

Application of Automation Control in Design and Manufacture of Mine Machinery and Equipment

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Abstract: With the continuous progress of modern science and technology and the continuous development of economy, the application of automation technology in various fields is increasing. Especially, in some mechanical equipment fields, automation technology has more space to play. The application of automation technology in mining is particularly remarkable. The combination of mining and automation technology not only effectively reduces the labor intensity of workers, but also saves related costs and greatly improves the efficiency of work. However, in practical application, there are still some problems that need to be solved urgently in the process of combining the design and manufacture of mining machinery and electrical automation technology. Therefore, in this paper, the application of automation control in the design and manufacture of mining machinery and equipment was analyzed. This paper hopes to promote the application of automation control in the design and manufacture of mining machinery and equipment.

1. Introduction

Electrical automation control is widely used in mining machinery and equipment, and the reason is that the application of automation in mining equipment has the advantages of low cost and high efficiency, and the introduction of it also ensures the stability of mining machinery. In the process of automated control of mining machinery and equipment operation, if the automated control platform has problems, then it is likely to cause equipment damage, and even cause huge economic and even casualties. Therefore, it is very important to pay attention to the early design and manufacture of mining machinery and equipment. So this paper takes the discussion of automation in the design and manufacture of mining machinery as the main research content.

2. Necessity of Automation of Mining Machinery and Equipment

At present, China's identity is a developing country of economy, and the greatest support for economic development is to vigorously develop high-tech. Therefore, the combination of mining machinery and automation technology has become the most important part in the development of mining industry [1]. Because of the late start of mechanical automation technology in China, the application of mining machinery automation is still in the process of further exploration. For the automation of mining machinery and equipment, it is not only required to overcome the traditional mining machinery production mode, but also to achieve the overall upgrading of mining industry. Automation control of mining machinery and equipment is not only the result of following the national policy, but also an important part of promoting the development of productivity driven by science and technology. At present, as far as the development of automation of mining machinery and equipment in China is concerned, we should not only constantly learn and summarize the advanced technology of foreign countries, but also transform it to suit our national conditions, so that automation of mining machinery and equipment can truly benefit enterprises and people [2].

At present, most of the research level of mine engineering machinery and equipment in China is still in a low level of intelligence, which are unable to independently produce controller and realize remote automation control of construction machinery [3]. The key to realize the automation of construction machinery is to provide production efficiency, reduce the probability of safety accidents in production, and realize the automation of construction machinery. Many foreign

mining machinery and equipment have realized automatic control, including intelligent vehicle controller. There are many construction machinery systems, each system is prone to various faults. The more manual operation there be, the more likely it is to increase the probability of failure. Automatic control of mechanical equipment can release more labor, reduce equipment failure and improve productivity [4].

3. Application of Automation Control in Design of Mine Machinery and Equipment

3.1. Flexible automation technology

Flexible automation technology is the basic concept of automation control and design of mining machinery, which was first put forward by British scientists. According to all the data information in the production process, the system and digital information of the product are improved to make it more suitable for the production and processing of more products. The essence of constituent technology is to sort the processed products according to a certain order, so as to achieve a more reasonable and efficient processing, transportation and storage procedures. If there are problems in the production process, it can deal with the problems more efficiently and quickly [5]. Composition technology is similar to flexible automation technology in practical production and application. They all regard the computer as the control center of the whole system, and inspect every link in the production process.

3.2. Virtual automation technology

Virtual manufacturing technology is widely used in the current equipment manufacturing industry, especially in the manufacturing of mining machinery and equipment. It mainly uses computer graphics, concurrent engineering, technology, artificial intelligence and other related sciences of mining machinery manufacturing to design, so it is a comprehensive technology that integrates multiple disciplines. The application of virtualization technology in mining machinery and equipment mainly refers to the use of computer to simulate corresponding links and carry out virtual monitoring and find relevant problems and give timely solutions, so as to improve the success rate of mining machinery products in production and processing and promote the better improvement and development of the combination of automation and mining machinery and equipment [6].

3.3. Intelligent automation technology

Intelligent design and manufacture of mining machinery and equipment has developed rapidly due to the introduction of automatic control technology. Intelligent design in mechanical manufacturing links enables mining machinery and equipment to have intelligent thinking ability and problem analysis and judgment ability in design, manufacture and production process. Intelligent nature of mining machinery design is to integrate artificial intelligence system, high-tech equipment and analysis and processing software, improve the overall operation efficiency of equipment, and make the automation control effect of mining machinery manufacturing become more ideal [7].

Information processing center is the core and "brain" of the whole system. It is not only the transfer station of communication, but also the center of data analysis and processing. It includes communication protocol analysis, business processing and logical judgment, as well as health status assessment, prediction, early warning and fault diagnosis of construction machinery. Its main components are communication module, data analysis module, fault diagnosis module, short message sending and receiving module, SMS alarm module, data storage module and so on. At the same time, it can also provide WEB service management functions. The communication module mainly receives and forwards the operation parameters of construction machinery and maintains the communication link; the data analysis module mainly realizes the analysis of the operation parameters, GPS information and control instructions of construction machinery; the fault diagnosis module mainly realizes on-line real-time monitoring and historical data playback, provides a remote

fault diagnosis analysis platform, and carries on the remote fault diagnosis analysis to the equipment; SMS alarm module mainly realizes real-time SMS early warning and alarm of equipment failure, informing relevant managers, customers and after-sales service engineers at the first time; data storage module realizes the storage of operation parameters, GPS information, alarm information, control instructions and other data of construction machinery and network query [8].

4. Advantages of Automation of Mine Engineering Machinery and Equipment

4.1. Improving production efficiency

In the current situation of economic globalization, enterprises are facing increasing competitiveness, so improving their competitiveness is the only way for all enterprises. Improving product quality and production efficiency through science and technology is the preferred way for enterprises [9]. Automation control plays an effective role in the design and manufacture of mining machinery and equipment. It is the product of the combination of environment and science and technology, and it is also an effective way for relevant enterprises to improve their competitiveness.

4.2. Improving energy efficiency

The automation of mining machinery manufacturing effectively improves the utilization rate of related resources [10]. First of all, the operation of automated production is more standardized, reducing the occurrence rate of defective products; secondly, the automated production links are more detailed, and the defective products can be repaired and reused again, reducing unnecessary waste of resources; thirdly, the high precision of automated control makes the design link of mining machinery more reasonable, thus improving the utilization degree of resources.

5. Conclusion

In the process of combining the design, manufacture and automation control of mining machinery and equipment in our country, it is necessary to continue to research and explore if we want to achieve further development. At present, in the development process of the combination of design, manufacture and automation of mining machinery and equipment, we should not only learn from foreign advanced technology and successful experience, but also draw lessons from foreign failures in this respect and avoid corresponding problems in time. Based on the current development situation at home and abroad and the exploration, the new order of automation control in the design and manufacture of mining machinery and equipment should be established, which is combined with the basic concept of sustainable development. While guaranteeing the economic benefits of enterprises, it is feasible to promote the better development of automation of domestic mining machinery and equipment manufacturing in China.

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