

Exploring Effective Paths for Reasonably Using Bim Technology to Improve Bridge Construction Quality

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Abstract: BIM technology is widely used to improve the quality of bridge construction. BIM technology is based on three-dimensional digital technology, and it is an engineering data model widely used in construction engineering. And can carry out distributed and global assessment of construction projects. This article makes an in-depth analysis of the implementation of BIM technology in the life cycle of the bridge. The implementation path of BIM technology in different stages and links is proposed, such as the use of BIM technology in the design stage to achieve collaborative design, and the use of BIM technology in the construction stage to achieve visual construction. This paper proposes a new BIM technology utilization program. This solution makes BIM technology more efficient in the field of improving bridge construction quality.

1. Introduction

Along with the rapid development of high-speed railways, my country has built a number of representative large-span railway or highway-span bridges. They are not only large in size, heavy in load and fast in operation, but also novel in structure and beautiful in design, indicating that the level of bridge construction in my country has leapt to the forefront of the world. The characteristics of BIM technology can help the rapid development of my country's bridge construction industry. This is not only conducive to my country's economic construction, but also facilitates transportation. Therefore, the rational use of BIM technology to improve the quality of bridge construction is a top priority.

In the domestic construction market, BIM is currently used in the following areas: BIM model maintenance, bridge site analysis, architectural planning and visual design, etc. Based on such characteristics and advantages, BIM technology has entered the construction market from the software market. BIM technology has had a positive impact on the main players in the construction industry. The project information can be better created and shared to provide coordinated, consistent and operable information for the project. BIM technology helps project participants get closer and improves the efficiency and correctness of decision-making. Of course, it also has a profound impact on design, construction and supervision.

With the rapid development of our country's economy, the bridge construction industry has developed rapidly in my country. In order to be able to complete the bridge construction with high efficiency and high quality. This paper proposes a method of using BIM technology to improve the quality of bridge construction. This article focuses on the analysis of BIM technology, and rationally analyzes the application of BIM technology in bridge construction

2. Bim Technology

2.1 Characteristics of Bim Technology

BIM has five characteristics of visualization, coordination, simulation, optimization and plotting. This makes the project management informatization based on BIM applications as “three-dimensional rendering, publicity and display”. In addition, BIM technology can also achieve “fast calculation, accuracy improvement”, “precise planning, reduce waste”, “multiple calculation

comparison, effective management and control”, “virtual construction, effective collaboration”, “conflict call, decision support” and so on. Thereby improving project production efficiency, improving construction quality, shortening construction period and reducing construction cost.

The characteristics of BIM technology can help the rapid development of my country's bridge construction industry. This is not only conducive to my country's economic construction, but also facilitates transportation. Therefore, the rational use of BIM technology to improve the quality of bridge construction is a top priority. The process and components of BIM are shown in Figure 1.

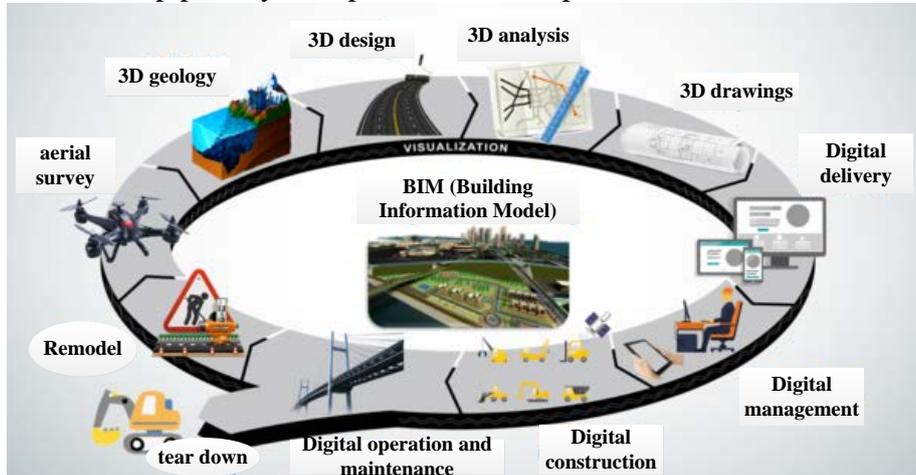


Figure 1 The Process and Components of Bim

According to Figure 1, we can see that BIM mainly includes 3D design analysis, digital processing, and architectural design. BIM technology refers to the use of a computer to operate the BIM modeling software, which can generate various models and related information generated in the construction engineering design and construction. It has the ability to make BIM and related 2D engineering drawings, 3D geometric models and other related graphics, models and documents that can be used for engineering design, construction and subsequent applications. Through the operation of BIM professional application software, the comprehensive application ability of BIM technology can be carried out.

2.2 Application Fields of Bim

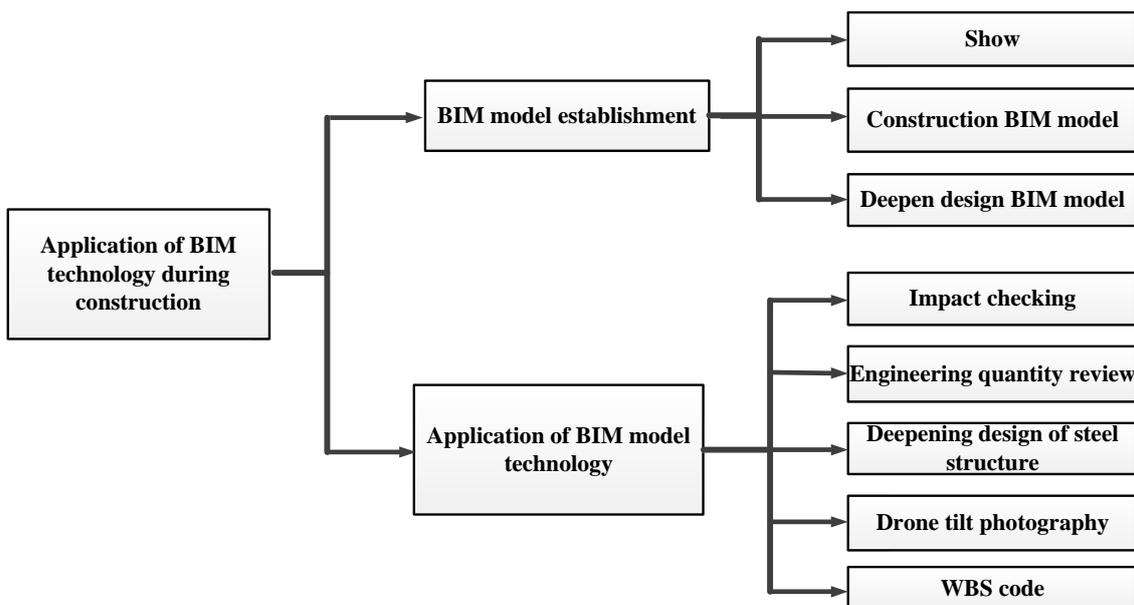


Figure 2 The Overall Flow Chart of Bridge Construction

BIM technology has the characteristics of 3D visualization, digitization and informatization, and has been widely used in my country's construction industry. Bridge construction projects are large

in volume and technically difficult, and have high requirements in terms of quality, safety, cost, schedule, and environmental protection. Therefore, the use of BIM technology during the construction phase of the project maximizes the social, environmental and economic benefits of the project during construction, ensuring safe and reasonable construction.

The construction of the three-dimensional model of bridge construction mainly includes: the main arch circle, the pillars on the arch, the deck system, the junction pier, the arch seat, and the lower and upper structures of the approach bridge. According to the requirements of on-site construction progress, the principles of batch modeling and batch confirmation are adopted. The modeling batches are divided into: Approach bridge lower structure→ Approach bridge upper structure→ Main bridge main arch ring→ Arch upper column→ Deck system→ Guardrail and other auxiliary facilities.

The overall flow chart of bridge construction is shown in Figure 2.

3. Application of Bim Technology in the Field of Bridge Construction

Along with the rapid development of high-speed railways, my country has built a number of representative large-span railway or highway-span bridges. They are not only large in size, heavy in load and fast in operation, but also novel in structure and beautiful in design, indicating that the level of bridge construction in my country has leapt to the forefront of the world.

In this article, the connection between BIM model and FEM analysis software; Smart construction + digital construction; Virtual construction and Construction information management.

(1) Combine with third-party meshing software or use Python, c/c++ and other programming languages for secondary development to develop a seamless interface with the leading finite element analysis software. This can realize the lossless transfer of the data model, avoid repetitive work, and improve the analysis efficiency.

(2) With the help of the Internet of Things technology, the key data and information in the construction process are collected in time, and uploaded to the management platform in real time through the Internet, so as to effectively control the key parameter value and key process quality. Using the geometrical information of the components contained in the BIM model, it seamlessly connects with large-scale machinery and equipment, and directly generates information such as blanking and processing, omitting the second conversion process of image conversion, and improving the automation level.

(3) Build relevant family libraries of construction equipment and construction technology. Before the formal construction of the project, the 4D virtual construction is carried out using BIM technology. Through visual pre-drilling and construction process simulation, the space location of the equipment and the feasibility of the process implementation are checked. Then optimize the construction organization plan, reduce rework, and effectively improve work efficiency.

(4) Integrate the specific requirements of the parties involved in construction, construction, supervision, and monitoring. According to the norms and standards, to achieve the collection, storage, analysis and feedback of progress, safety, cost and other construction information, to dynamically manage and control materials, equipment and other resources to obtain effective construction information. Construction information management can not only realize the tracking of construction quality, but also provide a basis for the delivery of completion acceptance documents. At the same time, it is integrated into the construction calculation and analysis module, which can provide technical support for construction personnel, which greatly facilitates on-site application.

4. Conclusion

With the rapid development of my country's economy, the bridge construction industry has developed rapidly in my country. In order to be able to complete the bridge construction with high efficiency and high quality. This paper proposes a method of using BIM technology to improve the quality of bridge construction. This article focuses on the analysis of BIM technology, and

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