Design and Implementation of Automatic Control System for Sewage Treatment

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Abstract: With the continuous development of our country's economy, the country has paid more and more attention to the environment in the process of developing the economy, especially the sewage treatment in our country. With the continuous acceleration of industrialization, how to better control the sewage has become a problem to be solved in our country. In this way, the application of automatic control system in the process of sewage treatment is particularly important, and it is very helpful to improve the effect of sewage treatment in China. The main purpose of this paper is to analyze and discuss the design of sewage treatment automatic control system at present stage.

1. Introduction

How to solve the sewage treatment in China is a very important point in the process of environmental protection in China at the present stage, and it is also the most important part of our country's environmental governance. Because the sewage treatment itself has the characteristics of variability and randomness, it is very important to use automatic control system in the process of sewage treatment. In the sewage treatment plant, in order to better use the automatic control system, the first thing to do is to ensure that the power supply and distribution system in the sewage treatment plant can operate completely, and other links do not appear as far as possible, only in this way can we improve the efficiency of sewage treatment in our country as much as possible. Fruit, at the same time, do the best to protect the environment.

2. Design Requirements for Automatic Control System of Sewage Treatment

In the process of the design of the automatic control system for sewage treatment, it must be carried out according to certain design requirements. Only in this way can the effect of the automatic control of sewage treatment in China be better guaranteed, and the specific requirements and contents are as follows:

(1) In the control system, all the electrical equipment and mechanical equipment that need to be used must be able to operate automatically or operate manually. In the process of designing the control system, the alarm template, interlocking template and control loop must be set up. And after the design is completed, it is necessary to ensure that the above devices can effectively convey information to the control panel and the monitor of the process control computer [1].

(2) During the design of an automatic sewage treatment system, it is necessary to ensure that when the design is carried out, all of its own set values, that is, flow, temperature, liquid level, pH, dissolved oxygen, etc., can be used in the control system of the sewage treatment, by the design of the operating panel or by the keyboard. Change.

(3) In order to ensure the safety of the sewage treatment control system, it is usually required that the set value of the process interlock must not be modified by the unauthorized personnel through the operation panel in the workstation, which requires that only after the staff enter the accurate password, it can operate and operate the whole process. Amend it.

(4) In the process of the design of the automatic sewage treatment system, it is necessary to realize the supervision of the automatic operation of the control system in the current process. In order to ensure the continuous operation of 24h all weather without rest, it is necessary to operate automatically according to the requirements of the design.

(5) In the process of the design of the automatic sewage treatment system, it is necessary to use

the parameter feedback of the process itself, and to achieve a stable control of the system during the operation of the system, including the control of the liquid level, the control of temperature, the control of the flow amount, the control of the pH value, and the dissolved oxygen. The control of the system can effectively improve the efficiency of the system in the process of working, and at the same time can achieve the purpose of saving energy, and improve the performance of the system's own impact resistance.

(6) In the design process of the automatic sewage treatment system, it is necessary to realize the level of the liquid level of the well, the level of the 2 pumps in the process, the level of the feed pump of the 2 cooling towers, the level of the balance pool and the level of the intake pump of the 2 modulation pools in the process, and 2 of the water level of the water pump in the process. The effective linkage control between the mixer and the shallow liquid mixer.

(7) In the design process of the automatic sewage treatment system, it is necessary to realize the temperature of the cooling tower itself and the temperature of the 2 fans in the cooling tower, the temperature of the reflux tube itself, the valve XV-401A/B, the addition pump of the alkaline solution in the process, the adding pump of phosphoric acid, the adding pump of hydrochloric acid, and the casting of the urea. Effective control between pumps. Ensure effective response and operation within the system [2].

(8) During the design process of the automatic sewage treatment system, it is necessary to realize the control of the anaerobic sludge pump, the sludge pump in the 2 initial sedimentation tanks, the adding pump of phosphoric acid, the feed valve XV-401A/B and the application of the urea pump in the process.

(9) In the design process of the automatic sewage treatment system, we must realize the flow switch of the reflux tube in the process and the valve XV-401A/B of the process feed, the anaerobic sludge pump in the process, the addition pump of hydrochloric acid, the adding pump of the alkaline solution, the adding pump of phosphoric acid and the feeding pump of the urea in the process. Column control.

(10) During the design process of the automatic sewage treatment system, it is necessary to realize the control between the level of the well and the lifting pump during the aerobic treatment of the sewage treatment.

3. Hardware Design of Automatic Control System for Sewage Treatment

In the process of sewage treatment, the design degree of the control system itself is the most important part in the process of sewage treatment in China at the present stage. At the present stage, China has a very broad development market in the direction of the automatic control system of sewage treatment, because the development of our country is not yet to be developed. It is very perfect, so at this stage, the market of our country is relative to the vacancy, especially about the hardware design of the sewage disposal automatic system in our country. How to do the hardware design in the sewage treatment system is very important. In view of this problem, it can be mainly from the system control of the sewage treatment and the hard of the PLC control system. These two parts are analyzed and discussed briefly [3].

3.1 Introduction of system control of sewage treatment

For the system control of sewage treatment, its own experimental objects can be divided into two categories, one is the switching quantity and the other is the analog quantity. In most cases, the amount of switch in the process of sewage treatment in China is much more than that in simulation. In order to avoid the damage of the system in the process of system design, the open loop control and closed loop control are set up in most of the systems themselves. In the process of concrete sewage treatment, the automatic system control of the sewage treatment will be dominated by logic control, and the closed loop control is used as the auxiliary control. System. In the process of sewage treatment, the system control in the process of control, mainly include: three communication links, two sets of CPU412 controller and three ET200M from the station. The Engineer in the engineer station can monitor the equipment in the whole sewage plant through the

monitoring software of the host computer, and can also record the water quality of the sewage plant in the process of monitoring, and produce the report. In the control of the sewage treatment system, the core part is the automatic control cabinet, which requires the staff to do a good part of the design, the better application of this part to the automatic control of the sewage treatment. In the process of practical application, the automatic control system of the sewage treatment has its own function master. All of them are controlled by the PLC system according to the user's numbered program requirements.

3.2 The hardware introduction of PLC control system

The so-called PLC system, which mainly refers to the programmable logic controller, is widely used in the current market, not only in the work of sewage treatment, but also widely used in the industrial field. In the hardware design process of PLC control system, the product category of PLC must be considered. PLC is interpreted from the definition. It itself belongs to a professional, specialized computer control technology for industrial development. It uses programmable logic controller. In the process of working, it is divided into three stages, namely: input sampling, user application, program refresh automatically. In the process of input and output, the main use of the input and output is digital input and output, and it directly replace the usual demand for the relay control device in the sewage treatment system in the application, but it can completely control the different types of machinery and machinery. The process of production [4].

In the application of PLC's control system hardware, in addition to the technical characteristics of the system control according to the actual situation at the present stage of the sewage plant, it also needs to adapt to the industrial environment and industrial needs of our country at the present stage. If the S7-400 PLC is used as the main station in the actual application process, then the slave station must be used to connect the different modules physically and electrically from the source floor bus, and it is necessary to ensure that each module is connected with the connection of the bus. Only in this way can the stability and safety of the system be better guaranteed. In the process of installation, the source floor should be first loaded into the guide rail, and then the different modules are inserted into the bus in turn. Finally, all the modules of the whole group are fixed to the guide rail for use.

4. Software Design of Automatic Control System in Sewage Treatment

At present, in the process of sewage treatment, a control system has been widely applied at home and abroad, that is, the PLC control system. In the current sewage treatment system, the application state of this system is the most stable and effective, and in order to better optimize the system, it is mainly discussed and analyzed from the following two aspects: the following two aspects: the development of the following control program and the monitoring software of the PLC [5].

4.1 PLC control program development

In the process of PLC control program development, the first requirement is to meet the requirements of system control. In the process of designing, we can develop according to the working principle of PLC. In the process of developing PLC control program, we can establish the I/0 image area and the circular scanning area. In the so-called I/O image area, its own size is determined by the program set by the user who uses it. In the process of user use, the user will have input or output image areas to correspond to each use of the system, every input point or output point. In the process of executing the instructions issued by the user, the PLC system needs the external information source for the user program, which is mainly the I/O image area, and does not have a certain relationship with the external equipment. This feature directly leads to the establishment of the I/O image area itself, which causes the PLC system to relate only to the information that exists within the address unit in the process of working, and in the process of the system's output, it is only to set a complete form for the unit of a certain address within the system. State. In the development of the PLC system control program, the lower computer is the most important part of the whole control system. Its main function is to complete the control instructions

and the collection of field data in the process of the user application system [6].

4.2 Software development of monitoring computer

In the process of interface development, the configuration software used by the host computer is WinCC. Through this software, the data collection work for the whole system in the process of sewage treatment and the control and real-time monitoring of the whole process flow are carried out. The WinCC configuration software will provide the programs needed for various systems for the drive of the entire PLC system, which makes it easy for PLC to connect with the host computer. In the process of sewage treatment, it requires that the monitoring system must cover the process of the whole sewage treatment, so in the process of sewage treatment in the sewage plant, it is necessary to ensure that the status of the sewage plant is tightly surrounded when the structure planning is carried out, and the information is reasonably arranged in the process of reflection. In the course of its own reflection, only in this way can we guarantee all kinds of functional modules that we need in the process of sewage treatment at the present stage, and ensure that the operation of its own monitoring system is safe and reliable in the process of sewage treatment. At present, according to the requirements of the wastewater treatment plant itself, the requirements of the control system at the present stage, the requirements for the monitoring software of the upper computer and so on, we can know that the host computer monitoring software in our country at this stage is mainly composed of the following parts: the module in charge of the prediction and the login. The management module, the interface of monitoring, the module responsible for the warning of the trend, the module responsible for the alarm, the module responsible for the data report, the module responsible for the database collection, and the help of the system, etc.

5. Conclusion

According to this article, we can know that the current situation is very urgent to see the sewage treatment task in our country, and the automatic control system of the sewage is a way to solve this problem quickly in the short term. At this stage, only when we treat the sewage well can we better develop the economy of our country, and the sewage treatment itself is one. With the long-term and complex project, we need to improve the design in the process of the design of the automatic control system, develop the design idea better, combine the different realities of different regions in our country to make the design perfect and choose, only in this way, we can ensure that the water resources of our country can be kept again. Health, constantly improve the current situation of water resources in China, and better promote China's economic development and environmental development.

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