

# Research on Mechanical Design and Manufacturing and Precision Processing

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## Abstract

**In the context of the continuous development of the global industry, the importance of the machinery manufacturing industry has been increasingly highlighted. This article first discusses the connotation of mechanical design and manufacturing technology and precision processing technology, secondly, it analyzes the specific application of mechanical design and manufacturing technology and precision processing technology, study the relationship between mechanical design and manufacturing and precision machining technology, laid a foundation for the application and promotion of mechanical design and manufacturing technology and precision processing technology.**

## Keywords

**Mechanical design, Manufacturing, Technology, Precision machining.**

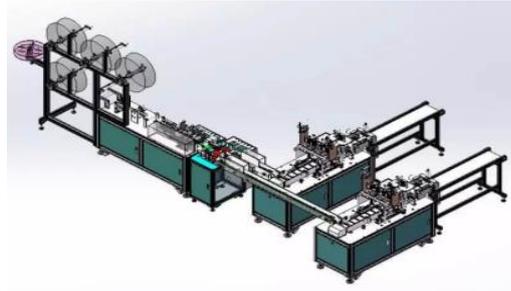
## 1. Introduction

Mechanical design and manufacturing process refers to the application of professional equipment, in accordance with the design requirements for some parts milling, grinding, drilling and other technical operations, so that the processed parts can be really put into production and application. In the current domestic mechanical research and manufacturing engineering, mechanical design and manufacturing technology occupies an important position. However, from the current point of view, compared with the foreign technology development level, my country's technological level in mechanical design and manufacturing still needs to be further improved. At the same time, the current my country's mechanical design and manufacturing process is developing in the direction of optimizing design and improving manufacturing efficiency. That is from the perspective of comprehensively accelerating the mechanical production rate and production quality, the material processing technology is effectively improved [1].

## 2. Overview of Mechanical Design and Manufacturing Technology and Precision Processing Technology

### 2.1. Precision Machining Technology

Precision machining technology is mainly used in the research and production of certain scientific research units in the country. In the manufacturing process of machinery, precision machining technology is required in almost every link (as shown in Fig. 1). By using precision machining technology, the accuracy of the machining process can be effectively improved, and the machining level can be significantly improved. By rationally using this technology, it can also effectively improve the development level of the entire machinery manufacturing industry, thereby promoting global economic growth.



**Fig 1.** Precision machining technology

## **2.2. Main Features of Mechanical Design and Manufacturing Technology and Precision Machining Technology**

(1) It has a certain degree of systemicity. In the process of machining and manufacturing, products need to go through a series of work such as production, sales, maintenance and overhaul, and these links are often carried out with quality and precision as the ultimate goal. With the continuous improvement of product technology, people's requirements for product quality are also constantly improving. In order to better meet the current product requirements, many manufacturers have begun to introduce high technology to improve the quality and efficiency of product production and processing to varying degrees. The use of precision processing technology and the systematic nature of the mechanical design and manufacturing process can better reflect the precision in the processing process, thereby effectively promoting the development of the entire machinery manufacturing industry.

(2) Obviously international, with the continuous advancement of globalization, opening up overseas markets has become the common goal of all industries. At the same time, the domestic machinery manufacturing industry should not only focus on the domestic market, but should constantly open up new markets and gradually gain a foothold in the international market. With the continuous development of industry, countries have focused on research in the field of machinery manufacturing. In this process, the domestic manufacturing industry should grasp the opportunities, meet the challenges, learn and draw lessons from advanced technology, fully improve their own shortcomings, and fundamentally promote the progress of the domestic manufacturing industry [2].

(3) It has strong relevance. The processing and production of machinery requires the joint support of processing technology and technology. Advanced processing technology can significantly improve the quality of the product itself. In the product production process, only by organically combining the precision machining technology and the mechanical design process can the quality of the mechanical parts be effectively improved. Therefore, in the actual mechanical production link, the producer should pay close attention to the correlation between mechanical design and precision machining, solve the quality and efficiency problems of the product production link from the root.

## **3. Specific Application of Mechanical Design and Manufacturing Process**

(1) Application of resistance welding process

Resistance welding is a process in which an electric current is added to the workpiece to make the surface of the workpiece hot to melt and finally complete the welding. In the application process of resistance welding, factors such as the length of welding time, the size of the current and the welding materials will all have a certain influence on the final welding effect. Therefore, in the actual technical application process, the welder should ensure the stability of the welding

current, and reasonably control all aspects of resistance welding, including welding time and welding method, to ensure that the quality of resistance welding can be effectively improved [3].

#### (2) Application of submerged arc welding technology

Submerged arc welding technology is usually used in the production and processing of steel structures. This type of technology has high welding efficiency. The difference of the welding wire material will affect the welding process, so in the actual operation process, the technician can select the appropriate welding wire according to the different characteristics of the material to avoid welding defects and similar situations. In the process of mechanical design and manufacturing, flux and wire are usually in accordance with the ratio of 3 to 2, according to different welding conditions can be adjusted to the ratio. In the application of submerged arc welding process, reasonable selection of flux and welding wire can save costs and improve production efficiency.

#### (3) Application of gas shielded welding process

Gas shielded welding process refers to the use of gas as the main medium to protect the entire welding process. Compared with other welding technologies, gas shielded welding has better safety, and the operation process of the whole technology is more convenient and faster. In general, the gas shielded welding process often uses carbon dioxide as the shielding gas, and the arc acts as its main heat source. In this way, the arc is isolated and the adverse effects of other harmful gases on the welding process are fundamentally avoided. However, in the actual operation process, the technician should pay attention to ventilation operation to avoid direct contact with the weld metal. At the same time, welding must ensure that the temperature during the entire process can be maintained within a reasonable range, so as to effectively improve the welding quality of the product.

## 4. Specific Application of Precision Machining Technology

#### (1) Application of precision cutting technology

Precision cutting refers to the selection of cutting tools to process materials according to the machining requirements, so that the dimensional accuracy of materials can meet the established standards. In the production and processing of products, the use of precision cutting technology can reduce the quality problems caused by factors such as machines and workpieces. In the cutting process, factors such as the rigidity of the machine tool and the anti-vibration effect will directly affect the machining accuracy. Therefore, technicians should first control the machine tool to ensure that under different temperatures and different operating speeds, the machine tool will not produce deformation and jitter during normal operation.

#### (2) Application of Grinding Technology

Grinding technology refers to the grinding of the workpiece by placing a certain amount of abrasive on the surface of the tool, and then grinding the material that needs to be polished. In the grinding process, technicians should add some lubricants appropriately, so as to reduce the friction between the abrasive and the base material to a certain extent, so that the overall grinding quality can be improved. Grinding processing technology is usually used in the finishing of mechanical materials, and for abrasives with different roughness, the grinding effect will be different. By applying this process, the error can be effectively controlled within 0.01 mm, so that the geometric accuracy of the workpiece is significantly improved.

#### (3) Application of Nanofabrication Technology

Nano-processing technology refers to the combination of existing physical technology and engineering processing technology, through the use of nano-level precision processing methods to remove and reorganize the technical operation of the product's atoms. Nano-

processing technology is a key research content in the current domestic mechanical precision processing technology. This technology is often used in the processing and production of some precision instruments, such as astronomical telescopes, computer hard disks and other precision devices. At the same time, the application of nano-processing technology is also extremely common in the field of optics, machinery industry and certain measurement technologies.

## 5. The Relationship between Mechanical Design and Manufacturing and Precision Machining Technology

Applying precision machining technology to the design and manufacturing process of machinery can significantly improve the accuracy, quality and efficiency of product processing, thereby bringing more economic benefits to manufacturers. At the same time, the use of certain machining technology in the precision machining process can effectively promote the improvement of the overall machining quality. Therefore, in the processing and production process of mechanical products, technicians must constantly strengthen the integration of mechanical manufacturing technology and precision processing means, so as to fundamentally change the production quality and effect of mechanical products.

## 6. Conclusion

To sum up, in the development process of the machinery manufacturing industry, the production business must strengthen the attention and analysis of core technologies. Technicians should also be familiar with the application characteristics of various technologies, early discover the deficiencies in the technology, and improve the product from the root cause. The overall production level has laid a solid foundation for the development and progress of the machinery manufacturing industry.

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