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Construction of Intelligent Platform for Architectural Engineering Design and Planning Using Building Information Model

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Abstract:With the advancement of science and technology and the development of the times, building information modeling (BIM) technology has broad application prospects in the field of construction. Building Information Modeling (BIM) technology is a relatively advanced visual technology. It can express the overall information of the building in the form of a three-dimensional model through computer integration and analysis, which leads to increased construction difficulty and requires BIM technology to improve its construction. quality. Based on this, this article studies and realizes the application of BIM technology in the intelligent construction of building structures from the perspective of parametric design, whole-process construction control, and intelligent information management platform.

Keywords: BIM, Intelligent planning platform, Architectural engineering design, AI

1. INTRODUCTION

The informatization management of intelligent construction projects is a complex and meticulous management work. The scope of management includes contract management, construction technology, construction cost, project quality and safety, and construction schedule. Because traditional information management cannot effectively achieve the integration of information, and the above-mentioned management content is scattered in different functional departments such as overall design, construction team, quality supervision, operation management, etc., it is difficult to coordinate the information of the entire life cycle of the project. operate. Before the installation of construction equipment, it is necessary to review and manage the project contract, including the actual amount of the project, the changes caused by emergencies in the construction process, the supply of raw materials, the use of equipment, the evaluation of the project goals, etc. With science and technology and people's lives with the improvement of the level, architecture is no longer a mere use space with a certain function, and architectural works with complex forms continue to appear [1-6].

In the field of contemporary architecture, architecture is inseparable from the support of information technology from design, construction and even operation. With the complexity of building forms, the increase of super high-rise buildings and large-span spatial structures, building data is also rapidly expanding. These huge amounts of building data that have grown over time can no longer be extracted, analyzed, and managed in a relatively short period of time through commonly used software. Obviously, the construction industry has entered the "big data era". James O'McKinsey's wife McKinsey pointed out: "Data has penetrated into every industry and business function area today and has become an important production factor. People's mining and application of massive data indicates a new wave of productivity growth and consumer surplus. s arrival." [7-12]

In the history of engineering construction development, the design and construction of ancient buildings were undertaken by different craftsmen. With the development of social productivity, the scale of the project is getting bigger and bigger, the degree of technical complexity is getting higher and higher, and the division of labor between design and construction appears. my country's construction industry is an important material production sector of the national economy with a large overall scale. Under the current engineering construction model, design and construction are combined to a certain extent, but most of them are still in different professions and are undertaken by different units. Under this traditional mode, many problems have been brought about, mainly manifested in: under the influence of separate bidding for long-term design and construction, the entry time and requirements of design and construction units are different, and the design and construction stages cannot be well overlapped. On the one hand, there are problems with the constructability of the design scheme, which leads to frequent design changes; on the other hand, the division of responsibility and authority caused by design defects and construction errors is unclear, causing disputes [13-17].

The amount of information between departments has increased, and exchanges and transmissions are frequent. However, various professional information exchange media have limitations, and there are gaps in information between departments, which leads to the loss of information and it is difficult to integrate and collaborate. There are repeated operations in all aspects of the construction industry; in addition, it is difficult to coordinate information between different productions; these two problems make production efficiency low, resulting in waste of resources and costs. Numerous studies have proposed that the main solution to the inefficiency of the entire engineering construction industry is

to integrate the design-construction-management process to form an integration of design and construction, strengthen the connection between the two most important stages in the life cycle of the project, reduce design changes, and save money cost. The construction industry has entered the "Big Data Era". How to extract these data, manage quantity, and organize information, and provide services for architectural design, construction, management, and even business operations?

How to use big data to solve the problems that engineering construction and designers care about? These have become subjects that urgently need to be studied. Based on the background of the "big data" era, construction production methods also need to be changed, and lead to the generation of intelligent construction ideas and technologies [18-24].

2. THE PROPOSED METHODOLOGY

2.1 The Building Information Model

BIM has the characteristics of the parameterization, and its appearance provides a boost to parameterized design. The structural parameterized design based on BIM technology has the characteristics of parameterization, visualization and coordination. Through the modification of parameters, the design project is processed uniformly, which can effectively shorten the design cycle of the building and improve the communication effect. It is also in the process of intelligent construction. An important part. Parametric design includes not only the information of the geometric model, but also the information of the structural design data. Parametric design based on BIM model.

To complete the analysis and optimization of the structure by modifying the parameter values. Building production and information processing are two inseparable processes. The implementation of design and construction integration realizes the integration of building production process; BIM technology promotes the integration of project information processing process, and BIM-based design and construction integration construction passes information The integration of the processing process realizes the effective improvement and reorganization of the production process, provides a collaboration platform for different participants, and realizes information sharing, which can provide a good way out for the current dilemma of design and construction integration.

BIM is a technology and a process. It uses three-dimensional digital technology to store the physical and functional characteristics of each building component in a database in the form of a model, and nest the relevant connections of each component to provide " The scientific collaboration platform of "simulation and analysis" realizes information integration, sharing and project management. The definition can be understood from the following aspects. The application of BIM technology in engineering construction makes it possible to realize the integration of architectural engineering design and construction.

2.2 The Architectural Engineering Design and Planning

Publicly released relevant information such as regulations, regulations, and regulations; various price information, such as equipment price lists and material price lists; information on weather conditions, climate temperature, environment, etc. for the construction of intelligent building projects; information on the overall status of the project, such as Information on construction site, construction unit, project number, etc.; information on safe construction, safety inspection, safety penalty, review and rectification, etc.

The application of BIM technology in the integration of engineering design and construction is mainly to enable the cooperation and division of engineering design and engineering construction to achieve cross and balance, so as to finally realize the complementarity, interaction and optimization of engineering design and construction. The integration of engineering design and construction, from the perspective of the project contracting personnel, is the integration of the engineering design and construction unit; from the perspective of the contractor, it is the integration of the engineering design, construction process and overall strategic goals. my country's long tradition of separate design and construction has led to many difficulties in the implementation of the integration of engineering design and construction in our country. The main problems now include: the design and construction of construction projects mostly adopt the subcontracting mode; the disconnection between the design plan and the construction makes it difficult for the construction plan to be successfully used in the construction process; the construction staff cannot fully understand the design concept and requirements of the project , Resulting in the construction project not in line with the designer’s intention; the separation of construction and design, resulting in the design information needs to be transmitted through the media to reach the construction staff.

By using BIM, you can simulate construction, experience the construction process in a virtual environment, and eliminate possible problems. It is especially suitable for complex and important projects. According to the construction sequence of the hierarchical building components, an early project plan is developed in the visual simulation software. As the project progresses, BIM building components can be used directly to prepare more detailed project planning, construction plans.

2.3 The Intelligent Planning Platform for Construction Engineering

To use building information modeling technology to achieve the integration of engineering design and construction, it is necessary to solve existing problems, overcome numerous difficulties, and integrate building construction with building information processing. The integration process of architectural engineering design and construction is the unification and integration of architectural information and architectural production. It is to integrate the collected building information, design a building model based on the data, and plan and arrange the overall construction of the building. The building construction is carried out on the basis of the architectural design. And they have a unified operating platform, which is carried out under a unified plan. The traditional architectural design and construction are separated. The functions of the intelligent management platform mainly include the provision of a deep design database, the modular management of the progress of the component production stage, warehousing, and logistics, the integrated management of personnel, machinery, materials, construction methods, and the environment in the on-site construction stage, and the control of the construction progress and correction, and the handover of database during the operation and maintenance stage. When designing a building, designers should use building information modeling technology, build building information models based on specific data and information, and make a budget for construction costs, and then visually simulate later construction on this basis. Of course, the ultimate goal of the design is to allow the construction

personnel to carry out construction according to the design drawings. In order to achieve the integration of construction and design, the construction personnel are required to participate in the design of the construction drawings in the design.

3. CONCLUSIONS

Building Information Modeling (BIM) technology is a relatively advanced visual technology, which can express the overall information of the building in the form of a three-dimensional model through computer integration and analysis. Based on this, this article studies and realizes the application of BIM technology in the intelligent construction of building structures from the perspective of parametric design, whole-process construction control, and intelligent information management platform. First introduced the concept, development and application of building information model; then analyzed the necessity of architectural engineering design and planning.

4. REFERENCES

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