Application Analysis of BIM Technology in Green Intelligent Building Design

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Abstract. With the rapid development of science and technology as well as the progress in the social economy, the urban construction has accelerated significantly, and a large number of people have poured into the city, resulting in a certain degree of deterioration of the urban environment. The concept of sustainable development put forward by the Chinese government is to use more environmentally friendly materials during construction. In this way, the material consumption and environmental pollution during construction can be reduced in order to improve the living environment of residents, and promote the efficient use of overall resources. Through the sustainable use of overall resources, it can lay a good foundation for the subsequent development and construction of cities, thereby promoting the parallelism of urban construction and environmental protection. In this case, the application of BIM technology for the design and construction of green and intelligent buildings is of great significance to the field of contemporary architecture.

1. Introduction
Building Information Modelling (BIM) technology stores the actual construction project information in a virtualized model, and realize the virtual construction, construction simulation, operation and maintenance management. It is a kind of visual digital construction. With the advent of the big data era, construction projects have become less dependent on engineers’ accumulated experience data. Two-dimensional drawings to guide construction and traditional paper data storage are gradually replaced. In order to promote the healthy and sustainable development of the construction industry, BIM technology has been gradually applied to all stages of engineering projects, and has achieved remarkable results in various projects.

As we all know, the current domestic construction field, both in terms of building scale and building height, has shown a trend of rapid increase. In this construction process, many advanced measurement technologies and modern information technologies have been widely applied to specific design work. In the design of green intelligent buildings, BIM technology can effectively analyze and study the structure and architectural form of buildings based on the actual conditions of the buildings and model data on multimedia software. Therefore, it can scientifically and intuitively present green intelligent buildings in a comprehensive way. The overall shape and details of the building will ultimately provide large construction data support for the majority of construction companies. In this paper, we exploit the usage of BIM in green intelligent building design. At first, the basic concept of BIM technology is introduced. Afterwards, the concrete applications of BIM in building design are explained and analyzed. Finally, conclusions are drawn.
2. Principles and Characteristics

2.1 Principles
BIM technology is to integrate all the data in the construction project and convert them into the basic data in the mode. Afterwards, the data model is established for different kinds of applications. All the real information of the building is entered into the simulation model. Its principles mainly include: constructing a unified architectural model, making the architectural design more parameterized, data-based and information-based.

2.2 Visibility in the application process
Green intelligent building design staff should make a clear understanding of the visibility characteristics of BIM technology. BIM technology is often used to visualize the construction projects as a whole. Observing the traditional architectural design schemes, ordinary construction companies will develop architectural structure planning on the design drawings. Although the history of construction has developed for a long time with a large number of excellent construction projects, it is undeniable that this simple drawing expression mode is sometimes difficult to clarify the actual construction situation and structural requirements. However, BIM technology can fully solve this problem, because it can visualize the design of green intelligent buildings, and scientifically present the overall structure of the entire building in a three-dimensional space form. At the same time, based on data information, the interaction and feedback achieve a fundamentally visual effect. The visualization of architectural design structure developed by BIM technology is not just for a certain link, but a visualization design throughout the entire design process, which also shows that BIM technology has the obvious characteristics of visualization.

2.3 Structural coordination
In the actual architectural design process of BIM technology, the most prominent feature is structural coordination. The structural coordination is the most important part of the entire green intelligent building design. It can enable the construction unit to develop the actual design process. It should carry out the full coordination and cooperation with the owner to develop the most suitable method for the construction of the project. BIM technology can intuitively develop a coordinated construction of the overall shape of the building, thereby providing more coordinated services for the collision of opinions in various professional fields. At the same time, BIM technology can also make the construction and design opinions perfectly integrated. Finally, it directly and effectively generates scientific coordination data, and select the most optimized design path for the design staff. It is obvious from this aspect that BIM technology not only improves the quality of architectural design, but also enhances the fundamental efficiency of architectural design.

3. Applications of BIM Technology in Green Intelligent Building Design
BIM technology can be applied in all aspects of green intelligent building design. The following is a specific analysis from five aspects.

3.1 Energy saving system design
BIM technology can be used to ensure the performance of the green intelligent building envelope. If the building does not meet the standard requirements during the design period, the corresponding energy consumption calculation needs to be carried out, referring to the energy consumption of the green intelligent building in a certain environment. In the same way, the green intelligent building design can be conducted. The energy consumption in the environment is compared. If the latter is greater than the former, it needs to be adjusted and calculated accordingly. The building party provides drawings such as general floor plans, enclosure structure practices, etc. And the corresponding information is input into the BIM system to obtain enclosure structure parameters, comparing the
national energy-saving standards, and finally determine the thermal performance of green intelligent buildings.

3.2 Building exterior design
Generally, public buildings will use glass curtain walls or mirrored exterior walls, which have high reflectivity. If the overall outdoor design cannot be reasonably designed, it will affect the lighting of surrounding buildings. The outdoor design of green intelligent buildings using BIM technology can improve the building's daylighting rate and reduce light pollution problems. Regarding the sunshine time, simulation calculation, etc., the BIM software conducts daylighting experiments, thus forming a light analysis report. The model is adjusted according to the report to avoid design errors. For the surrounding wind environment of green intelligent buildings, the BIM software can be used to stroke the environment analysis software and obtain the wind environment model. In the same way, the architectural design is also adjusted according to the simulation situation.

3.3 Indoor environment analysis application
The indoor environment of public buildings is composed of light, wind, and sound. The establishment of a BIM model can accurately analyze these environments. The model established by BIM performs data analysis on the environment, where the building is located. It can truly reflect the indoor environment's ventilation, lighting, air quality, and the distribution of pollutants. Designers can make reasonable adjustments to the construction project based on these conditions and improve, provide the best indoor lighting and ventilation conditions. In addition, it is necessary to analyze the sound conditions of the indoor environment in order to analyze the noise of the building. BIM technology can be used to predict the noise value in advance. If the noise exceeds the standard, it is necessary to carry out the corresponding noise reduction treatment. Certain treatment measures should be formulated to provide a low noisy indoor environment thus improving the applicability of the indoor environment of public buildings. BIM technology can be used to provide users with a good environment. Therefore, it can promote a more rational public building structure and further development of green intelligent building design, using a variety of energy-saving technologies.

3.4 Operation and maintenance
How to achieve sustainable development of public buildings in the operation stage is also a focus of green building design. The evaluation criteria for green intelligent buildings include the green building design, energy consumption, cost of buildings, solid waste management, and property management. BIM technology can make preliminary predictions and adjustments of green intelligent buildings before the building is put into use. Meanwhile, BIM can also formulate corresponding maintenance measures and scientific maintenance plans for public buildings, thereby further improving the operational sustainability of the buildings and reducing building performance consumption. So, the maintenance and operating costs can be reduced. With the intelligent operation and maintenance function in BIM technology, alarm and emergencies such as fires can be can quickly prevented to realize effective management of public buildings. BIM technology can also provide a green and comprehensive building evaluation system for public intelligent buildings, and use the Internet to combine BIM with public buildings in order to monitor the health of public buildings and facilitate the management of designers.

3.5 Overall management of buildings and environment
Since the development of BIM technology, it has already possessed a relatively complete natural environment control technology. Therefore, when applied in the corresponding building environment, it can be used without being restricted by a variety of building environments and equipment. Hence, it provides a theoretical basis for the specific construction of subsequent buildings. When designing the function of green intelligent buildings, BIM technology can analyze the three-dimensional model of the building, and obtain data from various aspects such as building lighting, wall insulation, and glass
wall fiber refraction. At the same time, the application of BIM technology can intelligently analyze the conditions of use in green buildings, ensuring that multiple data can be calculated and analyzed at the same time when designing the internal details of the building. Such functions can ensure that various departments and jobs throughout the construction process have good communication and exchanges. The professional level of green public building design is improved to satisfy the publicity of the function of the green public system.

4. Conclusion
Through the detailed analysis, we can see that in the process of green intelligent building design, the scientific and effective application of BIM technology can improve the final quality of architectural design. Therefore, the majority of architectural design companies should pay absolute attention to BIM technology. The reason why BIM technology can be used so widely is mainly that it has many advantages. These features not only ensure the stability of architectural design, but also improve the efficiency of architectural design. We believe that with the continuous development in the future, BIM technology will present a more complete state in the application process of green public building design.

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