

Establishment and Application of Civil Engineering Information Model of RC Education and Training Center based on BIM

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Abstract

In recent years, engineering projects have gradually become difficult and complex, and the traditional engineering technology is facing arduous challenges. In order to optimize, automate and modernize the traditional processes of the construction industry, the Building Information Model (BIM) has emerged, which has changed the prospects of current construction projects. BIM is a huge digital platform, which integrates construction engineering data and information, can be used as the core hub in the whole life cycle of construction engineering, and provides visual, digital and convenient services for the overall management of construction projects. BIM technology has effectively improved the quality and efficiency in the whole life cycle management of construction engineering. On the large platform of BIM, the processing, conversion and handover of engineering data become easy and convenient, and the related problems of various majors have found a solution. Through the coordinated design of BIM technology, improve the work efficiency of the project team; use BIM technology to express the designer's design concept more intuitively, at the same time, it can avoid errors in two-dimensional drawings and improve the efficiency of design. BIM technology can also well display the construction progress and provide data to support the establishment of a more reasonable construction process. To sum up, the application of BIM technology in design greatly improves the design technology, construction efficiency and project quality. Through the establishment of the civil engineering model of RongChang District Education and training Center, this paper focuses on the in-depth study of the application of the model, so as to have a certain understanding of the functions and applications, advantages and problems of BIM, and provide some references for the specific application of BIM technology in engineering.

Keywords

Building Engineering; BIM; Civil Engineering; Modeling.

1. Introduction

BIM technology first emerged in 2002. As an emerging technology in the construction industry, it has undergone many changes and development during this period, and it has played an important role in accelerating the informatization of the construction industry. From the current situation and industrial trends, BIM technology has become an important force to obtain a high level of information in construction engineering. In China, BIM technology is in the stage of vigorous promotion, which is mainly used in some large-scale construction projects, and will become the mainstream of China's construction industry in the future. This topic uses Guanglianda BIM modeling software (mainly Guanglianda BIM civil engineering measurement platform version 2018) to create a building

information model for RC Education and training Center. This paper discusses the advantages and disadvantages of BIM technology and the tradeoff of BIM application value, and then obtains the application direction of BIM technology in building life cycle management (BLM). It includes: (1) the research on the breakthrough point of BIM development; (2) the role of improving building working methods and work efficiency; (3) it is of forward-looking research significance to the informatization of building rules in our country.

2. Literature References

BIM technology has become a well-known building information technology in the 21 century. Countries all over the world have made a positive response to BIM technology, and have formulated relevant specific implementation methods and in line with their own implementation standards [1]. It has been widely used in developed countries such as the United States, Britain and Singapore. BIM technology has attracted many countries around the world, and its number is also growing rapidly, more and more related construction enterprises have invested a lot of resources to equip their construction projects with BIM technology [2]. As an advocate of public project informatization, the United States established the Building Information Model guidelines in 2003, and updated the reform in a short period of time after that. Until now, there are a large number of BIM associations in the United States and many related standards have been issued. Since 2017, China has increased the implementation of BIM policies and standards, and "Ten New Technologies in the Construction Industry 2017" lists BIM as the top one of information technology. According to the current BIM guidance, the time node of the planning goal is to reach 90% of the following new projects in survey, design, construction, operation and maintenance: large and medium-sized buildings mainly invested by state-owned funds, public buildings declared for green buildings and green ecological demonstration areas [3].

3. Establishment of Civil Engineering Model

The measurement is carried out according to the preliminary design and construction drawings of Chongqing RC District Education and training Center designed by Chongqing Q Construction Institute Co., Ltd. The project is a 2-story underground and 15-story above-ground frame shear wall structure. The elevation of the roof is 59.400m. The superstructure is embedded in the roof of the basement, and the joints above the roof of the basement are detached. The foundation adopts the independent foundation under the column and the strip foundation under the wall, and the foundation takes the moderately weathered bedrock as the bearing layer. The standard value of natural uniaxial compressive strength of moderately weathered mudstone is not less than 5.13MPa.

Figure1 is the final work achievement map of the civil engineering model. After nearly two months of exploration, we have a basic proficiency in the operation of GTJ civil engineering software. The models of foundation cap, column, beam, wall, slab and staircase are established and integrated, and finally the civil engineering model of RC District Education and training Center is completed.



Fig. 1 Civil engineering model

4. Application of Civil Model

Under the current background of the times, the importance of informatization has been determined in people's hearts, it can be said that today's rapid development of countries need a strong foundation of informatization. As an indispensable part of the economic development of various countries, the role of the construction industry in a country can not be ignored. And BIM technology is the direct embodiment of construction engineering information, it subverts the traditional old construction engineering industry, is the exchange of building information, the transmission of information is efficient and convenient, to a great extent, it solves the communication and cooperation between different professionals, each specialty can achieve instant interaction on a unified platform, and each branch system can respond quickly to enhance the correlation accuracy of each branch system, and linkage modification [4]. As a result, the cost of the project is less and the efficiency is greatly improved. In terms of the current development and use of BIM in China, the potential of BIM technology has not been fully tapped, coupled with its own problems such as the limitations of its role in construction engineering, so that the use of BIM technology is not widespread. However, it can be predicted that with the extensive application of BIM technology in China in the future to mature, China's construction industry will usher in a qualitative leap, the problems of the construction industry will continue to reduce until mature. During this period, we need a process, which requires the construction enterprises of our country to widely adopt BIM technology, constantly explore its potential and solve the problems during this period, which is an important step to promote the promotion of BIM technology in our country and the development of construction engineering industry in our country, and requires the joint efforts and struggle of relevant personnel.

At present, the application of BIM technology in our country can be analyzed from the following modules: in the initial design stage of the project, according to the old practice in the past, a large number of designers are required to do manual work, and conventional drawing tools (pen, ruler, etc.) are used to draw fine drawings on large white paper, which requires extremely high requirements for draftsmen. If problems are found in the drawings or changes to the project are found in the later construction, the original designer needs to make relevant changes on the drawings, which is a waste of time. If the changes in the relevant construction are not taken into account, it will lead to serious losses. Time-consuming and painstaking cutting efficiency has not been effectively improved. The application of BIM technology makes this problem fully and effectively solved, and the storage and change of data is simple and convenient. The designer only needs to modify the corresponding parameters on the computer and re-check the rationality of each component of the project to quickly complete the required changes. And with the gradual improvement and improvement of the software function, all the changed related information will be presented to the designer, making it convenient and fast to change the project information. Efficiency has been effectively improved. Far more than that, three-dimensional visualization makes the real situation of the project presented to the users, for the construction unit or the owner, any problems can be pointed out directly in the model, clear at a glance. The efficiency of communication between the two sides has been improved, the unnecessary operation of repetitive redundancy has been greatly reduced, and the visualization of information and timely, effective and accurate communication is a very effective medicine to solve the efficiency problem of the project.

The implementation and management process of the project is the key to the successful completion of the project. How to make the whole construction process within the plan, in control and in case of emergency, these problems can be solved in BIM technology. The interactive information integration and sharing of BIM technology enables relevant personnel to completely roam in the unfinished buildings, witness the completion of the project little by little according to the scheduled plan, take a peek at it, foresee the coming problems and solve them in advance before they occur, so as to ensure that the construction process is completed safely as planned [5-9].

5. Conclusion

The smooth implementation and perfect completion of a construction project require the organic combination of many comprehensive factors, such as financial, human and material resources, a virtuous circle and subtle and rigorous integration of resources. and the deviation of any one of them will bring huge and even irreparable serious losses to the specific implementation of the construction project. In the face of the above key issues, various factors and comprehensive considerations make the progress planning, quality and safety control and cost control of the project to achieve the greatest degree of meticulous rigor. The implementer is required to have the traditional craftsman spirit and can adhere to the implementation, to achieve Excelsior! This will have a profound impact on the vigorous and rapid development of China's construction engineering industry, the rapid improvement of China's overall economic level, and the Xin Fu life experience of the broad masses of people. in particular, the future development of China's construction industry and the world's recognition of the strength of China's construction industry. The emergence of BIM technology has injected new development power into the construction industry. As engineering projects become more and more difficult and complex, in order to optimize, automate and modernize the traditional processes of the construction engineering industry, the Building Information Model (BIM) has emerged, which has changed the prospects of current construction projects. Because it has more advantages over traditional design methods, there are now many different design teams using this method in many different countries. In addition, some developing countries regard it as a traditional design practice. BIM allows faster assessment of data and analysis of the entire architecture to support designers in making decisions when proposing different sustainability measures, thereby reducing evaluation time and integrating BIM efforts, which will promote the development of the construction engineering industry, more efficient than traditional practices, thereby creating a more sustainable environment. BIM technology promotes the construction industry to a new stage of development, which makes the construction industry at home and abroad have undergone earth-shaking changes. With the realization of information, digital and visual construction engineering industry, the construction engineering industry can achieve a qualitative leap. This is one of the tens of millions of gospels that the Internet brought to the world in the 21 century. BIM technology has effectively improved the quality and efficiency in the whole life cycle management of construction engineering. On the large platform of BIM, the processing, conversion and handover of engineering data become easy and convenient, and the related problems of various majors have found a solution. Through the establishment of the civil engineering model of the education and training center of RongChang District, this paper focuses on the in-depth study of the application of the model, so as to have a certain understanding of the functions and applications, advantages and problems of BIM. This paper provides some references for the specific application of BIM technology in engineering. Through the coordinated design of BIM technology, improve the work efficiency of the project team; use BIM technology to express the designer's design concept more intuitively, at the same time, it can avoid errors in two-dimensional drawings and improve the efficiency of design. BIM technology can also well display the construction progress and provide data to support the establishment of a more reasonable construction process. To sum up, the application of BIM technology in design greatly improves the design technology, construction efficiency and project quality.

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