Innovative Design and Application of Non-standard Automatic Mechanical Equipment

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Abstract: With the continuous advancement of China's industrialization process, non-standard automation products have been deeply applied to all walks of life. Among them, non-standard automatic mechanical equipment can improve the production efficiency and product quality of enterprises, and become the competition focus of the development of machinery manufacturing enterprises. On the basis of combing domestic scholars' research on non-standard automated mechanical equipment, this paper points out the innovative design and application strategies of non-standard automated mechanical equipment, including innovative equipment design ideas, improving the practicality of non-standard automated mechanical equipment; regular designer training, Improve the professional level of designers; optimize the materials used in non-standard automated machinery and equipment, improve the quality of design materials; use advanced software to design, enhance the operability of innovative equipment design.

1. Research background

1.1 Literature review

In recent years, domestic scholars have increased their research efforts on non-standard automated mechanical equipment and formed a documentary foundation of a certain scale. Zhao Jian combines the characteristics of low precision and large machining allowance of non-standard automatic mechanical equipment. From the aspect of production and design quantity, it points out the specific innovative design method of non-standard automatic mechanical equipment (Zhao, 2012). Zhou Wanhui pointed out that non-standard automated machinery and equipment can play a great role in enabling the production department to achieve automated production, improve production efficiency and product quality, save labor costs, and thus enhance corporate competitiveness (Zhou, 2014). Xiang Haiping pointed out that non-standard automatic mechanical equipment is produced in the background that the production department cannot use standardized automation equipment. Therefore, the characteristics of non-standard automatic mechanical equipment are introduced, and then the innovative design path of non-standard automatic mechanical equipment is explored (Xiang, 2017).). Based on the characteristics of non-standard automated mechanical equipment, Xie Shaoguang focused on the innovative design of non-standard automated mechanical equipment (Xie, 2018). Zhang Jun believes that the design and production of non-standard automated mechanical equipment requires the collection of various raw materials, electrical, communication and other technical means. The key point is to comprehensively adopt the multi-faceted technical engineering design process. Therefore, he elaborated on the relevant overview of non-standard automated mechanical equipment, and gave several suggestions for strengthening design innovation (Zhang, 2019). Bujie analyzed the problems existing in the innovative design of non-standard automatic mechanical equipment, and briefly introduced the importance of strengthening innovative design, including improving production efficiency and reducing production cost. Finally, pointed out the innovation of non-standard automatic mechanical equipment. Design points (Pu, 2019).

1.2 Purposes of research

Under the background of the continuous development of China's manufacturing industry and the

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shortage of labor force, non-standard automated machinery with the goal of improving efficiency and reducing labor costs has gradually increased. Moreover, with the increasingly fierce market competition, the competition in the non-standard automated machinery and equipment industry has gradually turned to the competition of non-standard automated machinery and equipment (Wu, 2018). In order to improve the operational efficiency of existing mechanical equipment, improve the overall quality of mechanical products, and ensure the safety and stability of the mechanical production process. Therefore, in the design process of non-standard automated mechanical equipment, the manufacturing enterprise should clarify the requirements of the customer's production equipment environment and productivity, and customize special products according to special needs. In the production process of the product, the company shall strictly follow the original technical parameters of the product to carry out the process operation. Therefore, as a practitioner or designer of the non-standard automated machinery industry, how to use scientific design concepts to design the most cost-effective and highly trusted automated mechanical equipment has important practical significance for promoting enterprise innovation and development.

2. Introduction to non-standard automatic mechanical equipment

Non-standard automatic mechanical equipment is a design and manufacturing integrated equipment specially developed according to the special needs of customers. Mainly composed of power components, control systems, actuators, transmission components and auxiliary, as shown in Figure 1. In order to meet the production requirements of non-standard automation equipment production units, improve production efficiency, production quality and production safety, manufacturing companies began to design and manufacture non-standard automated machinery and equipment. The modularization, standardization and simplification of the design are the key points of non-standard automation machinery.

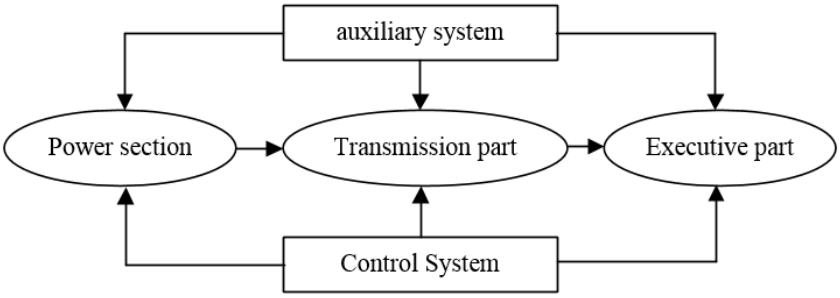

Figure 1. Components of Non-Standard Automated Mechanical Equipment

In actual production applications, compared with ordinary mechanical automation equipment, non-standard automatic mechanical equipment has a large processing margin and low precision of blank parts. Applying it to machine tools, non-standard automated machinery also exhibits low productivity. In general, in order to achieve the accuracy of certain products, non-standard automated mechanical equipment generally uses general gauges, tools and fixtures, combined with some skills and methods to achieve.

To a certain extent, non-standard automated mechanical equipment products are custom-made equipment. Therefore, when designing products, they often use software such as Auto CAD, Pro/E, and Solidworks. However, it is necessary to quantify the volume, weight and center position of non-standard automated mechanical spare parts and provide reliable data support for subsequent design and processing. Non-standard automated mechanical equipment based on 3D digital models can automatically generate 2D schematics to improve the quality and efficiency of drawing drawings and automatically generate accurate 2D schematics.

3. Innovative design and application of non-standard automatic mechanical equipment

3.1 Innovative equipment design ideas to improve the practicality of non-standard automated machinery and equipment

For the designer, after the design is drafted, the innovative design of the non-standard automated mechanical equipment needs to be reviewed and evaluated together with the customers and team colleagues. In this process, participants need to work with the project team to identify the risk points and specific details in the program, increase the humanized design, and continue to optimize and perfect until the customer is satisfied. Moreover, the innovative design of non-standard automated mechanical equipment needs to be combined with the actual production and production requirements of the enterprise to optimize the additional functions of the equipment and give full play to the value and advantages of the equipment.

When designing the equipment, the designer should analyze the user requirements, equipment usage and related precautions in detail, and design the recording method that can grasp the operation and habits of the equipment to improve the usability of the equipment. After the equipment design is completed, the mechanical manufacturing enterprise should also improve the operation manual of the equipment to help users master the correct use method across the Soviet Union. Through the effective integration of innovative design ideas, the company will truly implement the improvement of the production process, make the use of non-standard automated machinery and equipment more reasonable, promote the improvement of the production quality of various products, and promote the steady and sustainable development of enterprises.

3.2 Regular design training to improve the professionalism of designers

The specific production requirements of major enterprises are the main reference for the innovative design of non-standard automated mechanical equipment. In the existing machinery and equipment market, if the existing equipment can not meet the specific production needs of the enterprise, the enterprise can customize the corresponding production operation equipment. The overall innovative design level of the equipment is mainly determined by the design level of the designer. The level of knowledge and skill of the designer can directly determine the quality of the product. Therefore, mechanical equipment manufacturers should regularly carry out designer training to improve the professional level of designers.

First, companies should introduce a training program for designers, take one day each month, and have a design department supervisor or manager to train relevant skills and leading knowledge in the industry. Strong companies can hire senior designers in the automation machinery industry to train designers, or communicate with foreign designers to learn different design concepts and methods. Moreover, the excellent design directors in the company should summarize and evaluate each equipment design completed by ordinary designers, and conduct targeted training on common problems. According to the training results, designers can continuously reflect and summarize themselves, find their own advantages, and correct their own problems in time, so that the rights issue involves basic knowledge and quickly improve the design level.

3.3 Optimize the materials used in non-standard automated machinery and improve the quality of design materials

As an important part of the equipment design, the materials used in the equipment must be strictly controlled. The choice of design materials should be based on the quality of the equipment. Therefore, machinery manufacturers should continuously optimize the materials used in non-standard automated machinery and equipment to improve the quality of design materials. Specifically, in the face of materials with similar shapes, the material selection personnel need to carefully and carefully identify the materials to ensure that quality materials are purchased, thus avoiding mistakes between equipment design and production. For those who lack experience, you can choose standard parts on the market to improve the versatility and interchangeability of the parts. When selecting equipment components, try to consider high temperature resistance, shock

resistance, high speed, high load performance, choose materials to use, and continuously reduce equipment processing and production costs. For example, the relevant staff should accurately predict the use time of non-standard automated mechanical equipment, and select reasonable parts to ensure stable operation of the equipment. By increasing the quality of mechanical equipment parts design materials, the equipment life is extended, thereby reducing the frequency of replacement.

3.4 Design with advanced software to enhance the operability of innovative equipment design

In general, the design of non-standard automation equipment is primarily achieved through software mapping. The rapid development of modern Internet information technology has enabled various types of new technologies, software and equipment to be continuously researched and put into the market. Moreover, the improvement of people's quality of life and self-awareness has forced the innovation of mechanical equipment design, but the problems accompanying it have gradually increased. In order to solve various problems, machinery manufacturers need to improve the quality of the equipment they produce. The most effective way is to use advanced software to design and enhance the operability of equipment innovation design.

Therefore, in the innovative design process of mechanical equipment, designers should fully grasp the use of new software and operational skills, including the use of curve design and convergence design functions. On the basis of the specific production requirements, such as wear resistance, high temperature resistance, etc., the corresponding equipment design. At the same time, the designer should evaluate the overall performance of the equipment through data analysis of new software and improve the design performance of non-standard automated mechanical equipment. In addition, in the actual innovative design, the designer should comprehensively consider the possible failures during the operation of the equipment, expand the innovative design ideas and concepts of the equipment, simplify the design process, and enhance the operability of the equipment.

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