Design and Application of Mechanical Control System Based on Computer

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Abstract. With the development of computer technology, computer technology has been applied to all walks of life in industry, especially in traditional industrial system. With the application of information technology, computer control system has been applied to the field of machinery, which can also help people better control various equipment. Through computer technology, we can better manage, maintain and control the mechanical system, which can realize various functions of the system. The computer control system can obtain a series of data through various sensors. Through the process of collection, storage, processing and transmission, the computer can classify, calculate and organize the data. Finally, through the control system, we can realize the automation of mechanical equipment, which will avoid the uncertainty of manual operation. Therefore, the computer improves the efficiency of the mechanical control system, which also improves the safety of the control process. First of all, this paper analyzes the current situation of mechanical control system of computer. Then, this paper takes the automobile as an example to analyze the application of the module in the mechanical control system.

Keywords: Computer, Mechanical Control system, Application

1. Introduction
With the improvement of science and technology, informatization has been applied to all walks of life. Intelligence has become the basic function of various devices [1]. Therefore, information management and control has become the basic needs of people in the new era, which requires us to constantly adapt to the needs of people on the control system [2]. Computer control is inseparable from data processing system, which is the process of equipment information data collection, storage, processing, transformation, retrieval and transmission [3]. Information data is the effective expression of facts or instructions through sensors, which can be processed manually or automatically to form visual expression [4-5]. Mechanical control system design requirements are the basis of intelligent development, which can be traced back to the 1860s. Since the industrial revolution, the efficiency of human industrial production has been greatly improved, which has gradually expanded to focus on the development of high-tech science and technology [6-7].
2. Application status of computer in mechanical control system

2.1. Networking
With the development of information technology, network has penetrated into the application of computer control system, which has changed the traditional control system. Machinery manufacturing enterprises have gradually used the networked control system, which enables the communication between instruments. Through the network technology, we can connect the original network structure of the control system, which will realize the optimization of the whole process, such as the optimization of the bottom task control, high-level task structure, scheduling, etc. Among them, all kinds of instruments and sensors are the smallest unit of networked control system, which is based on digital basis to achieve networking. Through the bus control system, the computer can control the digital instrument unit through network. Then, through the intelligent field equipment unit, the computer realizes the information network transmission and communication between equipment and system. Finally, the computer can coordinate and organize all the tasks through the fieldbus system, which will finally realize the scheduled control tasks.

2.2. Delayering
In practical application, mechanical equipment is often provided by several suppliers. Due to the poor interaction of products from different manufacturers, the difference of interface protocol and structure will cause the instability of bus system. With the development of mechanical network technology, communication capacity and scale will continue to expand, the traditional distributed control system will be difficult to achieve network connection in a throughout environment. The field bus technology will network the field intelligent equipment and instruments, which can connect various functions of the computer control system. By improving the scalability of field network technology, we can accommodate more devices. Therefore, flat processing will solve the write only problem more perfectly. The overall adjustment and optimization of each subsystem should be managed by the internal network as a whole, which can make overall planning and timely adjustment. The field network task is responsible for the work of specific equipment unit and instrument unit. The two networks together form a computer control system, which can check and adjust the work progress at any time. Through the flat system, we can carry out a variety of work at the same time, such as error correction, display, recording, field control, monitoring, fault diagnosis, etc., which will make the whole control system unified and standardized.

2.3. Data based
The data processing process of computer mechanical control system is usually described by flow chart, as shown in Figure 1.

![Figure 1. Data processing.](image)

Flow chart is an effective icon to describe system information, which can describe abstract data information more intuitively and vividly. The data processed by computer information system mainly refers to symbols, letters, numbers or all kinds of characters. The process of data processing in computer information system is a very abstract process, which is more complex than traditional arithmetic calculation. The data is processed intuitively and effectively for people's daily life. In
addition, data or information are widely used in various organizations, which has formed an independent information processing system. Data and information have become extremely valuable resources in human society. The mechanical control system is controlled by module. The data function of the control module is shown in Figure 2.

![Data function of control module](image)

**Figure 2.** Data function of control module.

3. **Module application in automobile mechanical control system based on computer**

3.1. **Sensor**

The sensors are distributed in the whole body of the car, and the main function is to obtain the detailed information of the car. Through the sensor, we can judge and monitor the overall operation of the vehicle, which will form a record of monitoring information. According to the operation characteristics of the automobile mechanical control system, we can obtain the information of a certain time point of the car through the sensor. Through simultaneous transmission, we can use different frequency division systems, which can transmit the acquired information to the memory segment. In this way, we can achieve the purpose of monitoring the running state of the car, which will ensure the safety and stability of the vehicle control system.

3.2. **Power management**

At present, most cars do not use electricity as the main energy. However, the whole vehicle control system is inseparable from electricity. The management of power supply is the foundation of the whole automobile mechanical control system. Therefore, the stable operation of each part depends on stable and sufficient power supply. Many modules in automobile control system need different current and voltage, which requires power management to meet different requirements. Usually, we need to configure 5V, 6V, 12V voltage. Among them, most parts such as speed measuring element and single chip microcomputer use 5V voltage. If the output voltage of the power supply is unstable, we should first stabilize the voltage, and then we can convert it into the corresponding demand voltage.

3.3. **Optimization of distribution design**

In the process of power distribution design, we need to fully consider the requirements of vehicle load capacity and reliability. In line with the relevant standards, we should try our best to maintain the stability and flexibility of automobile machinery. The distribution design should be carried out according to the line load. When the load is small, we need to use the static compensation method to design. If the load is large, we can use dynamic compensation method. In order to reduce the loss of electric energy, we should make the resistance value of conductor as small as possible. The relationship between resistance and other variables can be expressed by Formula 1.

$$R = \frac{\rho L}{S}$$  \hspace{1cm} (1)
Among them, ρ is the resistivity, l is the length of the wire, and S is the area of the cross-section of the conductor. In order to reduce the conductor resistance, we can choose the conductive material with low resistivity, or increase the cross-sectional area of the conductor. In the process of distribution design optimization, we should consider many aspects, which requires strict implementation of relevant standards.

3.4. Data acquisition and computer processing system
It is composed of three parts: the input processing system and the output processing system. It usually includes data acquisition, parameter input, parameter display, performance calculation, report printing, abnormal alarm, accident sequence record, etc. By operating any system of computer data, we can control part of the system, which is convenient to monitor and control the running condition of the car.

3.5. Electro hydraulic control system of steam turbine
Before the emergence of electro-hydraulic control system, hydraulic control system was used in most steam turbine control systems in China. With the promotion of science and technology, the reliability of electrical equipment, electrical components and electro-hydraulic converter is gradually improved. In addition, the servo mechanism of high-pressure fire-resistant oil has been widely used, which can achieve good coordination between the electric control system and the supporting equipment of steam turbine. By controlling the speed and electric power, we can effectively enhance the control of the pressure after the regulating stage.

3.6. Detection and monitoring of automobile tire pressure
Taking tire pressure monitoring as an example, tire pressure monitoring is one of the systems that many vehicles have been equipped with, which is a very important safety auxiliary system in automobile mechanical control system. At present, by installing temperature and pressure sensors inside the tire, we can obtain and monitor the temperature and pressure parameters inside the tire. Then through wireless transmission, we can send these signals to the car control terminal. Through signal processing, we can form the tire pressure data, which will be presented to the driver. Therefore, the driver can obtain the tire pressure information in time, which can give an alarm when the tire leaks or the tire pressure is too low. The following points should be paid attention to in the design and development of tire pressure monitoring sensor. First, the working environment of the sensor is very bad. The operating temperature of the sensor ranges from 40 °C to 125 °C, which should be able to operate stably at high and low temperatures. In addition, the centrifugal stress of 3000 g is also required. Secondly, the tire pressure sensor usually needs to be placed inside the tire, which makes it difficult to replace it. Therefore, in the design of tire pressure sensor, we should ensure the stability and reliability of tire pressure. By extending its service life, we can play its low energy consumption characteristics.

4. Conclusion
We must promote the integration of computer technology and mechanical control system design, which will help China enter the industry 4.0 era as soon as possible. Based on the automobile industry, this paper analyzes the application of computer to mechanical control system, which can reduce the manpower consumption. By extending the service life of the machine, we can improve the work efficiency, which will increase the economic benefits.

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