

## Research on the Modernization Trend of Balanced Development of Engineering Management Information Based on Bim

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**Abstract:** over the Years, China's Construction Industry Has Made Great Progress in Scale and Efficiency, But At the Same Time, There Are Also Big and Weak Problems, and the Level of Design, Construction and Management is Relatively Low. the Main Performance is: Backward Construction Progress, Low Efficiency, Unadjusted Major Projects, and Frequent Quality and Safety Accidents. Therefore, It is Necessary to Accelerate the Comprehensive Application of Bim Technology in the Whole Project, Such as Planning, Investigation, Design, Construction, Application and Maintenance, So as to Realize the Data Sharing and Information Management of the Whole Project and Promote the Quality and Efficiency of the Construction Industry. as an Important Infrastructure Construction, Bridge Engineering Plays a Very Important Role in the Whole Construction Industry. Due to the Complex Structure of Bridge Planning and the High Requirements of Construction Management Accuracy, the Requirements for Safety, Quality, Schedule and Cost of the Construction Process Are High. Compared with Other Projects, Bridge Engineering Has the Characteristics of More Open, Complex Construction Environment, Longer Construction Cycle and More Professional Units and Departments. This Causes the Problem of Information Fragmentation between Professionals and Organizations in the Process of Construction, as Well as the Traditional Extensive Management. It Can Meet the Needs of Mature Production and Management. Therefore, in Each Stage of the Project, the Shared Information among Different Participants Who Apply Different Application Software is Integrated to Provide Auxiliary Support for the Urgent Use of Bim Information Technology and the Project Implementation Management and Construction Based on All Engineering Information in the Life Cycle. Therefore, the Safety and Economy in the Construction Are Improved.

### 1. Introduction

In Recent Years, with the Progress of Science and Technology and the Improvement of Information Technology, Aviation, Shipbuilding, Automobile and Other Manufacturing Industries Use Advanced Production Technology and Information Technology, Greatly Improving Production Efficiency. as the Pillar Industry of China's Construction Industry, the Total Output Value Continues to Grow, But Its Use Level of Information Technology is Still in Its Infancy. According to Statistics, the Information Utilization Rate of China's Construction Industry is about 0.027%, the International Average is 0.3%, and the Gap is 11 Times[1]. At This Stage, China is Carrying out Large-Scale Infrastructure Construction. the Scale of the Project is Expanding and the Structure is Becoming More and More Complex. Especially Due to the Emergence of Large-Scale Projects, in Order to Manage Huge Investment, Technology and Risk, the Traditional Extensive Information Management Level is Difficult to Meet the Development Needs of Modern Construction[2]. Therefore, the Application and Development of Construction Informatization is Indispensable. Bim Technology Has Attracted Much Attention Due to Its Strong Visualization, Common Management and Information Integration in the Industry, and Has Become a New Method for the Development of New Buildings. Like the Latest Technology, in Order to Achieve Seamless Communication between All Banquets, Information Authority and Unique Determination, Bim Technology Can

Include All Kinds of Data of Quality, Safety, Progress and Cost in the Whole Life Cycle of Design, Construction, Operation and Maintenance. the Development of Bim Technology in China is Relatively Late and Gradually Recognized after the 2008 Olympic Games, But Its Development Speed is Relatively Fast. the Ministry of Housing, Urban and Rural Development is “the Outline of Construction Industry Informatization from 2011 to 2015”. It is Necessary to Make Clear That the Construction Enterprises and Bim Technology in the Construction Process during the 12th Five Year Plan Are Actively Popularized. Engineering Information Construction and Construction Industry Standard Work, Realize 4d Virtual Construction, Dynamic Management and Other Technical Applications [3]. and, as the Focus of Enterprise Development, Promote the Application of Bim in the Whole Life Cycle of Construction Projects. on February 24, 2017, in Order to Promote the Sustainable and Healthy Development of the Construction Industry, the Comprehensive Office of the State Council Issued the Document “Opinions on Promoting the Sustainable and Healthy Development of the Construction Industry”[4]. in Order to Improve the Quality and Efficiency of the Construction Industry, the Sharing of Construction Technology and the Improvement of Information Management Life Cycle Data Are Being Promoted. in Short, the Rapid Development of Bim Technology is the Result of Meeting the Needs of National Strategic Development, and the Further Deepening of Technology is the Inevitable Requirement of Information Technology Construction.

## 2. Theoretical Basis of Bim

BIM, building information model is a complete life cycle project or its components of physical characteristics, functional characteristics and management elements of the shared digital form. It is a multi-dimensional database based on computer three-dimensional digital model, including architectural design, structural design, pipeline equipment design, technical quantity statistics, cost calculation, application management and other information. Application.

### 2.1 Bim Related Standards

Foreign BIM standards were established earlier and developed relatively well. In 2007, the first edition of BIM standard issued by the United States basically established the development method of BIM standard. The second edition was released in 2012. It clearly defines BIM reference standards, definitions, terms and exchange information standards[5]. In July 2015, the building intelligence alliance released the third edition, covering the whole project process from planning and design to construction, construction and operation. China's BIM standards for construction projects have also been developing. In 2009, China Building Information Model Standard Framework Research Association was established. In 2012, the Chinese Academy of bachelor, an institution related to architectural research, formulated the draft of “unified standard for demonstration application of construction engineering information”. The standard system has been established in several aspects for the establishment, application and management of building information model, which runs through the life cycle of the whole construction project. In December 2016, the Ministry of housing and urban rural development issued the National Standard No. 1380 and approved the “unified standard for application of building information model”. In BIM, the configuration level standard of application field specifies model structure, extension, data interoperability, model application and many other aspects [6].

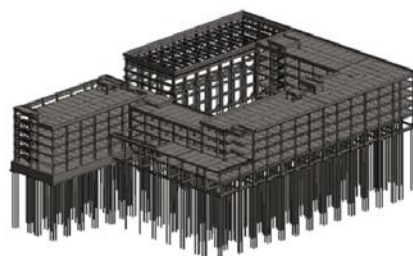


Fig.1 Structural Model of Civil Engineering Institute

## **2.2 Bim Related Software**

BIM Technology includes the whole life cycle of the project and the application of participants in various stages[7]. This specific value cannot be implemented without supporting various applications. As shown in the virtual construction software, it mainly includes BIM core transformation software and other analysis software.

## **3. Bim Based Virtual Construction Technology**

### **3.1 Technical Overview**

Virtual construction technology is a kind of digital visual method used in the simulation and analysis of project construction process. Mainly based on virtual reality, structural simulation and construction simulation technology[8]. The virtual construction technology can realize the joint operation on the computer, the comprehensive construction simulation of the construction project, find the construction problems, do not use the resources, and realize the three-dimensional simulation analysis of the actual construction project. Control the construction process and dynamic management in advance. The traditional virtual construction technology is realized to simulate the construction process without consuming any resources on the computer, but there are problems such as model, construction progress, resources and so on, which are not contradictory to the actual situation. The simulation results of the construction process show that the construction process can not guide the construction. The 3D visualization model of building height built by BIM Technology is unified and various data collection, and their size, material, function and location relationship can not directly reflect the unified correlation of digital model and can be updated in real time. The virtual structure based on BIM is mainly based on BIM model. In order to realize the visual management of building construction process, the dynamic simulation and analysis are carried out by using digital and parametric methods. Construction technicians can fully understand the construction project and ensure the safety of construction[9]. On the other hand, based on BIM construction model, engineering quantity statistics, engineering budget, dynamic analysis and calculation of engineering cost are carried out to ensure the management of cost and construction cost.

### **3.2 Technical Objectives**

Based on the BIM virtual construction technology, the security, quality, schedule, and cost of the construction, in order to ensure that the construction organization is based on the BIM model of optimized design, therefore, the information of the whole construction process is effectively managed and controlled. The value of BIM virtual construction of construction project information management depends on the value of information. BIM based virtual construction technology not only realizes the integration and sharing of information in all stages and professional fields, but also helps the management and control of the construction process. Pre control and dynamic management based on BIM information management, mainly according to other different application systems based on components, has formulated the conditions for all parties involved in the use of information in all stages on the basis of BIM of engineering information sent to information unification, in order to meet various stages of project organization management, exchange, sharing software, etc. With the support of BIM technology, project participants can extract and use model information from a unified model database according to their own responsibilities and requirements at different stages of project installation. Remove the information obstacles in each stage of the project, and manage the project information accurately and in real time between the units in the vertical direction.

Table 1 Project Information of Bim Model Fineness and Integration

Project stage	BIM model	BIM integration information	Model fineness level
Decision making stage	BIM basic model	Architectural appearance and function	LOD100
Design phase	BIM design model	Building performance analysis and construction drawing deepening	LOD200 LOD300
Construction stage	BIM construction model	Construction process simulation and cost control	LOD400
Operation stage	BIM operation and maintenance model	Building equipment, building space	LOD500

#### 4. Bim Based Virtual Construction Technology Architecture

The application of virtual architecture in BIM mainly includes two aspects: Deepening BIM model and BIM based information management. After the analysis, the virtual building software and its characteristics are determined, and integrated to build a building analysis software platform based on NavisWorks. The platform mainly uses C / S architecture to deepen the application of BIM model, including conflict detection, construction process optimization, construction management and other sub information models. According to the information model, simulate and optimize the construction process. Using the control. B / S architecture information integrated management platform, we independently developed BIM information management. Based on this platform, model information, quality, progress, safety information and other process documents can be managed and maintained. According to the analysis of application requirements, the technical architecture of BIM based virtual construction technology is mainly composed of data interface, data layer, model layer, platform layer and application layer. Based on BIM software, the corresponding data interface is developed to perform data conversion. IPC standard format model information, non IFC Standard format model made by non BIM software, and process information made by construction management software upload different forms of models and information to the platform. BIM data exchange interface and engine, using the BIM data information of the above-mentioned structure, the structure has not been processed with the file data information and process management information, and the information of IFC and non IPC forms has been transformed, so that the data of the data sharing platform has been transformed into layer merging. NavisWorks 4D construction as a platform, through the construction of conflict detection assistance to build 4D information model, process optimization, as well as the dynamic management of construction, to provide application layer data and model support, in order to respond, the requirements of each application software are formulated. Through the application of conflict detection, construction plan simulation, schedule management and other functions, the design, construction plan optimization, construction project management and precision management are realized. Based on the in-depth application of BIM model, the self-developed BIM application platform supports integrated interactive sharing, extraction and information management. At the same time, the data exchange relationship and business process should be clarified to realize joint operation. Provide real-time information query, data statistics and analysis, event history tracking and other functions to provide the basis for project construction management and decision-making. Provide management functions such as construction process, quality, conflict and change on application platform to realize effective management and control of construction safety, quality, scheduling and resource cost.

#### 5. Conclusion

The purpose of this paper is to study the quality management methods of construction projects based on BIM, the current situation of quality management as the starting point, the applicable BIM approach in quality management, and the research of big data analysis methods based on BIM

quality management. Moreover, a comprehensive quality management approach is based on BIM, such as the environment. As an example, project a is used to verify the implementation possibility of BIM based construction project quality management method in application and implementation.

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