Application of New Technology and Environmental Protection in the Construction of Water Conservancy and Hydropower Projects

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Keywords: Water Conservancy and Hydropower Project, New Technology, Environmental Protection

Abstract: Electric energy is one of the pillar energy sources in our country, which is of great significance to the national economic development. Strengthening the construction of water conservancy and hydropower projects will help to ensure the stability of electric energy supply. In the process of water conservancy and hydropower construction, the application of high and new technology can ensure the quality of the project, implement relevant environmental protection policies, and actively respond to the national strategy of environmental protection, energy conservation, efficiency and sustainable development. The article will carry on the comprehensive analysis from the significance, the new technology, the environmental protection measure three aspects, aims to promote our country water conservancy and hydropower project technology development.

1. Introduction

The construction process of water conservancy and hydropower project involves many projects, and the construction cost and maintenance cost should be controlled. In the construction of water conservancy and hydropower projects, it is necessary to transport a lot of materials to roll the surface and change the original river and its surrounding ecological environment in the construction process[1]. With the promotion of the concept of sustainable development, people's awareness of environmental protection has increased, for the construction of water conservancy and hydropower projects have higher technical requirements, water conservancy and hydropower projects need to reduce environmental damage in the construction process, and do a good job of economic balance to provide a stable supply of power for the country. Therefore, new technology should be applied in the construction process of water conservancy and hydropower projects to ensure the quality of the project and to control the impact of water conservancy and hydropower projects on the environment. At present, there are many research materials on environmental protection and the application of new technology in the construction of water conservancy and hydropower projects, which will be fully discussed in the article, as follows.

2. The Application of New Construction Technology to Water Conservancy and Hydropower Projects and the Significance of Strengthening Environmental Protection

Water conservancy and hydropower project is an important construction project for people's livelihood in China, which is also related to the national economic development and provides a large amount of electric energy for the country. The construction process of water conservancy and hydropower projects has the characteristics of long construction period, large scale, energy consumption and great impact on the environment, so it is easy to affect the environment in the construction process, and even cause irreparable damage to the local environment of the construction. Common water conservancy and hydropower projects mainly include power generation engineering, shipping engineering, flood control engineering and irrigation engineering. The above projects have the characteristics of large construction area, and their main purpose is to make use of water resources and do a good job of water disaster prevention and control. Because of the large area occupied in the construction process, it will inevitably cause great damage to the

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surface and affect the surrounding ecosystem. In addition, a large number of machinery will be used in the construction process, and the use of blasting technology to excavate mountains or rivers, resulting in changes in the environment. After the completion of construction, some water conservancy and hydropower projects will also lead to the rise of river water level, which will also affect the original water ecosystem.

Strengthening the new technology research in the construction process of water conservancy and hydropower projects can improve the construction quality of the project, reduce the impact on the environment after the construction of water conservancy and hydropower projects, overcome the harsh natural environment, reduce the adverse impact of the project on the environment, and protect the local ecological environment.

3. New Construction Technology for Water Conservancy and Hydropower Projects

3.1. 3D Vertical Continuous Monitoring System

With the development of water conservancy and hydropower projects, there are higher requirements for water resources utilization efficiency of water conservancy and hydropower projects. Water efficiency of water conservancy and hydropower projects is directly related to the dam, and if the water demand of the dam is overloaded, it will lead to the dam collapse accident. dam monitoring is the main method to ensure dam safety, but it is also the main problem for water conservancy experts, which is mainly manifested in inaccurate monitoring data, poor timeliness and high difficulty. Three-dimensional continuous monitoring system can effectively change this problem and make up for the deficiencies in dam monitoring process. The 3D three-dimensional continuous monitoring system mainly places the deformation monitoring sensor in its interior by embedding and drilling. The deformation monitoring sensor is composed of several fragments, which need to be isolated from each other during installation, and can feel the gravity field change of each part of the dam. If the pressure on the dam is too high, it will be reflected in the monitoring equipment and will be reduced to detailed parameters to ensure the stability of the dam operation. The three-dimensional three-dimensional continuous monitoring system saves human resources and can effectively avoid the problem of missed inspection caused by objective and subjective factors in the process of manual maintenance, and has the characteristics of strong timeliness.

3.2. Super Vacuum Pumping Technology

The foundation drainage and foundation pit drainage are the key core of the foundation project in the construction process of water conservancy and hydropower project, and the drainage efficiency directly affects the progress of the project. Super vacuum pumping technology is more efficient than general vacuum pumping technology, and its efficiency is about 2 times. Super vacuum pumping technology mainly with the aid of special construction, can directly act on the maximum depth of drainage, can complete the pumping function in a relatively short period of time, and the related costs are relatively low.

3.3. GPS Positioning Technology

GPS positioning technology, also known as global positioning technology, has a major role in accurate positioning and has important implications for many areas (see figure 1: GPS positioning system).[2] GPS positioning technology can be used to ensure engineering quality in the process of surveying data of water conservancy and hydropower projects. Through the continuous development of GPS positioning technology, dynamic positioning has been developed by static positioning, which can locate the trajectory of moving objects and accurate data coordinates. In the process of construction of water conservancy and hydropower projects, with the help of GPS positioning technology, the navigation and mapping of engineering construction can be carried out to ensure the accuracy of the construction data of the number of projects and ensure the construction quality of water conservancy and hydropower projects.

Figure 1 GPS positioning system

3.4. Autocad Design Technology

AutoCAD design technology mainly depends on computer to control the construction of hydropower project, and its application effect is directly related to the construction software[3]. AutoCAD design technology is compiled using AutoLisp language, and the data results are obtained by program operation. The application of the technology provides scientific and technical basis for the construction of water conservancy and hydropower projects. The water conservancy and hydropower project is complex, so it is necessary to analyze the geometric space of the project before construction. AutoCAD design technology can calculate the intersecting lines of different body parts. The water conservancy and hydropower project is huge, if only through the calculator carries on the computation, cannot guarantee the result accuracy and the timeliness. In construction, the digital model can be constructed by means of AutoCAD design technology, and the data calculation problems involved in the project process can be solved quickly by querying the point coordinate function. In addition, AutoCAD design technology also brings new changes to the construction survey of water conservancy and hydropower projects, and it can be intuitively clear by graphic calculation method, which is convenient for engineering development.

3.5. Database Technology

The water conservancy and hydropower project database technology mainly relies on GIS, can enhance the database automation level. Compared with the traditional water conservancy and hydropower project data management technology, it can ensure the accuracy of data and do a good job of surveying and mapping management[4]. The three-dimensional model of water conservancy and hydropower project can be constructed under the joint application of database technology and GIS, and the virtual construction site can show the intuitive relationship between engineering space and engineering construction directly.

4. Environmental Protection Measures for Water Conservancy and Hydropower Projects

4.1. Environmental Protection of Waters

Domestic waste disposal: the construction period of water conservancy and hydropower project is long, the scale is large, the number of construction personnel is large, it will cause water pollution to the environment, the water pollution produced in the construction process should be precipitated, purified and used in the project of sinking and greening, etc.[5]. The construction units need to

reform the aqua privies, and do a good job of anti-seepage treatment, the sewage produced in the canteen after the separation of oil separation, no random disposal of domestic waste.

Construction waste treatment: the waste water and concrete mixing produced in the construction process of water conservancy and hydropower projects should be reasonably stacked and settled, so as to avoid blocking the sewage treatment system, washing the aggregate of the treated wastewater and saving water resources. The sludge used in the site shall be transported to a designated waste treatment plant for centralized disposal.

4.2. Treatment of Air Pollution

The air pollution in water conservancy and hydropower projects mainly comes from sand and stone processing and dust in transportation. In the process of treatment, the construction unit can prevent and control air pollution through semi-dry method and closed circuit circulation method. Incoming machinery and equipment should use higher fuel performance equipment in the construction process, through the exhaust gas purification system into the air purification (as shown in figure 2: installation diagram of the exhaust gas purification system) using wet operation[6]. When transporting water conservancy and hydropower projects, the vehicles need to cover the upper tarpaulins to avoid the phenomenon of spilling. During transportation, it is necessary to strictly control the vehicle speed and carrying capacity.

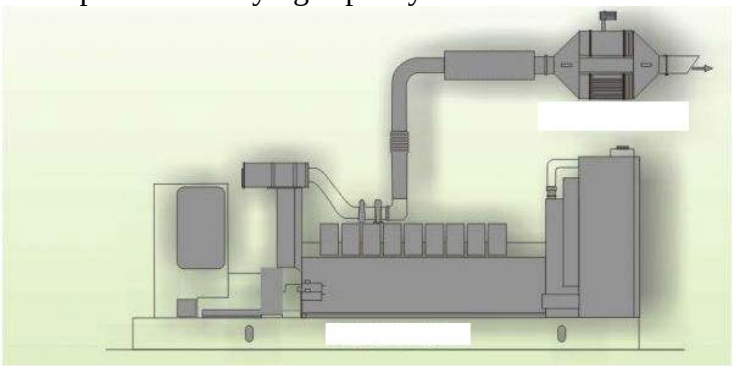

Figure 2 Installation of tail gas purification system

4.3. Solid Waste Disposal

The solid waste produced in the construction process of water conservancy and hydropower projects is mainly domestic waste and construction waste. In the process of treatment, it is necessary to carry out recyclable treatment according to its utilization value, and to properly dispose of the unusable solid waste and avoid dumping at will. For example: the waste slag excavated in the construction of the project must be in accordance with the requirements of the designated site landfill.

4.4. Soil and Water Conservation Measures

A large amount of earth will be excavated during the construction of water conservancy and hydropower projects, and the drainage ditch should be set up. In the process of work, the construction unit should adhere to the principle of "first blocking and then abandoning ", and should open the working surface, perfect the drainage system, and control the construction quality of the permanent support and temporary support project. Construction units need to pay attention to the workers living area and construction area next to the steep slope to do a good job of soil and water conservation, must strictly prevent landslides and landslides. During the course of preventing erosion of water and soil on both sides of the river, the reinforced stone cage retaining net can be used to prevent it (see figure 3: reinforced stone cage retaining net).

Figure 3 Steel cage screen

5. Conclusion

Water conservancy and hydropower projects can make effective use of water resources, provide people with a large amount of electric energy, promote economic development, and prevent floods and floods. Water conservancy and hydropower projects need to adopt modern information technology to improve the construction quality in the construction process. The paper briefly analyzes the database technology, AutoCAD design technology, super vacuum pumping technology, GPS positioning technology,3D three-dimensional continuous monitoring system, and analyzes the environmental protection measures from the aspects of water environment protection, solid waste treatment, soil and water engineering conservation, air pollution treatment and so on. In the future construction, the relevant units and technicians of water conservancy and hydropower projects should strengthen their research, adhere to the development road of environmental protection, energy saving and high efficiency, and promote the sustainable development of water conservancy and hydropower projects.

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