Research on BIM Collaborative Design and Electrical Safety Monitoring of Building Electrical based on Compressed Sensing Theory

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Abstract: With the increasing demands of industrial society for building electrical design and the promotion of science and technology to traditional manufacturing and design industries, Building Information Model (BIM) technology is widely used in building electrical design to meet the quality requirements of building electrical design solutions, and the development needs of the field of building electrical disciplines. Therefore, continuously optimizing the development of BIM technology in the field of building electrical design is crucial to the development of the construction industry. It is urgently necessary to study the application of this technology in electrical design of buildings. This paper gives a brief introduction to BIM technology, and illustrates the application of BIM technology in building electrical design and its advantages and disadvantages.

1. Introduction

BIM (Building Information Modeling) technology is an engineering digital design method that relies on computer aided equipment in the architectural design industry in recent years, usually referred to as BIM technology. Due to its information completeness, information relevance, information consistency, visualization, coordination and portability, the technology is increasingly valued by governments and enterprises in various countries, and has been obtained in the research and practice of European and American countries. A certain result. BIM technology realizes multi-angle and all-round civil engineering design and related supporting work such as related detection and pipe network control through the establishment of the overall virtual building information model. Deeply process the information existing in the actual engineering process, recombine and construct the corresponding building model as opposed to the real situation. Because of this convenient and reliable working mode, BIM technology can realize effective simulation and simulation of buildings, and its related fields are increasingly wide. At present, in the digital management of design, construction and management, there are a large number of successful examples of BIM technology application. From the technical characteristics, it mainly involves the following three outstanding advantages: First, it has a clear simulation, and it is often difficult for engineers and designers to express all the buildings directly and clearly in reality, and adopt BIM. Technology, which can simulate such designs that are difficult to achieve in the real world; second, the model can be visualized, because the mature BIM technology can express the designer's ideas based on the design needs and use the three-dimensional model, so the visualization is BIM technology. One of the features; third, with typical optimisation, BIM technology can be used in the process of building electrical design, such as the application of building electrical design, can complete the collision check in the process of implementation, this function is very practical, because Provides easy guidance for designers to judge whether there are conflicts in the design. Based on the above analysis, BIM technology has been widely used in China's construction field.

2. BIM application in building electrical design

When applying BIM technology to the design of power distribution systems for construction projects, it is generally necessary to follow certain operational procedures. First of all, it is necessary to carry out preparatory work according to the information and information currently available, including electrical family preparation, electrical settings, and view configuration of the

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power distribution system. Second, in the building power distribution system view, each type of power is set by security. Equipment, at the same time, collect related other dynamic conditions; third, use BIM software to create power lines in the corresponding files of the building distribution system, where it is necessary to point out that between different power facilities The internal logical relationship must be sorted out clearly. Fifth, the line layout that meets the requirements of the building power distribution system is generated. This step can be realized by automatic generation in the BIM software to complete the arrangement of the wires. Fifth, as mentioned above. BIM has a collision check function. In this step, this function is used to analyze whether there are conflicts in the various elements in the process of building power distribution system design. If problems are found in the basic elements such as switchboards and line attributes, they should be arranged immediately. Correct; finally, accurately identify the electrical equipment and wiring arrangements in the plan view, and clear the design reasonably express presented.

When designing a lighting system using BIM technology, the following processes are mainly involved: First, comprehensive analysis is required to accurately grasp the data and related information of the electrical lighting system. Based on these materials, the analysis is performed not only for each part but also for different parts. Coordination between the matches. Second, it is necessary to ensure that the interaction of data information is normal, and the information data of the lighting system and the control terminal can be smoothly communicated and exchanged, thereby ensuring the scientificity and feasibility of various schemes in the design process. In addition, in such an interaction process, it is required the design scheme is continuously optimized. Thirdly, the BIM technology is used to scientifically analyze the design scheme and actual construction conditions of the system, propose the scheme of lighting system design, and use the visualization function to display the three-dimensional model to provide guidance for the construction operation. . In short, the design of lighting systems through BIM technology can design efficiency, enhance system performance, and assist management and control of relevant personnel.

Under BIM technology, information exchange is smooth, data transmission is effective and accurate, so each department can be effectively communicated and connected, so that design errors and conflicts caused by poor communication can be reduced and avoided. Designed low error rate, high efficiency, optimization and other advantages. In building electrical design, BIM technology can not only ensure the design quality, but also shorten the design period and reduce unnecessary engineering expenses, thus achieving the purpose of reducing the electrical design cost of the building. Although BIM technology has obvious advantages compared to 2D CAD mapping, there are still some shortcomings: 1 Development is limited by the update of design software. The development of BIM technology relies heavily on the continuous updating of 3D design software. At present, BIM design software is not mature enough. The number of family libraries built into or available in the software is small and small, which brings additional workload to the designer because the components need to be re-modeled. Moreover, the software development has a long history, and there are still inconveniences in operation. For example, some family library contents cannot be accurately connected, and the size of the software is different from the actual construction. In the electrical profession, there are many kinds of equipment and suppliers are complex. Therefore, software developers are required to constantly update the family library, and actively cooperate with equipment suppliers to improve the details of the parameters. 2 Due to the popularity of software and the application of BIM technology, many models of BIM technology design can only refer to the relevant standards and depth of expression of 2D drawings, which restricts the development of BIM from the standard and makes the technology unable to play. Expertise." It is conceivable that in the future, it is necessary to call for the establishment of BIM technical standards, standardize construction design, and give full play to the advantages of BIM technology.

3. BIM-based security management system

The key to ensuring construction safety is to correctly identify all risk factors that may cause safety accidents before construction work, and to develop corresponding safety precautions. Make full use of BIM's six characteristics of digitization, spatialization, quantification,

comprehensiveness, operability and persistence, combined with relevant information technology, so that project participants can carry out three-dimensional interactive construction and construction simulation before construction. On a simulation platform with clear structure, easy to use, universal and project-specific information, project participants can more accurately identify potential safety hazards, more intuitively analyze and evaluate on-site construction conditions and risks, and develop more reasonable safety. Preventive measures to improve and improve decision-making. At the same time, BIM technology can be used to dynamically identify potential safety hazards during the construction process and adjust the construction plan in time.

Identification of hazard factors The BIM system contains information on the building components and construction schedules. The schedule contains information on all activities and forms a 4D model that can effectively identify potential hazards at the construction site. For example, H. Yang et al proposed an RFID-based hazard identification system for safety management and accident avoidance at the construction site. Hazardous area division In the dynamic construction simulation process, according to the hazard source identification results, the visual model is used to divide and manage the regional hazard level at different stages of the project, and the corresponding evaluation results (including the affected area and degree of influence) are fed back to The model interface uses four colors of red, orange, yellow and green to describe the regional hazard level to guide the construction and specify the construction activities prohibited under each safety level, which can effectively reduce the safety accident caused by the unclear danger zone. For example, during the construction process, the corresponding level of affected area and the prohibited procedures and behaviors are specified for each level of excavation, such as non-loadable, non-stationable, non-parkable machinery. Building construction safety management system based on BIM is the classification of dangerous areas around the foundation pit and its corresponding prohibited behavior. Classification of dangerous areas around the foundation pit and corresponding prohibited behaviors. Hazardous area classification for foundationation excavation surrounding and corresponding prohibited behaviors Construction space conflict management concentrates a large number of machinery, facilities, materials and people in the limited space of the construction site. At the same time, due to the complexity of construction engineering, it often occurs in the same work space. Work conflicts between different types of work occur, resulting in frequent safety accidents, so predict and rationally arrange the space occupied by construction activities, and plan to use site resources and work space effectively to shorten the construction period, reduce cost waste, and reduce Safety incidents are very important. BIM technology can realize static inspection design conflicts, dynamically simulate the space requirements and boundary ranges of each process with progress, and effectively solve the construction space conflict management and control, effectively reducing the occurrence of object impact, mechanical damage and other accidents. Safety measures in the integrated safety management system based on BIM technology, safety measures can be automatically proposed to protect construction activities or to avoid the occurrence of identified hazards. These measures are from SOPS (safe operating procedures). Extracted out. SOPS is independently developed by security personnel based on the security special program, through the security management platform developed by BIM, and can be continuously updated dynamically according to changes and needs of the construction site. 5) Safety evaluation the hazard factors and safety protection measures identified in the virtual construction can be evaluated by safety analysis methods such as analytic hierarchy process, Monte Carlo, fuzzy mathematics, etc. If it is reliable, it can be executed if it exceeds safety. The construction safety special design will be returned, the safety measures will be re-planned, and the BIM construction model will be adjusted. The safety evaluation will be carried out again until the safety requirements are met before the next step can be carried out.

4. Conclusion

With the continuous development of BIM technology in the field of engineering and construction, the application of BIM technology in building electrical has become the trend of the times. The application of BIM technology in building electrical has also been widely concerned by electrical

designers. The characteristics of BIM technology are to make the design refined and visualized, enhance the synergy between professional and professional, reduce the occurrence of design conflicts, etc., and pipeline integrated collision detection is a highlight of BIM technology application. BIM still has some problems in the design and application of actual projects. First of all, BIM software has not yet formed a unified design standard that meets the requirements of construction. The level of localization still needs to be improved. Secondly, the content of the family library is not perfect enough, and designers need to continuously add updates according to actual needs. Finally, BIM data and other analysis and processing software Compatibility has yet to be optimized.

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