Application of PLC Technology in Industrial Automation Control

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Abstract: With the continuous development of science and technology, PLC technology has been widely used in industrial automation control. Reasonable application of PLC can not only effectively improve the reliability of automation control, but also promote the further development of industrial automation. Based on this, this paper first makes a detailed analysis of the PLC technology, then discusses its application in industrial automation control, and finally puts forward some points for attention, hoping to promote the full play of the role of PLC technology.

1. Introduction

With the continuous development of science and technology, the traditional electrical automation control system obviously can not meet the needs of electrical equipment, and the drawbacks of which are becoming more and more prominent. Reasonable application of PLC technology can solve this problem very well. It has unique advantages in digital operation, analog processing and man-machine interface. It has been widely used in the field of industrial automation, and has become the mainstream control equipment in this field. However, there are still some problems to be paid attention to in practical application. Otherwise, it may not only cause unnecessary losses, but also affect the effectiveness of PLC technology. Therefore, it is necessary to strengthen the analysis of the application of PLC technology in industrial automation control, which has a strong practical significance. Specific analysis is as follows:

2. Technical Analysis of PLC

2.1 Overview of PLC Technology

PLC can be said to be a kind of computer technology in time. Its technical functions are diversified, which can well meet the needs of industrial automation applications, such as accurate counting, logical operation and intelligent timing. These functions can not only save a lot of costs, but also improve the accuracy to a large extent [1]. In order to achieve long-term and sTable development, industry first improved machinery and equipment. In order to meet the new needs of modern engineering and achieve more operations, machinery and equipment become more and more complex. This makes the probability of staff making mistakes more and more, so people are required to continue to improve, reduce the probability of errors, and realize the automation of electrical engineering. However, with the continuous development of science and technology, people are demanding more and more, so electrical engineering is once again improved and innovated, reasonable introduction of network computer system, PLC technology has gradually been concerned. Through PLC technology, it can make up for the shortcomings and deficiencies in electrical engineering, and promote the automation level further.

2.2 Technical Characteristics of PLC

As an advanced computer technology, PLC technology has its unique advantages and technical characteristics, which are embodied in the following aspects:

1) There is a strong connection with other electrics. In practical application, PLC technology can grasp and understand the operation process of industrial automation in combination with other

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electrical reflections, so that staff can better grasp it.

2) Easy to operate. The simple operation process of PLC technology can not only reduce the pressure of technicians, but also greatly reduce the error rate.

3) High safety factor. The safety factor of PLC technology is very high, which can avoid all kinds of interference.

4) Easy maintenance. The computer system has its own self-diagnosis function, which reduces many unnecessary troubles in the work, and can also effectively reduce machine failures and improve work efficiency.

5) Unified communication protocol. The application of international standard communication protocol in PLC not only brings many conveniences to users, but also helps different manufacturers to realize interconnection and interoperability.

3. Application Analysis of PLC in Industrial Automation Control

3.1 Sequential control

As far as the current situation is concerned, with the continuous development of science and technology, the technology of PLC has also made great progress, and the sequence control is also constantly updated and improved. The sequence control here mainly refers to the technical status information of PLC. In practice, only simple instructions need to be input to achieve a comprehensive sequence control, which is similar to its control in configuration software, as shown in figure 1 below. At this stage, sequence control can reflect the basic functions of PLC well, and in terms of the development of sequence control, PLC technology still occupies a comparatively advantageous position, which can be said to play a very important role in industrialization.

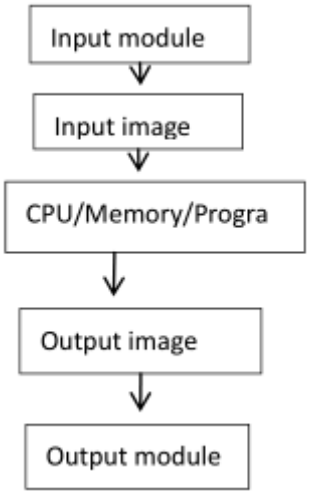

Fig. 1 Application steps of PLC in configuration software control

3.2 Switching control

Switching quantity control is one of the most frequently applied fields of PLC technology. It not only has strong anti-jamming ability and reliability, but also is very convenient for maintenance. In addition, it can also improve the quality of digital operation system with very fast running speed, thus greatly saving the cost of output [2]. The switching control of PLC is scientific and normative in design, and its main purpose is to further improve the reliability of control. The design of switching quantity control is based on the action of intermediate relay control system, which can be obtained directly by the formula of sequential controller. With the continuous development of PLC, the software virtual gradually replaces the traditional relay circuit, which can realize the decentralized control of one device and centralize the control of all devices, thus avoiding all kinds of problems caused by the complex system circuit, and finally forming a perfect and efficient control system.

3.3 Analog control

Based on the characteristics of control objects and combined with the characteristics of modular function modules, PLC is reasonably assembled into a well-functioned control system, which can promote the accuracy of the system. As far as PLC technology is concerned, it is composed of many parts, such as communication module, position control module and host module, as shown in figure 2 below. For the analog control of PLC, it can effectively improve the accuracy of industrial automation control, and also can provide convenience for the maintenance and design of the whole system through heat treatment.

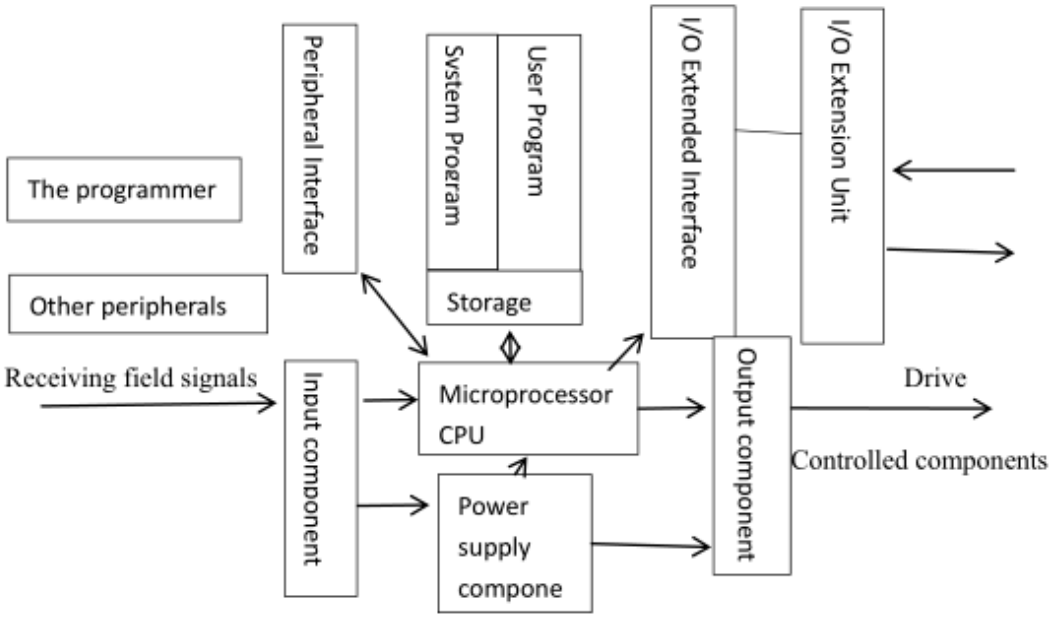

Fig.2 Main components of PLC

3.4 Position control

For industrial automation control, position control is a very important part of it, so it is of great significance to pay more attention to this part of the design. The most important purpose of position control is to control the position of stepper motor, and the reasonable application of PLC technology can further improve the accuracy on this basis. This is mainly because the PLC technology can control the stepper motor while sending pulses to the winding of the stepper motor, in order to achieve accurate control of the displacement change of the stepper motor and effectively reduce the error.

3.5 System centralized control

Reasonable application of PLC technology in industrial automation control can realize the control of the whole control system. For example, in actual operation, some parts of the system have problems, so the PLC technology can automatically detect the causes of the failure, and display the test results. The main purpose of the control system is to control the whole system through logical error detection and fault detection. For industrial production machine tools and equipment, it needs sufficient preparation time to carry out their work, and also requires safe passage through various working procedures. In the process of step action detection, the timer will start in time. When it sends out a signal, we can directly regard it as a start alarm signal, and it can also be regarded as an automatic stop signal.

3.6 Frequency control

As far as mechanical frequency control is concerned, PLC technology also plays a very important role, and involves a lot of production. In the long-term continuous operation, there will inevitably be certain wear and tear, and many unpredicTable factors will appear in the actual

production and processing, and the existence of these problems will further aggravate the internal friction of machinery, seriously affecting the efficiency of mechanical operation and production implementation. The reasonable application of PLC technology can effectively control the mechanical frequency. However, in practical application, we must take full account of the industrial automation production situation, and then adjust the operating frequency of machinery on this basis, so as to reduce the internal structural wear of machinery to a large extent, and improve the orderliness of mechanized production.

3.7 Networked Communication Control

PLC technology has strong networking communication function, so it can achieve interactive networking communication very well. At the same time, the PLC technology also has the network communication with the host computer, which can connect with the intelligent equipment [5]. Reasonable application of PLC technology in networked communication control can well strengthen communication conversion function and module processing function, so that different data can be reasonably converted in industrial automation production process, and ultimately form a multi-level distributed and perfect control system to improve application efficiency.

4. Notes on the Application of PLC in Industrial Automation Control

4.1 Temperature control

In order to fully play the role of PLC technology, we must strictly control the temperature so that it is always within a reasonable range. In the application of industrial automation control, the temperature of PLC is limited to a certain extent, usually 0-55 C. If the temperature is too high, it will be difficult for the machine to work properly, and beyond this range, it will greatly affect the heat dissipation of the machine, which is to use heat dissipation or ventilation equipment to reduce the temperature. Therefore, in the actual installation process, we should pay more attention to stability control to ensure that the PLC can work at a reasonable temperature. Only in this way can we ensure that the role of PLC can be fully played.

4.2 Humidity control

In order to ensure the normal operation of electricity, it is necessary to strengthen the control of air humidity to ensure that it is within a reasonable range and avoid excessive moisture content in the air, otherwise it will seriously affect the insulation of PLC components. In short, air humidity must not exceed 85%.

4.3 Vibration control

In order to ensure the normal operation of PLC, it is necessary to pay more attention to the control of the system's anti-seismic coefficient. In the actual installation process, we should try our best to avoid being too close to the high-strength vibration device [6]. In the process of operation, because the system often carries out some precise operation, it is necessary to set up appropriate anti-seismic equipment, which must be far away from the working environment that the system can not afford, otherwise it will seriously affect the role of PLC.

4.4 Air factors

Gas content in industrial environment is very complex, and there are likely to be some corrosive and flammable gases, which affect the PLC. Therefore, in the practical application of PLC, we should try our best to avoid operating in this bad environment. If it can not be avoided, it is necessary to install the PLC in the closed control cabinet to avoid contact with complex air and ensure its normal operation.

4.5 Anti-interference design

Although the anti-interference ability of PLC is very strong, it is not absolute, but it will still be interfered by lead, internal and radiation. In the actual design process, manufacturers should take

full account of the interference caused by the radiation theory between circuits and components. The main reason for wire interference is the interference caused by power transmission and signal lines. Radiation interference is mainly due to electrical radiation, television radiation and communication network radiation in the production environment. In order to improve the stability of the system, it is necessary to scientifically wiring, design and installation, through various measures to suppress interference factors, to ensure that the system can operate stably.

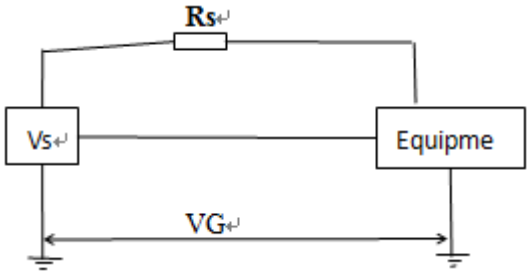

Fig. 3 Common mode interference diagram

5. Conclusion

In summary, the rational application of PLC technology in industrial automation control can not only improve production efficiency, user experience, and save costs, but also promote further industrial development. In practical application, staff should pay more attention to the improvement of work efficiency and strengthen product quality control. Automation technology is a newly developed discipline, which has a very close relationship with people's life and industrial production, and has wide application prospects. In terms of future global development, it can be said that whoever is the first to master the dominance of energy-saving high-tech industries can dominate the future global economy, and advanced automation technology can effectively promote energy conservation and emission reduction in various industries.

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