

## Discussion on the Method of Detecting the Status of Automatic Instrument Equipment

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**Abstract:** Nowadays, people's demand for industrial products is increasing while the demand for quality is also higher, so each enterprise is changing the traditional manual operation equipment into automatic equipment so that the production capacity and product quality can meet the current social demand. Automatic instrument and equipment status detection can ensure the safety and normal operation of the equipment to the maximum extent. First of all, the device can determine whether there is a problem through self-diagnosis, and then the detection system needs to use PLC system or DCS system to complete the comprehensive analysis of the data. Then, the automatic point inspection system will track the equipment in real time and analyze the processing method.

In industrial production, the work is mainly carried out by mechanical equipment. Traditional equipment in the past needs to be operated and transformed by staff. On the one hand, it costs a lot of human resources; on the other hand, mechanical equipment operated by hand lacks certain precision. With the development of science and technology, automation equipment has gradually replaced manual operation equipment and is widely used in industrial production. Modern industrial production makes the production safer and more efficient. Real-time status detection can be carried out on automatic instrument equipment in order to ensure the efficiency of industrial production and then equipment faults can be detected and solved in time. How to detect automatic instrument equipment is the main content of this paper.

### 1. Necessity of advanced detection means and equipment status detection

At present, most of the enterprises or most of the equipment in an enterprise in China adopt the conventional detection method and rely on on-site observation to diagnose the equipment. This method cannot accurately judge whether the mechanical equipment fails, so the equipment failure has become the main cause of production accidents in enterprises. With the introduction of advanced detection methods, the enterprise can conduct long-term real-time detection and technical analysis of the equipment and transmit the detected data to the command center through the network. The staff can take measures for faults and effectively prevent the occurrence of problems.

In order to reduce the occurrence of accidents in enterprises, it is necessary to have more advanced detection methods and carry out real-time on-site detection on various kinds of equipment. The following four detection methods can be selected according to the actual situation. The first can be used for most common equipment, with equipment connected to the PLC system and then for comprehensive analysis through the system. The second one is intelligent equipment that is currently rarely used. The equipment with a diagnostic function can detect the running state of itself and timely find equipment problems. The third one is to develop an automatic point inspection system for the equipment, which can automatically monitor the equipment in real time. The fourth one is the focus of this paper, which can enable the combined equipment to be tested at the same time and the information can be integrated and analyzed, as shown in table 1.

Table 1 classification table of detection methods

Classification of detection methods	Connect the equipment to PLC system, and then make comprehensive analysis and judgment through this system
	The intelligent equipment has a diagnostic function, and can automatically detect the running state of the equipment and discover equipment problems in time
	According to the equipment, an automatic spot check system has been developed, which can automatically monitor the equipment in real time

## 2. Equipment Status Detection Method and Performance Analysis

### 2.1 Visualization and self-diagnosis of the equipment state are accomplished by the equipment's own function

First of all, completing the automatic power supply control of the equipment power supply can be realized by the utilization of parallel room or power redundancy and other ways. Then, the relevant data of the power box will be transmitted to the detection center through the PLC system, so that when the automatic power switch is completed, the hidden trouble of the power system can also be timely determined to ensure the stability of the power system. Secondly, the control and management of the distribution system needs to install self-diagnosis software in the distribution system, so that the distribution system can record data and diagnose problems by itself. Once the problem is found, it can be fixed by remote modification. Then, the need to complete the remote control and diagnosis of the equipment can be achieved through the equipment PLC hardware information to complete the operation of this step. As long as the IP address of the system is put in the browser, we can observe the running state of the device in real time and control and manage the device. The device data seen on the Internet is clearer and more orderly, which makes the device management more convenient and quicker. Finally, it is necessary to develop a system that can predict the possible failure of equipment in advance. This system can judge whether the equipment will fail based on the judgment of network node information and the operation status of indicator lights of each module. Using software programming, we can gain the warn of possible failures, as shown in table 2.

Table 2 Equipment state performance analysis table

Equipment Condition Monitoring Method and Performance Analysis	The visualization and self-diagnosis of the equipment state are completed by using the self-function of the equipment.
	Analysis of Field Equipment with PLC or DCS System

### 2.2 Carry out field equipment analysis with PLC or DCS

#### 2.2.1 Develop maintenance free system

Maintenance free system refers to the self-judgment of the cause of the obstacle in the control system and the main diagnosis is the key signal of interlocked shutdown template channel information. When there is a problem with the linkage information, the first step is to diagnose

whether the channel is normal. When the channel is abnormal, it means there is a problem with the template. Otherwise, it may be the cause of the field instrument. When the cause of equipment failure is found, the detailed information of the problem detection point should be transmitted to the staff, so that the staff can deal with the equipment problem more accurately and shorten the time to deal with the problem.

### **2.2.2 Key equipment alarm to achieve automatic interconnection of man - machine**

In order to ensure that the failure of key equipment occurs, the relevant maintenance personnel should be notified in the first time for timely treatment. GSMODEM technology can be adopted to connect the equipment with the control system so that the alarm information can be quickly passed to the maintenance personnel. First, an alarm prompt device should be installed on the key equipment. When there is a problem with the equipment, the alarm information will be sent out by SMS. Then the PLC system will conduct a comprehensive analysis of the alarm information and convert it into a voice message, letting the staff deal with the problem.

### **2.2.3 System dynamic network fault diagnosis**

All the required equipment systems required by production form a large network structure. We first need to obtain the IP address of each system in order to complete the fault diagnosis of the system dynamic network. Then, all IP addresses are dynamically connected to form a corresponding dynamic connection graph so that real-time information of each system can be obtained at any time. After the implementation of dynamic monitoring of the system network, the operation state of the system network can be observed more intuitively. For the system with faults, the IP address can be marked so that the maintenance personnel can quickly find the problem.

### **2.2.4 Signal virtual detection**

According to relevant professional knowledge, the virtual value that can be used as the reference of system signal is calculated and then the virtual value that is calculated is compared dynamically with the actual value that is obtained in actual operation, so that the dynamic curves of the two are consistent within a certain error range. For example, in the production of sintering machine equipment, the running process of the first sintering machine will be tracked and studied in real time while the following equipment production will be guided according to the obtained data.

## **2.3 Automatic point inspection system of equipment**

Equipment failure is not a sudden thing but a gradual process of damage, so it is necessary to use the automatic point patrol system in order to find the problem in time and prevent the failure. First, the detailed information of each device should be recorded, such as device name, temperature and running state, etc. After the operation of the device, every running state of the device should be recorded while the data should be uniformly transferred to the computer system. The data information is recorded in real time comprehensively and in a detailed and organized way. The staff can view the required data at any time and will prompt the staff in the first time when the data is abnormal.

When the automatic point inspection of the equipment is implemented, the temperature gun and bar code technology are generally adopted to take the corresponding measurement code of the equipment as the bar code required by the inspection. The ambient temperature of the equipment under normal operation is recorded and used as the reference value for patrol inspection. When the

actual temperature exceeds the normal value, an alarm will be given and the equipment information will be analyzed and processed.

### **3. Conclusion**

By combining various detection technologies and applying them to industrial production, we can timely and effectively grasp the running status of the equipment, understand the places that need to be changed and improve the production efficiency. Automatic instrument and equipment status detection can also minimize the occurrence of production accidents, which is a major guarantee of production safety. Therefore, modern enterprises will only gradually turn production equipment into automatic one and pay attention to the detection of automatic instrumentation, then they will not be eliminated by the society.

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