Research on the Application of Computer Technology in the Construction of Civil Engineering Projects

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Abstract. As large-scale comprehensive engineering, civil engineering has the characteristics of complex technology, wide range and difficult management. Under the background that the construction of the civil engineering project is more and more difficult and the construction scale is more and more large, the traditional manual management mode has been gradually eliminated. At present, in order to ensure the construction quality and improve the construction efficiency, it has become the consensus of civil engineering enterprises to adopt flexible computer technology and highly information management system in each construction link of civil engineering. Therefore, this paper analyses the existing problems of civil engineering in planning and construction management, and illustrates the specific application of computer technology in civil engineering exploration, planning and construction management. On this basis, this paper explores the future integration direction of computer technology and civil engineering, and has made innovative research for the development of civil engineering towards a high degree of information and intelligence.

Keywords: Civil Engineering, Computer Technology, Construction Management

1. Introduction

Compared with traditional civil engineering, one of the most obvious development characteristics of contemporary civil engineering is the obvious improvement of the information level. The integration of diversified computer technologies has created a broader development platform for the development of civil engineering. Therefore, the development of civil engineering shows the characteristics of contemporary, diversified and technological. At present, there are more and more civil engineering projects in our country, and the construction scale of civil engineering is also growing, but the corresponding engineering management level and technical innovation level are relatively lagging behind. This kind of unbalanced development mode brings great difficulties to the management and construction level improvement in the process of construction.
2. Overview of civil engineering

2.1. The meaning of civil engineering

Generally speaking, civil engineering project work includes: the road, water, drainage and flood control engineering and transportation, etc.\(^1\). In the field of civil engineering, people once called all non-military civil engineering projects as civil engineering, but with the cross integration of various technologies and civil engineering, many subjects originally belonging to civil engineering have become a separate discipline type. At present, in a narrow sense, civil engineering, also referred to collectively as construction engineering, can be divided into bridge, tunnel, geotechnical engineering and railway engineering and other small-scale contents.

2.2. Existing problems in civil engineering

At present, engineering geology and foundation investigation technology are mainly field drilling sampling and indoor analysis test, which has certain limitations\(^2\). In order to meet the needs of modern large-scale construction and management, it is urgent to use diversified information technology to create new exploration methods.

With the increase of the difficulty of construction, construction tools, equipment and machinery supporting the civil engineering construction are developing towards multi varieties, automation and large-scale, and the construction process of civil engineering is increasingly moving towards mechanization and automation. Under this background, the construction system and organization management at this stage have also begun to apply the theories and methods of system engineering, and are increasingly scientific. This method can not only solve the construction problems under special conditions, but also make the past difficult construction projects relatively easy.

3. Integration of computer technology and civil engineering

3.1. The application of computer technology in geotechnical engineering

The rock is under the surface of the earth, which is usually difficult to be observed directly by the naked eye. However, computer simulation technology can show the process and content of the deep layer of rock and soil, and then produce great use and research value. For example, a university simulated the sedimentation of an estuary delta and set the conditions of the estuary, and then the monitoring software can be used to display the sedimentation area and the corresponding thickness of sediments of different sizes\(^3\). Generally speaking, this kind of experiment is very helpful to the construction of the port and the dredging of many rivers.

3.2. The application of computer technology in engineering survey

Surveying is the primary prerequisite for ensuring the accuracy of civil engineering activities, but surveying is not just about running on the construction site with measuring instruments, it also includes checking and checking of measurement errors and topographic map surveying, etc. However, there must be a lot of data to deal with in every civil engineering survey, which will take up a lot of time by manual calculation alone, and it is easy to produce artificial calculation errors. Using civil engineering surveying software, such as CASS, can solve these problems well. As shown in Figure 1 is an example of computer
technology in measuring structural vibration displacement.

![Graph](image)

**Figure 1.** Measurement of structural vibration displacement

3.3. The application of computer technology in civil engineering construction

In the construction process of civil engineering project, a reasonable construction organization and arrangement can bring good flow mode of capital chain and save construction period \([4]\). By using the relevant computer software, the construction organization can be better arranged, and the construction organization network diagram, construction organization bar diagram and construction layout plan can be drawn quickly and accurately. In this way, the construction enterprises of civil engineering projects can avoid the unreasonable arrangement of human resources and equipment in the actual construction, and can also greatly avoid the occurrence of the end result.

3.4. The application of computer technology in engineering cost

The implementation of each stage of civil engineering is inseparable from the calculation of cost, such as feasibility study, project evaluation, bidding, the project settlement, etc. However, due to the comprehensive impact of many cost issues such as people, materials, and machinery, the cost of civil engineering has always been difficult to calculate very accurately. In China, engineers usually use civil engineering cost software to evaluate the overall cost of the project \([5]\). The usability and accuracy of engineering cost software has a good reputation in the civil engineering industry. Its appearance can effectively avoid many human errors and greatly reduce the workload of cost engineers.

4. Analysis of the development prospect of computer technology in civil engineering

4.1. Integration of virtual reality technology and civil engineering

The construction scale of civil engineering is generally large and the construction time is long. In the process of construction, it is easy to be affected by various factors such as human factors and environmental factors. In addition, there are many links in the construction of civil engineering, and each link is closely related. No matter which link is wrong, it will seriously affect the overall construction quality of civil engineering \([6]\). Therefore, before formal construction, the construction enterprise can use the simulation reality technology to simulate the civil engineering construction site, and input all the data information involved in the civil engineering construction into the virtual reality system. Then the system will intelligently evaluate these data and make a suitable construction scheme according to the evaluation results. The research shows that the construction scheme made by the virtual reality system is more reasonable and comprehensive than that made by man. At the same time, by reasonably
calculating the construction cost and construction time of civil engineering, the virtual reality system can work out a relatively high cost-effective construction scheme. In addition, the virtual reality system will analyse each link of civil engineering construction independently and clarify the relationship between each link of construction, so as to ensure the construction of civil engineering step by step. Figure 2 shows an example of the application of virtual reality technology in civil engineering.

![Figure 2. Application example of Virtual Reality Technology in civil engineering](image)

**4.2. Using computer to monitor the construction process**

In the construction process of civil engineering, through the application of computer technology, engineers can control the construction site situation in real time. Network sensor can monitor the situation of the construction site in real time, and feed back all kinds of information of the construction site to the project management personnel through the computer network, so as to assist them to control the construction situation in an all-round way. In addition, the use of on-site monitoring functions is helpful for management personnel to discover various emergencies in a timely manner and quickly take corresponding measures to ensure the smooth progress of the project.

**4.3. Formulate perfect information technology management standards**

Expand the technology through GPS global positioning, information system and remote sensing system to further enhance the information construction of civil engineering. Civil engineering can use computer technology to explore the topography and accurately analyse the actual terrain standards. Then, according to the 3S technical standard, the remote sensing standard in the construction of the civil engineering project is determined. Finally, mark in a short time to determine the construction design scheme. The 3S information technology standard can realize high-precision, massive data statistics, rapid positioning analysis, and realize the standard construction of civil engineering.

**5. Conclusion**

To sum up, the management of civil engineering is a complex work. When managers work in practice, they should not only consider the quality and safety of civil engineering, but also control the cost of civil engineering projects as much as possible, which puts forward higher requirements for engineering management. Therefore, construction enterprises and managers must learn new knowledge from
diversified information technology to realize the deep integration of information technology and civil engineering, so as to provide a solid technical foundation for the construction and management of civil engineering in China.

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