Preliminary Study on the Application of BIM Technology in Computer-Aided Architectural Design

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Abstract: Building information model technology (BIM technology) is commonly used in computer technology in the construction industry. In architecture, BIM technology can be used to build 3D three-dimensional models in computer-aided architectural design, which can run through the early, middle, and later stages of construction. It is beneficial to improving building effects and improving work efficiency. BIM technology is an important link connecting computer functions and architectural design functions. How to apply BIM technology in computer-aided architectural design is a question worthy of discussion. This paper explores the current state of BIM technology and its application in computational architectural design to provide reference for further application of BIM technology in computer-aided architectural design.

With the improvement of Internet information technology and the universal application of computers, various industries have designed and introduced targeted computer technologies according to industry needs to give full play to the functions of computer. BIM technology is an emerging technology created by the combination of computer and construction industries. With the continuous improvement of BIM technology and its application in the construction industry, BIM technology has received widespread attention, which has further promoted the research and development of BIM technology, and further improved the application effect of computer-aided building design.

1. The Characteristics and Application Advantages of BIM Technology

1.1. The Meaning and Characteristics of BIM Technology

BIM technology is the abbreviation of Building Information Modeling, which is simply translated into Chinese as building, information, and model. Literally, BIM technology is born for the construction industry and plays an important role in the construction industry, but its functions are not limited to the literal function of building information and models. BIM Technology is an organic combination of the relevant internal and information models of the construction industry through computer information technology, which can display the architectural design model through 3D digital information technology. BIM technology has the characteristics of visibility, simulation, optimization, and coordination, and can be refined to the specific details. The model designed through BIM technology can be closer to real data and meet actual needs.

1.2. Application Advantages of BIM Technology

BIM technology has a wide coverage, rich content, and a large scope. It is suitable for application in the construction industry. With the technology of building model and computer information technology, the building design is more reasonable, efficient and comprehensive. BIM technology provides technical support for computer-aided architectural design, provides a communication platform for the construction team, makes the design closer to the needs, and also meets the communication needs as a whole and improves the work efficiency. In addition, BIM technology can collect and process relevant information about the building design process, analyze and apply it, which can strengthen the design effect. With the assistance of BIM, the building-related information can be updated in time. During the building information model

construction process, the change of one information will be related to the display effect of other information. And with the support of BIM technology, the information can be displayed faster, which is conducive to timely adjustment of relevant information and the significant effect of computer-aided architectural design and to improving the design efficiency.

2. Application of BIM Technology in Computer-Aided Architectural Design

2.1. Application in the Design of Virtual Building Model

In modern society, architectural design with computer is the development trend of the information age, and also one of the directions of computer function application. However, the content of architectural design industry is various, and the requirements are relatively fine. The ordinary computer design function is difficult to meet the needs of modern architectural design. BIM is an important technology of computer-aided architectural design. It provides multi-dimensional and multi-perspective design content for architectural design through the construction of architectural models, which brings a huge visual impact to architectural design. And under BIM technology, it can also be filled with the colors of architectural design, with 3D and 5D effects to make the architectural design model more realistic. Compared with the traditional two-dimensional plane architectural design drawing, the virtual building model under BIM Technology is closer to the real effect, which makes people intuitively evaluate the effect of architectural design, and makes up for the deficiency of traditional design drawing. In addition, the virtual building model under the BIM Technology can directly observe the later effect of the building, and is conducive to the adjustment of the expected deviation.

2.2. Application in the Process of Visual Design

In the process of architectural design, with the help of BIM Technology, the ideas of the design team can be fully displayed, and the design process can be transformed into a visual process. Through multi-dimensional display of various details of architectural design, the ideas of the design team can be expected to better show the design highlights to the audience, which is conducive to the optimization of the design process. Architectural design will involve more contents on the overall structure of the building, material selection, construction process and final expected effect of the building. In order to achieve the expected effect and to coordinate with each other in the construction process of various types of work, many problems need to be considered in the architectural design process, and the possible problems and corresponding countermeasures should be taken into account in the whole design process. And a clear design process is needed to facilitate the construction team to carry out construction and control each link to ensure the quality. In BIM technology, the materials, overall, and internal conditions of the architectural design can be refined, clarified, and transparent, which is conducive to the development of material selection and internal construction in the construction process. When adjusting the overall structural materials of architectural design, it can be more targeted adjustment and is easier to get the ideal effect in the process.

2.3. Application in Efficient Data Analysis

In the process of architectural design, the feasibility of the design scheme should be evaluated, and the data and other parameters of the scheme should be adjusted to find the optimal design scheme. In BIM Technology, the functions of computer can be used to collect and analyze the information and data involved in the design scheme. After collecting the surrounding environment of the building and the situation in the construction process, the collected information can be analyzed pertinently. The data can be processed efficiently to provide accurate and powerful data support for the scheme implementation and improve the feasibility of the design scheme. Construction engineering is a large project, involving all aspects. From the beginning of architectural design, it will affect the development of later projects, and even affect the service life, personal safety and property safety of buildings in serious cases. The application of BIM

technology in the computer-aided architectural design can reduce the error caused by manual measurement and calculation, and can evaluate the data with the use of more scientific, effective and efficient calculation methods, so as to make the data and information more accurate and improve the rationality of the architectural design scheme and the scientificity in the implementation process of the engineering construction. In addition, it improves the operability of building construction, ensures the quality of the architectural design scheme and the quality of the building, and improves the service life of the building.

2.4. Application in Automatic Generation of Design Document Drawings

In traditional architectural design, blueprint, mainly drawn manually, is important materials for architectural design. It takes a long time and are cumbersome. It also takes a lot of time and workload to modify the process, which leads to low efficiency and heavy workload of architectural design to a certain extent. The application of BIM technology in computer-aided architectural design can give full play to the intelligent, automated, and convenient functions of computers. The architecture can be designed in the computer through BIM technology, the construction of building model, the modification of architectural design drawings and the building model can be complemented online, which improves the work efficiency and reduces the workload. When the design model is finally determined, document drawings can be automatically generated according to the set model, and relevant information and data in the design model can be attached to the document to make the drawings more accurate and meet the needs of the building. In the process of automatic generation of the document drawings, the waste rate of drawings and the workload of drawing modification are reduced, and the drawing design is more efficient and convenient.

2.5. Application in Feasibility Verification of the Design Scheme

In BIM technology, the actual situation of the architectural design can be displayed in three dimensions, and the effect of the architectural design can also be verified, so that the relevant personnel such as the architect, the head of the household, the owner can intuitively see the effect of the architectural design, and can also intuitively see the advantages and disadvantages of the design scheme and the spatial characteristics of the interior of the building in the process of simulating the building. In traditional architectural design schemes, there is often only one drawing. The owner are not professional, and it is difficult for them to understand whether the building meets their needs according only to the drawings. But for the content is not limited, it may be difficult to realize in the construction process. It is difficult to achieve the ideal effect of architectural design. Different construction plans can be formulated for different structures, different construction projects, and different construction project requirements in the architectural design. The construction plan in the design can be verified with the help of BIM technology to clarify the parameters of the relevant equipment and materials to achieve the desired effect of the architectural design, and further ensure the quality and longevity of the building.

2.6. Application in Green Design

As the concept of environmental protection has taken root in the hearts of the people, people are paying more and more attention to the "greenness" of the construction industry. They advocate to reduce resource consumption and implement green and sustainable design concepts. In the architectural design process, computer functions can be used to control the use of human resources, materials, equipment and other resources in the entire design through BIM technology, and the resources in the entire construction process can be allocated through computer function analysis, so that all links can get the most appropriate design project under the most reasonable resource loss and resource allocation. It is difficult to achieve the expected results for the deployment of construction process resources only by relying on the traditional manual mode. In BIM technology, the information in the construction process and the efficient operation of the computer can be fully utilized to increase the resource allocation rate and efficiency, so that the resources such as materials, manpower, and equipment in the building construction process are fully utilized. It is helpful for reducing the loss of construction resources and construction costs and guaranteeing the

ideal effects of the building and the needs of users.

3. Conclusion

With the development of Internet information technology, BIM technology plays an indispensable role in computer-aided architectural design. With the deepening research of BIM technology and its rich application experience, its role has been fully played. It can be applied to virtual building model design, visual architectural process design, efficient data information analysis, automatic generation of documents and drawings in architectural design, as well as the verification of design scheme and realization of green design. It provides strong support for efficient and high-quality architectural design, and also provides strong guarantee for the improvement of building quality and building life.

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