Research on Construction Site Intelligent Management Based on BIM Technology

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Abstract. At present, with the rapid development of information technology, the traditional site management mode has seriously lagged behind the development of the information technology. In view of the shortcomings of the intelligent management construction, this paper puts forward the deep integration of BIM Technology and site intelligent management to solve this problem. The integration of the two needs to rely on the existing technical team, establishes an application system platform suitable for the front-line construction, and improve the development of site intelligent management information technology. Besides this paper expounds the connotation of the three focus points in detail. This study has reference significance for promoting the construction of site intelligent management.

Keywords: information technology · site · intelligent management · BIM

1 Introduction

BIM (building information modeling) is abbreviated as building information model [1, 2]. It is a technology aimed at using digital information technology, taking all relevant data of engineering construction as the basis and simulating all information of solid model, which can greatly improve the construction efficiency as well as the core competitiveness for enterprises, as shown in Fig. 1.

Many scholars in China have carried out research on BIM information technology before. Among them, Wang Ning [1] and others proposed to introduce BIM Technology into the auxiliary teaching of civil engineering specialty, so as to improve teaching efficiency and learning effect; Li [4] tried to integrate BIM Technology and VR simulation technology, analyzed the application mode of fusion technology in civil engineering teaching, and demonstrated it through typical cases; Liu [5] summarized the development history of BIM, gave the relationship between BIM information technology and civil engineering curriculum construction, and put forward relevant suggestions on BIM Technology participating in teaching; Che [6] proposed to integrate BIM Technology into the teaching of civil engineering related courses and build a "four in one" teaching system without changing the existing teaching system.

For site intelligent management, it is the specific embodiment of the intelligent concept for information technology in the construction industry, and it is a new information

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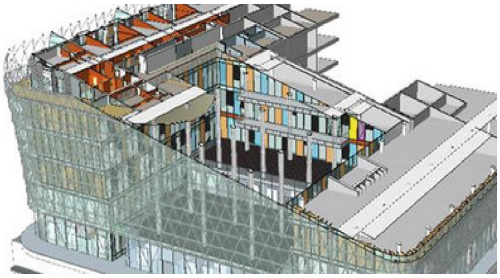
(a) high-rise buildings



(b) Complex building

Fig. 1. Engineering application of BIM technology

means based on a high degree of information to support comprehensive perception, comprehensive intelligence, interconnection, decision-making and intelligent pre-control of risk. It focuses on the construction site of civil engineering professional engineering, closely around the key elements of people, machine, material, method, environment and so on. It makes comprehensive use of BIM technology.

BIM Technology is a technology integrating construction front-line data, big data analysis, management decision-making, operation and maintenance information and intelligent management. It can greatly promote the integration of these information technologies, produce an integration effect, greatly promote the information management of civil engineering, and help the rapid and healthy development of Civil Engineering.

2 "SMArt Site Management" in the Field of Civil Engineering

At present, the field of civil engineering construction in China presents the characteristics of large-scale structure, modularization, diversification of functions, intelligent environmental protection, systematization of the process, refinement of management and so on. Traditional extensive management and construction mode have many problems, such as high labor intensity for front-line construction, chaotic on-site material management, low resource utilization rate, insufficient construction informatization and bad environmental impact. It has long been unable to adapt to the overall development idea of safe, efficient, energy-saving and green civil engineering construction in China. Therefore, it is urgent to seek a sustainable and green management mode. Facing the unprecedented heavy construction tasks and the new situation of rapid development of science and technology, the construction site intelligent management based on BIM

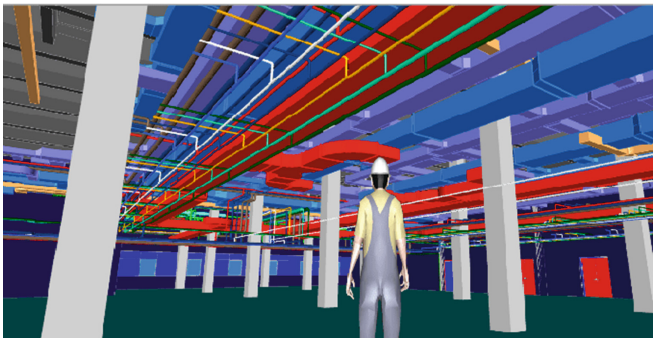


Fig. 2. Intelligent management based on BIM technology

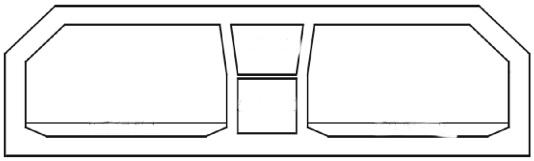
technology has increasingly become a necessary way (as shown in Fig. 2), which can enhance the reliability of construction process and operation and maintenance, using information technology to help the rapid development of traditional civil construction. Specifically, it includes:

2.1 Reduce Cost

In recent years, a series of new concepts such as smart city and the construction site has been launched. Artificial simulation technology and BIM Technology have sprung up and are widely used. The informatization and intelligent development of the construction industry is in full swing, which has promoted the domestic construction engineering industry to embark on a spiral path of continuous change and development in the process of development. Based on the construction scheme, the construction process is optimized and the BIM is taken to prevent and reduce the construction cost in advance; The reliable transmission of information, real-time interaction and sharing can be realized through the Internet, cloud platform, big data and artificial intelligence, so that the construction site can be controlled remotely; In terms of decision-making, based on big data analysis technology and BIM data technology, conduct correlation analysis and processing on a large number of relatively complete business data, and carry out intelligent prediction, real-time feedback or automatic control on the analysis results in combination with the actual situation of construction site, so as to assist personnel in scientific decision-making. Therefore, the construction of site intelligent management based on BIM Technology is the only way.

2.2 Solve Engineering Problems

With the development of information technology, site intelligence based on BIM technology is the product of the development of information technology, which has high technical advantages for engineering problems that are difficult to be solved. For example, for the construction management of immersed tunnel (see Fig. 3), because the construction is located on the seabed, it can only be completed at one time, and the cost is very high. In order to improve the accuracy of construction, engineers must consider



(a) tunnel structure

(b) physical tunnel structure

Fig. 3. Immersed tube tunnel structure

various situations before construction to ensure the accurate completion of construction tasks. The traditional method is subject to the problems of region, capital and repeatability, which is difficult to achieve or even repeat, The construction site management based on BIM technology can well solve this engineering problem, so that the tunnel construction, operation and maintenance under various working conditions can be realized in virtual simulation, so as to solve the problems that are difficult to find in the project in advance, reduce the cost of project management, and finally get the design and construction standard of immersed tunnel.

2.3 Solve Educational Problems

BIM expands the depth and dimension of education. Traditional education mostly reflects the performance comparison in students, focusing on the level of performance on paper. The focus is on the performance itself, which cannot reflect the individual differences of students and the real acquisition degree of learning (obviously, it is not that the higher the score, the greater the acquisition degree). The emergence of BIM based virtual simulation technology makes it possible, Thus, it can track and master the growth and progress of students from the beginning of college admission to the later stage, further draw a clear and complete learning "trajectory", provide students with opportunities for virtual practice, and provide a more scientific. At present, when carrying out civil engineering practice teaching, only on-site visit cannot realize the whole process management analysis for the whole engineering structure. It can only be a glimpse of the leopard, which makes the practice teaching of professional course have huge blind spots and

Fig. 4. Application of BIM technology in education

difficulties. BIM based virtual simulation technology should make use of mature virtual site management and operation and maintenance, which is conducive to students' intuitive understanding of professional knowledge points, expand the scope of professional knowledge mastered by students, lay a foundation for the cultivation of innovation ability, help students use fragmented time after class to complete their professional construction management learning.

Due to the influence of objective conditions, many college students in China still have insufficient understanding and mastery of BIM [8], there are still major problems in the talent reserve for BIM technology popularization, in which a serious shortage of high-end talents who understand site intelligent management exist, and the actual engineering experience needs to be improved; At the same time, there are gaps in communication means, software and hardware system construction and information technology, and the accumulated experience and achievements are relatively insufficient. Many front-line construction units are less in line with cutting-edge science and technology, especially in the development of information technology. Second, the objective development is not clear. Many front-line engineering units are satisfied with completing the engineering tasks according to the time point, focusing on completing the tasks in time. The construction efficiency is low, the management of manpower, materials and machinery is often rough, there is a lack of long-term planning for the development of the whole enterprise, there is little research on cutting-edge construction technology, or even conflict; The internal relationship about universities, scientific research units and construction units in information management is unclear. Generally, universities and scientific research units are engaged in the planning of "site intelligent management", while the construction front-line is hard-working, which often makes the plan disconnected from the actual situation, which restricts the development of the construction level of civil engineering to a certain extent, as shown in Fig. 4.

3 Intelligent Management of Construction Site

First of all, we should fully rely on our existing technical team and unite with domestic excellent technical experts to form a win-win situation, truly understand the BIM simulation technology, compact, deepen and firm the technology, and cultivate our own

informatization talented team. At the same time, we should strictly grasp the overall and key technical problems, not deviate in the direction, but keep up with the forefront of the times. On this basis, with intelligence as the core, BIM Technology and information management system as the support, the broad site intelligent management covering a series of activities such as engineering construction, guarantee and site management will comprehensively improve the information construction level of construction units.

The second is to establish an application system platform suitable for the construction front line. Introduce advanced management technology, integrate the existing management information system, establish an information-based and intelligent management platform represented by BIM Technology, build a big data platform and a big data system for front-line construction management, further deepen the development of the existing management system, and take the progress, quality, cost, safety, operation and maintenance management and other construction elements as the starting point and foothold.

4 Conclusions

This paper summarizes the huge technical advantages and construction deficiencies of current site intelligent management, and puts forward solutions, the core of which is to have a technical team. This paper has important reference significance for promoting the application of intelligent management in construction site.

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