Study on Application of BIM Technology in Water Supply and Drainage Design of Construction Engineering

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Abstract. In water supply and drainage work of construction engineering, its design is very important. In particular, BIM technology can maintain the implementation quality of the overall in water supply and drainage work of construction engineering. This paper, based on the understanding and analysis of BIM technology, analyzes the specific content of application of BIM technology in water supply and drainage work of construction engineering, and illustrates relevant examples.

Introduction

With the continuous improvement of modern social and economic level, the water supply and drainage work of construction engineering keeps continuous progress and development, and the design of water supply and drainage engineering will play a very important role. If the selected design is more complex, it will be effects by various factors, the quality cannot be ensured, and various functions of the building cannot fully performed. Therefore, in order to make the total efficiency of buildings water supply and drainage design give full play, it is necessary to improve the design quality and promote the introduction of advanced technology.

Connotation of BIM technology

BIM technology is building information model, including architecture, engineering, etc. It is not only a management method, but also a construction method in the project. BIM technology is suitable for the design work of construction engineering. Use three-dimensional graphics, to integrate all the information as a whole, so as to achieve data model. The use of BIM technology also has many advantages. Its application in the construction design work is mainly the drawing design. In the traditional way, the drawing changes the use of delivery tools, but contents are not changed. BIM technology will be applied to the design of construction. It can not only promote the innovation of tool use, but also optimize the delivery content. By the use of BIM technology, both the design process and engineering design methods can be optimized. At present, in water supply and drainage design work, CAD is also widely used. During the use of this software, a number of aspects need to be improved. Because CAD software is to use two-dimensional graphics to display, and in the design work, it needs to separate the work; therefore, it cannot achieve synchronization. The use of BIM technology is different. This technology uses three-dimensional graphics to display, and it can design the construction plans, and construction programs synchronously. At the same time, through the use of BIM technology, short-term benefits are relatively low, and with the promotion of technology, it can have a wide range of applications, also fully play its use effect. At the same time, if BIM technology is applied to the water supply and drainage engineering design, the relevant information will be stored in the database, which can provide reasonable conditions the model construction. Based on BIM database, the sharing of information resources is also achieved, especially in the design of water supply and drainage engineering, in the BIM database the relevant information can be queried. Use of this technology can provide greater convenience for the data collection work, but also promote the efficiency of water supply and drainage design. Based on the establishment of BIM database, the information will be fed back, and the relevant staff members will establish a certain link during the implementation of the work. This design behavior can not only achieve mutual coordination and

cooperation, but also promote stable promotion of the efficiency of the design of water supply and drainage engineering [1]. Therefore, it can play a very important role in the design of the water supply and drainage engineering.

Application examples of BIM technology

According to the analysis of the design example of the water supply pipeline in the interior bathroom of the building, Revit model is used as the assistant in the background of the application of BIM technology to promote the three-dimensional design process and the related methods so as to ensure the effective advice proposed for the design work of the relevant personnel.

Application in the placement of sanitary equipment

There is a big difference between traditional design and three-dimensional design. For example, in the development of design program, based on painting, reduce conventional design methods in the traditional design, including point, line, and surface. Under normal circumstances, directly take "family" as the main control element. In the design of the bathroom water pipeline in the building, the "family" element can be applied, especially some walls, pumps, doors, etc., and based on these basis, construct related models.

Application in water supply system construction work

The use of the Revit model is to use a project browser to design all the sanitary devices within the system. For example, choose a toilet, wash basin, etc. It is necessary to choose one of the water supply system options to ensure that the choice of water supply system can establish a link with other sanitary devices [2].

Application in generation of pipeline layout scheme

During the generation of the pipeline layout scheme, the Revit model is applied, and the sanitary ware items under the water supply system need to be selected to allow the system to automatically generate the layout scheme. In this case, there exist various types of layout schemes, and if the designer is not satisfied with the scheme, he can choose one of items to make modification. When the layout options are generated in the system, it is necessary to click "complete" after the modification work finished. At the same time, in the water supply system design and layout work, it also needs to be transformed into the steel pipeline, and the logical relationship will be changed into physical relations.

Application in sanitary ware and pipeline

Under the background of use of BIM technology, it is required add sanitary ware and pipelines in the design work. There are two ways for the actual implementation of the work. First, mainly design and edit water supply pipes, and add sanitary ware and pipelines in the water supply system to promote the realization of the logical connection of water supply system. Second, for some connections required to add sanitary ware, set a new pipeline to achieve the connection between the new pipeline and the pipe interface. In both cases, the first one is suitable the case in which sanitary ware and pipelines are added and the second is suitable for the case in which there are many pipelines turning points [3].

Main content of BIM technology in design work of water supply and drainage of construction engineering

Collaborative design

In the traditional way, design work of water supply and drainage of construction engineering uses CAD technology, but the use of the technology still has some deficiencies to some extent, such as all the relevant content required to be designed in the project cannot fully displayed, because in the design period CAD technology achieves the mutual reference. When some designers modify and

correct the drawings, some non-timely phenomenon will happen [4]. At the same time, when the project module to be designed is relatively large, greater delay will exist during some information transmission. Therefore, when CAD technology is applied to the design work of water supply and drainage, many problems are to be solved. For BIM technology, the use process has more advantages. The use of BIM technology can aggregate all the information and build an overall model for it. In case of use of BIM technology in the design work of water supply and drainage, the relevant design content can be pooled into the model, especially the size of the pump, the main power consumption and information of other elements can be read. During the design of the water supply and drainage engineering, the pump can be modified and the load can be calculated. At the same time, the use of BIM technology can also promote the integration of design content, to ensure the simple implementation of the design work. BIM technology can also design the water supply and drainage engineering model. The designer should reasonably modify the design work to promote the optimization of information. And other designers need to keep abreast of information and think about existing problems, which can not only promote the synergy of water supply and drainage design work, but also enhance the stable promotion of design efficiency [5].

Visualized design

Water supply and drainage design work is generally completed by CAD technology. All the information in the design work needs to be retrieved by using CAD platform, and displayed by various three-dimensional images. The work is complex on the whole, and based on the performance of three-dimensional graphics, it also needs to achieve the restoration of engineering entities to promote finishing and analysis of all kinds of information. The use of the technology is still relatively complex for the structural design, and in the information transmission process, distortion will easily occur, affecting the overall effect of the project. Therefore, BIM technology is necessary to be applied in the construction project, and use three-dimensional images to represent the information in the design work. In case of use of BIM technology, information access methods are more intuitive, also able to reduce the distortion during the transmission of information, and maintain the integrity of information. At the same time, the water supply and drainage design work, is based on civil engineering design. The design work is separated from each other between the floor, to promote the independence of water supply and drainage works. When a part of it needs to be modified, it will affect the overall quality. In the traditional way, the implementation of the work is analyzed based on the actual situation of the floor, but this layout is more chaotic, and its modification requires changes to the overall design drawings, the implementation of which is more troublesome. Therefore, in the data model, use of BIM technology, not only can help in real time understand relevant information, but also promote the effective implementation of the modification work [6].

Comprehensive design of pipeline

During water supply and drainage engineering design work, BIM technology enables staff to conduct a comprehensive design of the pipeline. During the period, it can help them accurately access the clearance height of the pipeline and also promote the smooth implementation of the water supply and drainage design. At the same time, during the process of analysis on the design drawings, they can study some problems, conflicts and contradictions. In addition, the designer also can conduct reasonable detection based on the existing problems, to promote the smooth implementation of the adjustment [7].

Material table design

For the statistical work of the material table, the traditional way is to use CAD technology to implement measurement, statistics and preparation work, but in fact, some errors will occur, and the overall complexity of the work will be increased. After the modification of drawings is completed, statistics of the relevant data is required. For the use of BIM technology, its database can provide a favorable basis for the implementation of the design work, therefore, during the preparation of the material table, it can help find more information and also reduce the cost for the water supply and drainage engineering design work [8].

Parametric design

For Revit model, the information is presented in the form of two-dimensional and three-dimensional graphs, and some parameters in the model get modified. At the same time, during the design work, the use of Revit model can also update the modified information to ensure that the model in line with the actual development situation in the practical application. For example, apply Revit model into the water supply and drainage design work, according to the plane design, allocate reasonable drainage nozzles, fire hydrants and so on. However, the number of these devices changes according to the data in a certain case, therefore, reflection on the number needs to use the material table to ensure that relevant requirements can be met during the update work to promote the accuracy of engineering design. During the parametric design work, the use of BIM technology for water supply and drainage engineering design can help calculate the water force. The implementation of this work is done by professional software, so, during the operation, professional staff is required. BIM technology can directly access all kinds of information and modify the designed water supply and drainage pipeline, so as to promote the optimized development of water supply and drainage engineering.

Installation simulation

The design of the water supply and drainage engineering is faced with the greater complexity. Especially the installation work of lines, pipes and ceiling is complex in the implementation process. Therefore, before the overall construction, its design is required. During the period, execute according to the water supply and drainage engineering design program and ensure promotion of the quality of water supply and drainage engineering. In case of application of BIM technology into design of the water supply and drainage engineering, the model is required to be installed, and the maintenance will be analyzed during the practical application. According to the time dimension, reasonably compile the installation schedule and ensure the improvement of the planning work comprehensively, so as to provide effective guidance for the implementation of the engineering. In the whole case, it can not only facilitate the simple implementation of the installation work, but also ensure the stabile promotion of the construction efficiency [9].

Conclusions

From the above analysis and research, it can be found that BIM technology has more advantages. Especially the application of BIM technology into the design work of water supply and drainage of construction engineering is also of great significance for the development of modern design. The application of BIM technology can provide effective implementation programs for the design work and also promote the full use of the application platform. At the same time, the application of BIM technology can also provide a good operation way for the water supply and drainage design work, to reduce the burden of design work and maintain the harmonious and stable development of the society.

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