality is the most important factor in construction, improving the quality of construction engineering management is the work that engineering management personnel must do. In the data processing results of BIM model analysis, it can provide the most basic guarantee for the quality of energy-saving technology of construction engineering, prevent in advance, put the quality inspection work in place seriously, and avoid most of the unnecessary hidden dangers in the construction management process. The data entry software is used as the basis before the start of work, and the data is re-entered after the actual construction. If there are differences in the data entered in the two times, it shows that the actual construction and design are not completely consistent, and the difference needs to be checked and remedied in time to lay the foundation for the overall quality of the project.

4. Conclusion

The development and application of BIM technology is a great change to the construction industry, it is a new form of technology, which makes up for many shortcomings in the traditional architectural design. The application of this technology can save a lot of limited resources in our country, and can make adjustments more in line with the characteristics of the project and the actual situation in the aspect of building energy saving. The technology will carry out more professional analysis of the factors likely to have an impact on the construction, and some special cases will be analyzed in order to adjust the design scheme, generate the most suitable design scheme, and ensure the quality of the building, which is undoubtedly a breakthrough for the development of the construction industry.

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