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Application Analysis of Computer Technology in Mechanical Design, Manufacture and Automation

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Abstract: With the continuous development of science and technology in China, computer technology is widely used in all walks of life in China. By combining computer technology with mechanical design and manufacturing and its automation technology, the efficiency and quality of mechanical production in China can be improved, and the mechanical production industry can gradually move towards the road of intelligent and automatic development. This paper studies and analyzes the application of computer in mechanical design and manufacture and its automation.

1. Introduction

Applying computer technology to the process of mechanical design and manufacturing can improve the production efficiency and quality of enterprises, reduce production costs, improve market competitiveness, and enable mechanical manufacturing enterprises to occupy a dominant position in the fierce market competition. At present, 3D technology, computer-aided technology, simulation technology, three-dimensional technology, CNC machine tool technology, etc. are widely used in the current mechanical design and manufacturing process.

2. Overview of mechanical design

Mechanical design is mainly divided into mechanical design and mechanical manufacturing. Mechanical design refers to the conception and design of the structure, principle and transmission mode of mechanical equipment; Mechanical manufacturing refers to the use of advanced manufacturing instruments and mechanical equipment to complete the production and manufacturing of products. At present, with the continuous development of science and technology in China and the acceleration of industrialization, more and more automatic machinery and equipment are widely used in the production and manufacturing industry in China, which can improve the production efficiency and quality of the industry and enable enterprises to gradually move towards the road of automation and intelligent development.[1] At the same time, the introduction of advanced computer technology can optimize and improve the existing mechanical design and manufacturing related links, so as to enhance the effectiveness and reliability of mechanical manufacturing. In addition, through advanced computer technology, mechanical design and manufacturing can gradually move towards the road of virtual development. Through computer aided technology and simulation software, the whole process

of mechanical production and manufacturing can be simulated, in order to timely find the problems in the mechanical design process, and develop a more scientific and reasonable mechanical manufacturing program. Therefore, in the current digital and information development environment, it is necessary to integrate the relevant data of mechanical equipment, improve and optimize the existing mechanical manufacturing design technology, and make the mechanical equipment more effective and reliable[2].

3. Application status of mechanical design and automation

In recent years, the rapid development of mechanical design and manufacturing and its automation technology in China has laid a foundation for China's mechanical manufacturing industry to move towards intelligent and automatic production. However, compared with other developed countries, China's existing mechanical design and manufacturing and automation technology level is still relatively backward. At present, although most machinery manufacturing enterprises have actively introduced advanced mechanical automation technologies and concepts, they have not combined them with their own actual operating conditions. In addition, due to the limitations of the existing technical level, the product quality and efficiency still cannot meet the current market demand, thus making enterprises unable to occupy a leading position in the fierce market competition. At the same time, due to the lack of corresponding high-tech talents in China's mechanical design and manufacturing and automation industry, the existing technicians have not actively learned advanced design and manufacturing and automation theories and technologies, and the graduates lack rich practical experience, which further leads to the relatively low level of mechanical design and manufacturing and automation in China.

4. Analysis on the importance of combining computer technology with mechanical design and manufacture and automation

4.1. Improving the application effect of symbol graphics in design

In the process of mechanical design and manufacturing, a large number of graphics and symbols will be used. As the core content of design drawings, graphics and symbols have strong complexity and diversity. At the same time, in the process of mechanical design, only the scientific and reasonable application of symbols and graphics can ensure that the design drawings can meet the expected requirements, thus laying the foundation for the later mechanical manufacturing process. Generally, computer aided technology, such as CAD software, can be used to complete the corresponding symbol and graphic programming, so that the later mechanical design process has unified, standardized and perfect symbols and graphics. Meanwhile, errors in mechanical design drawings can be reduced through CAD drawing software. In addition, all information can be processed quickly and analyzed efficiently, and all symbols and graphics can be classified scientifically and reasonably to improve the quality and level of product design.

4.2. Application of visualization technology and virtual simulation technology

Through visualization technology and virtual simulation technology, the mechanical manufacturing process can be fully controlled. In the process of mechanical manufacturing design, the abstract data information can be transformed into visual graphics through visualization technology and virtual simulation technology, so as to help staff better understand the current data and lay a foundation for the smooth development of later mechanical manufacturing production. In addition, the use of visualization technology can reduce the defective products in the process of mechanical

design and manufacturing, thereby continuously improving the quality and level of production.

4.3. Mechanical equipment and parts

In the process of mechanical design and manufacturing, different types of parts will be involved. Therefore, in the process of mechanical design and manufacturing, it is necessary to constantly optimize and improve the existing part design scheme in combination with the actual demand, so as to improve the performance and quality of mechanical equipment. The application of computer aided technology in the mechanical design and manufacturing process can enable designers to control the key content, and understand the role of the current mechanical equipment product parts. Through man-machine dialogue, the data in the mechanical design and manufacturing process can be comprehensively analyzed and controlled, so that the deficiencies and defects in the design process can be found in time through advanced computer professional software, a more scientific and reasonable solution can be developed, and continuously improve the level and quality of mechanical parts design and manufacturing.

4.4. Improving drawing quality

Design drawing is an important link in the process of mechanical design and manufacturing. The quality and level of drawing determine whether the subsequent mechanical manufacturing and processing operations can be carried out smoothly. Generally, the mechanical design and manufacturing drawing work is mainly completed by manual drawing, which is prone to error in the design process. At the same time, manual drawing usually shows the parameters of various links and components in mechanical design and manufacturing in a two-dimensional plane, which has many defects. Using computer aided technology to complete mechanical design and manufacturing drawing can create a good design platform and reduce errors. For example, the current design can be optimized and improved through CAD software drawing to reduce design errors, so that the product parameters can meet the actual needs, thus ensuring the continuous improvement of design quality and level.

5. Application of computer technology in mechanical design and manufacture and its automation

5.1. Application of computer aided technology

The combination of computer aided technology with mechanical design and manufacturing and its automation technology can meet all the requirements of mechanical design and manufacturing, and is widely used in the field of production and manufacturing in China. Computer aided technology can ensure the accuracy and reliability of current product design, and ensure the economic and social benefits of enterprises. First of all, through the scientific and reasonable application of computer-aided technology, the basic principles and structures of mechanical design can be comprehensively analyzed, and the level and quality of mechanical design can be improved. Secondly, the use of computer aided technology can make the mechanical design work more efficient and reliable. In addition, using computer aided technology to assist mechanical drawing can make it easier for designers to understand the whole life cycle of design, reduce design errors and errors, and ensure that design drawings are more accurate and reliable. Finally, computer aided technology can make the design drawings more unified, standardized and accurate, and reduce repeated design.

5.2. Application of computer machine tool technology

Through the scientific and rational application of CNC lathe technology, the mechanical design and manufacturing process can gradually move towards the road of automation and intelligent development. Generally, CNC machine tools are mainly composed of computer platform and software programming. Software programming is divided into manual software programming and automatic software programming. At present, software automatic programming CNC machine tool software is widely used in the production and manufacturing process of parts and accessories. It can use the computer as the operating platform to complete the corresponding parts production application program through standard programming software, and control the CNC machine tool to complete the specified operation.

5.3. Application of computer 3D technology

As the core content of current computer technology, 3D technology can complete corresponding three-dimensional design through the latest theory and technology, thus providing a more scientific and reasonable design scheme for the mechanical design and manufacturing process. For example, 3D technology can be used to present the stress structure of products and the process of product deformation, so as to improve the level and quality of mechanical design and manufacturing. At present, 3D CAD technology is widely used in the process of mechanical design and manufacturing. It can simulate and analyze the size, shape and position of products, and give specific physical information to products. For example, CAD 3D technology can be used to analyze the quality, volume and color of products, so as to formulate a more scientific and reasonable product design optimization scheme, reduce production costs, and improve the production efficiency and quality of enterprises.

5.4. Application of computer ERP management system

In the process of mechanical design and manufacturing, due to the variety and complexity of mechanical accessories and parts, the mechanical design and manufacturing industry has discrete characteristics. Therefore, the mechanical production and manufacturing industry should formulate a more scientific and reasonable production and manufacturing plan based on the detailed information of product parts. Generally, the daily operation of mechanical design and manufacturing of enterprises mainly includes product processing and product management. For product management, enterprises can use the ERP management system to monitor the quantity and inventory information of parts and accessories in real time, and then establish a corresponding database, so that staff can quickly query the quantity and related information of different batches and types of parts and accessories, complete the comprehensive tracking of products, and lay a data foundation for later management to formulate marketing plans.

5.5. Application of simulation technology

With the continuous development of science and technology in China, simulation technology has been widely used in the mechanical design and manufacturing and automatic production process in China. Through the scientific and reasonable application of simulation technology, the whole life cycle of mechanical design can be simulated, so that the staff can intuitively understand the problems and hidden dangers that may exist in the process of mechanical design and manufacturing, and lay an important data basis for the optimization and improvement of mechanical design and manufacturing scheme.

5.6. Application of 3D technology

The development of 3D technology in China has gradually become mature, which can play an active role in mechanical design and automation process. At present, the application of 3D technology is mainly in the following aspects: (1) Through the application of 3D technology, the size and characteristics of products can be simulated at the product design stage, so as to help designers find possible loopholes and problems in the design in time and make more scientific and reasonable design plans. (2) After the design is completed, 3D technology can be used to comprehensively analyze the parameters and data of the product, so as to ensure that the product quality meets the actual needs. (3) Parts with complex structure can be produced through industrial 3D printing technology, and the parts can be guaranteed to have high accuracy. (4) In the stage of product quality inspection, computer 3D technology can be used to simulate the products, thereby saving inspection costs, ensuring the quality and efficiency of production, and making machinery enterprises move towards sustainable development.

6. Future development of mechanical design and manufacture and its automation

6.1. Economization

Applying computer technology to mechanical design and manufacturing and its automatic production process can improve work efficiency, ensure product quality, reduce production costs, and enable enterprises to obtain higher economic benefits. In order to ensure the long-term and stable sustainable development of enterprises, we should choose more economical manufacturing materials, improve equipment utilization and reduce equipment production costs.

6.2. Green and environmental protection

With the acceleration of China's industrialization process, the problem of environmental pollution has become increasingly serious, and environmental protection has attracted more and more attention. Therefore, in the future mechanical design and manufacturing process, we should integrate the concept of environmental protection and green production, and combine advanced green production technology, so that enterprises can gradually move towards a healthy, harmonious and stable production path.

6.3. Intelligence

In the future, mechanical design and its automation will surely move towards the road of intelligent development. By applying advanced theoretical knowledge and technologies such as artificial intelligence technology, computer science and technology, fuzzy mathematics, psychology, physiology, etc. to mechanical design and manufacturing and its automatic production process, mechanical manufacturing can gradually move towards intelligent production.

6.4. Miniaturization

At present, the mechanical products produced by most of China's machinery manufacturing enterprises are large in volume and quality, which is not conducive to long-distance transportation and short distance movement. Therefore, the mechanical design and manufacturing in the future will surely move towards the road of miniaturization development, which will make the later production and manufacturing process more convenient and fast.

7. Conclusion

To sum up, with the continuous development of China's economy, by combining computer technology with mechanical design and manufacturing and its automation technology, the efficiency and quality of China's mechanical production can be improved, so that mechanical manufacturing enterprises can occupy a dominant position in the fierce market competition. At the same time, the use of computer technology can make the later mechanical design and manufacturing process more scientific and reasonable, and lay an important foundation for the optimization and improvement of the later mechanical design scheme.

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