Research on the Application of Digital Technology in Civil Engineering Survey Management System

Xiaowen Hu(✉), Ronggui Liu, and Zhongjie Jia

Nantong Polytechic College, NanTong 226002, JiangSu, China

Abstract. With the continuous development of science and technology, computer digital measurement technology develops rapidly. In engineering measurement, digital measurement technology plays a very important role, It is an important guarantee for the smooth development of engineering survey. This paper analyzes the requirements of civil engineering survey management information system, aiming to lay the foundation for the computer digital development of civil engineering survey management information system, and build a multi-agent, multi module, multi-stage computer digital engineering survey management system. So that the managers of engineering construction project fully realize the important influence of engineering survey management on project quality, progress and cost, and fully realize the importance of computer digital civil engineering survey management information system. Only by paying attention to the development of engineering survey management information system, can we promote its continuous improvement and give full play to the maximum benefits.

Keywords: Computer digitization · Civil engineering · Engineering survey

1 Introduction

Measurement plays a very important role in civil engineering. The inspection before construction and the measurement in the construction process also need to be carried out when installing equipment. After the completion of the project and the later inspection and maintenance work need to be measured. The role of measurement is to predict and measure. Through the collection of data to test, we can ensure that we can master the operation process of the whole project after checking. In the whole life cycle of civil engineering, there will be a large amount of and diversified engineering information. Managers need to use modern computer information technology and effectively use and manage the engineering information to realize the effective management of the whole life of the project. The engineering survey management is an important daily project management work. The effect of engineering measurement management has an important influence on the construction quality, cost control, construction period organization and management efficiency of the project [1]. In the early stage of the project, the project construction program and after the completion and acceptance of

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the project, the engineering measurement is essential. It can be said that the engineering measurement is necessary in the construction measurement The project has the ability of all aspects and full cycle influence. The work content contained in engineering survey is closely related to other contents in project management, and is connected with each other and supported. It is a technical control of project duration, quality and cost, and an important guarantee for the smooth realization of all objectives of project construction.

At the same time, the continuous development of computer digital information technology has constantly promoted the change of people's life and working style, and its influence in the construction of engineering projects is also more and more extensive, which promotes the continuous improvement of the digital information level of engineering project management computer, and plays an important supporting role in project management, even in some enterprises and some projects The development of information technology in the process has played a transformative role in the management, which is more systematic, comprehensive and integrated, and more attention to management efficiency, which is of great significance to the measurement management of civil engineering [2].

2 Civil Engineering Survey Technology

Engineering survey is a very important link in the whole construction project. It is the first step for an engineering project to proceed smoothly. The improvement of Surveying and mapping technology ensures the quality of engineering survey. So in today's social development, we should continue to study the modern measurement technology in engineering measurement, and better apply it [3]. In the continuous development of science and technology, measurement technology is also improving, and more widely used, such technology is applied to engineering measurement, so that its quality is enhanced at the same time also has a guarantee, at the same time greatly improves the efficiency of engineering measurement, so that it can be carried out very smoothly, to provide data support for the future engineering construction, it can be seen that the new technology of Surveying and mapping is of great significance to engineering measurement Quantity management plays an important role in better development.

3 Computer Digitization and Civil Engineering

3.1 The Influence of Computers

One of the most outstanding and greatest scientific and technological inventions of human beings in the 20th century is computer. The birth of computer has opened a new page for the history of human science and technology, especially in its indispensable civil engineering, which has a great impact on the development of human society, marking the unprecedented information age for mankind. Digital information management is the most widely used field of computer at present. Because of the massive storage of computer, a large amount of data can be input into the computer for storage, processing, calculation, classification and sorting.

3.2 Digital Engineering Survey Technology

With the rapid development of science and technology, measurement technology and methods are constantly changing. From the beginning of manual recording, manual calculation, to manual recording calculator calculation, until today's electronic recording, electronic calculation, greatly improve the efficiency and accuracy of measurement data processing. The comparison between traditional measurement method and computer measurement technology is shown in Table 1.

Table 1. Comparison between traditional measurement method and computer measurement technology

Data processing method	Using tools	advantage	shortcoming	Conditions of use	Development prospects
Manual calculation	Manual calculation	Low cost	The calculation efficiency is low and the error probability is high	A small amount of calculation	Auxiliary calculation
The computer combines many kinds of software	All kinds of adjustment software	The calculation efficiency is high and the error probability is small	High cost	Large amount of data	It has wide prospect and wide application range

Modern measuring instruments are mainly developing in the direction of automation and digitization. The most representative instrument in engineering measurement is called total station, which is the product of the combination of electronic theodolite and range finder. Total station has many functions, including electronic angle measurement, mobile recording, storage and so on. It has very high efficiency in engineering. With the progress of science and technology, the total station is more and more developed, and gradually has a lot of new functions, such as automatic focusing can aim at the target, and can measure the operation inside the software, and so on [4].

At this stage, modern measuring instruments have gradually realized the informatization and digitization, which makes the detected information more intuitive and can better analyze the information. Because there is a large memory in the measuring instruments, the main purpose is to record the engineering measured data more timely and accurately, and to prevent the huge loss caused by the loss. Now there is no memory in the engineering measurement instruments, mainly using the computer to record the detected data, and can also be processed and transmitted in time. The most important thing of modern measuring instruments is to move forward in the direction of informatization. Because the

realization of informatization brings great convenience for engineering measurement, it can realize the integration of information processing and transmission, which provides great guarantee for the smooth progress of engineering construction, and also improves the construction efficiency of engineering construction, and has certain guarantee for its quality.

The experimental results are analyzed.

In this paper, 100 000 English words are randomly selected from the thesaurus and divided into two groups. Within the specified time, the system in this paper is used to carry out the comprehensive query of the vocabulary respectively. The query results are shown in Table 1.

4 Application of Computer Digital Civil Engineering Survey

4.1 GPS Positioning and RTK Measurement Technology

The GPS positioning system takes the satellite system as the core, and the ground monitoring system and the terminal signal receiving system realize the positioning analysis of the object. The current positioning technology for static positioning and dynamic positioning is divided into the following two types: one is differential technology, which can improve the positioning accuracy by determining a reference point, setting up a base station, setting up a receiver, calculating the signal difference of the point and correcting the positioning results [5]. The second is 0 measurement technology, Base station, mobile station and radio communication equipment constitute T system. The base station is set up with the observation building position as the reference point. Observation points are set around the base station. Combined with the satellite signal received by the signal receiver and the time and position data, the time history curve is established, and the three-dimensional coordinates, velocity and other parameters are obtained to realize the dynamic monitoring of the observation point displacement.

4.2 Ground 3D Laser Scanning Technology

The three-dimensional laser scanning technology is suitable for the field measurement, and the three-dimensional laser scanning technology is relatively fast. The application principle of this technology is to use laser to carry out distance measurement, take 3D laser scanner as the main measurement tool, complete data acquisition and processing in working state, match the corresponding color gray with the reflected laser intensity, and obtain the three-dimensional coordinates of the measuring point in X, y and Z directions.

4.3 UAV Tilt Photogrammetry Technology

UAV barrel photogrammetry technology mainly uses UAV equipped with infrared camera and digital camera to collect ground information through low altitude photography to ensure the mapping accuracy. The realization of this technology includes the following five processes: one is camera calibration, which recovers the position relationship between the photo and the horizontal head by means of pre calibration. A calibration plate

and a calibration field are set in the room to obtain the distortion coefficient according to the azimuth elements of the main distance change, so as to realize the camera calibration and ensure the acquisition of the real ground image; the other is image positioning, which is automatically completed by fploonn software, The third is to make the line plan, import the specific point coordinate value in the artificial fish swarm period method and 10 software, determine the flight height, speed, line, shooting angle, shooting frequency and other parameters, so as to plan the optimal line and generate the boundary value of the flight area with high accuracy. The fourth is the image acquisition, which can be used for image processing The fourth rotation UAV system is introduced to improve the negative judgment ability of the platform, support a variety of high-precision navigation equipment, optimize the ground holding rate and other data, and improve the quality of image acquisition. The fifth is the surface 3D reconstruction and fine product generation. After the confirmation of exterior orientation elements, the scene is reconstructed based on automatic national image matching technology, and the point cloud data is output and the point cloud density is adjusted, With the image matching algorithm, feature points are automatically selected to ensure the generation of accurate point cloud.

5 Computer Digital Engineering Management

The quality of civil engineering management and management measures, to a large extent, determines the level of project management efficiency, as well as the survival and sustainable development of construction enterprises. And the normal organization and development of personnel, equipment, materials and technology in the construction process must be realized through good project management.

Civil engineering projects generally have the characteristics of long periodicity, high mobility and many open-air operations. In addition, the construction process often needs multi process cross construction, and the comprehensive application of multi project construction, which determines the complexity and particularity of civil engineering project construction. Therefore, scientific project management measures must be formulated and implemented to ensure the smooth progress of engineering construction, so as to achieve the expected quality standards, functional requirements and cost control requirements of the project.

With the rapid development of China's civil engineering industry, all kinds of new construction technology, new technology, new materials and new equipment are constantly popularized and applied in civil engineering projects. In recent years, engineering projects generally present the trend of large-scale structure, complex function and novel decoration, which put forward higher and newer requirements for engineering management.

Therefore, digital management based on computer is of great significance to civil engineering. Computer management system is a human oriented system that uses computer hardware, software, network communication equipment and other office equipment to collect, transmit, process, store, update, expand and maintain information. The application of management information system is to realize the management, adjustment and control of various activities of the organization. A lot of valuable organization information, management information, economic information, technical information and regulatory

information will help to choose a variety of possible schemes during the decision-making period of the project, which is conducive to the project objective control during the implementation period of the project, and also conducive to the operation after the completion of the project. The objectives and meanings achieved are shown in the Table 2 below.

Table 2. The purpose and significance of computer digital engineering management

Achieve the goal	Significance
Digitalization and centralization of information storage	It is conducive to the retrieval and inquiry of project information
Programming of information processing and transformation	It is helpful to improve the accuracy of data processing
Digitalization and electronization of information transmission	It can improve the fidelity and confidentiality of data transmission
Convenient access to information Improve information transparency Information flow flattening	It is conducive to information exchange and collaborative work among project participants

6 Conclusion

This paper focuses on the development and application of measurement management in civil engineering and the implementation and optimization of project management measures from three aspects of computer digitization, engineering measurement and engineering management. In order to improve the level of project management and realize the informatization of project management, it is necessary to use computer and network technology to realize project management. Through the collection, storage and processing of relevant data, the project management information system is established to serve as the basis for the project management planning, decision-making, control and inspection, so as to ensure the smooth implementation of the project.

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