ISSN: 2664-9640

The management of the assembled steel structure construction project based on BIM Technology

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Abstract

BIM Technology is an integrated modeling technology which integrates a variety of construction information.Because of the large span and complex structure form of the steel structure in the construction project, and some building top floor is equipped with special structural objects with apron, it is difficult to construct and the composition of steel structure in the general drawings is weak.BIM Technology can effectively strengthen the project structure visibility, improve the management of steel structure construction project and have obvious effect on cost saving.

Keywords

BIM Technology;Assembly type;steel structure.

1. Introduction

BIM is a multi-dimensional model information integration modeling technology which integrates a variety of building information.In the application of construction engineering, BIM data system can be applied to many different stages, such as architectural structure design, structure stereoscopic graphics, engineering construction, post operation and maintenance, and even to the overhaul and reinforcement, building demolition and other stages in the later stage of the building.BIM data collection and management is made by the cooperation of government construction department, consulting planner, architectural design unit, construction construction unit, project supervision and owner.

The advantages and disadvantages of the assembled steel structure building are obvious.The advantages of the method are that compared with the traditional building construction, the construction speed is faster and the quality is easier to control;The seismic performance of the building is improved because of the good ductility of steel;Compared with concrete, the weight of steel frame is lighter, and the cost of building foundation will be reduced effectively;The steel frame can be recycled and reused, which is more economical and environmental protection;The construction area of steel beam column will be reduced, and the use area inside the building will increase.The disadvantage is that the building is more complex;Steel frame needs special fire protection and anti-corrosion treatment, which is more troublesome.Compared with the construction industry, this assembly structure meets the needs of industrialization and scale development of construction industry. Most of the components can be industrialized processed and produced in the factory workshop, which is conducive to the stability of material quality.The emergence of this technology also marks the upgrading of the construction industry, from labor-intensive industry to knowledge intensive industry.

The combination of BIM Technology and assembly steel structure can make the design and construction of building structure more concise and efficient, meet the needs of industrialization and scientific and technological upgrading of the construction industry, and is a great help to promote the development and progress of the industry.

ISSN: 2664-9640

2. Brief introduction of BIM Technology

BIM Technology can establish an intuitive three-dimensional data model by collecting various detailed data in the construction process and summarizing and analyzing information.In the fabricated steel structure construction project, the construction party can use BIM Technology to intuitively control the orderly and compliant construction of each construction stage of the whole project [1].At present, the starting point of building informatization application in China is relatively late than that in western developed countries, and the laws and regulations involved in the relevant implementation process are not perfect. Therefore, in the process of BIM practical application and construction industry, it is inevitable to learn from foreign advanced technology and mature experience, and carry out reasonable BIM technical modification in combination with its own actual situation and construction needs,To ensure that the overall technology meets the construction design requirements.

In the modeling process of BIM, we must first create a static model, and then gradually improve the data construction of the main frame structure in the static model according to the specific parameters in the CAD drawings, and improve and update the temporarily built equipment and other relevant data with reference to the actual situation on site, such as the data update of tower crane and material template.Therefore, it can also show the characteristics of information-based BIM Technology different from previous construction technology:

(1) Intuitiveness

Through BIM 3D modeling technology, the architecture can be visualized.By intuitively displaying various data information in the model, it can effectively improve the management and correction of information by technicians, reduce the probability of errors in data entry or update in the construction process, and reduce the probability of construction problems.

(2) Collaboration

BIM Technology is different from the previous form of different operations in civil engineering. It makes overall planning for the whole construction through overall data acquisition, and carries out real-time monitoring for each classified construction, so as to ensure effective communication between different types of work and improve the smoothness of the overall construction link, which not only ensures the quality of cooperative construction,It also effectively improves the quality of the overall construction.

(3) Simulation

Different from the previous drawing data simulation of subsequent construction, BIM Technology will rely solely on the way of digital calculation to simulate the subsequent situation. Through the way of modeling calculation, all links of construction will be simulated and demonstrated in real time through the model.Including the change of simulation calculation and construction efficiency after data modification, it can be expressed intuitively through BIM Technology model.It is convenient for technicians to adjust relevant data and formulate emergency plan according to actual situation, and can effectively reduce the occurrence of construction accidents.

(4) Can be quickly modified and plotted

BIM Technology can collect, summarize and analyze a lot of data information, which is convenient to adjust the important information. When the technicians need it, the adjusted data can be quickly derived through the data model, and the accurate results can be obtained, and the results and construction drawings after adjustment and update can be obtained more conveniently.

ISSN: 2664-9640

3. The application advantages and problems of assembled steel structure based on BIM Technology

(1) Can improve the overall management level of project construction

In the process of domestic construction industry gradually changing to science and technology, the scale of building is expanding.The biggest advantage of steel structure assembly building is that the materials used for construction are easy to reach the agreement on quality and specification through standardized and unified production. The assembly building independent material unit is constructed to the whole building structure through splicing the corresponding structural units.This kind of building method can greatly save construction time.The premise of this construction is to fully grasp the detailed data information of parts and components based on BIM Technology to ensure the applicability of parts production.Therefore, in the practical application of BIM Technology, it is necessary to collect the detailed data of buildings.Through the collection, collection and analysis of big data, it is convenient to manage the construction links in an orderly manner.

(2) Improve the quality of steel structure construction and design

Because of the detailed collection of all the data of the whole construction in the modeling stage, the construction environment and project quality can be accurately simulated based on the collected data, so as to find out the problems in the design in time and adjust and modify them quickly.In the deep analysis of data, the quality of design scheme is effectively improved, which lays a good foundation for the subsequent construction on site.

(3) Reasonable control of project cost

Large projects are accompanied by a large number of bidding, which greatly reduces the profits of construction enterprises to a certain extent.The application of bin technology can contact the three-dimensional model system and accurately predict the use of various materials through accurate data analysis and calculation, which is not only conducive to improving the passing rate of bidding, but also easy to reduce the loss of various materials and effectively reduce the construction cost.

4. Application of BIM Technology in fabricated steel structure construction engineering

Taking a fabricated steel structure indemnificatory housing as an example, its total construction area is 13457.33 m2, the design standard structure is 29 floors, the average floor height is 3.3m, the total height of the building is 95.7m, the indoor and outdoor height difference is 430mm, the longitudinal length of the building is 32.7m, and the transverse length is 17.3m. The mixed structure fabricated steel structure residence is adopted [2].In the design, BIM Technology and Revit software are used for model creation, analysis and structural optimization design.

(1) Split component

Summarize the imported data through Revit software to make a three-dimensional model.Its main information includes building outline, steel structure information and construction materials.After local correction, dynamo in Revit software is used for visual programming of component splitting.Finally, the split and assembly of cast-in-situ components in the overall structure model are completed.

(2) Improve reinforcement information

In the process of engineering construction, it is necessary to continuously improve the structure and splitting of reinforcement according to the requirements of reinforcement layout process.By using the program again, the detailed parameters and material selection of

ISSN: 2664-9640

reinforcement are continuously adjusted and arranged.In the design of precast beam, special attention should be paid to the densification range of precast beam reinforcement and the maximum value of beam end.

(3) Layout of embedded parts

Strictly abide by the rules of layout of embedded parts. During construction, the embedded part of embedded parts shall be treated, and the design of reinforcement lifting ring shall be optimized to select a reasonable position.When the software is used, all associated parameter data of Yaojiang are input to improve the global parameters.

(4) Simulated construction

Due to the uncertainty of various factors in the construction process, the actual construction process may be different from the planned construction. Therefore, the most complex stage of BIM Technology is the simulated construction stage.Through the timeliner in Navis works, the three-dimensional model is visually displayed in four dimensions to clearly display the design intention, construction plan and current construction progress.The application of BIM Technology in fabricated steel structure high-rise buildings mainly includes site layout and construction simulation [3].

Site layout.Simulate the reasonable layout of components and site areas on the construction site through Revit.The position of the tower crane is compared and optimized by multiple schemes.

Construction simulation.BIM Technology is used to convert two-dimensional drawings into three-dimensional visual models in Navis works to optimize the construction scheme and structural layout from subtle points, such as the intersection of pipelines.Avoid all kinds of losses caused by modifying the scheme during construction.

5. Concluding remarks

The application of BIM Technology in fabricated steel structure construction engineering represents the integration of modern construction industry and information technology.The information integration modeling ability of BIM is the technical basis of fabricated steel structure building, and the large-scale application of fabricated steel structure building engineering promotes the renewal and development of BIM Technology.With the technological upgrading and industry development of the construction market, more data acquisition and research work will be incorporated into the application of BIM Technology. BIM's big data platform will have broader market application prospects, and BIM Technology will be combined more deeply and perfectly in the construction industry.

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