

The Integrated Application of Industrial Design and Mechanical Design is Briefly Analyzed

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Abstract: With the continuous development of modern industry, mechanical design and manufacturing and its automation has become an indispensable part of the industrial field. The efficiency, quality and safety of machine design and manufacture are very important to the whole industrial production process. Therefore, the application of modern machinery design and manufacturing technology has become a research hotspot. This paper will focus on the integration of mechanical design and manufacturing and automation technology, and respectively from the two aspects of mechanical design and manufacturing analysis. In mechanical design, we will mainly introduce the integration application and digital technology application related content. The development of the application of these two technologies can not only improve the efficiency and accuracy of mechanical design, but also reduce the errors and costs in design and production. Through the study of this paper, we can better understand the significance of mechanical design and manufacturing and its automation, and have a deeper understanding of the specific application of modern mechanical design and manufacturing process.

Keywords: Industrial design; Mechanical design; Automation; Integration; Digital technology

This paper mainly discusses the significance of the integration of industrial design and mechanical design and the specific application of modern mechanical design and manufacturing process. In mechanical design, the characteristics and advantages of modern mechanical design are studied, and the necessity of applying automation technology in mechanical design is put forward. In the aspect of machinery manufacturing, the paper discusses all aspects of modern machinery manufacturing technology, including material selection, processing technology, assembly process, etc., and points out the role and necessity of automation technology in machinery manufacturing. In the mechanical design automation technology application analysis, mainly discusses the integration application and digital technology application. Among them, integration application emphasizes the coordination and cooperation between different automation technologies, while digital technology application pays more attention to data processing and management. The research of this paper provides theoretical basis and practical guidance for the integration application of industrial design and mechanical design.

1. Significance of mechanical design, manufacture and automation

1.1 Improve production efficiency and quality

Mechanical design and manufacturing and its automation can effectively improve production efficiency and quality, which is one of the most important factors in industrial manufacturing. Modern machinery design and manufacturing process combined with digital, automation and information technology, so as to achieve intelligent, high efficiency and sustainable production mode. Through automated production lines, robots, digital management and other means, production efficiency and quality can be raised to new heights.

The automated production line can maintain the stability and consistency of production under the changing market demand. In the traditional mode of production, workers need to do a lot of repetitive work, which can easily lead to fatigue and mistakes. The automatic production line can achieve efficient production and quality assurance through advanced sensors, controllers and robots, so that the stability and consistency of the production line can be guaranteed.

Digital management can digitize production and management information to achieve real-time control and accurate management. Through digital management, the production process can be monitored and controlled, so as to achieve the improvement of production

efficiency and quality. In addition, digital management can also realize rapid response to changes in market demand, so as to ensure the flexibility and adaptability of the production line.

1.2 Personalized customization

The realization of personalized customization is an important meaning of mechanical design, manufacture and automation. In the traditional machinery manufacturing process, designers are usually required to design according to the needs of customers and make corresponding production plans. However, this traditional mode of production often requires a lot of manual intervention, resulting in high production costs and cycles. And the application of mechanical design and manufacturing and automation technology can realize the high efficiency of personalized customized production.

Specifically, through the use of robots and other automation equipment, design, production, assembly and other links can be automated. Customers only need to provide their own needs, and the machine can automatically design, manufacture and assemble corresponding products according to these needs, so as to achieve personalized customization.

In addition, the application of mechanical design and manufacturing and its automation technology can also realize more accurate and high-quality personalized customization. Through computer-aided design and other technologies, the precision of the design can be improved to the level of millimeters, so as to ensure that the product quality is higher, to meet the more stringent requirements of customers.

1.3 Reduce job risks

There are certain risks in the process of machinery manufacturing, such as heavy lifting, high altitude operation, dangerous goods handling, etc. In these dangerous environments, the safety risk of staff is higher, and may even lead to the occurrence of casualties. Automated production lines can replace manual work, especially in the repetitive, high-risk work, such as welding, spraying, etc., the application of automated production lines can effectively reduce the workload and labor intensity of the staff, while reducing the risk of work, to ensure the safety of the staff.

1.4 Promote technology upgrade

With the continuous progress and innovation of science and technology, the development of machinery manufacturing industry also needs to keep pace with The Times, constantly introduce new technology, new process and new equipment, in order to adapt to market demand and improve product quality. In the process of machinery manufacturing, the application of automatic production line, CNC machining and other new technologies can improve the precision and efficiency of mechanical processing, to achieve high quality and high efficiency of mechanical production. In addition, the application of new materials and new processes can also improve the performance and quality of mechanical products and promote technological innovation in the machinery manufacturing industry.

To sum up, the application of mechanical design and manufacturing and automation can improve production efficiency and quality, realize personalized customization, reduce job risks, and promote technological upgrading.

2. The specific application of modern machinery design and manufacturing process

2.1 Mechanical design

(1) CAD Design: CAD (Computer-Aided Design) technology is an important means in modern mechanical Design, which enables mechanical designers to carry out three-dimensional modeling, assembly, analysis, optimization, etc., on computers, so as to improve design efficiency and design accuracy. At the same time, CAD design can also provide necessary data support for CAM (Computer-Aided Manufacturing) to realize seamless connection between mechanical design and manufacturing.

(2) CAE analysis: CAE (Computer-Aided Engineering) technology refers to the simulation analysis of mechanical structure, material, fluid, and heat by Computer, so as to predict and solve potential problems in the design stage and improve the design quality of machinery.

2.2 Mechanical manufacturing

(1) Numerical control machining technology: Numerical control machining technology can realize the precision machining of various complex shapes of parts, with high machining precision, high production efficiency, stable product quality and other advantages.

(2) Intelligent manufacturing technology: Intelligent manufacturing is a manufacturing mode based on advanced information technology. It integrates machines, equipment, workpieces and workers into an intelligent system to achieve production automation, traceability of production process, production flexibility and other goals. In modern machinery manufacturing, intelligent manufacturing technology has been widely used.

(3) 3D printing technology: 3D printing technology is a new manufacturing technology that converts digital models directly into

physical models. It has the advantages of high efficiency, low cost and high precision.

3. Analysis of application of automation technology in mechanical design

3.1 Integrated application

With the development of information technology and automation technology, automation technology in mechanical design and manufacturing has gradually developed from simple CNC technology to intelligent and integrated direction. Integrated application refers to the technology that integrates different mechanical design and manufacturing software into the same software platform to improve design efficiency and production efficiency by sharing data and interactive functions.

In mechanical design, integrated application can realize the seamless connection between multiple software, such as CAM process planning directly in CAD design software, reduce the manual involvement, improve the design efficiency, and can ensure the consistency between design and manufacturing. In addition, integrated applications enable comprehensive monitoring of the entire design and manufacturing process, so that potential problems can be detected and resolved in a timely manner to improve product quality.

In mechanical manufacturing, integration applications can improve the efficiency and quality of manufacturing by integrating different manufacturing software into one platform. For example, by integrating CAM software and machine tool control software into one platform, NC code can be automatically generated and sent to machine tool for machining, thus reducing manual intervention and improving machining accuracy and speed.

3.2 Application of digital technology

The application of digital technology is a very important part of modern machine design. With the continuous development of computer technology and software tools, digital design and manufacturing has become the mainstream trend in the field of mechanical design and manufacturing. The application of digital technology can help mechanical engineers to better complete the mechanical design, improve the precision and quality of mechanical products, but also can accelerate the product development and manufacturing cycle, improve production efficiency and reduce costs.

Digital technology applications include CAD (computer-aided design), CAM (computer-aided manufacturing), CAE (computer-aided engineering), PLM (product lifecycle management), etc. CAD software can help designers to carry out 3D modeling on the computer, improve the efficiency and accuracy of design. CAM software can transform 3D design models into machine tool programs, helping manufacturing engineers build parts and assemble products more efficiently. CAE software can simulate the stress and thermodynamic properties of mechanical products in the process of use, so as to optimize the design and performance prediction. PLM software can manage the whole life cycle of products, including design, manufacturing, maintenance, abandonment and other links, so as to achieve traceability, information sharing and collaboration of the life cycle.

The benefits of the application of digital technology are not only to improve the efficiency and precision of design and manufacturing, but also to support innovative design, improve product reliability and stability, reduce product costs and maintenance costs, and realize global production. Therefore, in today's mechanical design and manufacturing field, the application of digital technology has become an indispensable part.

4. Closing Remarks

With the development of industrial automation and digitization, the application of automation technology in mechanical design and manufacture becomes more and more common. This trend can not only improve production efficiency and quality, achieve personalized customization and reduce job risks, but also promote technology upgrading and promote the development of the entire industry. In modern machinery design and manufacturing process, integration application and digital technology application are two of the most important aspects, they play a vital role in improving production efficiency, precision and quality, and reducing cost and energy consumption. In the future, with the continuous development of automation technology and digital technology, mechanical design and manufacturing will usher in more intelligent, efficient and sustainable development.

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