Application of BIM in Computer Aided Design

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Abstract. The construction industry is large, diverse, involving a wide range of people, large amount of money, progress in any link means to bring higher efficiency, greater savings and more security. Based on the current situation of BIM technology in computer aided design, the paper analyzes its application prospect and technical advantages in current application.

Keywords: BIM, Computer-aided Design, Application

1. Introduction

With the rapid development of science and technology, with the arrival of the information age, the rapid development of digital information technology has brought earth-shaking changes to people's lives. Information technology affects every field of people's production and life, which has changed all aspects of society. In the construction industry, the application of computer technology is still at a low level. The computer is the main drawing tool of architectural design. In CAAD field, the two-dimensional drawing tools, such as CAD, are most commonly used. The two-dimensional drawing software did play an important role in the field of architectural design before, replacing the complicated manual drawing and greatly improving the efficiency of the work. However, with the continuous development of information technology and the gradual development of engineering construction projects into larger and more complex engineering projects, the comprehensive performance requirements of engineering projects are becoming higher and higher. CAD and other two-dimensional graphic design software had been difficult to meet the requirements of the field of architectural design. Therefore, the current architectural design puts forward higher requirements for drawing software [1]. Many designers have also felt that the application of 2D CAAD has been unable to catch up with the trend of the times, so there is more understanding of the CAAD system of 3D, and more and more applications of 3D to architectural design [2]. Under the current architectural environment, the application of three D of CAAD for architectural design has become a technical trend to cope with the current rapidly changing architectural form, and BIM based architectural design has become the most advanced computer-aided architectural design technology.

2. Application prospect of BIM computer-aided architecture design

2.1. Architectural design

High-speed development of construction and computer technology meet in time and space, the two use
each other, and after continuous improvement and improvement of the integration of BIM technology. At present, in the field of construction industry, there are many computer-aided software, many of which only play a role in one or several links of the whole life cycle of the building, and BIM technology is very different from these software, it can play a very important role in the whole life cycle of the building, and it is widely used in architectural design optimization, construction technology improvement, project management and later construction use [3]. During the period of architectural design, the BIM technology can present the design effect at any time, so that the designer can control and modify the shape, structure, beauty and utility of the building at any time, and can realize many kinds of design attempts at very low cost. The design of such a building, whether in quality, appearance, or in the structure of reasonable, risk factor control, can be optimized, and the cost is very low, construction parties can fully communicate, and finally achieve the results that everyone is satisfied. Figure 1 is a schematic diagram of the BIM based collaborative design workflow.

![Figure 1. Schematic diagram of BIM collaborative design workflow.](image)

2.2. Optimize drawing documentation
BIM technology is disruptive to traditional work models, and this innovation is unexpected. After the application of BIM technology, the identity and tasks of architectural designers, including workload, have undergone subtle changes. First of all, the architect no longer needs to verify and modify the drawings back and forth, but refers to the architectural conception and design in the virtual environment, only needs to modify and perfect the virtual model of the computer interface [4]. Furthermore, by using BIM technology, designers can easily view the graphics and angles of view of each aspect of the building, greatly saving design time, improving design efficiency and design quality. After the building model is determined, the computer automatically generates and saves all kinds of drawings and documents which related to the building and calculates the relevant construction data such as working hours and consumption of money, which is more accurate, convenient and comprehensive than the traditional drawings [5].

3. A unique advantage of BIM - based computer aided design in architectural design

3.1. The design of virtual architecture is realized
In the past, architects designed on graphic drawings, and they could only use their imagination to express the space they conceived on paper. After the sketch is built, even if the designer finds that there
is a big difference with the design he imagined, there is not enough time for them to modify, so it will lead to inconsistent effect drawings and surface drawings. Such a design approach has become an important factor affecting building quality \[6\]. At present, BIM technology can lie in the architect in the virtual building model for space design, at any time can see the effect of architectural design, throughout the design phase of the architect-centered. By using BIM technology, architects can observe the scene of the design, the effect of space and the effect of the internal structure of the building from various angles, make a practical experience of the design effect, and seek the detail space that still needs to be improved. BIM technology can not only realize the virtualization of architectural design, but also put architectural design in a specific site environment, so that architects can more comprehensively consider the impact of the surrounding environment on architectural design, so that the architectural style can be better integrated with the environment, and achieve the harmony and unity of architecture and environment. At the same time, BIM technology can make architects strengthen the thinking of space factors while designing, ensure the correctness of the design direction, and make all-round thinking about the appropriateness of design materials and the harmony of design color, as well as the fusion of space and environment. This way of designing in the virtualized space liberates the architect from the traditional drawing design, fully releases the architect's imagination and creativity, and improves the level of architectural design. Figure 2 presents the visual advantages of virtualization for BIM computer-aided design buildings.

![Figure 2. Comparison of (a) and (b) presents an intuitive advantage BIM computer-aided design](image)

3.2. Automatic generation of drawing documents

In traditional drawing design, each drawing is a separate small document. According to the design flow, the plane structure should be drawn first, then the opposite structure and the section structure should be drawn, and after the completion of these two steps, the drawings need to be modified according to the actual situation. Therefore, the revision of drawings has become the main content of the architect's work, wasting a lot of time and energy on the revision of drawings, rather than innovative design. BIM technology allows all drawings to be automatically generated from the model, so the drawings are no longer the center of gravity of the design, but an accompanying product form. Each drawing generated from the model is the embodiment of the data in different angles. So that the architect can view the plan,
elevation, section, three-dimensional and large samples at any time according to their needs. In addition to automatically generating drawings, the technology can also automatically generate data for material statistics, area calculation and cost calculation. In essence, the drawings obtained from a single model according to the actual needs of the architect are all the same data, but the expression is different, the report is the summary and collation of this information.

3.3. Automatic management
BIM technology frees architects from trivial and complex revision drawings, improves work efficiency and saves design time, because BIM technology can automatically generate the required drawings according to the design model, and can also automatically generate all modification processes into all documents that can reflect the whole project. Since all the data is from the same database, no matter which process of view modification will be reflected in the database, the data of other views will be automatically updated with it, and the real-time modification and real-time update of the drawings are realized. Formal because BIM technology can achieve automatic document management, so that architects save time to modify drawings, focus on the implementation of design, promote design innovation.

3.4. Ability to conduct advanced analysis
Conventional hand-drawn drawings can never achieve intelligent analysis and simulation, but the application of BIM technology can achieve the functional analysis of drawings. The virtual building model can complete the analysis of structure, performance, energy and so on. It can also realize the inspection of fire safety, pipeline conflict and quality specification, and let the complex analysis and simulation work be done by computer, which can not only improve the efficiency of the work, but also guarantee the accuracy of the analysis data and realize the real significance of computer aided design.

4. Conclusion
The development of the construction industry has entered a new stage, and the weight of the traditional competitiveness is getting lower and lower under the new competitive situation. Reducing costs and improving quality are still important means for construction companies to continue to profit and attract customers. The importance of architectural design effect is gradually recognized. Because of the improvement of architectural technology, the space of architectural design has been greatly expanded, and BIM has a promising space. Through the analysis of the application of BIM technology in computer-aided architectural design, this paper hopes that through the writing of this paper, people can better understand the current situation of the use of BIM technology, more use of BIM technology for architectural design services, but also hope to make it popularized, which will help our design industry to go further.

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