

On the Application of Bim Technology to Building Energy Saving Design

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Abstract: With the continuous improvement of the current level of science and technology, some new processes and technologies have been applied to the construction industry. As a modern architectural design method, building energy saving design meets the increasingly high energy-saving and environmental protection requirements of the current construction projects. The use of energy saving methods in the design of construction projects can promote the healthy development of China's construction industry, and promote social progress. The sustainable development strategy is the premise and foundation for the development of all walks of life, and the construction industry is no exception. Only by actively studying the building energy saving design and improving the design level, can it continue to meet the new requirements of users for construction engineering and improve the core competitiveness of construction enterprises in the industry. BIM Technology is newly developed based on computer technology. In the process of design, the application of this technology can simulate all aspects of the construction with many advantages such as coordination and visibility. Therefore, the application of BIM Technology to building energy saving design is an inevitable development direction of the construction industry in the future.

1. Introduction

As the construction engineering belongs to an industry with large energy consumption, the design needs to be optimized, so as to avoid the waste of resources, improve the utilization rate of resources, and promote the overall improvement of China's architectural design level. Building energy saving design is an effective solution to eliminate the waste, which can not only effectively improve the utilization rate of resources, but also optimize the building structure, improve the internal environment of the building, and significantly improve the comfort of the building interior.

2. Analysis of the Technical Characteristics of New Bim

The application of BIM Technology needs the help of computer technology. It realizes the simulation of engineering structure, indoor, outdoor and other elements, which is presented in the form of three-dimensional model in the computer. It is a technology to establish virtual architecture, and the optimization of architectural design can be achieved through corresponding operation. In the application of BIM technology to building energy saving design, digital information is required to make the building elements of the model more complete and accurate, showing the engineering information more consistent with the actual situation of the construction project. BIM Technology, as a more mature technology, has been widely used in many industries, and has achieved good results. For example, real-time sharing of data and information can be realized, providing timely and effective information support for relevant departments of construction enterprises, as well as facilitating the coordination of various departments in different construction stages and the smooth development of various work. At the same time, through the application of BIM technology to optimize the design of the construction project, it effectively reduces the cost, optimize all aspects of the construction, ensure the completion in accordance with the contract, and play an important role in improving the economic and social benefits of the construction enterprise.

3. Importance Analysis of Bim Technology in Building Energy Saving Design

As the complexity of the current construction project in design and construction has been significantly improved, especially in the design and construction process of some engineering transformation problems, it is necessary to integrate all the information of the building for centralized calculation and analysis, consider the characteristics of traditional buildings, and formulate reasonable design opinions, so as to ensure the safety and stability of the project. Because of this, at present, in the construction engineering design, it is essential to apply new technology to optimize the engineering design, thus ensuring the overall quality and improving the accuracy of the architectural design. Designers can rely on the simulated building 3D model, use the virtual way to simulate the design of building drawings, input the building structure data, surrounding environment data and other relevant data into BIM software, and analyze the errors in the design after comparing with the design drawings, so as to effectively guarantee the feasibility and scientificity of the final result of architectural skill design.

4. Analysis of the Current Application of Building Energy Saving Design in China

With the continuous progress of our society and rapid economic development in recent years, people's recognition of building energy saving design has gradually increased. Under the background of the concept of ecological environmental protection deeply rooted in people's hearts, how to continue to play the advantages of building energy saving design and optimize it is very vital. From the technical level, improving the design level relies on modern science and technology. However, on the one hand, it is restricted by the construction cost, on the other hand, the construction enterprises need to obtain higher economic benefits. Therefore, in many stages of building engineering design, the relevant designers still focus on improving the building performance and beautifying the building appearance, while neglect a good job in the exploration of the construction site in combination with the situation of the building itself. In this case, the energy saving effect may not be effectively utilized, or is not perfect. Through the use of BIM Technology to simulate the building related elements and establish models, it may be more convenient to adjust the building design, use the experimental way to verify the effect of energy saving design, and ensure the scientificity. Therefore, both the construction enterprise and the construction engineering designer are required to improve their understanding, reasonably use modern engineering design technology, and constantly improve the level of energy-saving design of construction projects.

5. Optimization Effect of Bim Technology in the Process of Building Energy Saving Design

5.1 Optimization of Bim Technology in Indoor Environment

With the continuous improvement of people's living standards, in the process of building selection, consumers not only pay attention to the overall appearance, surrounding environment and building performance, but also put forward higher requirements for the comfort of indoor environment. Since people live and work more and more in the room, the building must be combined with the characteristics of the surrounding natural climate to ensure good lighting, temperature, humidity and ventilation, so as to provide more comfortable living conditions. Good lighting, temperature and humidity improve the comfort feeling of the human body in the indoor environment. Good ventilation is conducive to the indoor air exchange, ensure that harmful gases or odors are discharged to the outdoor in time, and improve the indoor air quality. All of these factors to a certain extent affect the user experience. At the same time, the indoor environment is with a good insulation effect, which can effectively save energy waste generated by air conditioning, heating and other equipment, and meet the requirements of ecological and environmental protection of buildings. The application of BIM Technology to building energy saving design can simulate the lighting, humidity, temperature, ventilation and other relevant environmental factors in the indoor environment. The designer uses computer technology to analyze the specific information, and optimizes the design scheme based on the data, so as to effectively improve the design efficiency,

reduce the workload of the designer, and prepare in advance for the completion of the project with quality and quantity guaranteed.

5.2 Optimization of Bim Technology in Building Environment Matching

In the design stage of the construction project, it is necessary to fully consider the matching between the building itself and the surrounding environment, improve the effective use of the surrounding natural environment, and to a certain extent, enhance the energy conservation and environmental protection performance of the building itself. The lighting conditions usually determine the interior structure of the building. To ensure good lighting, it is required to design the interior structure well in combination with the lighting characteristics of the building location. Meanwhile, the external design is also inseparable from the surrounding environment. It should be harmonious and unified with the environment. While improving the appearance, it is also necessary to avoid damage to the surrounding environment caused by unreasonable design. By using BIM Technology, it simulates the surrounding environment elements, so that the building energy saving design and the surrounding environment match each other.

5.3 Optimization of Bim Technology in Building Energy Consumption Control

By using BIM Technology to analyze the relevant data of construction engineering, with the help of component library and parametric technology, the speed of data analysis can be effectively improved, and the relevant feedback information can be quickly obtained in the analysis process, so as to realize the overall control of the design work of construction engineering projects. It is also conducive to providing efficient feedback of building cost analysis, quality analysis and other information for designers simultaneously. Combining with such data to optimize the design, it ensures the due economic benefits and the overall high quality of the project. Through the simulation of the energy consumption information used in the whole year, after calculation, we can get other construction projects in the same environment as the reference standard of energy saving design, so as to achieve the reasonable optimization. If we only rely on the manual way to calculate such information, not only the workload is huge, but also the calculation is easy to produce errors. Therefore, BIM Technology has made a great contribution to the improvement of building design energy efficiency.

6. Effective Application of Bim Technology to Building Energy Saving Design

6.1 Site Analysis and Design

To apply BIM Technology to building energy saving design, it requires building engineering designers to conduct on-site investigation on the surrounding environment of the building area, mainly including natural factors such as climate and geological characteristics. After information processing of these factors, they will be input into the analysis software to make corresponding simulation buildings. The integrity of the input information will directly affect the effect of building energy saving design. Therefore, it is a must to comprehensively check the factors affecting the energy conservation of the construction project in combination with the relevant technologies, and provide a reasonable design scheme for the construction project in combination with the architectural design characteristics and the final quality of the building in the same environment, and scientifically check the hidden dangers in the architectural structure design, so as to provide guarantee for the construction safety.

6.2 Architectural Drawing Design

BIM Technology can be used to simulate the building, and form a three-dimensional reference model, and achieve the effective optimization of building energy saving design through environmental simulation. Moreover, by using BIM technology in architectural drawing design, three-dimensional drawings will be produced, so that architectural designers are able to more intuitively observe the drawings, and judge rationally the building structure. The establishment of three-dimensional drawings effectively makes up for the shortcomings of traditional drawings,

makes the data more accurate, and then ensures the scientific and reasonable design of building energy saving. Using BIM Technology to design the building soil is of the advantage of soil visualization. The construction personnel are more capable of defining the construction objectives in combination with drawings and improving the safety of the construction process.

6.3 Lighting Simulation Analysis of Indoor Environment

Daylighting design is an indispensable part of architectural structure design. Good daylighting performance can not only improve the comfort of indoor environment, but also enhance the energy-saving and environmental protection effect of the building itself, which conforms to the concept of building energy saving design. The traditional interior lighting design needs to integrate the relevant environmental information of the building location to determine the sunrise side. However, this design method is so cumbersome that designers have to provide reliable information through a large number of calculations. Through the use of BIM Technology to simulate the lighting conditions of the indoor environment, designers can not only quickly obtain a reasonable design scheme, but also find the optimal scheme of lighting design by carrying out a comparative analysis of the indoor lighting in combination with different seasons.

6.4 Simulation Analysis of Natural Wind in Outdoor Environment of Buildings

Building energy saving design needs to make full use of natural resources. Natural wind, as a natural resource that can be used by all buildings, also needs to be studied in depth in the design stage, so that it can be fully used to improve the building energy saving effect. In contrast, the traditional design method takes less consideration of natural wind. By using BIM Technology to optimize the building energy saving design scheme, the simulation of the outdoor environment can be realized, and the impact of air flow on the indoor and outdoor of the building will be fully considered, so as to improve the layout, and determine the outdoor green area. In this way, the natural wind also contributes to the optimization of the indoor environment of buildings.

6.5 Ventilation Simulation Analysis of Indoor Environment

The indoor ventilation effect of buildings is usually affected by the outdoor climate environment. Improving the indoor ventilation effect by taking advantage of the surrounding environment can effectively save the energy consumption generated by the use of indoor ventilation system, so as to meet the requirements of building energy saving. By using BIM Technology, the ventilation characteristics in the indoor environment is simulated and analyzed. Moreover, the utilization rate of indoor ventilation in natural resources is improved.

7. Conclusion

At present, people's awareness of environmental protection is getting stronger and stronger. Construction projects are required to meet the needs of users through optimized design. However, due to the relatively short time of using energy saving design method to design construction projects in China, the maturity of many technologies still needs to be improved. BIM Technology, as a new way of building energy saving design, needs to be further recognized and effectively applied by the construction industry, so as to ensure the overall quality of the project and improve the effect. Therefore, in order to improve the use efficiency of BIM technology, play the auxiliary role of computer technology in building energy saving design, and then promote the rapid improvement of building energy saving design level in China, it is essential for relevant professionals to combine computer technology, BIM Technology and energy saving design concept to conduct an in-depth research on the application of BIM Technology to building energy saving design and the optimization.

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