

Research on Management of Special Construction Scheme Based on BIM Technology

Zheng Li, Yudong Han *

University of Science and Technology Liaoning, Anshan, Liaoning, 114000, China

**Corresponding Author*

Keywords: BIM technology, Special construction scheme, Management research

Abstract: At present, the mushroom growth of social economy and technology has provided a good development opportunity for the construction industry. The construction industry has also made rapid progress, and the construction scale of construction projects is also continuously expanding. With the mushroom growth of China's social economy and technology, people's living standards and quality of life are also continuously improving. Architecture has a close relationship with people's real life. In the new era and social situation, people's requirements for building quality are also increasingly high. In recent years, with the mushroom growth of information technology, BIM technology has emerged as the times require, and has been widely valued and applied in the construction industry. It can not only improve the effectiveness of project management, but also improve the current situation of management work, with certain application value. The application of BIM technology in construction management (CM) can not only optimize the construction process, but also strengthen construction supervision, providing strong support for the improvement of construction quality and efficiency. BIM technology can provide intuitive and accurate data information for CM personnel, not only improving the efficiency and quality of CM, but also promoting the modernization and intelligence of China's CM. This article describes the characteristics of BIM technology and its application in CM.

1. Introduction

In the modern society of the 21st century, China's construction industry has also achieved mushroom growth. However, compared to other industries, there are still some unsatisfactory aspects in CM, such as extensive management methods and low level of informatization, which to some extent also affect the level of CM and the favorable growth of China's construction industry[1]. In the process of CM of construction projects, enterprises should attach importance to the application of BIM technology, strengthen the control of progress, quality, safety, and cost of engineering projects, implement relevant management work in all aspects of engineering project construction, continuously improve the effectiveness and level of CM, and promote the good construction and growth of construction projects[2].

With the mushroom growth of the economy, the construction scale of buildings is gradually expanding, and the building volume is gradually increasing. The structure, function, and construction process of buildings are becoming increasingly complex, and management and

technical issues are also increasing. If construction enterprises want to exert their influence in modern economic society, they must constantly innovate. During the construction process, construction enterprises should actively apply advanced technology to improve the quality of Chinese residential buildings and create more economic benefits. Due to the lack of information and visualization capabilities in traditional construction drawings, it is difficult to assist construction and technical personnel in achieving effective communication during the construction process[3]. The emergence of BIM technology has brought inspiration to building CM, enabling all parties involved in the construction to collaborate on design and refined management on a multidimensional information model, and solving the problem of information sharing in the development process of prefabricated buildings. BIM technology is an emerging technology that can simulate real construction environments and situations, providing effective reference data for designers. BIM technology provides refined management in the design, inspection, construction schedule control, resource allocation, and other aspects of prefabricated buildings, creating a more standardized and transparent industry environment[4]. Applying BIM technology to construction projects can solve problems that are difficult to solve by traditional construction techniques and various pipeline collision problems that are difficult to detect, thereby promoting the improvement of CM level.

The application of BIM technology in CM has not only improved the efficiency and quality of CM, but also promoted the modernization of CM in construction projects, which providing scientific and advanced methods and means for innovation in CM[5]. With the growth of globalized economy and cultural integration, the era of globalization has also arrived. If China's construction industry wants to occupy a place in the international market and achieve sound development, it must advance with the times and carry out self transformation, actively integrate and apply advanced technology in CM, so that it can be in line with international standards. As a new technology, the application of BIM technology in CM can better achieve standardization, standardization, and refinement of CM, and can greatly enhance the market competitiveness of construction enterprises.

2. Characteristics of BIM Technology

2.1 Visualization and Coordination

BIM technology has significant visualization features, which can use 3D graphics to present objects in a 3D manner, molding dynamic object images, and further enabling people to understand objects more clearly and intuitively from drawings, making the existence of objects more realistic. The visualization characteristics of BIM technology can greatly reduce the difficulty coefficient of drawing reading. During the construction process of construction projects, the application of BIM technology can clearly and intuitively display the construction drawings, and at the same time, it can also produce reports of data from various construction stages, facilitating management personnel to understand the construction progress and construction situation[6]. The image visualization features of BIM technology can achieve complete visual 3D spatial design, and to a certain extent, it can not only effectively reduce the difficulty coefficient of drawing reading in architectural design, but also greatly reduce the difficulty of drawing reading in architectural construction, thereby providing good conditions for drawing display in various stages of architectural construction, and also providing important support for the generation of various reports in various stages of architectural construction.

The introduction of BIM technology into CM can establish a 3D building information model that is compatible with the actual situation of the project and can simultaneously be compatible with different professional “types of work” and different departments for joint data and information

processing (as shown in Figure 1). From this model, staff can master various aspects of the actual project construction process. For construction personnel and subcontractors in various disciplines, BIM technology can enhance their communication and exchange, providing favorable conditions for the efficient and orderly construction of construction projects. Building design units, construction units, and owners can also achieve closer communication and contact through the information model platform. Especially in the architectural design stage, the information model platform built by BIM technology can better promote good interaction between each department involved in the design, strengthen communication and communication between departments, and conduct good coordination on existing and emerging issues, thereby making it more professional. Accurate data and information are applied to various designs such as drawing design[7].



Fig.1 3D Building Information Model

2.2 Simulation and Optimization

The application of BIM technology in building CM can achieve early simulation of possible situations, whether it is the digital simulation of building construction or the simulation of various processes of the overall construction of a building project. Applying BIM technology in CM of construction projects can identify existing problems before construction, and then take effective measures to solve them. At the same time, BIM technology can help staff become familiar with the project construction process in advance, thereby ensuring high quality and promoting project construction. The simulation of BIM technology involves various key points and stages of the project. Not only can the stages of architectural design, construction, operation, and maintenance be simulated, but also the cost and control management during the construction process can be simulated in advance through the application of BIM technology. Even the energy-saving control and energy consumption in architectural design can be analyzed during the operation stage, such as structural damage. Disaster damage can be analyzed and predicted through the reasonable application of BIM technology to the safety and durability of building structures[8].

The optimization of BIM technology can be better demonstrated through both project construction scheme optimization and project design optimization, which not only avoids errors, omissions, and collisions in traditional design models, but also promotes the optimization and improvement of design quality. In the process of project scheme optimization, while fully considering the project design, the return cannot be ignored, and the continuous optimization of the

scheme should be realized to the greatest extent.

3. Application of BIM Technology in Cm

3.1 Application of BIM Technology in Construction Safety Management

Safety is more important than anything else. During construction, it is necessary to establish a safety concept to avoid or reduce the occurrence of safety accidents as much as possible. However, in the construction process of many construction projects in China, safety accidents still occur from time to time, and the incidence of safety accidents is still high, which not only brings economic losses and even casualties, but also seriously affects the construction progress of the project. During the construction process, according to the traditional construction safety management mode, the effectiveness of identifying potential safety hazards in construction projects is not good.

Troubleshooting potential safety hazards through relevant responsible persons is a common management method in past safety management work. Although this safety management method can also play a certain preventive role, to some extent, due to the limitations of staff's sense of responsibility and work ability, the results are often unsatisfactory[9]. After the application of BIM technology, it can effectively solve key issues in construction safety, thereby achieving the safety management objectives of construction projects, and improving the safety control effect. At the same time, 3D space technology can be used to determine personnel positioning, real-time monitoring of project construction, and timely detection and handling of safety hazards. During the construction of the building, a 3D visual simulation of the construction site was conducted, and a protective structure was set on the building surface, as shown in Figure 2.

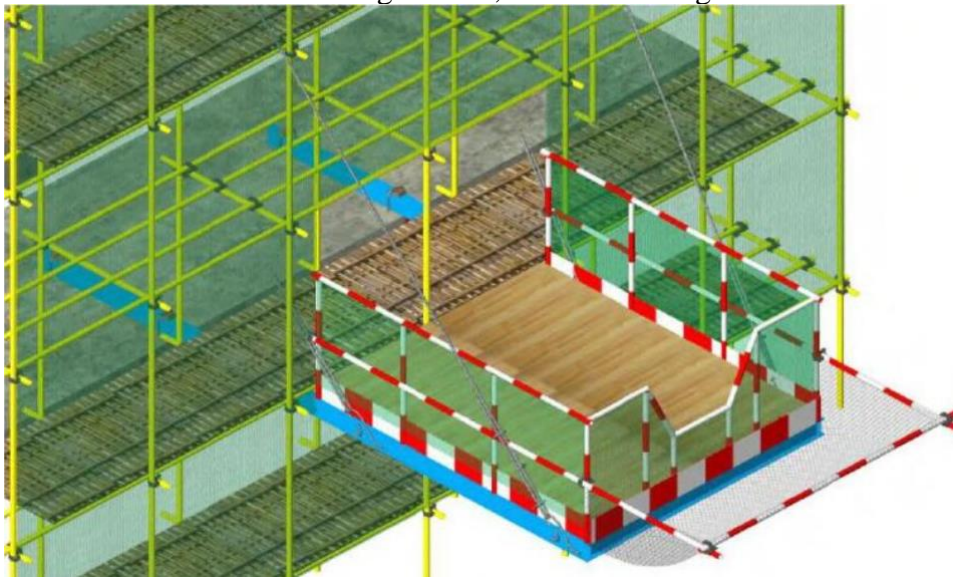


Fig.2 Protection Management during Construction

3.2 Application of BIM Technology in Construction Quality Management

Construction quality is an important guarantee of whether a building project can play a functional role after it is put into use, not just whether a simple building project can smoothly pass the acceptance check. Construction quality is also a key content in building CM. Applying BIM technology in the construction quality management process can build a dynamic3D model, monitor all situations on the construction site in real time, discover factors affecting the construction quality in a timely manner, and take effective measures to handle them.

Based on the importance and complexity of project quality, actively introduce advanced technology to promote innovation in management methods, thereby providing important guarantees for ensuring and improving project quality. As a new technology, the introduction and application of BIM technology in construction quality management can enable managers to have a clear understanding and comprehensive control of the situation on the construction site[10]. Input the construction data and information of the project into the 3D model, simulate the environment and construction situation of the on-site project, accurately analyze various quality influencing factors, and propose standard specifications for the quality of construction materials, mechanical equipment, and personnel construction quality, so that all departments on the site can effectively complete tasks in accordance with the standards and specifications, and prevent quality problems of the project. The application of BIM technology can build 3D visual models to provide technical support for construction projects.

4. Conclusions

The growth of globalization and the proposal and implementation of China's "the Belt and Road" strategy have provided new development opportunities for the growth of China's construction industry, but also brought many challenges to China's construction industry. Due to the lack of pre control management in traditional CM methods, there are problems such as difficulty in effectively controlling the construction period, frequent occurrence of safety accidents, and high investment in quality and HSE management, which seriously affect the sound development of construction enterprises, and also pose certain constraints to the growth of China's construction industry. During the construction of prefabricated buildings, the application of BIM technology by construction personnel can better ensure the quality of the entire project. In the new era and new social situation, it has become an urgent requirement to vigorously improve the traditional CM mode and achieve the application of BIM technology in CM. In the current growth of the construction industry, BIM technology is widely used. Applying BIM technology in CM can effectively improve the quality management and safety management of construction projects. Therefore, construction enterprises should actively apply BIM technology in actual CM, so as to be at the forefront of industry development. The application of BIM technology in CM has promoted the growth process of industrialization and informatization in the construction industry, improved the efficiency of construction output, and laid a solid foundation for the sustainable and sound development of China's construction industry, creating good conditions for Chinese construction enterprises to enter the world stage.

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