Discussion on Application of BIM Technology in Aluminum Alloy Formwork Support System

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Abstract: With the development of science and technology, society has put forward more stringent requirements for the construction industry. The traditional two-dimensional design method can no longer meet the requirements of architectural design. The proposal of BIM technology and its application in the construction industry have solved the problems existing in traditional architectural design methods and adapted to the long-term development needs of architectural design. In the design of aluminum alloy formwork support system, BIM technology can realize efficient processing and management of massive data, realize informationization and integrated management of project design, and effectively improve the quality of project design. In view of this, the author believes that it is necessary to analyze the application of BIM technology in the design of aluminum alloy template support system. Based on the overview of this new technology, this paper will analyze and discuss the application and practical application of BIM technology in the design of aluminum alloy template support system.

1. Overview of Aluminum Alloy Template Support System and BIM Technology

1.1. Aluminum Alloy Template Support System
The aluminum formwork consists of a formwork system, fastening system, support structure and accessories. It has high strength and thickness and can ensure rapid forming during concrete pouring. In the aluminum alloy and the skeleton welding, it can be a metal template with high strength and rigidity. In the support system of the engineering project, it is composed of a support head and a column, and it makes functions in the fastening system. It also plays a role in the connecting member and the screw, it was used in accessory systems for auxiliary tools such as climbing stools and mold removers. The application of aluminum formwork technology in construction engineering can take advantage of its own small weight, it can conveniently support system, simple operation control, short construction period, high strength, stability and carrying capacity, which is beneficial to the improvement of the overall building quality. Firstly, the weight of the aluminum template is small, which can improve the operation efficiency of the construction. When it is applied to the pin of the connection system, the utility model has the advantages of convenient disassembly and assembly, and only manual transportation is required in actual operation, thereby eliminating mechanical expenses. Secondly, the convenience effect of the support system is very obvious. There are not many support rods but the maximum independent support spacing is large, which can provide favorable construction space for the construction of the house. Once again, the aluminum formwork has a short construction period and is easy to assemble and disassemble. Only one set of templates is needed for the entire project, which effectively reduces the construction cost. At the same time, the aluminum formwork also has high strength and stability, and the overall structure is stable after installation, and its bearing
capacity is large. In addition, the effect can be maintained after the template is removed, and the connection is tight when the connection is made, the gap is small, the effect is obvious after the construction, and the smooth surface effect can be ensured. Certainly, the application of aluminum formwork in the construction of the house can also effectively reduce the construction cost. This is because the aluminum formwork can be reused. A set of aluminum formwork can be recycled for about 400 times. The environmental protection effect is very good, and the cost of the overall engineering is reduced.

1.2. BIM Technology
BIM technology refers to a new type of data technology developed on the basis of three-dimensional virtual technology. It also belongs to the category of architectural information, with the characteristics and functions of visualization, simulation and synergy. The application of BIM technology in urban road engineering can optimize the overall architectural design on the one hand, and improve the efficiency and quality of the project on the other hand. At this stage, although there is no unified viewpoint to define the technology, its essence belongs to the digital architecture model based on computer technology. It integrates the characteristics of information technology and architectural design, and implements the management of architectural engineering design and construction. The integrated analysis of building information to achieve intelligent project management can ultimately improve the efficiency and quality of management and promote the development of the overall project.

2. Application Advantages of BIM Technology in Aluminum Alloy Formwork Support System

2.1. Play An External Role
The application of BIM technology in the design of aluminum alloy formwork support system for construction engineering can promote the innovation and development of project design through the external promotion. For example, BIM technology can be applied to cost budgeting, site analysis, and three-dimensional coordination. To meet the needs of technology applications, scientific policies must be formulated, and these policies and regulations also lay a good foundation for the development of construction projects. At the same time, the development of construction engineering has also promoted the application and popularization of BIM technology to a certain extent. It also constantly expanded the application range of the technology to give full play to the maximum advantage of this technology.

2.2. BIM Technology Can be Used to Modify Architectural Drawings
BIM technology itself has visual and analog features, that is, when applying BIM technology, it can realize visual judgment of engineering design through system platform, simulate engineering implementation effect, timely discover problems in design and modify drawings. The modification of the model can reflect the relevant functions in the drawings, helping the designer to find and correct the problem in time, without spending too much time on the error finding and the correction of the drawings.

2.3. Information Function
After applying BIM technology to the design of aluminum alloy formwork support system, the engineering information can be described by unified standards. Information exchange can be carried out to realize remote coordination and control of the project, which not only saves time and improves work efficiency but also Reduce errors in pre-design and reduce design risk. Secondly, BIM technology uses its visualization function to solve the shortcomings of the human brain imagination in the previous aluminum alloy template support system. Under the situation that the aluminum alloy template support system structure is more and more complicated, BIM technology uses the visualization function to make the aluminum alloy template support. The linear components in the system form a unit-dimensional object graph, which can improve the accuracy of the design through
modeling, thus realizing the virtual construction of the overall project process, realizing the popularization of the project design, three-dimensional visualization, non-professional people can judge projects more clearly and efficiently, and ensure the accuracy of decisions. Thirdly, using the three-dimensional features of BIM technology can accurately describe the content of project construction, and combine the BIM model to calculate and analyze some details. In addition, the intuitive characteristics of BIM technology enable users to understand the construction effect of construction projects in advance. After using BIM technology, the description of building information can be completed by unified standards, and effective information exchange can be realized. It can realize coordinated control of remote projects, which can effectively reduce design errors and post-design changes, thus reducing information security risks. In short, the use of BIM technology can make the communication of engineering design information more convenient and accurate. It is more convenient to manage the information, avoid the threat of information due to software problems, and also help the construction unit to express its appeal to the design unit.

2.4. Improve Calculation Speed and Accuracy

In the design and construction of the aluminum alloy formwork support system, the calculation of the relevant materials can be automatically calculated by using the model attribute data, and the calculation of the software information road to the cost software can reduce the complicated calculation workload. In the case that the construction of construction projects becomes more and more complicated, the use of BIM results to optimize the construction drawings and statistical tables can ensure the accuracy, quality and innovation of the project design to the greatest extent. Because the BIM model has information storage and information calculation functions, it can automatically and accurately calculate the data information for each sub-module, accurately calculate the project engineering area, engineering quantity, etc., and can also calculate the engineering quantity according to the project structure. The information can be archived through the construction of the BIM model without manual operation. In short, the use of BIM technology for information calculation can not only intuitively understand and communicate all the information of the management project. But also the model is based on BIM technology has powerful project-related information functions, there are many derived data analysis methods, the feasibility of the project, the design cost. Analysis of project finance, construction plan, construction plan process, change order, etc., can increase project maneuverability, reduce design errors, shorten construction period, and reduce the problem of design change by increasing the speed and accuracy of calculation. The cost is reasonably adjusted and controlled to improve the overall quality of the project.

2.5. Realize the Optimization of Aluminum Alloy Formwork Construction Design

The application of BIM technology in the design of aluminum alloy formwork support system for construction engineering can improve the design of the overall project, and combine the perfect results with the complexity of construction to improve the truth and accuracy of the engineering information. Traditional design methods in project engineering require a lot of time and effort to optimize the design, but BIM technology can optimize the project design with its automated performance, and combine the overall project design and investment return analysis. The relationship between precise design changes and return on investment. In addition, in the design and construction of aluminum alloy formwork support system, there are many people and materials involved. How to coordinate various relationships in actual construction is difficult. BIM technology can effectively coordinate and deal with these complex relationships, and form coordination data to achieve three-dimensional collaborative design among professionals, multi-disciplinary and multi-systems, avoiding drawings caused by poor communication. Mistakes and other issues can effectively improve the quality and work efficiency of the aluminum alloy formwork support system design.

3. The Combination of BIM Technology and Template and Support System

BIM technology has the characteristics of visualization, coordination and optimization design. It can
timely discover that the project management system and standards are incomplete and lack of collaborative management can solve problems, thus facilitating communication and solving problems. Therefore, the template and support engineering design based on BIM technology is to set the parameters of the template and the support and generate the template and scaffold model. At the same time, BIM technology is used to check the spatial arrangement of the brackets, analyze whether it meets the design specifications and mechanical requirements, improve and optimize the places that do not meet the requirements, and use the BIM model for real-time dynamic monitoring during the construction of the formwork and supports. Existing problems are adjusted, such as dealing with collisions of complex structural parts and coordinating relationships, through timely corrections can reduce the occurrence of safety accidents and improve construction efficiency and quality. At the same time, because the speed and accuracy of the calculation are improved, the process of simulating with BIM technology is also a construction process, which can reduce the time and cost, and at the same time meet the process construction needs. In addition, the BIM technology is used for visual display, so that the owner and the construction unit can intuitively understand the construction design plan, verify the feasibility, and understand the problems that may be encountered before the construction and solve the problems together. Finally, component safety and mechanics and cost analysis should be carried out on the generated template and bracket model. Correction of the strength and deflection should be carried out in time to correct the unreasonable place. This is the biggest advantage of using BIM technology to optimize the aluminum alloy template support system.

4. Analysis of the Difficulties Encountered in the Design and Construction of Aluminum Alloy Formwork

First of all, no safety construction technical measures and special construction plans were prepared before the construction of the project, and even the frame model design and the stiffness deflection check were not carried out. Instead, the support system was completely arranged by the previous experience, resulting in the stiffness and deflection of the support system stability and other requirements do not meet construction requirements. Secondly, when calculating the template construction plan, the workload is huge and needs to be checked repeatedly. If the amount of materials used for erecting the template is estimated only by experience, a large error will be generated and the safety hazard will be buried for the later construction. Because of the imperfect security system, unreasonable construction design, improper selection of calculation parameters, and other problems caused by templates and brackets, there are many casualties, and if the cause analysis and improvement are done before the accident, the safety can be reduced. The probability of an accident. In addition, in the design of the aluminum alloy formwork support system, because it is a new type of formwork. There are no special atlas and construction technical specifications, that is, there is no reliable basis for design and construction. At the same time, the expressions of the drawings are not perfect, the fonts are too small, the complex node structure is not clearly expressed, and the labeling method is not reasonable enough, which may lead to design errors. In addition, the calculation of engineering quantity is huge and complicated, and the traditional statistical method is used, and accurate data cannot be obtained. Finally, the team coordination ability is not strong. For the different project design of the same project, there is no timely communication. In some complex nodes, errors often occur and need to be redesigned, which will reduce work efficiency. Because of these factors, it is urgent to propose more effective and effective measures, which has become an opportunity to refer BIM technology to the design optimization of aluminum alloy formwork support system.

5. Application Analysis of BIM Technology in Aluminum Alloy Formwork Construction

5.1. Modeling

The BIM technology is used to build a three-dimensional model. Before the start of the support, the virtual digital model including the wall, column, beam and floor template is built by computer software, and the virtual model is started by virtual mode. Then analyze the problems that the
simulation project may encounter before the project construction, analyze the feasibility of the project, and solve the problems of collision or inconsistency of complex structures in actual construction. Not only saves time and cost, but also understands the actual situation that may be encountered in the construction through simulation construction, and knows how to make it in advance. In the actual construction, it is not necessary to become confused after encountering problems.

5.2. Implementation Process
First, create a project template that meets the requirements for aluminum alloy formwork design, and build a BIM technology model based on this. Second, the Autodesk Revit Architecture tool software provides a sample of the project for all users, so adjust settings when targeting individual. It including creating common component families that meet corporate design standards, creating common annotation symbols and detailing projects, and building 3D CAD based on 3D architecture. Drawings create BIM models, place templates and support components, use Revit Architecture tools to count the amount of work of templates and other components, and finally create frames and Revit tool maps.

6. Conclusion
In summary, the aluminum alloy formwork support system has a good development prospect, and the application of BIM technology in the design and construction of the system. We can utilize BIM technology visualization, informationization, simulation and other functions, through the establishment of the aluminum alloy template BIM model. Not only the design process is simplified, and the problems that may be encountered during the construction of the aluminum alloy formwork support system can be understood in advance through simulation and optimization is made, and a reasonable solution plan is formulated. In the practical application of aluminum alloy formwork support system, through the integration and informationization to meet the future development needs of the construction industry. The value of BIM technology applied in the aluminum alloy formwork support system has also been recognized, providing a theoretical basis for the development of the construction industry.

Acknowledgement
2018 Science and Technology Innovation Project of Dalian Vocational & Technical College
Research project support of Dalian Polytechnic Subject No.: dz2019a-08

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