

Application and Development Prospect of Mechanical Engineering Automation Technology

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Abstract: With the continuous development of social politics and economy, the level of modern science and technology in China is also improving. The backward manual labor mode is gradually replaced by the automation technology of mechanical engineering. Mechanical engineering automation not only improves the quality of products, but also saves labor costs, and promotes the development of China's modern economy and the progress of information technology. In order to better promote the application of mechanical automation technology in many fields and promote the development of mechanical automation technology, this paper discusses the application advantages and development prospects of mechanical automation technology, so as to make it better serve life and production.

Keywords: Mechanical Engineering Automation Technology; Application; Development Prospect

Introduction

Mechanical automation refers to the goal of automatic production of a processed object through the application of relevant automation technology in mechanical manufacturing industry ^[1]. With the emergence of mechanical automation technology, the efficiency of mechanical manufacturing industry has been greatly improved, which saves cost and time for enterprises and obtains considerable economic and social benefits. The research of mechanical automation technology in China started late and the industrial foundation is relatively weak, which leads to the mechanical automation technology in China lags behind that in developed countries, and there are still many problems that need to be further improved ^[2].

1. Development status of mechanical engineering automation technology

1.1 The rapid development and application of mechanical engineering automation and intelligence

In recent years, with the development of domestic and international mechanical engineering, mechanical automation and intelligence have gradually occupied a leading position. The high efficiency, high quality and low cost of automation and intellectualization has benefited all industries, which has fully covered many fields such as military, medical treatment, agriculture, industry and finance, greatly saving labor, time and capital investment.

1.2 Development and application of flexible technology in Mechanical Engineering

With the efficient development of computer technology, flexible technology came into being. Flexible manufacturing technology, also known as flexible automatic production technology, is based on information and takes numerical control technology as the core. It can be based on the whole production process of mechanical enterprises, comprehensively coordinate multiple links such as material storage and transportation, processing, manufacturing and assembly, fully adapt to

different production tasks and improve the production automation level of enterprises^[3]. The emergence of this technology has greatly improved the production quality, reduced the labor cost, effectively reduced the production cost, and then expanded the production efficiency. It can be seen that the development of flexible technology is also an important direction of future development.

2. Application of mechanical automation technology

2.1 Application in engineering field

Mechanical automation technology has been widely used in the engineering field, especially in projects operating in high-risk environments, such as high mountains, deep sea and some environments with very steep terrain. Automatic identification system in mechanical automation technology can sense the surrounding operating environment and reduce the risk of construction. In addition, the automatic identification system can also judge the position and state of the machinery, ensure the smooth progress of construction, and then effectively prevent accidents and ensure the personal safety of construction personnel. In the process of specific application of automatic identification system, it is also necessary to set up corresponding procedures to analyze dangerous projects and carry out corresponding construction operations. At present, the application of mechanical automation technology in the engineering field enables many projects involving high-risk work to be completed smoothly and efficiently, and also provides a guarantee for the personal safety of construction personnel.

2.2 Application in industrial field

With the rapid development of science and technology, mechanical automation technology is widely used in industrial field and promotes the development of industry. For example, the food industry can realize the automation of processing, packaging and production through the application of mechanical automation technology, so as to reduce human labor, reduce the production cost of the food industry, and improve the production efficiency. Besides, mechanical automation technology has also been widely used in new energy development and manufacturing, and its role is more obvious. For example, in the machinery manufacturing industry, many dangerous operations rely on manual work and are prone to accidents. The application of mechanical automation technology can not only meet the accuracy requirements, but also avoid accidents.

2.3 Application in agriculture

In the current process of continuous promotion of new agriculture, mechanical engineering and automation technology can effectively improve the efficiency and level of agricultural economic development. For example, in agricultural activities, on the one hand, through the application of mechanical engineering and automation technology, the efficiency of production, processing and transportation can be greatly improved, the processing process can be reduced, and the circulation speed of crops can be accelerated. The use of mechanical engineering and automation technology can also ensure the accurate control of various data of agricultural production, reduce agricultural production costs and improve agricultural output. On the other hand, it can also irrigate and harvest through mechanical engineering and automatic devices, which reduces the labor burden of farmers.

2.4 Application in detection

Testing is to adopt relevant methods to test the specified technical performance indicators of an object, which is applicable to the quality evaluation of various industries. In the past, traditional detection methods used more visual observation and life experience, such as identifying true and false, but only relying on traditional experience and means cannot meet the current actual needs, and gradually applied mechanical automation in the detection work. Based on the background of the previous era, it belongs to the period of economic transformation of machinery manufacturing industry. The application of mechanization in testing should be made to prevent the lack of experience and energy of traditional manual labor force and improve the accuracy of testing results.

2.5 Application in logistics system

Logistics system is an organic whole with specific functions formed through the materials to be transported and many mutually restrictive dynamic elements (equipment, transportation tools, personnel, communication, etc.) in a specified time and space. The current productivity level has been significantly improved, and the number of products produced is increasing. Therefore, during machinery manufacturing and production, the transportation of a large number of raw materials and finished products is a key problem. The main reason is that on the one hand, the raw materials used to produce finished products should be transported at the processing place, on the other hand, the transportation should be continued at the storage or transportation place after the formed products are produced, and the transportation efficiency and continuity at this stage are the key to the sustainable operation of the enterprise. Therefore, for the transportation system, that is, the logistics system has higher requirements and standards. By effectively improving the mechanization level, the transportation efficiency and continuity can be enhanced.

2.6 Application in driving and medicine

In the past, the operations of vehicles relied heavily on human control. Various operations such as accelerating, decelerating, turning, and pitching could only be achieved manually. Not only were these actions highly imprecise but also they all required lengthy periods of concentration which easily caused exhaustion of the drivers and led to accidents. Autonomous steering systems has been developed for many years, and many companies like Google and Baidu have invested a surprising number of resources on it. For example, in 2020, Waymo, Alphabet's self-driving car company, announced 2.5 billion dollars in one investment round^[4]. However, despite these countless efforts, autonomous driving vehicles are still far from being mass-produced. Current stable automatic steering systems are only installed on airplanes, but their functions are still limited to driving and stabilizing the planes during cruising and they often need human interference when encounter difficult environments.

Similar situations happen with automatic medical technologies. In many surgeries, doctors need to perform treatments in microscopic scales. And scientists believe the precision and stability of robots can greatly ease the work. At present, the uses of autonomous technologies in surgeries are still exceedingly rare as robots cannot effectively deal with various emergency situations so they are more of complementary equipment.

3. Development prospect of mechanical automation technology

3.1 Practicability

With the popularization of the application of mechanical automation technology, its technology continues to mature and better meet the needs of the application of mechanical automation technology. For the future development of mechanical automation technology, we should avoid blindly introducing foreign technology, fully consider the demand of domestic market for mechanical automation technology, and make the mechanical automation technology develop in the direction of practicality. If the development of mechanical automation technology does not pay attention to practicability, it will lose its due value and cause a waste of resources. Therefore, China's mechanical automation technology must focus on the actual needs of production, carry out the research and development of mechanical automation technology, and promote the development of mechanical automation technology in the direction of practicality.

3.2 Greenization

Under the influence of the concept of green development and the concept of sustainable development, modern science and technology is developing in the direction of green. For mechanical automation technology, it is mostly used in industries with high energy consumption. Automatic mechanical production reduces the production cost and brings more convenience to the society, but it also has a certain impact on the environment. Hence, mechanical automation technology should develop in the direction of green and environmental protection and develop modern mechanical automation technology with low

carbon and low energy consumption.

3.3 Low cost and high efficiency

Mechanical automation has the advantage of high efficiency. Many enterprises have invested a lot of money to introduce advanced mechanical automation equipment but investing a lot of money will not only increase the cost of technology application, but also cause unnecessary waste of resources. Therefore, the application of mechanical automation technology in enterprises should develop towards the direction of low cost and high efficiency. Reducing the cost of mechanical automation technology can reduce unnecessary capital investment and reduce the risk of the application of mechanical automation technology. The development of high-efficiency mechanical automation technology is the inevitable result of the development of science and technology. To better meet the needs of social production, we must constantly innovate and study mechanical automation technology to improve its application efficiency. The two development directions of low cost and high efficiency will promote the overall development of mechanical automation technology and make it mature gradually.

3.4 Micromation

At present, mechanical automation technology has been widely used in agriculture, military, and other industries, but the volume of mechanical automation equipment is generally large. In the future, mechanical automation technology will be applied to more industries, such as information, medical treatment, military, etc., which puts forward strict requirements for the volume of mechanical automation equipment. Therefore, mechanical automation technology will develop towards small volume and miniaturization in the future to meet the needs of various industries.

3.5 Adaptability

As mentioned previously in 2.6, humans have been trying to expand the application of autonomous technologies to fields that used to heavily rely on human work. The similarity of driving (especially car driving) and surgery is that both scenarios require the system to have the ability to swiftly react to emergencies. Unfortunately, current autonomous systems cannot perfectly handle all situations without human interference. In the case, further development in technologies such as computer vision, detect system, and feedback algorithm is needed.

In addition, people need to consider ethical issues when bring automation technology to another work field other than engineering. For example, autonomous surgical robots are supposed to make clinical decision by themselves, and doctors, the only group that has legal authority to regulate the practice of medicine, usually do not have the technical competence to evaluate the performance of robots^[5]. Scientists and engineers should include such ethical considerations in the development phase of relevant technologies.

To sum up, automation technologies have become an indispensable part in social productive and their roles are becoming more and more important. With more extensive applications of mechanical automation technology and its good development prospects, people need to constantly explore and innovate mechanical automation technology to better serve people's life and production.

References

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