Discussion on the Application of BIM Model in the Selection of Key Areas of Building Fire Protection

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Abstract

Along with the continuous growth of China's construction industry, the incidence of fire safety accidents in cities is also rising, which has brought great challenges to the development of China's construction industry. Due to the complexity of the high-rise building structure and the diversity of personnel evacuation, the damage caused by fires in different areas of the building and the time of personnel escape are not the same. The key fire zones of the building can be identified by identifying the fire scene with the longest escape time. How to determine the key areas of fire protection through evacuation simulation is the focus of building fire protection. In recent years, the continuous development of BIM technology has not only brought new computer technology to the construction industry, but also provided new ideas and methods for building fire protection. This paper studies the application of BIM technology in the simulation analysis of building fire protection, and finds the evacuation scene with the longest evacuation time through simulation analysis to find out the key fire protection areas of the building and provide key monitoring objects for fire safety.

Keywords

BIM, fire protection, evacuation.

1. Introduction

With the reform and opening up, China's economy has developed rapidly. Advanced construction technology and strong economic strength have allowed a large number of high-rise buildings to emerge, such as airports, railway stations, super high-rise buildings, commercial buildings and so on. At the same time, the incidence of fires in Chinese cities is also rising. A large number of fires not only caused great losses to our economy, but also threatened people's lives and property. At the same time, the issue of building fire safety has always been one of the most concerned issues of the people. Therefore, improving the fire safety work level of buildings has become one of the most important tasks in the construction industry. In recent years, with the application of BIM technology, traditional building fire has ushered in new technology. The visualization, synergy and simulation presented by BIM technology provide more convenient science and technology for building fire protection.

2. BIM Modle

BIM is the English abbreviation of “Building Information Modeling”, which is “Building Information Model”. It includes all the data of different stages of the project in a 3D model. It is a popular method of building design, construction and management in the industry. BIM is an intelligent 3D model that

can contain all the data involved in the project's life cycle. The most important thing is that it can improve the efficiency and precision of construction projects. The BIM technology digitally expresses information such as building entities and functional characteristics parameters. The three-dimensional information model of buildings built by BIM technology can include information on the participants' data, building structure, spatial location, and supporting equipment at various stages of the building. In the model, integrated management and life cycle management of all building information is achieved. For BIM, the key is to use digital mode to realize the information integration and management of the entire building project, so that people can master the whole process of the project in detail, and establish a three-dimensional working environment based on parameterized and multi-view building components. Effectively integrate designers, architects, construction parties, etc., thereby improving the quality of construction projects, reducing unnecessary losses and increasing project benefits [1]. At present, BIM has been widely used in construction engineering, and has achieved good results in architectural design and fire evacuation simulation. The use of BIM technology can not only comprehensively monitor the dynamics of the building, but also provide a powerful basis for building fire protection work. Therefore, BIM can play a huge role in both construction and fire protection work.

3. Construction fire safety management

Building fire safety management is a scientific, technical and professional job. Objectively understand the fire safety management work, and use advanced technology and methods to minimize the frequency of fires and reduce the damage caused by fire. At present, with the development of the construction industry, more and more complex projects have emerged, an d the building functions are constantly expanding. New building materials are also being applied continuously. Large-scale equipment such as electric power and heat in various regions are also The continuous increase, especially in the high-rise buildings in the city, due to its many functions, complex structure, user-intensive characteristics, resulting in high-rise buildings in the safety of the hidden dangers, especially prone to fire accidents [2]. Faced with increasing fire safety risks. Building fire safety management must be based on the principle of “prevention first, fire protection combined”, effectively combining fire prevention and fire suppression into one. While improving the fire prevention capacity of buildings, it is also necessary to prepare construction fires as early as possible.

4. Application of BIM model in analysis of building fire protection mode

The BIM model is an intelligent, informative 3D building model. It can effectively combine the building data resources and processes of different links, and then comprehensively depict the entire building process, which can provide effective decision-making basis for users who use BIM technology [3]. Taking the application of BIM technology in building fire protection as an example, the user can accurately grasp the location of the fire protection facility, the daily maintenance of the fire protection equipment, and formulate the fire emergency response mechanism according to the relevant building information model according to the building information model. And with the support of BIM technology, it can effectively carry out information management and data collection. In the context of the information age, computer simulation technology has become an important method for fire simulation in fire protection work. In the use of computer simulation software, in order to accurately simulate the occurrence of fire and accurately simulate the real situation, it is necessary to correctly construct the physical space model, which should contain all the information involved in the fire situation, such as the location of the fire extinguishing equipment. And functions, personnel distribution, types and quantities of combustibles, building structure, etc. Only the real construction of accurate models can make the results of the fire simulation more realistic. Therefore, this article will discuss in detail the process and method of using BIM technology for fire simulation in the following sections, and will explain how to combine fire protection design and fire simulation into the application of BIM technology, so as to fully exert the potential of BIM technology.

4.1 Building a building information model.

4.1.1 Preparation for the creation of building information models.

(1)Establish a reasonable software and hardware working environment, such as a network environment that can work together, and a hardware facility environment that can meet the modeling requirements. (2)Learn more about modeling work, including checking construction drawings and electronic drawings, familiar with construction organization design and construction drawings, familiar with modeling software, and so on. (3)Develop relevant model standards. If you want to improve the efficiency of modeling work and ensure the accuracy of collaborative work, you must develop a unified standard of regulation. (4)model split. In order to improve the running speed of the workstation, it is necessary to carry out the model splitting, and the splitting of the model needs to be carried out according to the structure, the building, etc., and the model is guaranteed to be within 20 MB. (5)Set model depth. As the demand for building information changes at different stages of the project, the depth of natural modeling will also change. Therefore, in the process of setting the depth of the model, the requirements of the building information model at different stages must be considered.

4.1.2 Process of building information model creation.

Firstly, the elevation and the grid of the model are drawn. In the process of drawing the grid, correct and reasonable setting of the elevation and the grid can not only ensure the accuracy of the position information of the components, but also facilitate the addition of the later components, and also ensure the simulation of the fire. accuracy. Secondly, add the floor, wall, column and other parts of the corresponding position in the drawing to the existing elevation and the grid. Finally, add the magic information necessary to simulate the fire and improve the BIM model.

4.2 BIM Building Fire Safety Simulation.

The following is the fire simulation process in the BIM model:

(1)Extract the most valuable and effective information from the model and import it into the fire simulation software, including component location information, component fire prevention parameters, fire protection facility properties, fire protection facility location, and flammable distribution. (2)According to the actual situation of the building, plan the corresponding fire source location, and then set the simulation time of the fire site, so that the fire simulation can be accurately implemented. (3)Detailed analysis of the final fire simulation data, analysis of relevant conclusions based on the simulated data. Apply relevant conclusions and data to fire protection design.

In the simulation of evacuation personnel, BIM technology can accurately obtain the best escape route, detect the safe channel carrying capacity, obtain the personnel escape time, and evaluate the rationality of the building design. Compared with the traditional evaluation method, the accuracy of the evaluation is greatly improved, and accurate and favorable data for the subsequent actual fire protection work is provided. However, for relatively large-scale buildings, it is necessary to construct intricate three-dimensional models to meet the two-dimensional and simplified three-dimensional unsatisfactory simulation results, and then simulate effective measures to properly handle fires, effectively ensuring people's life and property and construction quality.

4.3 Fire Management

According to the application of BIM model in building fire simulation, building information model can effectively store fire data, provide accurate data support for fire work, and improve the efficiency of fire work [4]. Among them, the personnel evacuation model provides detailed evacuation routes, greatly improving the speed of evacuation and providing powerful assistance for rescue work. Secondly, according to the evacuation time of the fire in different areas, the key fire-fighting areas are determined to provide key monitoring targets for fire prevention work. At the same time, the fire field model can provide detailed structural information and the location of flammable materials, providing an accurate basis for the on-site command of fire protection work.

5. Conclusion

In summary, BIM technology plays an important role in building fire simulation analysis and has huge potential advantages. With the advancement of the times, there are more and more giant buildings and the structure is becoming more and more complicated. Fire fighting is also getting harder and harder. The emergence of BIM technology not only improves the efficiency of construction projects, but also improves the safety of construction projects. The use of BIM technology to select key fire-fighting areas can help people scientifically arrange the fire-fighting facilities and patrol the fire-fighting areas, thus providing tremendous help in safeguarding people's lives and property.

Acknowledgements

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