Application Analysis of Automated Production Technology Based on Industrial Robots

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Abstract. With the all-round development of China’s economy and society, the equipment manufacturing industry has shifted from Chinese manufacturing to creation in the past. The domestic production rate of many advanced manufacturing equipment is getting higher and higher, which has made a huge contribution to economic and social development. In recent years, with the rise of industrial robot technology, more and more industrial robots have replaced traditional manual operations, and they have created greater benefits for enterprises with their precision, speed, technology, and efficiency.

1. Introduction
The application technology of industrial robots has a long history in China. With its advanced productivity, super storage and memory ability, and non-stop work, it has been welcomed and praised by the majority of enterprises, especially the application time in the automobile manufacturing industry. It played a very important role in strengthening automated production technology and improving automated production capacity. Nowadays, the application field of industrial robots is very wide, which will greatly promote the comprehensive improvement of equipment manufacturing level, increase the efficiency of automated production, and strengthen the research and development and application of automated production technology.

2. The concept of automation production technology based on industrial robot
Industrial robots first appeared in the United States with a history of more than sixty years. At that time, the robot mainly used the disk rotation technology to freely extend and rotate the robot arm to complete the welding action. The performance of modern industrial robots has been very advanced. It is an automation technology that uses modern big data technology, information storage technology, high-tech computing technology, and software programming technology to generate a series of instruction operations. Compared with traditional labor, industrial robots have the characteristics of high work efficiency, long working hours, and low operating costs [1]. In recent years, by virtue of its own advantages, the global inventory of industrial robots has increased year by year (Figure 1). Industrial robots are widely used in a large area, which can effectively promote and upgrade automated production technology. It is of far-reaching significance for comprehensively improving the level of equipment manufacturing industry and strengthening competition with the world’s advanced technologies.
3. Significance analysis of automatic production technology based on industrial robot

3.1. It helps to reduce the probability of production failure

As the most advanced and high-end link in the modern equipment manufacturing chain, industrial robots play an important role. The full introduction of this technology can greatly promote enterprises to reduce the occurrence of machine failures, reduce operating costs, and improve corporate efficiency. Compared with manual operation, industrial robots have a high degree of accuracy and rigor according to their own performance. In the process of docking with mechanical equipment, through scientific calculations in the early stage, the contact surface between the robot and the machine is reduced to the most reasonable range. After setting the parameters, the work can be effectively avoided and reduced during the work process. Excessive wear and failure of production machinery can be caused by inaccuracy. Industrial robots operate machinery strictly in accordance with the input instructions. The stability and accuracy of operating machinery are effects that cannot be achieved by manual operation, so it will greatly reduce the occurrence of production failures[2].

3.2. It is conducive to improving the quality and efficiency of automated production

The reason why robots can greatly improve the quality and efficiency of automated production is mainly because they can perform high-intensity, high-efficiency, and high-precision work. Regardless of human will, within the scope of reasonable use of the equipment, as long as sufficient power supply is ensured, it can even work 24 hours a day. The introduction of a large number of industrial robots into physical enterprises can greatly promote production efficiency and quality. Artificial labor has a serious impact on the quality and efficiency of product production due to physical, weather, mood, and technical proficiency. The production efficiency is high if the production workers are skilled. Newly recruited workers are unfamiliar with the position and technically unskilled, and it is difficult to guarantee production efficiency and production quality. Robots do not have the above-mentioned problems. Robots use input instructions and strictly output related technical operations, and can be on duty all the time and throughout the year. Therefore, the introduction of industrial robots plays an important role in guaranteeing production quality and production efficiency in enterprises.
3.3. It is helpful to promoting the steady improvement of industrial level
At present, most of industrial level, except for some high-tech state-owned large-scale enterprises, is still dominated by small and medium-sized enterprises, with insufficient capital investment, low scientific and technological production efficiency, and low labor level. The products are mainly the lowest-end products in the downstream of the industrial chain. The competitiveness of the products is insufficient and corporate profits are not high. The market share can only be based on price wars. This forms a vicious circle and seriously affects the improvement of industrial level. After the rational introduction of industrial robots, this phenomenon will be greatly changed. Industrial robots can greatly improve production efficiency, reduce enterprise costs, increase enterprise core competitiveness, and are more conducive to expanding trade exports and increasing international market share. Intelligent manufacturing is the general trend, and the sales volume of industrial robots is also gradually increasing (see figure 2). At the same time, the introduction of industrial robots can also drive a series of related industries into the era of industrialization. It can play a role in driving and developing all related products in machinery manufacturing, industrial materials, software programming, mechanical maintenance and other industries. The steady improvement of manufacturing level plays a vital role[3].

4. Analysis on the application strategy of automatic production technology based on industrial robot

4.1. Strengthen the scientific application of welding robots
Welding robot, as the name suggests, is a robot that can perform welding operations. With automatic welding technology, during the welding process, it can effectively target some high-risk industries, dangerous areas, underground, underwater, deep trench and other areas where manual welding is relatively difficult, such as submarine welding, nuclear power plant related parts welding, natural gas pipeline welding. The welding robot is mainly composed of intelligent software, a fixed operating chassis, a welding handle and a power supply device. It can play its due role in the welding process and improve the welding quality. The advantages of welding are low welding speed, high quality, less consumption of welding equipment, and high resource utilization. Strengthening the application of welding robots is of far-reaching significance, which will help promote the transformation and upgrading of national equipment manufacturing, improve quality and efficiency, and promote the country to enter the ranks of advanced manufacturing.
For example, a company that produces and processes pipe vents requires a large number of welding workers. On the one hand, the flange piece is welded to the completely cut steel pipe to ensure that the weld seam is tightly closed, and there are no problems such as air holes and leakage. Generally, a worker can weld up to 20 semi-finished manholes in a working day. If a semi-finished manhole is welded at 30 yuan per piece, the worker’s wages are required to be 240 yuan. The company should introduce welding robots in time, and a machine costs about 20,000 yuan. After the installation and commissioning is completed and the test machine is successfully tested, it takes 10 minutes for one machine to weld a manhole with an inner diameter of 600 mm, and 6 pieces can be welded in 1 hour. If someone works for 8 hours a day, it can complete 48 semi-finished manholes. It is equivalent to twice the labor, and calculated on the basis of 16 hours of use per day, it is more than 5 times the labor efficiency, and its welding cost is greatly reduced. The welding robot is not only efficient, but also the welding joint is smooth and beautiful, and the connection is firm. In addition, welding robots can also be applied to other high-risk industries and can play a greater role[4].

4.2. Improve the effective application of assembly robots

Assembling a machine is the process of assembling some parts that need to be assembled to form a machine. For manual assembly, the strength of some specific data needs to be carefully grasped. Because the strength of the person is different, errors will occur in the strength of the assembly and use, which will affect the overall performance of the machine, fail to perform its due function, and affect the value and practical functions of the machine. The assembly robot relies on its various performance advantages (see table 1) to make it have the advantages of high precision, stable work, good flexibility, and rapid action. Therefore, the use of assembly robots can perfectly eliminate this problem. Because the strength of the robot output is uniform and symmetrical. For the strength required in the assembly process of some machines, the robot can be set in advance and the error can be reduced to the extreme value. The machine produced in this way has good performance, powerful power, strong durability, and can quickly win and occupy the market[4].

For example, in the process of producing diesel engines, a diesel engine company does not have assembly robots, so it is necessary to hire old skilled workers who have worked for many years and have rich experience to assemble the piston ring in the final process. Many young workers are unable to effectively perform this link because the last link has very precise requirements for intensity, and the intensity is not well mastered. In the case of a wrong direction, not only does it need to be reworked and reinstalled, but more importantly, the entire diesel-powered vehicle cannot start normally at all, and the operation is unstable after it is started. The introduction of assembly robots can completely avoid this problem. It can set the output force of the robot in advance, and ensure that the direction of the output torque is correct. The assembly robot performs a continuous and stable output according to the value set in advance. It just ensures the perfect docking of the piston and the piston ring, which not only improves the assembly accuracy, but also increases the assembly speed. The assembly efficiency can reach more than three times that of the master, and it can work for a long time without stopping. In this way, the overall efficiency of the diesel engine can be effectively improved, and the efficiency of the engine can be improved, and the service life of the engine can be increased by more than 30%. Therefore, strengthening the large-scale application of assembly robots plays a vital role in enhancing the core competitiveness of enterprises.
**Table 1. Analysis of the Performance of Assembly Industrial Robots**

| Application technology of assembly robot | Working characteristics of assembly robot | Work area of assembly robot | Work efficiency of assembly robot |
|------------------------------------------|------------------------------------------|----------------------------|----------------------------------|
| The research and development of assembly robot combines various technologies, including communication technology, automatic control, optical principle, microelectronics technology and so on. | The biggest characteristic of assembly robot is high installation precision, flexibility and durability. | Because the assembly work is complex and fine, it needs to choose the assembly robot to install the electronic parts and the fine parts of the automobile. | According to the characteristics of the work task and the working environment, the assembly robot can carry out the efficient assembly task on the basis of keeping the shape of the object and the nature of the object unchanged, and its working efficiency is far more than that of manual. |

4.3. **Deepen the rational application of handling robots**

In modern logistics companies, a large number of sorting workers are required for on-site operations. Because there are too many items to be sorted in logistics enterprises, workers are in the process of sorting. The problem of wrong selection and missing selection is easy to occur, which has a very bad impact on customers. In the case of serious circumstances, it will increase the operating cost of the logistics company and affect the efficiency of the company. The introduction of handling robots can well avoid this problem. The handling robot is the latest scientific research achievement in recent years. It is mainly used in some large logistics companies, truck loading and unloading goods, and sorting in the express delivery industry. Its appearance can liberate a large amount of labor, promote handling efficiency, improve handling capacity, and avoid the problem of missed and wrong picking[6].

For example, a large express delivery company needs a large number of workers to carry out careful checking, sorting, packing trucks, and delivery in the face of nearly one million express goods every day. Especially in the process of sorting and loading, handling robots should be used to complete this task. It can set the relevant parameters of the robot in advance, and accurately identify, sort and pack different types of express goods at different addresses. Sorting and shipping are carried out according to the four levels of province-city-county-township. In the process of shipment, the corresponding parameters of the robot should be set to be handled gently to ensure that there is no bumping phenomenon. After the introduction of robots, the speed of sorting express delivery is 20 times that of ordinary workers, and there will be no mistakes. This has won a good reputation for express delivery companies, and effectively improved the economic benefits of the company. For another example, in smart warehousing companies, the use of handling robots can well solve the problem of finding and picking up goods. Large smart warehousing companies have a wide variety of goods and complex categories, and they only rely on manual technology to retrieve goods, which is not only time-consuming and labor-intensive. The most important thing is that the goods at high places are not easy to take. One is that the shelves are high and the risk is high. The other is that it needs to use many years of work experience when taking it. Otherwise, it is easy to take the wrong. After the introduction of a handling robot, it can be completely avoided. Because the handling robot has super storage and memory capabilities, when inputting the required goods on the computer, the handling robot can follow its own trajectory and quickly grab the goods, and it is not easy to make mistakes[7].

5. **Conclusion**

In summary, the investment and development of industrial robots have played a very important role in
improving the level of industrial automation, enhancing the core competitiveness of enterprises, and driving the overall improvement of the machinery manufacturing capabilities and material application levels. At present, the level of national industrial robot manufacturing capacity is still relatively low, and it is still at a backward level compared with developed countries. To strengthen the development and use of industrial robots, generations of Chinese people need to continue to work hard to create more advanced and scientific industrial robots and apply them to the economic construction.

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