Systematic analysis of rationalization of mechanical design in mechanical manufacturing process

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Abstract: The use of mechanical equipment instead of labor is the core link of the rapid development of modern industry, which can greatly improve the efficiency of manufacturing and effectively reduce the risk of manufacturing, but at present, there is less systematic research on the design of mechanical equipment, so it is difficult to rationalize the design of mechanical equipment from the aspect of mechanical manufacturing technology, which can easily lead to the reduction of the precision of mechanical equipment. In view of this, the paper studies the importance of the rational design of mechanical manufacturing, and studies the process flow of mechanical manufacturing. On this basis, the rational mechanical design based on mechanical manufacturing process is systematically analysed, and the rational mechanical design strategy is formulated provided theoretical support for the manufacture of machinery and equipment.

1. Introduction
With the increase in the proportion of mechanical equipment used in social production and life, mechanical equipment has become the core propeller of rapid social and economic development. Therefore, with the development of computer technology, a large number of well-designed mechanical equipment have been applied to various parts of social life, such as Excavators, gantry cranes and high-precision lathes, but the manufacturing accuracy and production process of the above mechanical equipment are very different. Even the manufacturing accuracy of mechanical equipment under the same type and production standard is different. These problems are basically due to machinery the lack of systematic rational analysis during the design reduces the efficiency of industrial production, but also reduces the convenience of the use of mechanical equipment, and even reduces the service life of mechanical equipment, causing great problems to social production and life. In view of the above problems, the article starts from the manufacturing process of mechanical equipment, conducts an in-depth study of its production process, and introduces a rationalized mechanical design idea for a systematic analysis. On this basis, the system strategy based on the mechanical manufacturing process is formulated to rationalize the mechanical design and provide reliable theoretical support for the research of modern mechanical equipment manufacturing.

2. Overview of mechanical design and manufacturing
Science and technology are the primary productive forces of society, and the development of social economy cannot be achieved without the application of new technologies. Therefore, applying various new manufacturing technologies and processes to the design and manufacture of mechanical equipment has become an inevitable choice for social development. At present, mechanical equipment has entered thousands of households, and mechanical equipment with excellent production performance is becoming the primary problem faced by mechanical equipment suppliers. Therefore, optimizing the
design of mechanical equipment has become the core link to improve the performance of mechanical equipment. An important component of unavailable service life. [1]

According to the above research, construction workers can reduce the intensity and risk of manual work to a certain extent when using mechanical equipment for production, and at the same time can improve production efficiency to a certain extent. However, subject to China’s current three mechanical design and manufacturing aspects in terms of defects, it is difficult to maximize the performance of mechanical equipment. Especially in the process of mechanical equipment design and manufacturing, it is difficult to rationalize the design requirements of scientific equipment, equipment reliability, equipment efficiency and environmental protection, and cannot form a systematic and rational mechanical design strategy. Therefore, the following will start from the mechanical manufacturing process Optimize research on rationalized mechanical design strategies to provide theoretical support for promoting the improvement of China's industrial production efficiency.

3. Mechanical manufacturing process research

Mechanical manufacturing process refers to the process and method of manufacturing raw materials or semi-finished products of mechanical equipment into corresponding finished products of mechanical equipment. The application of advanced mechanical manufacturing processes is an indispensable link to improve the performance and quality of mechanical equipment. [2] Carry out research, including: production procedures and technical procedures, part clamping back, part positioning and precision control.

3.1 Production procedures and technical procedures

According to the above research, it can be seen that the finished equipment in the manufacturing process of mechanical equipment is transformed from raw materials or semi-finished products. Therefore, the basic mechanical manufacturing process program also includes two kinds of programs, specifically: production program and technical program. Among them, the production process refers to the process of making raw materials into ready-made mechanical equipment that can be sold by manual or existing mechanical equipment. In the actual application process, the production process will be divided into a preparation stage and an implementation stage. The technical procedure refers to the process of further processing of semi-finished mechanical equipment into manual finished mechanical equipment that can be sold by manual or existing mechanical equipment. [3]

3.2 Part positioning

The part positioning work is the first job after determining the mechanical manufacturing process. This work is an important link to achieve the matching of parts installation and mechanical design. It is also a key influencing factor of the quality of mechanical manufacturing. At present, the mature application of part positioning methods in the field of mechanical manufacturing includes many Therefore, according to the actual situation of actual mechanical design, the positioning method of parts should be adjusted in time to improve the quality of mechanical manufacturing. In the actual manufacturing process of mechanical equipment, the positioning standard of the parts should be determined before the positioning of the parts. [4] The selection of different positioning standards will change the accuracy performance of the mechanical equipment. Therefore, the corresponding positioning standard of the parts should be selected according to the use environment of the mechanical equipment. During the evaluation of the use environment of mechanical equipment, practical investigation and theoretical research should be comprehensively considered to make the processing of details of mechanical equipment manufacturing systematic and standard.

3.3 Parts clamping

After the positioning of the parts is completed in the manufacturing of mechanical equipment, the part clamping process should be carried out. This process includes two tasks, specifically: part fixing position and part clamping. Among them, the fixed position refers to placing the pre-processed workpiece on the
machine tool fixture that has been positioned according to accurate part positioning; and the part clamping refers to fixing the workpiece that has been placed in the accurate position to prevent the displacement of the workpiece during the processing process or vibration phenomenon. The precision of the clamping operation of the parts manufactured by mechanical equipment has a direct impact on the precision of mechanical equipment manufacturing, and also has an indirect effect on the efficiency, safety and reliability of mechanical equipment manufacturing. [5] At present, there are three kinds of parts clamping methods that can be maturely applied in the manufacturing process of mechanical equipment in my country, specifically: scribing to find the formal, fixture clamping type and direct to find the formal”.

4. Rational design strategies in the mechanical manufacturing process
According to the above research, there are many defects in the traditional mechanical design strategy, it is difficult to systematically comprehensively consider the factors affecting the mechanical design, resulting in the lack of rationality of the existing mechanical design technology, so it should be based on the mechanical manufacturing process studied above Balance the consideration of the influencing factors that affect the design of mechanical equipment, and formulate a rational mechanical design strategy that meets the modern mechanical equipment manufacturing standards. [6] In this strategy, the balance between mechanical design cost, manufacturing cost, test cost and wastage cost should be reasonably considered. On the premise of ensuring the manufacturing quality of mechanical equipment, the loss of raw materials and the loss of lathe tool should be reduced as much as possible, so that the mechanical design strategy is more adaptable the need for mechanical manufacturing. The following will systematically study the rationalized mechanical design strategy based on the mechanical manufacturing process.

4.1 Adopt standard mechanical design
In traditional mechanical design, especially in the process of standardized mechanical design and manufacturing, there are usually differences between actual mechanical equipment manufacturing and mechanical design standards, which can easily lead to difficult to meet the finished mechanical equipment, industrial production standards, resulting in low product quality and other problems If the above deviation is large, it will also affect the safety of industrial production, causing industrial production safety problems and causing unnecessary property losses. In view of the above problems, the use of rationalized mechanical design should first ensure the standardization of mechanical equipment manufacturing, that is, the rationalized mechanical design strategy should establish the mechanical design goals, accuracy and accuracy on the premise of meeting the requirements of mechanical manufacturing standards, and according to the actual production The situation is adjusted in a timely manner. The balance between the above three is to ensure the best product rate of finished mechanical equipment. [7]

4.2 Use standardized parts
The quality of mechanical manufacturing products is not only determined by the perfect mechanical design strategy, but also affected by the quality of raw materials in actual mechanical manufacturing. The raw materials or equipment semi-finished products, their own materials, specifications and other performance parameters are important links that affect the manufacturing quality of mechanical equipment. In the traditional mechanical design strategy, there is no systematic research on the requirements of raw material performance parameters and other standards. Therefore, in order to improve the mechanical design Reasonable, we should choose raw material parts that are manufactured in a standardized manner as far as possible, so that the parts have uniform material and specifications and other performance parameters. While improving the manufacturing quality of mechanical equipment, they also effectively reduce the economic investment of different materials for standardized processing, and effectively improve Mechanical manufacturing efficiency.
5. Conclusion
The article analyzes the defects of traditional mechanical design from the principle of mechanical design and manufacturing based on the stepped research method, and analyzes the mechanical manufacturing process. Based on this, the two are combined to formulate a rationalization based on the mechanical manufacturing process. The mechanical design strategy and its application prospects and advantages have been studied, which has effectively improved the efficiency and quality of machinery manufacturing, and provided a solid theoretical basis for the production of machinery manufacturing industry.

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