Research on Development and Application of Mechanical Engineering Based on CNC Machining Technology

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Abstract. The machinery industry is an important foundation for the development of a country. It is very important and necessary to do a good job in the development of the machinery industry. In the new era, with the development and application of information technology and automation technology, it has provided a powerful boost for the development of modern machinery industry. By applying information technology and automatic control technology to the machinery industry, the technology to improve the information and automation level of the machinery industry is called CNC technology. Based on the analysis of the characteristics of CNC technology, the article analyzes and introduces the important influence it brings to the machining technology, and prospects the future development and intelligent trend of CNC technology.

1. Introduction
Numerical control technology has a wide range of applications in the field of mechanical processing, especially Siemens, FANUC, HEIDENHAIN and other numerical control systems occupy a large proportion in the CNC machine tool control system. Modern machining has higher requirements on the accuracy and speed of processing, especially in the fields of aviation, aerospace, navigation, etc., which requires ultra-high-precision processing, regardless of the dimensional accuracy and geometric accuracy of parts after processing. Claim. Doing a good job in the development and application of CNC technology in machine tools will effectively improve the machining accuracy of CNC machine tools [1]. Provide a powerful boost for industrial development.

2. Composition and characteristics of CNC technology
Numerical control technology is an organic combination of digital computer control technology and mechanical manufacturing technology. Its most typical representative is the numerical control machine tool. From the development of the first numerical control machine tool in the 1960s to 1970s, the numerical control technology has shown a leap forward. Especially nowadays, CNC machine tools integrate modern and present sensor technology, optoelectronic technology and computer and communication networking technology, so that CNC machine tools are more informatized and intelligent, not only for faster data processing speed, machine tool movement and The cutting speed is faster, at the same time, the machining accuracy of the CNC machine tool is higher and the machining speed is faster. It can be said that CNC machine tools occupy an extremely important position in the development of modern industry, and it is necessary to actively develop and apply CNC machine tools. CNC technology is an integrated technology and a systematic project [2]. It consists of multiple components working together to jointly promote the development of digital control technology.

3. Connection and application of group technology and CNC technology
Group technology and CNC technology are complementary to each other. Group technology can be called the foundation of the development and application of CNC technology. In modern times, CNC technology

The deep connection and integration with the group technology has promoted the manufacturing technology to a new stage. Among them, the flexible processing system formed mainly by numerical control technology and supplemented by group technology can efficiently process multiple varieties and small batch parts, occupying an important position in the field of modern machining. The industrial manufacturing system formed by the close combination of group technology and numerical control technology not only brings help to the processing and manufacturing industry, but also provides technical support for computer-aided design and computer-aided manufacturing technology, which is a concentrated expression of numerical control technology. The deep combination of group technology and numerical control technology has not only greatly improved the machining form, accuracy and machining efficiency, but also has a great influence on the production organization form. The processing system formed by the combination of group technology and numerical control technology makes full use of the functions of each link through the reasonable allocation of various elements of mechanical production to improve the economic benefits of the enterprise [3].

4. Application of CNC technology in the field of mechanical manufacturing
CNC machine tool is a typical application of CNC technology in the field of machining and manufacturing. The CNC machine tool is mainly composed of the mechanical structure part, CNC system, control module, CNC, PLC and CNC motor, etc., and is supplemented by hydraulic pressure, compressed air and other parts. The above parts together constitute the CNC machine tool. Modern CNC machine tools require high precision, which puts forward higher requirements for the mechanical structure of CNC machine tools: higher dynamic and static stiffness of the machine tool. The high precision of CNC machine tools is based on the good dynamic and static stiffness of the machine bed. The frequency conversion motor used in modern CNC machine tools has a very fast linear motion. The CNC machine tool will have a strong impact on the bed during high-speed movement. Good dynamic and static stiffness of the machine tool will help the machine tool reduce vibration due to the machine itself. The influence of influencing factors on the machining accuracy of the machine tool. The friction and transmission clearance between the lower moving pairs. The movement of the CNC machine tool is the drive chain from the frequency conversion motor through the drive screw to the machine tool cutter. The higher friction and transmission clearance of any transmission pair in the drive chain will have a serious impact on the overall transmission accuracy of the CNC machine tool. The high precision of modern CNC machine tools is based on good mechanical rigidity and traditional characteristics. Higher machine tool life and mechanical rigidity. The high-speed movement of modern CNC machine tools has high requirements on the mechanical characteristics of the machine tool. It requires high precision and wear resistance of the mechanical parts of the machine tools, which can withstand the rapid friction caused by the high-speed movement of the machine tool in a short time and the temperature rise of the material. The impact. In order to meet the above requirements of CNC machine tools, continuous research and application of materials, processing techniques and technologies used in CNC machine tools are required. In the modern processing industry, the numerical control technology represented by numerical control machine tools is occupying an increasing proportion. At the same time, with the development of computers, communications and automation technology and the application of numerical control technology, the degree of automation and intelligence are also continuously deepening. This laid a good foundation for the progress of the industrial system. The industrial system formed by the combination of numerical control technology and traditional industry mainly includes: FMS system, DNC system CIMS system, STEP-NC system and so on.

4.1. Flexible manufacturing technology and system
The flexible manufacturing system is an organic combination of the logistics transportation system and the numerical control processing system. The biggest feature of this system is the ability to organically
combine random automatic manufacturing with no fixed processing sequence and mechanical processing equipment. The use of a computer for centralized control allows the workpiece Complete integrated processing and manufacturing. The flexible manufacturing system can be well applied in small and medium-sized processing enterprises. Not only the application cost is low and the scale is small, but also the application is more efficient and reliable. The flexible manufacturing unit is an important part of the flexible manufacturing system. The processed workpiece is fixed on the pallet, and the clamping of the workpiece is completed through the exchange of the pallet, thereby achieving seamless connection of the workpiece processing. The flexible manufacturing unit can play an extremely efficient processing rate in the processing of single batch and large batch of parts, so as to realize the efficient production of large batch.

4.2. Computer Integrated Manufacturing System

The computer integrated manufacturing system is one of the components of modern numerical control technology. The computer integrated manufacturing system organically integrates modern management technology, manufacturing technology and information technology, and utilizes the powerful data processing capabilities of the computer to achieve production for enterprises. The calculation, processing, and deployment of technology, personnel, and logistics information in the process have enabled efficient allocation and utilization of resources.

4.3. Distributed CNC

The distributed numerical control system adopts the "one-to-many" control mode, with one or more computers as the "host computer" of the entire system. The "host computer" can realize the inspection, control and information transmission of the controlled calculation. By applying it in the processing management of the enterprise, it can effectively reduce the intermediate link of the workpiece from programming to processing, and the process programmer can directly transfer to the required processing through the DNC system after completing the programming of the required processing parts. In the machine tool, the machine tool operator combines the completed machining program to complete the processing and manufacturing of parts. The DNC system can connect multiple CNC machine tools in the processing workshop through a large CNC machining system, and can obtain extremely good processing results in large-scale CNC machining.

4.4. STEP-NC technology

The technology was proposed by the European Union, and the joint research and development of many countries in the world finally made the technology possible. This technology has the advantages of being able to process complicated information, realize intelligent control processing, visually display processing tasks, complete product information description, etc. when it is used. The core advantage of STEP-NC technology is that the machining system can complete the design of the machining tool movement mode according to the designed workpiece drawings, and realize the possibility of product manufacturing and processing according to the design drawings. The core of the technology is to read and read the data of the design drawings. Therefore, in the research and application of the technology, it is necessary to strengthen the development of the file reading technology to improve the reading efficiency and ensure the accuracy of the relevant data reading. In the past traditional STEP-NC technology, numerical control technology used indirect rather than direct way to complete the reading, reading and control of related data, but it should be noted that the traditional STEP-NC technology uses indirect interpretation technology. The low reading efficiency cannot maximize the advantages of STEP-NC technology. The direct interpretation and adaptive interpretation used by the new-generation STEP-NC technology can effectively avoid the problems caused by the traditional STEP-NC technology indirect interpretation. Therefore, in the development and application of STEP-NC technology, it is necessary to strengthen the research on this technology and use new technologies to improve the application prospects of CNC technology, so as to make CNC technology get better development.[4]
4.5. The interaction of artificial intelligence technology and CNC technology

The modern society is an information society, and the Internet + technology represented by cloud computing, artificial intelligence, and big data technology is combined with the numerical control technology to make the numerical control technology rejuvenate a new life. Especially for artificial intelligence technology, through years of development, artificial intelligence technology has achieved certain breakthroughs. Its learning and intelligence will provide more core power for modern manufacturing. The "Smart Manufacturing 2025" strategy released by China is based on this core concept. In the new era, new technologies have brought both opportunities and challenges. CNC technology should actively explore the development and application of artificial intelligence technology in CNC technology, promote the deep integration of a new generation of artificial intelligence technology and CNC technology, and form a more intelligent CNC machining equipment, so as to indicate the direction of the development and application of CNC technology.[5]

Figure 1. Application of CNC technology in the field of mechanical manufacturing

5. Conclusion

The influence of CNC technology on modern manufacturing is very far-reaching, especially in the field of mechanical engineering. By combining CNC technology with mechanical equipment, it can effectively improve the automation and intelligence of mechanical equipment. At the same time, it is necessary to increase investment in research and development of CNC technology and master the core technology.

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