Research on the Application of BIM Technology on Bridge Engineering

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Abstract: Firstly, the principle and working mode of BIM technology are introduced. Then the role and value of BIM technology in bridge engineering are analyzed. Then, combined with engineering practice, the specific application of 1BIM technology in bridge engineering survey, design and construction is introduced. Finally, the application prospect of BIM technology in bridge engineering is prospected.

Keywords: BIM; Bridge Engineering, Application Study

1. INTRODUCTION

BIM technology is actually an extremely efficient and intelligent working mode. It is based on 3D simulation technology. Through the construction project participants, the creation of relevant model data on the software platform (such as design, construction, supervision, etc.) The circulation improves the communication efficiency between the managers of each link and the engineering details, which greatly promotes the efficiency of engineering decision-making. According to incomplete statistics, the application rate of BIM technology in construction enterprises may increase by more than 100% in 2018. The large-scale application of high-tech means will certainly promote the further upgrading of the construction industry. Of course, since the original intention of BIM technology is to optimize work and improve efficiency, it will not bring economic benefits directly to the construction engineering unit, but it will bring more internal and even even docking units to the construction engineering unit through an efficient technology platform. Intuitive and efficient communication of information flow reduces the information barriers between the parties involved in the project, and at the same time reduces the internal friction between the various aspects of the project construction and improves the efficiency of collaborative decision-making between the parties. BIM technology aims at the unified preservation and transmission of information, and uses an intuitive 3D model construction platform as a carrier to bring an extremely effective information communication experience to all parties of the project. Therefore, BIM technology will be complicated and involved. Wide range of applications in the field of construction engineering.

2. THE ROLE OF BIM TECHNOLOGY IN BRIDGE ENGINEERING

Using BIM technology, the owner of the bridge project can obtain intuitive engineering renderings and technical data after the project is designed, so that the owner has a more concrete basis in the review of the engineering plan. BIM technology can display the engineering solution in three-dimensional form, so that the cost calculation of the material will be more accurate than just calculating according to the design drawing. Moreover, since the BIM technology platform can also perform cost calculations according to needs, this further reduces the difficulty of the cost budget and improves the accuracy of the cost.

The unique visual 3D model technology of BIM technology platform enables bridge architects, construction managers and project operators to share engineering information and coordinate engineering construction. Therefore, for bridge projects that require data communication and program discussion, the BIM technology platform can be used for greater innovation. Since the 3D model of the project will be displayed on the BIM technology platform and transmitted to the operation unit of the bridge project by the design and construction side, this intuitive and specific form of expression can make the bridge operation unit have deeper structure and data of each part of the bridge engineering. With a comprehensive understanding, it is also possible to arrange maintenance and daily management of the bridge according to the completion of the bridge. At the same time, the owner can obtain the progress information and construction plan change information of the project on the BIM technology platform, so as to manage and supervise the construction process in time.

3. NECESSITY ANALYSIS OF BIM TECHNOLOGY APPLIED IN BRIDGE CONSTRUCTION

Based on the current construction of bridge engineering projects in China, compared with other

engineering projects, the biggest characteristic of the project is that the construction difficulty is more prominent. This large construction difficulty is mainly reflected in the following three aspects: (1) From the perspective of the scale of the bridge engineering project, it is generally quite large. This huge volume is not only reflected in the overall structure of the bridge project, but also in the concrete components of the bridge project. This large-volume feature also makes the construction of specific bridge engineering projects more difficult, and thus puts higher requirements on construction technology and construction personnel and management personnel; (2) Structure from bridge engineering projects In terms of aspect, the structure of the bridge is generally difficult to design and construct, especially compared to some traditional buildings. The specific structure of the bridge needs to be more focused on the analysis and construction of safety and stability. Better improve the final construction effect, avoid any errors and problems; (3) From the perspective of construction environment, bridge engineering projects are easily interfered by various external factors in the construction process, which in turn is likely to cause some construction quality problems, construction progress problems and construction safety problems. It has increased the difficulty of construction and management of bridge engineering projects. It can be seen that the complexity and difficulty of construction of bridge engineering projects are extremely prominent. To improve the implementation effect, it is necessary to strengthen management and control, which has become an important condition and demand performance of BIM technology application. .

BIM technology is fully utilized in the construction of bridge engineering projects. Because the application of this technology does have ideal application advantages and value, the application advantages are mainly reflected in the following aspects: (1) Information integrity. The application of BIM technology in the construction of bridge engineering projects has outstanding information integrity advantages. The completeness of this information indicates that it can comprehensively implement various components and specific structural types in the construction of bridge engineering projects. Analysis and interpretation, as well as the corresponding data information, can be better reflected, and thus can better provide more effective management and control assistance for the construction of bridge engineering projects. (2) The relevance of the model. Based on the specific application of BIM technology in bridge engineering projects, it also shows the ideal correlation characteristics. That is to say, through the building information model structure, the relationship between the various components in the bridge engineering project can be the mechanism of action is presented in a comprehensive and detailed manner, which ensures that relevant personnel can rely on this correlation rendering effect to carry out reasonable design and construction to ensure the final construction effect and level. (3) Visualization of the model. Appropriate use of BIM technology in bridge engineering projects can also reflect the ideal visualization effect. This visualization can also help bridge design project designers and construction workers to more accurately grasp their specific construction points and The key links ensure the standardization and standardization of the construction, avoiding some human error and problems in the subsequent construction, and maximizing the construction effect. Based on the application advantages of this BIM technology, it is also worthwhile to promote the application of this technology in the construction of bridge engineering projects and enhance its application value.

4. APPLICATION OF BIM TECHNOLOGY IN BRIDGE CONSTRUCTION

The application of BIM technology in the construction of bridge engineering projects is first manifested in the optimization of the design of bridge engineering projects. It is well known that the impact of the design phase of bridge engineering projects on construction results is extremely critical, thus ensuring the accuracy and reliability of the design. Sex is also extremely necessary. In this respect, the proper use of BIM technology can effectively be based on the specific structure and components of the entire bridge project, so that the model structure can be used for detailed analysis and understanding of its specific design. All kinds of problems and defects exist, and on this basis, to ensure that the design plan can be better implemented in the construction of bridge engineering projects, which is the most direct and application for the application of BIM technology. The value of performance is the clearest.

Specific to the construction process of the bridge project, the specific construction process is also an important aspect of the impact. Different construction processes can exert different construction effects, and there are certain final construction quality and construction progress. The relevance, therefore, it is essential to focus on the optimization of the construction process. In this respect, the application of BIM technology is mainly to be able to carry out simulation analysis for different construction processes, and then it can be compared and verified based on different construction processes, and finally select the best construction process for concrete construction.

The construction of the bridge project should also focus on the strict control and control of the progress. The management of this construction schedule has become an extremely important goal and task, especially in the construction schedule management

of the bridge project. Because of the high complexity of construction, the corresponding schedule management is more difficult. Appropriate use of BIM technology can better control and control the construction process and details of the entire bridge project, so that all construction operations can meet the expectations of construction progress and avoid large construction delays. In the construction of bridge engineering projects, the core of the construction is undoubtedly the quality of construction. In the management and control of such construction quality, BIM technology can also be effectively optimized. The application of BIM technology in bridge construction quality management is mainly to better improve the comprehensiveness and reliability of its management. The information model based optimization optimizes the control and review of the entire construction operation process, and thus the maximum extent Improve the control effect of the construction quality and ensure the quality of the construction of the bridge project.

The application research of domestic BIM technology in bridge engineering is still in its infancy. The research content is mainly for practical bridge engineering, and it tends to analyze the application advantages of BIM technology in various stages of bridge engineering and the method of 3D parametric modeling of bridges. The application research depth is shallow. On the contrary, there are few studies on BIM basic theory, core software development and data transfer format, but it is precisely these three aspects that play a decisive role in the maximum value of BIM technology in bridge engineering. The integration of BIM models with other technologies has become a trend. Scholars have proposed combining BIM models and two-dimensional codes with existing technologies such as radio frequency technology, single-point measurement and three-dimensional scanning technology, cloud technology, and RFID technology. This combination can better play the value of BIM technology in bridge engineering. Better implement the BIM concept. With the emergence of emerging technologies in the future, BIM technology will contain more content and needs to be further explored.

Successful implementation of digital information construction. Some of the components of the steel bridge project can be selected for off-site processing, and then transported to the construction site for the next assembly work. With the help of the digital information method, the bridge structure can be prefabricated, and then the factory manufacturing methods are used to prevent and control various unfavorable factors in the construction process. The quality constructed in this way can be well protected and It can shorten the construction period of the bridge body on the basis of quality guarantee and continuously improve various benefits. (2) Complete information management of safety data. The bridge safety data information management platform based on BIM technology can carry the key data in the management construction, and at the same time, the integration platform can be used to realize the sharing of data, so that each unit can fully grasp the safety information of bridge construction, and master these On the basis of the basic situation, relevant personnel can formulate a scientific and effective construction organization plan, in this way, it can better avoid various safety problems caused by the excessive backwardness of safety information data management. If this work is not handled well, serious It also causes a variety of construction safety incidents. (3) Meet material equipment management. Before the successful launch of BIM technology, the construction unit borrowed from the more mature management experience and technical solutions in the logistics industry. The common use of RFID technology, the staff chose to attach the bridge components, engineering equipment and related materials. Label, hope to achieve the purpose of tracking construction progress in this way, but it should be pointed out that RFID technology can only identify a part of the information, it is almost impossible to fully grasp the data flow of the whole process of bridge construction, but the drawback is It is possible to supplement the bridge information model based on BIM technology. (4) Collaborative work. Collaborative work is design-related management functions such as various design documents and office document management, personnel authority management, design review process, planning tasks, project status query statistics, etc., including design and owner, and construction party. The supervisory party, the material supplier, the operator, and other parties involved in the project, and jointly carry out a collaborative management system such as document interaction, communication and communication. In the actual bridge construction process, the use of BIM technology to achieve collaborative work, to ensure that the construction is more scientific and rational. Mainly using software services and cloud computing technology to build a cloud-based BIM model, which can provide a visual BIM3D model and directly manipulate the model through WEB. In this way, our model will avoid the limitations and constraints of time and space factors, and successfully help us to solve the communication barriers between different sites and different participants, while the information is updated and released. In an all-round way, the application of this technology can improve the efficiency of design and operation, and at the same time save costs. It is a multi-tasking technology that deserves to be promoted in bridge engineering.

5. CONCLUSON

In order to better introduce BIM technology into the

field of bridge engineering, domestic scholars and engineers should further deepen the research on BIM basic theory and expand the scope of engineering application of BIM technology. In the design phase, accelerate the identification or development of core modeling software for bridge engineering to ensure that the design model data is accurately transmitted to the construction phase. In the construction phase, solve the problems of BIM technology in key node applications, and try to apply it continuously and continuously to the whole bridge construction process. In the operation and maintenance phase, we should pay attention to the application research of BIM technology in the operation and maintenance phase, clarify the application requirements of BIM technology in the operation and maintenance phase, and establish corresponding management systems and management specifications.

6. ACKNOWLEDGMENT

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