Design and Application of Computer Mechanical Control System

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Abstract. The practical application of computer control system in mechanical manufacturing can make communication between various instruments, thus replacing the transfer and control of manpower as each instrument. The design and analysis of computer control system in mechanical manufacturing enterprises is beneficial to the innovation of enterprise equipment. Compared with the traditional mechanical manufacturing equipment, the manufacturing enterprises using computer control system have great competitiveness and greatly improve the precision and performance of the products. This paper first analyzes the current situation of computer control system in mechanical manufacturing industry, and then analyzes the design, advantages and disadvantages of computer control system and its development trend in detail.

Keywords: Computer, Mechanical Control System, Design and Application of Mechanical Control System

1. Introduction

With the arrival of the information age, computer control system is gradually applied to various fields of production and life, and with the continuous maturity of technology, the application scale of computer control system has also changed. The traditional use of human resources is gradually replaced by computer control system, which is especially obvious in mechanical manufacturing enterprises.

In the continuous growth of computer control system technology, mechanical manufacturing enterprises gradually change from human control to network control, and computer control system plays an important role in this transformation [1]. The practical application of computer control system in mechanical manufacturing can make communication between various instruments, thus replacing the transfer and control of manpower as each instrument.
Each instrument is the most basic unit in the networked control system. These basic units add the existing network to the original digital platform. The general control system in the actual production is composed of the basic unit which realizes the network intelligence and the equipment unit which can handle the communication between the instruments independently. Finally, the control system of transmitting and processing information between equipment and equipment, between system and system is formed [2-4]. Through the field master control system, the specific unit can accomplish the task of the unit independently. The master control system coordinates each unit through the network, and finally realizes the preset goal. (see figure 1)

![Diagram of Control System and Mechanical Equipment](image)

**Figure 1.** Relationship between control system and mechanical equipment

In actual production and life, the interaction between products of different enterprises is poor, which is caused by the fact that the computer control systems of different production enterprises are relatively independent. The connection between the general control system and the equipment is different. If the same system is used to control different equipment, the system will be disordered and the equipment can not achieve the established goal.

In general, the mechanical control system of computer can be roughly divided into the internal network of production enterprise and the control network of production site. The overall regulation of each subsystem and the related optimization are managed through the internal network of the production enterprise, so the internal network of the production enterprise has decisive control over the field control system [5]. The production site control network is responsible for the specific basic units and equipment between the smooth, to ensure that the basic units can work normally and smoothly. These two networks form a computer control system together. In the actual production of mechanical manufacturing enterprises, the management and coordination of field production lines can be implemented by using internal networks. The management of the production enterprise can use the
internal network to schedule and check the production operation at any time. The instructions issued by the management can be directed to the field control network through the internal network, and the expected goal can be achieved by further refinement of the control instructions by the field operators to change the status quo of the production line.

2. **Design of computer mechanical control system**

   In the process of continuous application of computer science, there are many problems, so in various fields, there are many clear definitions for the design of computer systems.

   In mechanical manufacturing, computer control system greatly improves the production efficiency of enterprises and greatly reduces the production costs of enterprises [6]. These all come from the dividend brought by the rational use of computer control system, so there is a clear definition of mechanical intelligence, that is, coordination and control. Through the analysis of the advanced machinery manufacturing enterprises in the international community, the mechanical manufacturing technology has become an intelligent manufacturing industry by computer control system.

   In the actual mechanical manufacturing, it is a great test for the enterprise to meet the different needs of different customers for the product. The processing requirements of the customer for the product manufacturing, the size of the batch are all the factors that affect the cost of the manufacturing enterprise.

   Therefore, in the aspect of mechanical manufacturing, the corresponding operation should be carried out according to some functions of the machinery itself, which can be completed by using computer system [7]. The intelligence of mechanical manufacturing is a complex system, which mainly includes the coordination between production equipment and secondary system, and the interoperability between secondary system and general control system. For the product, the perfect fit between the computer master control system and the secondary system, the secondary system and the equipment, the internal structure of the system has a clear connection, so as to meet the customer's demand for the product.

   Different products for functional requirements and control systems are different. Before the product enters the market formally, must have the advance investigation to the market, each kind of product uses the user group and the product function consummation, The degree of popularity in the market is the factor that affects the income of machinery manufacturing enterprises. The application of advanced technology can not only increase the function of mechanical equipment, but also make the control system more intelligent and humanized. Through the correlation analysis of image, data, text and so on, the control system can make corresponding adjustments in time, so as to meet the needs of different customer groups for different functions of the product.

3. **Advantages of computer control system in mechanical manufacturing**

   In mechanical manufacturing, the addition of computer control system enables mechanical manufacturing enterprises to adjust the program according to the specific needs of customers in the face of different needs of customer groups. In order to achieve the production of products to meet customer needs. For the control system program problems, can also achieve self-repair, no need to disassemble the mechanical equipment as a whole. The secondary systems controlling mechanical
equipment need to ensure their own storage capacity, and need to regularly overhaul and maintain the stored data.

Using computer control system can realize intelligent production and processing to a great extent. Compared with the traditional mechanical manufacturing equipment, the manufacturing enterprises using computer control system have great competitiveness and greatly improve the precision and performance of the products [8-9]. Intelligent products can be expanded in depth under the adjustment of the system, so as to give play to the advantages of the control system and improve the performance of the products.

The most important thing in the actual production of computer system control is to ensure the stability and safety of the production equipment on the assembly line. The system can give the alarm in time and point out the fault position accurately. Especially in the production process of the most power failures, once this failure, the system can accurately judge the state of the equipment, timely change the mode of the equipment into a safety mode, under the instructions of the preset program, Mechanical equipment can be cut off by itself to prevent the occurrence of safety accidents. Because the production line controlled by computer system is intelligent and does not need human resources to contact the production equipment directly, the possible unsafe factors in production can be effectively avoided. (see figure 2)

![Flowchart of instruction transfer system](image)

**Figure 2.** Flowchart of instruction transfer system

4. The development direction of computer control system

With the continuous improvement of the level of science and technology, intelligence is a major trend in the future development of machinery manufacturing industry. Mechanical intelligence refers to the
combination of artificial intelligence and computer systems, the use of top of production line equipment. Instead of manual work, carry out some more dangerous workflow. The application of this technology can not only greatly reduce the harm of workers in production, but also improve the quality and quantity of products, thus reducing the production cost of enterprises and increasing profits. The use of computer control system in the actual production of machinery manufacturing enterprises will become the mainstream in the future.

There are many kinds of products formed by the program control of mechanical equipment system, but it is difficult to control many functions with a single system at present [10]. Therefore, the application of modularization solves this problem to a great extent, whether for the design and manufacture of mechanical manufacturing enterprises, or for enterprises that change the mode of processing units, Modularization can effectively improve the production efficiency of enterprises. Therefore, the practical application prospect of modularization in mechanical manufacturing enterprises is also very considerable.

The miniaturization of computer control system is also one of the mainstream research directions. In the traditional machining process, digital processing has been a more advanced processing process, but the huge digital control equipment and the slowness of manual operation are the practical problems in the actual production. Although the computer control system can effectively solve the problem of manual operation, the problem of huge control equipment is still difficult to solve. Therefore, miniaturization is an indispensable technology, computer control system miniaturization has the advantages of small volume, low energy consumption, small occupation, strong mobility and so on. The miniaturized control system is complex and requires precise instruments to work inside. In today's machinery manufacturing enterprises, the popularization of computer control system still needs to be improved, and the miniaturization of control system is in the stage of experimental research, but in the process of continuous progress of science and technology, with the advance of time, The miniaturization of control system can be applied in practical production.

5. Conclusion

The mechanical control system of the computer can be roughly divided into the internal network of the production enterprise and the control network of the production site. The production site control network is responsible for the specific basic units and equipment between the smooth, to ensure that the basic units can work smoothly. In the design of computer control system, we must follow the two basic definitions of coordination and control. Compared with the traditional computer control system in machining and manufacturing industry, the performance and output of the product can be greatly improved, and the risk of manual operation is greatly reduced by replacing the process of manual operation. In the future, the use of computer control systems and the miniaturization of computer systems will become the mainstream. In this paper, the practical application of computer system in machining and manufacturing enterprises and the reasonable design of control system are expounded, and the advantages and disadvantages of computer control system and its development trend in the future are compared and analyzed.

References

[1] Wang Ying. Application of Automation Technology in Automobile Mechanical Control System
[J]. China equipment Engineering,2017000(014):151-152.

[2] Wei Ping, Jiang Jian. The application of embedded PLC and touch screen in the control system of road construction machinery [J]. and Instrumentation Technology,2013(12):53-55.

[3] Xu Wei. A Study on Mechanical Control System Based on Computer [J]. Technology Automation and Instrumentation,2017,000(004):13-15.

[4] China Society of Mechanical Engineering. Design of Mechanical Control System [M]. in China Jiangxi Science and Technology Press,2002.

[5] Lin Songrun. A Study on Multi-Motor Synchronous Control of Stage Mechanical Control System 2015.

[6] Wang Fengjuan. Application of Hydraulic Mechanical Control System in Mechanical Design and Manufacture Heilongjiang Science and Technology Information,2019000(015):142-143.

[7] Li Zhijie, Wang Zhenhua, Li Wenguang, et al. Research on the Application of PIC single Chip Microcomputer in Agricultural Machinery Control system [C]// International Agricultural Engineering Conference Modern Animal Husbandry equipment Innovation and Industrialization Branch. China Society of Agricultural Machinery; China Society of Agricultural Engineering,2010.

[8] Liang Keshan, Tang Li, Cao Yujun, et al. PLC - based Construction Machinery Control System [J]. Military Automation,2009(10):76-77.

[9] Song Huazhen. Development Trend of Packaging Machinery Control System Automation Expo (11):30-31.

[10] Cai Mingzheng, Wang Haisheng, Xu Xiaolong, et al. Application of Embedded Microprocessor in Construction Machinery Control System [J]. and Road construction machinery and construction mechanization,2006,23(009):60-62.