Discussion on Modern Water Conservancy and Hydropower Construction Technolog

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Abstract:

In the environment of endless emergence of various new technologies, it is both an opportunity and a challenge for the construction of water conservancy and hydropower projects. The rational use of various new technologies can not only ensure the construction quality of water conservancy and hydropower projects, but also effectively promote their long-term development. The following, combined with the author's practical work experience, briefly summarizes the application of modern technology in the construction of water conservancy and hydropower engineering for reference.

Keywords:

Water conservancy and hydropower; construction; modern new technology

1 Modern water conservancy and hydropower construction technology pays more attention to technical content

Under the premise of the current market economy, the old system of water conservancy and hydropower construction has been unable to meet the requirements of the development of scientific and technological capacity. Only by improving the quality of each technical personnel in engineering units, strengthening the knowledge updating ability of scientific and technological personnel, strengthening science and technology as the first productive force, paying attention to scientific and technological innovation, and guiding from the policy, will the results be significant. In hydropower engineering, rapid measurement technology and other high-tech content will promote the progress of the project, improve the quality of engineering construction, and make important contributions for enterprises to master the core competitiveness and create brands.

1.1 GPS positioning technology

The full English name of GPS is "Navigation Satellite Timing And Ranging / Global Position System", which means "Satellite Timing and Ranging Navigation/Global Positioning System", referred to as GPS system. The system is a satellite-based radio navigation and positioning system. With the emergence and continuous development of GPS positioning technology, the application of GPS positioning technology in water conservancy and hydropower construction not only provides new technical means and methods for engineering surveying, but also makes a complete change in surveying, mapping and positioning technology. Over the years, the conventional ground positioning technology with angle measurement, ranging and level measurement as the main body is gradually being replaced by GPS technology, which has the characteristics of high speed, high efficiency and high precision, and the positioning range has been expanded to the entire universe. Its positioning method has been expanded from static to dynamic, and the field of positioning services has expanded from the field of navigation and surveying and mapping to a broader field of national economic construction. GPS receiver has gradually become a general positioning instrument, with the characteristics of fast, economical and precise, and has been widely used in engineering surveying, which can greatly improve work efficiency.

1.2 AtuoCAD aided design technology

Computer Aided Design (CAD) is an emerging technology-based application software developed in the early 80s of the 20th century. Nowadays, it has been widely used in various fields, especially in the field of water conservancy and hydropower engineering, which greatly improves the work efficiency of engineering and technical personnel. Using AutoCAD and AutoLisp language, you can compile some commonly used calculation programs and obtain customized calculation results. This provides

a more accurate scientific basis for engineering construction. There are many complex calculations in water conservancy and hydropower projects, especially the intersecting lines at the junction of various body shapes, which need to be solved by the method of spatial analytic geometry. Relying on the calculator to calculate by hand is very tedious, the workload is large, and the accuracy cannot be guaranteed. For a long time, relying on the experience of old craftsmen, now using Auto-CAD to build a digital model, the execution of the point coordinate query function can solve this problem. The features of AutoCAD provide a new and intuitive graphical calculation method for measuring the calculation of internal data. On the other hand, it is the drawing of various engineering cross-sections, longitudinal sections, as well as the calculation of cross-sectional areas and the drawing of other required drawings. As a result, the work intensity and workload of engineering surveying are greatly reduced.

1.3 Database technology and GIS technology

With the gradual automation and digitization of survey data collection and data processing, the most effective way for surveyors to better use and manage a large amount of surveying and mapping information accumulated or collected for a long time and better serve engineering construction is to establish a database or information system by using database technology or GIS technology. The purpose of doing so is to scientifically store a large number of measurement data or information, establish a three-dimensional digital terrain model, improve the utilization rate of measurement data, reduce the duplication of human labor, so as to facilitate retrieval, analysis, distribution and utilization, and realize the scientific and modern management and service. The application of GIS to the construction of water conservancy and hydropower projects is also applied to water conservancy and hydropower projects in recent years. 3D panoramic virtual display of the construction layout, intuitive reflection of the components in the space and time of the relationship, and to achieve a variety of information visual query, analysis, statistical calculation, to achieve the whole process of building construction dynamic simulation demonstration. Taking the digitization, visualization and visualization of information as the starting point, the construction dynamic process of complex engineering construction is described intuitively and clearly.

2 Modern water conservancy construction should strengthen the traditional construction technology

2.1 Prestressed anchorage technology

Prestressed anchoring technology is a promising engineering measure, which has significant benefits and a wide range of adaptability. It can not only reinforce the original building, but also show its unique function in the new project. Due to the special advantages of prestressed anchorage to transmit tensile stress, it has been valued by various departments in the industry at home and abroad. Prestressed anchoring is a general term for prestressed rock anchors and concrete prestressed tension anchors, which is an anchoring technology developed on the basis of prestressed concrete. This traditional technology, combined with emerging technologies such as GPS positioning technology, can more effectively apply active precompressive stress to the bedrock or building in advance according to the direction, size and anchorage depth required by the design, so as to achieve the purpose of reinforcing or improving its stress conditions.

2.2 Technology of mass RCC

Roller compacted concrete (RCC) is a new dam-building technology that has been developed rapidly in the past 20 years and has been more and more widely used in the world. It is the use of earth-rock dam filling large transport, vibration rolling machinery, compaction of very dry concrete mix, using a large volume, thin layer rolling rise pouring method. This construction method has the advantages of high speed, low investment and high economic benefit. It is most suitable for large-volume and large-area concrete construction (such as road surface, airstrip, etc.). The world's first large-scale RCC project was in 1975 when U.S. Army engineers were contracted to rehabilitate the Tabra Dam flood discharge tunnel in Pakistan. China's RCC experimental research is suitable for 1978. The main characteristics of RCC that distinguish it from conventional concrete are: the mixture is dry and hard, and the slump is zero. The construction method is closer to the filling method of earth-rock dam, using a thin layer of paving material through the warehouse, and vibrating the surface of the roller compacting, while the conventional dam concrete construction adopts columnar blocks and plug-in tamping, resulting in more joints and blocks, affecting the integrity and structural stress. Engineering practice shows that the superiority of RCC is fast construction speed and high economic benefits.

2.3 Construction diversion and cofferdam technology

(1) Shield technology

Special section shields can be divided into two broad categories. The complex round shield includes double round shield and

three round shield. The double shield can be used in the construction of subway, and the establishment of double subway tunnels, sewers and common trenches is a triple shield. Consider the alignment of the cross-section shape, the number of tunnel splits, and the assembly accuracy, and plan carefully, even if this section can be assembled correctly, especially when the shield machine is biased, the overdigging mechanism should be used early, fixed and modified. Finally, waterproofing is more difficult and prudent measures need to be taken to ensure waterproofing. The use of double shield construction technology for the Tokyo Underground railway and other plans. In the special area for shield construction, in addition to the shield machinery with special section shape characteristics, it is also necessary to consider the actual situation without engineering, and the tunnel needs to be paid attention to the operation of the shield machine.

(2) Composite shield construction technology

According to the transformation method of the shield construction technology, it can be divided into longitudinal and transverse, that is, continuous tunneling and horizontal continuous tunneling, and only one shield machine is used. It is a construction method in which the continuous ground of longitudinal and transverse tunnel construction begins, and the vertical excavation is carried out in the correct direction and the tunnel engineering is carried out in the horizontal direction without continuing to the rotating shaft, and the ground is at right angles. When the shield is installed in the shield sphere of the field shield, it is necessary to carefully study the weight of the shield and the reaction force of the excavation, and promote the balance relationship of the force. Especially in the longitudinal and transverse shaft construction, the shield ball needs to rotate 900 during the construction of the shield method, and the phenomenon of water and sand gushing will easily occur at this time.

Conclusion

In short, as an important part of the project construction, the quality of water conservancy and hydropower projects directly determines the operation effect and safety of the project, and it is related to the image and benefits of the participating parties. Therefore, all parties involved in the project should pay attention to the monitoring and strict implementation of the project quality, effectively master the modern construction technology, and reasonable application, so as to ensure the construction of the project, improve the project speed, and finally achieve the healthy development of water conservancy and hydropower.

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