

Application of Intelligent Technology and PLC in Automation Control of Electrical Engineering at Present

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Abstract

Nowadays, the development of science and technology, the realization of intelligent automation in the field of production has become the trend of development. With the in-depth study of the theory and technology of artificial intelligence, its application field is expanding. Compared with traditional electrical engineering automation, intelligent technology has many advantages, which can significantly improve the automation performance of equipment and optimize product quality. This paper analyzes the application status of electrical engineering automation control, expounds the intelligent technology and its application advantages in the automation control of electrical engineering, and summarizes the specific applications of the intelligent technology in the automation control of electrical engineering, such as electrical equipment, electrical control, fault diagnosis and repair of equipment and so on.

Keywords

Electric control, PLC, intelligent technology, electrical engineering.

1. Introduction

Automation of electrical engineering plays an important role in the development of China's industry and economy. With the development of artificial intelligence technology, the application domain of artificial intelligence has expanded. Compared with the traditional electrical engineering automation, intelligent technology has many advantages, can significantly improve the automation performance of equipment, and optimize product quality. This paper analyzes the application status of electrical engineering automation control [3], expounds the intelligent technology and its application advantages in the automation control of electrical engineering, and summarizes the application of intelligent technology in electrical engineering automation control, such as electrical equipment, electrical control, fault diagnosis and repair of equipment, and the current intelligence. The application of energy conversion technology in automation control of electrical engineering is of great significance. PLC (programmable logic controller) is a kind of computer used for industrial control. It is a general controller [4] which is developed with the application of computer technology, communication technology and automatic control technology. PLC is in essence a mechanical or production process that can be stored, logical, controlled, controlled, time, data, and arithmetic calculations, through digital or analog input / output control. The main features are small size, light weight; universal practicability; strong anti-interference ability; simple and ordinary application; easy maintenance and transformation [5].

2. PLC's Working Process

To collect and input the initial data under the control of the software program of the control system, the input region is scanned by the execution of the pre edited instructions, and the running state [7] in the input region is analyzed and judged. The program handles specific functions according to the program instructions set in the user control system, and carries out a comprehensive scan according to the prescribed rules, and makes real-time analysis or logical operation [8] according to the status of the field operation and the requirement of instruction. The control response process outputs the related analysis results and the logical operation results of the collection execution program to the system control host, and then the host sends out response signals to all the output points, thus controlling the related device [8]. Follow these steps to start again, each time is a work cycle. In practice, many processes of equipment are often needed.

The regular control error causes the signal to be unable to transmit to the control system (1) because of the line aging, mechanical pull, the destruction of the natural animal and so on, causing the transmission signal line to produce the fault, causing the control error. This kind of error does not complete the extraction, loading and conversion of data without controlling system. A series of execution instructions [9] of the control system can not be received normally. (2) the electric valves and electromagnetic switches, such as electric valves and electromagnetic switches on the spot, do not close thoroughly and are not closed fully when open, causing field data collection and transmission failures, making it impossible to receive information and even receive errors, resulting in error control operation, and the system can not work normally, causing field signals to be incapable of transmitting to the control system. Control error (3), due to the poor contact between contacts and wiring caused by mechanical switches, on-site transmitter failure. The frequent occurrence of the case is that the wiring is not strong and the electrical contact is damaged, so that the data can not be stored in the data into the data storage and the data input control analysis and processing system, and the process of data acquisition, transmission and processing can not be carried out [10]. It affects the efficiency of decision analysis, information query accuracy and data output timeliness. 2. the execution of the error, causing the instruction can not be executed, the main reasons such as electromagnetic interference, the contact of the contactor of the control load is not tight, the control of the load of the contactor fault, resulting in the execution of the execution of the execution instruction can not be completely transmitted to the executive end, the control system can not perform the [11] in accordance with the expected requirements in the application of the control system. 2, mechanical switch, electric valve self failure. Such as mechanical switch contact is not good, electric valve loosening and so on, these reasons can cause the control system to be unable to work normally. Other faults such as controlling the frequency converter because of its own quality problems or the damage caused by the external force can cause the motor to be unable to operate normally. Finally, the system can not run normal [12].

1. The reliability of the input signal in the PLC control system should be strengthened: the reliability and durability of all the selected control systems and the related components must be ensured, and the failure of the transmission line must be avoided because of the cause of the accessory. Other measures include updating and designing the main interface functional modules. Increasing the reliability of signals is to reduce errors in control. Increase the sensitivity of the control [13]. 2. Improving the early-warning system of the electrical control system in the control system is very important in the fault warning and alarm function of the perfect, reliable, humanized and intelligent network integration. The early warning system monitors the action in real time aiming at the execution action. To prevent the loss of the system from the error of the instruction.

3. Background and Implementation of Some Cases

1. The electrical control of the machine tool in PLC: the electrical control of the machine tool is independent of the device, the two device signals are transmitted inside and the transmission between the electrical control signals of the machine tool. It is mainly through the initialization of the following

functions with the interface, the urgent stop, the signal processing of the locomotive panel, the axis of the coordinate axis, the hydraulic, the work clamp, the control of the spindle and the alarm subroutine. The CNC machine tools are automatically tightened, communication detection automatically establishes communication connections, automatic knives for the manipulator, tool position detection, cutter detection and so on. The function of CNC machine tools makes the realization of monitoring automation, and the productivity of the system has been greatly improved. The stages involved in machine tools are generally divided into drawing drawings and processes, electrical installation and on-site commissioning, and acceptance of user units.

2. PLC electrical control of solid warehouse: solid warehouse is an important part of logistics and an important link in warehouse management science. At present, the stereoscopic warehouse has lifting and traversing, stacking, stacking, vertical lifting, vertical circulation, circular horizontal circulation. The solid warehouse consists of PLC, stacker, computer, and rack, and outgoing conveyor, shuttle and so on. Among them, PLC is the core of [14] in electrical control of stereoscopic warehouse. The three-dimensional warehouse system adopts closed loop control for motor control, which is composed of a high speed counter receiving the number of feedback from the encoder, sending digital signals to realize the closed-loop control of the motor. The application of electrical control in the three-dimensional warehouse improves the efficiency of goods in and out of the warehouse, and improves the status of traditional warehouse management. The traditional management model has been changed.

3. PLC electrical control in the spinning system: the control of all kinds of electrical equipment in the spinning system as the mainframe, including motor control, man-machine interface processing, and switchgear control. In addition, data from a spindle controller are collected and input to the man-machine interface in real time, which is provided to operators. Logically, all the spindle controllers are arranged in a logical loop, which controls the network communication management and maintenance of the system. The electrical system composed of individual spindles has the functions of sand defect detection, removal, data collection, and statistics and so on, which is convenient for management and maintenance and data analysis [15]. Compared with other traditional spindles, the electrical control spinning system, which is composed of the spindle, has the advantages of fast running speed, low cost, small volume, high precision, less energy consumption and strong networking ability, and the system adopts a custom fieldbus protocol, which makes it simple, flexible and high speed.

4. The application of automatic control in electrical engineering to realize automatic production and improve the performance of product equipment have been the development trend in the field of electrical engineering automation in China. In the field of electronic engineering automation technology in China, after decades of development, the application of electrical engineering automation technology in our country is becoming more and more popular. At present, there are mainly distributed control system DCS (distributed control system) system, Windows NT and IE system, centralized control in electrical automation engineering. The automatic control system and the information integrated electric automation control system are made. The distributed control system (DCS) has the advantages of real time and extensibility, but it is a traditional instrument, which increases the difficulty of maintenance and maintenance. The WindowsNT and IE language system makes the electrical engineering equipment visualized, integrated, easy to operate, easy to maintain in later period, and the automatic control system under centralized control. The speed is slow, the input of a large number of monitoring equipment, reduce the space of the host, and affect the performance of the automatic control system, so the reliability is lower [16]. The integrated electrical automation control system is operated through the information browser to facilitate and understand the information of the first time. And analysis. It can be said that the electrical engineering automation control market in China is combining with the actual situation of our country, giving full play to its advantages, carrying out scientific and technological research and development, and promoting the gradual maturity of the electrical engineering automation control market.

5. Intelligent technology and its application advantages in electrical engineering automation control: (1) improving the performance of automation control, promoting the unified intelligent technology of electrical engineering automation with computer powerful programming, accurate algorithm and excellent design, can improve the performance of automation control, and promote the unification of electrical engineering automation. In the production of electrical equipment, the intelligent technology can design a precise algorithm according to the needs of the equipment, which can greatly improve the efficiency and accuracy of the automatic control of the equipment. In this way, it can reduce the input of manpower and material resources in the electrical engineering automation and reduce the cost effectively. (2) To simplify the model of electrical engineering automation, the introduction of intelligent technology in the automation control of electrical engineering can effectively avoid the early establishment of the corresponding control model, resulting in the probability of errors in the parameters established in the model. It can be said that the application of intelligent technology to automation control of electrical engineering simplifies the automation model of electrical engineering. The effect of unpredictable factors on the automation control of electrical engineering is prevented, and the operation is simple, and the efficiency and accuracy of automation control of equipment are improved. (3) With high precision and high efficiency, the error is small: intelligent technology, such as high speed CPU chip, RISC chip, and multi CPU control system and so on, is applied to the automation control link of electrical engineering. It has the advantages of high precision and high efficiency and small error, which greatly improves the precision of the electrical engineering automation control system. Efficiency is conducive to improving the quality of electrical products, reducing the error rate in the automatic control of electrical engineering, thus promoting the development of the electrical industry.

3. The application of intelligent technology in the automation control of Electrical Engineering (1) the application of the traditional electrical automation in the electrical equipment of the intelligent technology is the design of the control model of the electrical equipment, and the intelligent electrical controller breaks the traditional automation control. The intelligent technology is applied to the automation control of electrical engineering. It can quickly solve the complicated calculation and simulation process of electrical engineering automation according to the requirements of the automation equipment and the accurate algorithm. It greatly improves the efficiency and shorten the design cycle, and the designed electrical equipment products are compared to the traditional ones. The electrical equipment products are both practical and scientific. (2) The application of intelligent technology in electrical control: the application of intelligent technology in electrical engineering automation mainly includes the three methods, the expert system, the neural network control and the fuzzy control, [17]. In the process of intelligent operation, the operator can directly control the various parameters in the use of the equipment through the remote control of the software, and can also use artificial intelligence to realize the monitoring and protection of the electrical equipment. If the electrical equipment is working or stopping, the protective instruction can be sent to prevent the loss of the electrical equipment. Bad. In addition, the intelligent technology can effectively monitor and control the power equipment. It can input the algorithm according to the requirements of the equipment automation in advance, collect and organize the switch quantity of the electrical equipment, the analog data, analyze the data online, and carry out the real-time information retrieval and storage. (3) The application of intelligent technology in the diagnosis and repair of equipment fault: the traditional electrical engineering automation control system has many shortcomings, which causes the trouble diagnosis and repair of the later stage of the electrical engineering automation control system. The application of intelligent technology in the diagnosis and repair of equipment failure is mainly reflected in the analysis of fault location in power system, preparation of preventive measures in advance, reducing the loss caused by machine failure, and compared with conventional human diagnosis, the accuracy and efficiency of diagnosis can be greatly improved. The fault diagnosis part of electrical engineering automation mainly uses the fuzzy theory of artificial intelligence, artificial neural network and expert system to diagnose electrical engineering equipment, such as transformer, generator and engine.

4. Conclusion

PLC is widely used in automatic control because of its high reliability, simple operation and convenient maintenance, and rich I / O interface module. Now PLC is developing towards electrical control, instrument control, computer control integration and network information. PLC can be seen everywhere in the industrial system, such as steel, petroleum, chemical, building materials, power, machinery manufacturing, automobile, transportation, transportation and so on. Especially in the application of electrical control, the proper integration and synchronization of the two will improve the efficiency of production and promote the progress of the society. In summary, the development of science and technology, the realization of intelligent automation in the field of production has become the development trend of the electrical engineering automation domain.

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