

## Research on Civil Building Design Based on BIM Technology

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### 0 Introduction

With the advent of the information age, information on people's lives, work, learning and so have a profound impact, and the future development of the construction industry will inevitably be affected by social information, information technology has become an important way for the future development of the construction industry. Based on this, BIM technology with the social information came into being. BIM technology will be the architectural design from the two-dimensional CAD drawing design to integrate all the architectural information of the simulation of architectural design, runs through the entire construction industry, which is effectively improving the building efficiency.

### 1 BIM Technical Overview

The so-called BIM technology is an advanced CAD technology based on architectural design, a digital description of the building, and integrates all the building information in a virtual model, which is a major change in the development of the construction industry.

With regard to the design of civil buildings, the virtual model based on BIM technology integrates all the building information or building components, such as material properties, physical characteristics, etc., as shown in Figure 1, in addition to the architectural design, Analysis, equipment management, structural design, the entire life cycle of the building are playing an important role.

In fact, CAD is not a new concept, the digital description of the building has always been an ideal state, but has never been commercialized and with the popularity of personal computers, BIM-based application system was developed. BIM technology based on the drawing software to break the limitations of low-level drawing tools, the operation of the object from the original point, line and other plane geometry into doors, windows, walls and other three-dimensional building components, the computer is no longer for some unrelated points. The line to modify, but for some of the building components by the overall structure of the operation, as shown in Figure 2 below.

With the development of economy and technological progress, the civil building design system based on BIM technology can build simulation modeling building model of all building information such as the nature of materials and physical characteristics, which not only integrates all the building information, but also can be used in construction cost analysis, structural design, equipment management and the entire life cycle of the building plays a management role. In this paper, based on the overview of BIM technology, this paper analyzes the application advantages of BIM technology in civil architecture design, and then studies the concrete application and related enlightenment of BIM technology in civil architecture design, so as to provide a reference for practical application of BIM technology. itional drawing

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**Key words:** BIM technology; civil architecture design; overview; specific application

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tools and BIM software design objects

In recent years, some of the world's leading CAD software developers have launched and continue to improve their BIM software. Although its call to BIM technology is not exactly

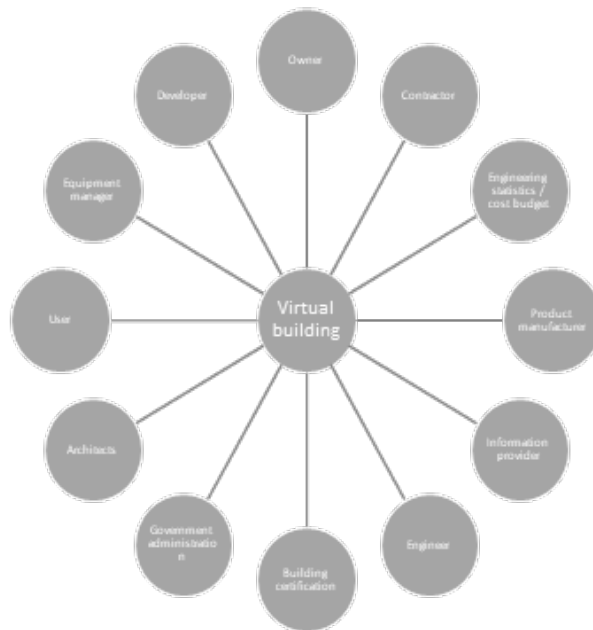


Figure 1 Information sharing of virtual building models based on BIM technology

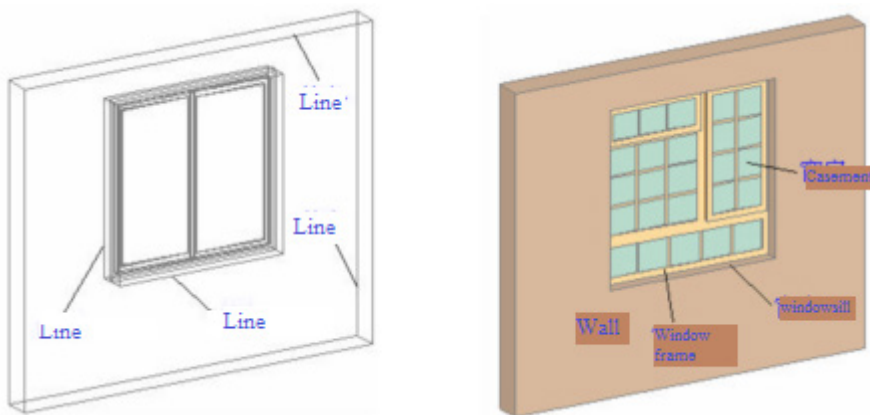


Figure 2 Comparison of traditional drawing tools and BIM software design objects

the same, the architectural features of BIM software can be roughly summarized as follows:

- ① Consists of parameter definitions, dynamic parallel construction components;
- ② Real-time 2D, 3D, virtual model display and adjustment;

③ Fully integrated non-graphical data reporting form.

**2. Advantages of BIM Technology in Civil Building Design**

For the traditional two-dimensional CAD drawing work, engineering designers in the drawing drawings, production charts and other waste

of more time, often overlooked the importance of the design link, and other designers, builders, customers and other communication difficulties.

In this regard, the BIM-based civil architectural design will be designed from the cumbersome drawing

work out, as long as the building of the simulation model, you can in each design part of the automatic generation of the relevant building documents, architectural drawings, building charts. At the same time, the construction of the three-dimensional building model also enables engineering designers to freely communicate with others. In general, the biggest advantage of BIM-based analog building design in addition to the efficient use of computer intelligence to ensure the quality of architectural design, but also improve the accuracy of the drawings to avoid rework, a large extent to improve the architectural design efficiency. The Figure 3 shows a two-dimensional CAD drawing design and BIM-based simulation of the architectural design of the comparative analysis of the diagram, you can find two-dimensional CAD drawing design in the drawing part of the need to spend more time, and for professional design time. But still based on BIM technology simulation building design by modeling the way the building in the design to spend more time, some drawings, charts are automatically generated. Thus, for the same civil building design, based on BIM simulation of architectural design cost and design quality is much better than two-dimensional CAD drawing design.

All in all, the advantages of BIM-

based analog building design are generally reflected in the following:

- ① Building simulation design;
- ② Automatically generate drawings, charts, etc.;
- ③ Real-time dynamic update design information;
- ④ Advanced analytical ability.

### 3 BIM technology in the civil construction design of the specific application

#### 3.1 Simulation and comparison optimization

The application of BIM technology in civil building design is based on the BIM model to integrate the material properties, design features and physical characteristics of civil buildings. The simulation, calculation and calculation of light, noise, ventilation, water supply and energy consumption of civil buildings are carried out. Analysis, so as to provide designers with optimized design data analysis results. Such as the combination of cooling and heating needs to choose energy-saving construction equipment, combined with local climate and statistical data to assess the building's carbon emissions.

#### 3.2 Data sources unified and infor-

mation dynamic association

BIM technology will be building engineering information into a unified database, the design content is stored in a dynamically associated model file, that is, architectural design information database. Whether it is a three-dimensional model, plane drawings or statistical data, are simulation model dynamically generated and dynamic correlation with each other to achieve real-time dynamic update. In fact, a construction period of the various stages of the building model information is the same, do not need to repeat the input, by the relevant designers in accordance with the purpose of supplement, fundamentally solve the problem of information is not uniform.

#### 3.3 Standard unified and improve architectural design efficiency

The so-called design standards are unified, is the design criteria, design methods, etc. into the BIM model template database, the design professionals can query and update the design information, thus achieving the design of unity. BIM model database after a long update to supplement, the formation of the size, style and other design templates, in terms of long-term development, a large extent to enhance the efficiency of the design staff.

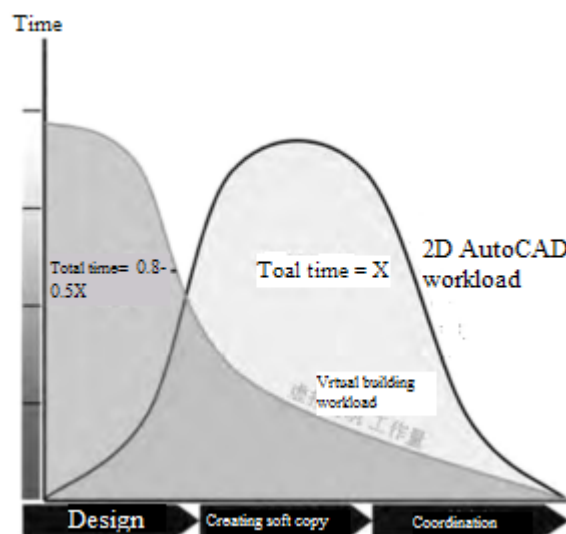


Figure 3 Comparison of CAD design and BIM model design workload

### 3.4 Professional design visualization and synergy

In fact, BIM technology provides the basic support for professional design visualization and collaboration. Such as the establishment of professional BIM design team, set up by the construction of professional core documents, the design professionals with the relevant software in the core file on the basis of the local file, in its local file design work. In addition, BIM technology based on the building, architecture, equipment, as one of the three-dimensional building model to achieve the professional information visualization, sharing, without relying on human intervention, and truly achieve the design of the synergy.

### 3.5 To strengthen the quality of architectural design and reduce rework

On the architectural design of the professional collision problem, the traditional detection method is the engineering designer will overlap the plane, combined with the profile to detect the collision. However, BIM-based detection method is to use the computer real-time detection of collision problems, improve the accuracy. In general, after the completion of the BIM model, AVISWORKS software will be used to detect the collision problem between the various professions, and to improve the design according to the data analysis results, thus effectively solve the collision problem.

### 3.6 Combined with customer needs and building simulation

Under normal circumstances, the architects in the design phase to ask the specific needs of customers, so as to constantly adjust the design of the design, select the appropriate model to fully demonstrate the results of the building, so that customers can understand the effect of the completion of the building. Although BIM technology in the use of civil architecture design has some advantages, but its hardware and software standards are higher.

## 4 BIM technology used in civil building design related inspiration

### 4.1 Selection of implementation mode

At present, China's application of BIM technology enterprises, the implementation of the model generally include two: First, the design team and BIM team parallel mode, that is, professional design team has not changed, and set up a BIM team to build BIM building model; Second, the design and BIM integration model, that is, designers to build their own BIM building model. The first model has the advantage of being easy to promote, low risk, good quality, the disadvantage is the additional cost of personnel; The second model is to give priority to maximize the advantages of BIM technology, and to ensure that the design efficiency, the lack of quality requirements for the design staff is higher.

For the general civilian construction enterprise BIM technology application, to combine the difficulty of design, designer quality and engineering risk and other factors, in the initial stage of the building can take parallel mode, that is, another independent BIM team. With the BIM technology application mature, can be gradually transitioned to integrated mode.

### 4.2 Experience through pilot accumulation

Compared with the two-dimensional CAD design, the design and design flow of the virtual model based on BIM technology has greatly changed. Therefore, it is not necessary to apply BIM technology in the early stage, but to accumulate experience in the pilot project Promotion. For the pilot project selection, it is best to have completed or basically completed the construction project, there will be no risk of delay in construction period, but also cover the professional, to ensure that all types of engineering staff can participate in BIM design, and to dig out BIM technical application of the person in charge, to lay the foundation for the subsequent promotion.

In the application of BIM technology in the pilot project, it is necessary to summarize the common problems in the application process of BIM technology, establish the preliminary construction, management and application standard system, and provide effective opinion analysis for the further promotion of BIM technology.

### 4.3 To build an effective safeguards mechanism

At present, the domestic AEC industry production process management is based on two-dimensional drawings to start. With the extensive application of BIM technology, to ensure the effectiveness of the 3D design, construction and three-dimensional design archiving issues need to be resolved, and to build an effective protection mechanism.

## 5 Conclusion

All in all, the BIM-based analog building model integrates all the information about the entire lifecycle of the building, such as material properties, physical characteristics, etc., and simply importing the model into the analysis software, as compared to traditional 2D CAD mapping related analysis report. At the same time the engineering design staff from the cumbersome drawings of the liberation of the work, more in the design process to spend energy and time, thereby enhancing the construction efficiency and enhance the quality of construction. In addition, BIM technology will bring a wide range of business needs, standard system, industry linkage and a series of changes, the construction industry needs mutual coordination and supervision.

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