Analysis of Design Characteristics of Intelligent System for Super High Rise Building Based on BIM Technology

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Abstract. The design and construction of super high-rise building is a very complex system engineering, which not only involves the intersection and integration of many disciplines and fields, but also involves the management of personnel in various disciplines and fields. Traditional system design and building mode are difficult to effectively support the intelligent design and construction of super high-rise buildings. Based on this, this paper first analyses the concept of BIM Tech and its application characteristics in super high-rise building engineering, then studies the application of BIM Tech in the intelligent system design of super high-rise buildings, and finally gives the design and analysis of intelligent system of super high-rise buildings based on BIM Tech.

Keywords: Intelligent System, Super High Rise Building, BIM Tech

1. Introduction

With the iterative growth of social economy, a variety of infrastructure construction has made remarkable progress, especially various modern buildings represented by super high-rise buildings have sprung up and become a display and image representative of the development level of each city [1]. The design and construction of super high-rise building is a very complex system engineering, which not only involves the intersection and integration of many disciplines and fields, but also involves the management of personnel in various disciplines and fields. The traditional design and construction mode of sword building is difficult to meet the construction needs of super high-rise buildings. It is urgent to carry out system design and integration based on new tech [2]. On the other hand, building intelligent tech in recent years is also constantly improving and maturing, which makes it gradually show greater advantages in the system design of super high-rise buildings, and has gained more and more attention and research.

In addition, the design information of super high-rise building is huge, and involves multi-dimensional and multi-dimensional collaborative design [3]. There are practical problems such as communication and coordination difficulties, engineering quantity statistics difficulties and other practical problems, which bring a lot of inconvenience to the normal development of super high-rise building projects. With the gradual maturity of intelligent tech represented by BIM Tech, it has played an important value and advantage in the intelligent system design of super high-rise buildings, and has
become an indispensable important tool and application carrier in the whole life cycle of current super high-rise building system.

At present, many buildings still use the traditional system design and building mode, which not only can not directly show the actual implementation effect of the building system design plan, but also affect the decision-making efficiency of the management personnel, and there are many engineering changes, which makes it difficult to deal with the sudden changes of various environments, and has no access to real-time information, which affects the decision-making and effect of system design and construction [4]. In this context, based on BIM three-dimensional model, the intelligent system tech is used to express the information of all stages of the life cycle of super high-rise buildings, and effectively integrate the Internet of things, AI and other multi-agent systems to realize the intelligent system design of super high-rise buildings.

Compared with general buildings, the users of super high-rise buildings have more stringent requirements on the internal and external environment of buildings, and it is more difficult to solve the problems. Due to the obvious advantages of BIM tech in the following figure 1, BIM Tech has great application potential in the intelligent system design of super high-rise buildings. In order to ensure the safety and comfort requirements of the building, it should to fully apply BIM Tech to realize the systematic and scientific design and construction of the building, better realize the analysis and design of the building, and improve the interaction of the design process. Therefore, it is of great practical value to study the design characteristics of intelligent system of super high-rise buildings based on BIM tech.

![BIM Tech Advantages and Characteristics]

**Figure 1.** Advantages and characteristics of BIM tech.

2. The concept of BIM tech and its application feature in super high-rise building engineering

2.1. The concept of BIM tech
The utilization of BIM Tech is mainly to use digital model to carry out the auxiliary design and construction of the whole life cycle process of planning, design, construction and operation of super high-rise buildings [5]. BIM Tech is generally used in complex and important projects represented by super high-rise buildings, so as to achieve better investment return ratio. BIM contains all the first mock exam items, including geometry, physics, and function and performance information. The participants of super high-rise building projects can collaborate and utilize this information in the same stage of the project at all stages. BIM model can be used to calculate, analyze and simulate various types and specialties of super high-rise building projects.

2.2. Utilization characteristics of BIM tech
The utilization of BIM Tech in the construction of super high-rise buildings requires the organic integration of BIM model of engineering construction with the data information in the process of survey, design and construction, so as to realize the parametric creation and display of BIM model. Secondly, BIM Tech integrates several aspects of engineering information and other information management systems as shown in Figure 2 through standardized utilization interfaces. In addition,
coordinate the needs of all parties involved in the construction of super high-rise building on a unified platform to realize the management and utilization of the whole life cycle of engineering construction.

![Figure 2. BIM information of super high rise project construction integration.](image)

In addition, BIM has been applied in the design, construction, maintenance and management stages of super high-rise buildings, and the corresponding utilization software has become mature, and its utilization value and utilization potential have been verified. After the utilization of BIM tech reaches a certain degree of maturity, the project efficiency can be greatly improved.

2.3. Key technologies of BIM utilization
The key technologies of BIM utilization include 3D digital tech, visualization tech, 3S tech, VR tech, Internet of things tech, cloud computing tech, information management platform, digital construction system, database tech and network communication tech [6]. Among them, the 3D collaborative design of computer BIM is a process of knowledge sharing and integration, which can share data, information and knowledge. Secondly, BIM visualization tech turns digital information into intuitive, graphic and image information. The integration of BIM and Internet of things tech is mainly used to collect the original construction information. 3S tech is the centralized display platform of BIM achievements.

3. Utilization of BIM tech in intelligent system design of super high rise building

3.1. Utilization of BIM Tech in intelligent system design of super high rise building
The specific utilization of BIM Tech in the intelligent system design of super high-rise buildings involves the owners / developers, architects, project managers, draftsmen, structural engineers, plumbing engineers, suppliers, general contractors, construction drafters, subcontractors, property managers, etc. These personnel use BIM Tech to complete the process of building drawings, structural analysis, water heating and power design, business collaboration, effect drawing production, engineering calculation, construction management, energy consumption analysis, building acoustic analysis and sunshine analysis of super high-rise buildings. BIM can be used to calculate, analyze, design, information management and recheck of super high-rise buildings in the early, middle and late stages of construction.

Firstly, at the level of building visualization, 3D modeling, parametric components and building information fusion are used to analyze the structure, lighting, energy efficiency, flow / emergency evacuation, acoustics and optics. Secondly, BIM is used to complete the process of information calculation, automatic data extraction, construction engineering budget estimation, construction progress visualization, scientific construction management, cross discipline data sharing, building information transmission and collision inspection.

3.2. Advantages of BIM Tech in intelligent system design of super high rise buildings
First of all, in the design stage of intelligent system of super high-rise building, BIM Tech can realize the expression of 3D complex space form. Generally speaking, the material or structure of super high-rise building is very complex. Through the utilization of BIM Tech, it can realize accurate and detailed 3D model modeling and management, which is easy to construct. BIM Tech is helpful to carry out
collaborative design, conflict and collision checking, and automatically coordinate changes through parametric modification engine and associated changes. Secondly, BIM can also carry out a variety of analysis, such as structural analysis, energy saving analysis, cost analysis, space analysis, volume analysis, effect drawing analysis and so on.

In addition, in the construction stage of super high-rise buildings, the utilization of BIM Tech can provide information about building quality, progress and cost, and directly process and construct without paper. It also helps to carry out visual simulation and management, promote building quantification, generate the latest evaluation and construction planning, improve the quality of documents, and save investment on process and management issues. As an important part of the whole life cycle of super high-rise buildings, the utilization of BIM Tech in the operation and management stage can synchronously provide information about the use or performance of buildings, occupancy personnel and capacity, building time and buildings, provide digital update records, and improve relocation planning and management.

4. Analysis of intelligent system design for super high rise building based on BIM tech

4.1. Visualization characteristics of BIM model for intelligent system of super high rise building

The BIM model of intelligent system of super high-rise building is established in architecture, structure, mechanical and electrical specialty. The energy consumption, structure, acoustics, thermal engineering and sunshine are analyzed by using the model information, and various interference inspection and specification inspection are carried out, as well as the engineering quantity statistics. Physical collision and regular collision check are carried out after using actual products in BIM model, as shown in figure 3 below.

![Figure 3. BIM model of electrical and HVAC for super high rise buildings.](image)

4.2. BIM tech characteristics of intelligent system for super high rise buildings

The design of intelligent system for super high-rise buildings often involves many participants, so it is necessary to carry out centralized collaborative office. Through the effective integration of BIM to the information management platform, enhance the interaction, contact and cooperation, realize the collaborative management of super high-rise building project stage, and improve the construction efficiency. At the information management level, the utilization of BIM Tech can better control the quality, safety, contract, progress, in-depth design, and daily office information in the construction process. BIM's IoT tech can realize intelligent vertical transportation management; carry out efficient and low-cost green construction, and save costs.
5. Conclusion
In summary, BIM Tech has great utilization potential in the intelligent system design of super high-rise buildings. The full utilization of BIM Tech helps to realize the systematic and scientific design and construction of buildings, better realize the analysis and design of buildings, and improve the interaction of the design process. This paper analyzes the concept of BIM Tech and its utilization characteristics in super high-rise building engineering, and studies the key tech of BIM utilization. Through the research on the utilization of BIM Tech in the intelligent system design of super high-rise buildings, its utilization advantages are analyzed. Through the design and analysis of intelligent system of super high-rise building based on BIM Tech, the BIM tech characteristics of intelligent system of super high-rise building are studied.

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