Application of Computer Software in Civil Engineering Technology

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Abstract. The development of computer technology promotes the reform of engineering industry. People gradually realized the convenience of computer technology. Civil engineering is the main specialty of construction engineering. Civil engineering includes many kinds of engineering. With the emergence of computer software development technology, many problems in civil engineering have been solved. Experts have developed a lot of computer software [1]. These softwares are widely used in civil engineering technology. This paper mainly lists the application of four kinds of computer software in civil engineering. In this paper, the main application skills of computer aided design, finite element software, GIS software and virtual reality software are mentioned.

Keywords: Computer Software, Civil Engineering, Application

1. Introduction

In ancient times, ancient Chinese lived in caves. People at that time understood the concept of nest. Later, five, people left the cave. They learn to use tools to build their own houses. In the Qin Dynasty, the ancient people had learned to use art to design houses [2]. In the Qin Dynasty, the level of artistic design of houses was relatively high. Today, the design of our houses is ever-changing. This phenomenon shows that the development of civil engineering in China has a long history. With the progress of society and the development of the times, gradually found the traditional civil engineering construction problems. Now, we can finally use computer software to help complete the construction of civil engineering process.

Nowadays, the definition of civil engineering is very broad. Compared with ancient times, the construction steps of our engineering facilities are very simple. Moreover, our project quality is very good. However, the emergence of bean curd residue engineering leads many people to question the quality of traditional civil engineering design (see Fig 1). Experts put forward that the traditional construction standard of civil engineering has great limitations. Using the software development technology of computer, we can improve the quality standard of civil engineering construction process. This paper mainly analyzes four kinds of computer software for civil engineering design. I hope this article can provide readers with a lot of help.
2. Current situation and future development of Civil Engineering

2.1. World history of Civil Engineering
In the mid-19th century, concrete and steel had appeared in the world. People began to use concrete to build houses. With the rapid development of engineering technology, people began to build large-span buildings. Nowadays, many large-span buildings can be seen everywhere. At the beginning of the 20th century, people had the consciousness of building highway engineering. Until now, the United States has become the longest highway journey country in the world.

2.2. General classification of Civil Engineering
In China, civil engineering is mainly divided into structural engineering, bridge engineering, road engineering and water conservancy engineering. Structural engineering refers to housing construction and building construction. Bridge engineering has developed from suspension bridge to cross sea bridge. There is no doubt that China's bridge engineering is world-famous. Road engineering mainly includes Railway Engineering and highway engineering. Water conservancy projects mainly include the construction of dams and hydropower stations.

![Figure 1. Civil engineering drawing based on CAD software.](image)

2.3. The civil engineering will extend vertically
The land resources on earth are limited. The sudden increase of population leads to the reduction of land occupation per capita. Moreover, the cost of land use in some high-grade cities is very expensive. Many rural residents want to make a living in the city [3]. This form has caused a lot of land use costs, and the rising trend is faster and faster. Therefore, many cities have high-rise buildings. Civil engineering extends vertically.

2.4. Civil engineering will extend to the ocean
In order to reduce the impact of noise on residents, some foreign scholars suggest that the airport should be built next to the ocean. Some scholars have even developed marine aircraft. The construction process of civil engineering on the sea is very difficult. Scholars all over the world are thinking of various ways to build some engineering facilities around the ocean. Nowadays, the emergence of China's Cross Sea Bridge and undersea tunnel has shocked the world.
3. Analysis of the main application of CAD in civil engineering

3.1. Introduction to the application of CAD
Generally speaking, CAD is mainly used in the design of mechanical engineering. This kind of design technology generally includes two-dimensional technology and three-dimensional technology. Designers use two-dimensional drawing technology to show customers the virtual drawings of various projects. However, there are many contrast problems in this way. Some users do not understand the basic principles of two-dimensional drawing. As a result, many customers do not know the intention of 2D drawing. In order to help people more intuitive view of the project entity, many scholars study the application of 3D technology.

3.2. Difference between CAD and traditional civil engineering design
In the process of traditional engineering drawing design, the academic level of many designers is not enough. The error of their drawings is very big. This leads to a lot of civil engineering facilities, the safety risk is very big. When we use CAD technology, the computer can help us calculate various parameters of the drawing. Generally speaking, the computer can effectively ensure that the parameters of the drawing are accurate.

3.3. Combination of auxiliary technology and cost forecasting software
Designers can use auxiliary technology to draw virtual drawings of civil engineering facilities. After that, the designer shows the drawings to the developer. However, the implementation steps of this process are complex. Designers should learn to use cost forecasting software with auxiliary technology. The software includes market prices for different materials. It can calculate the market cost of different civil engineering according to the entity diagram of 3D software.

3.4. The application of auxiliary technology of civil engineering should be strengthened
CAD technology is generally used in the process of civil engineering drawing. However, many designers think that the computer design drawings are not perfect. The older generation of engineers think that the manual drawing technology can better show the designer's knowledge content. The main reason for this is the instability of parameter setting of mapping software. In addition, many CAD 3D software have no definite engineering standard. The application of these software technologies should be strengthened.

4. Analysis of the main application of finite element analysis software in civil engineering

4.1. Bridge engineering based on finite element analysis
The main part of bridge engineering design is safety control. Generally speaking, bridges are set between two commanding heights. Therefore, the designer must ensure the safety of the bridge in the use process. The finite element analysis software can establish the bridge model. It can simulate the shape change and dynamic response of the bridge in the process of stress. ANSYS software in the finite element analysis can simulate the stress of the bridge.

4.2. Dam engineering based on finite element analysis
The main function of the finite element analysis software is to simulate the force acting on the object. The forces on the dam at rest include the pressure of water, the load of water flow and some other forces [4]. Finite element analysis can divide dam project into many elements. It can analyze the influence of force on each element one by one. ANSYS software of finite element analysis software package can be used to analyze the main stress concentration area of dam.
Table 1. Analysis of the application of different computer software in Civil Engineering Technology.

| Computer software                  | Major function                        | Main features                      |
|------------------------------------|----------------------------------------|------------------------------------|
| CAD software aided                 | Mapping                                | 2D and 3D                          |
| Finite element analysis            | Project detail analysis                | Layered                            |
| Geographic Information System      | Geological analysis                   | Foundation analysis                |
| Virtual reality software           | Visualization model                   | The visual effect is remarkable     |

4.3. Foundation pit engineering based on finite element analysis
Generally speaking, the construction area of foundation pit engineering is relatively large and its depth value is very high. The finite element software can effectively simulate the parameters of foundation pit engineering. The software can help designers to choose the main way of foundation pit support reasonably. This selection method can ensure the safety checking of foundation pit engineering. In the area with many kinds of buildings and dense buildings, the way of foundation pit support determines the safety of the surrounding buildings.

4.4. Tunnel engineering based on finite element analysis
Compared with the above three kinds of civil engineering, the construction steps of tunnel engineering are very complex. Many tunnels are built at the foot of the mountain. This situation leads to the change trend of tunnel engineering stress is different. Moreover, in some specific weather changes, the stress changes of the tunnel are also different. The law of stress change of tunnel can be analyzed by using finite element analysis software. It can greatly reduce the safety risks of tunnel engineering.

5. Analysis of the main application of GIS in civil engineering

5.1. Geological investigation of Civil Engineering
GIS can effectively explore the safety of engineering foundation. It can draw two-dimensional geological graphics. Designers can also use drilling data to build 3D geological models. 3D geological model is more visible. Therefore, GIS is often used by designers in the process of geological exploration of civil engineering. Although our GIS software is not very developed, we can still roughly understand the hierarchical structure of the foundation.

5.2. Construction of engineering parameter repository
Repositories are also known as data management repositories. This link can be applied to data entry, parameter entry, project scheme entry and project scheme query. The powerful data management function of GIS can realize the associated storage function of drilling data and graphic data. Generally speaking, this kind of database has memory function. It can record the parameter data of previous civil engineering.

5.3. Geological analysis of layered foundation
Many civil engineering foundation structure is very complex. Designers can not clearly understand the hierarchy of the foundation. They can't guarantee the quality of civil engineering [4]. When designers encounter this situation, they will use GIS to analyze the structure of foundation layer by layer. According to the mechanical analysis of the soil structure of GIS, the software can help people more easily predict the security risks of the foundation.

5.4. Establishment of engineering geological contour
Contour map is a kind of commonly used engineering geological drawing. Geographic information system can establish discrete points with the same value of soil thickness. On this basis, the software uses solid lines to connect discrete points to form spatial graphics [5]. This function is generally used in the process of image expression of foundation geology. The use of isoline can help designers to analyze the safety and stress uniformity of soil structure.
6. The main application of virtual reality technology in civil engineering

6.1. Project presentation and report
Before building a large construction project, developers need to demonstrate the details of the project to customers. The bidding of project evaluation also needs the demonstration and explanation of design scheme. The virtual reality software with 3D technology has rich demonstration functions. He can build a virtual and real entity model. After establishing the model, the software can form the corresponding project report.

6.2. Visual planning process of Engineering
Many project developers do not understand the implementation process of the project. They can't understand the two-dimensional drawings of the project. This situation leads to many developers can not clearly know the intention of the designer's engineering design. Virtual reality software with three-dimensional technology can design engineering project as three-dimensional model in computer. This kind of model can view the detailed design of the project from different angles.

6.3. Visual expression of matters needing attention in civil engineering construction
Developers are more concerned about the safety of civil engineering project implementation. The design of construction scheme is an important link [6]. Generally speaking, there are many risks in the process of engineering construction. For example, the risk of working in a small space and the risk of working at height. Virtual reality system can express these risks through the model. The probability of its occurrence can even be predicted.

7. Conclusion
In order to facilitate readers to study the process of using civil engineering software, this paper briefly introduces the application of CAD software, finite element analysis software, geographic information system software and virtual reality software. These softwares are commonly used. Readers can explore the main application problems of other software in civil engineering independently.

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