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Analysis on Technical Transformation of Machining in Aviation Industry

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Abstract: This paper focuses on the analysis of the aviation industry machining technology transformation, and its current development status. The entire development plan for numerical control machine tool needs to be perfected, and the balance of numerical control technology development has to be strengthened. Additionally, the utilization rate of numerical control machines is relatively low; thus, raise the rate of equipment, numerical control, and numerical control equipment usage, and enhance the mechanical processing technology management task. Its aim is to improve aviation industry machining efficiency, which leads to a good development in China's aviation industry.

Keywords: Aviation industry; Mechanical processing; Technical improvement

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1 Introduction

In fact, the mechanical industry is important to China's social and economic development, and whether or not its processing technology is advanced and perfect has a significant impact on China's social and economic development. The aviation industry belongs to the main industry which shows the national strength of China. Its technological frontier is helpful to promote the further development of the aviation industry of China. In machining process, numerical control (NC) equipment belong to strong advanced processing equipment, because it has many advantages, which typically have high precision production, with strong production and sales, and has a lower production cost. As a result of the extensive utilization of aircraft manufacturers and their application in the aviation sector, the industry can not only improve its enterprise system. Due to certain of the mechanical parts used in the aviation sector have high quality and precision requirements, their processing must be completed by CNC machine tools, not only to increase the level of production management, but also to promote the overall development of companies.

2 Technical Development Status of Mechanical Processing in Aviation Industry

Since the establishment of the China's aviation industry, the mechanical processing technology, methods, and accuracy requirements have been very high, so in our country's aviation industry, as the first strong precision processing equipment and numerical control machine tool has been widely used, as the manufacturing of airborne equipment, engines, and fuselage structures. The utilization of advanced equipment to improve the aviation workpiece processing size progress, improve surface quality, improve production and sales, and many other aspects plays a vital role in the aviation sector.

To completely address the manufacturing needs of the aviation industry, China's aircraft machining department gradually incorporated developed-country 2D and 3D software into industrial production, greatly improving the aviation sector's machining efficiency. Furthermore, the introduction of 3D printers into the industry in recent years has provided a new processing method for aircraft machinery processing, which not only improves the machining

precision of mechanical parts but also increases their efficiency. However, due to China's late development of higher-precision equipment and instruments compared to developed countries, current research is unable to meet the long-term development needs of China's modern aviation machinery manufacturing industry, which has a negative impact on the industry's long-term development.

3 Aviation Industry Mechanical Processing Technical Problems

China's science and technology has advanced rapidly in recent years, and aviation industry machining technology has advanced significantly as well. However, an in-depth analysis of China's aviation industry machining technology development reveals that China's aviation industry machining technology still has some imperfections. If the balance of numerical control technology development needs to be strengthened, the overall development plan needs to be improved, and the numerical control rate of machine tools and the utilization rate of numerical control machine tools are both relatively low, the following details are needed:

3.1 The balance of numerical control technology development needs to be strengthened

After further analysis of the use of CNC machine tools in the aviation industry machining process revealed that the balance of CNC technology development in the use of CNC machine tools must be strengthened; the technology update speed of each host equipment is extremely fast, but the development of the use of other equipment on CNC machine tools is slow. The development of this imbalance has a significant impact on CNC machine tool dimensional accuracy. These factors are very unfavorable to the improvement of dimensional accuracy and surface quality in China's aviation industry equipment processing, restricting China's aviation industry equipment manufacturing industry's rapid development.

3.2 The overall development plan needs to be further improved

In terms of mechanical processing, the aviation industry in China must reform its technology based on certain airplane parts or the precision of some of the details. At the moment, the aviation industry's machining technology development is very adverse, and it is hindering the aviation industry's ability to improve the performance of machining parts. It significantly affects the goal of rapid development of China's aviation industry.

3.3 The numerical control rate of machine tools and the utilization rate of numerical control machine tools are relatively low

Due to the aviation industry's manufacturing and processing needs, dimensional accuracy and surface quality of parts are held to extremely high standards, requiring the utilization of high-quality equipment in aviation industry machinery manufacture in China, as well as highly qualified personnel. The mechanical processing department of China's aviation industry favors NC machine tools as significant components of mechanical processing equipment. However, based on further analysis and investigation of the aviation industry's development by the department of mechanical processing equipment, some mechanical processing departments in the aviation industry in our country have not yet reached the high-end CNC machine configuration, with domestic CNC machine accounting for nearly 40% of the total compared to developed countries. This is due to the fact that China's aviation sector, which has a strong mechanical processing department, has been slow to adopt new numerical control processing technology and equipment. Furthermore, it was stated that mechanical processing is not given too much attention and input in China's aviation industry, resulting in no circumstances to purchase front by the department of aviation industry machinery processing machinery and equipment.

After conducting a thorough study into the current state of China's aviation industry sector through the use of numerical control machine tool equipment, it was discovered that only around 60%

of the equipment utilized in the aviation industry is mechanical processing equipment. This is because the CNC machine center lacks advanced equipment operating personnel, or there is a major lack of programming, and programming technology cannot keep up with the development steps. The usage of machine tool centers cannot be totally replaced by artificial means, and CNC machine tool center parts processing will be severely hampered, restricting China's aviation sector equipment processing industry's sustainable development.

4 China's aviation industry machinery processing technical transformation content

The existing mechanical processing equipment in China's aviation industry's mechanical processing department is quite outdated, resulting in low equipment efficiency, which is particularly unfavorable to the long-term development of China's aviation industry mechanical processing sector. Only by thoroughly understanding the current technical issues in China's aviation industry's mechanical processing and proposing workable solutions will we be able to solve them. Only then will we be able to raise the mechanical processing level of our country's aviation industry.

4.1 Transformation Policy

For China's aviation industry, the technical problem in machining the staff in the aviation industry mechanical processing technology, to fully comply with the requirements for layout and planning, implement step by step, in the process of updating its technology should strictly comply with the current production quality requirements and processing precision requirements, specific technical renovation work. In the process of processing technology transformation, but also according to the production resources system planning CNC machine tools and other modern production equipment use efficiency, in order to assure dimensional accuracy and quality while improving the effectiveness of CNC machine tools.

4.2 Modification method

Through further analysis of China's aviation industry the human factor, namely management, should combine the aviation industry in the unique requirements of performance for some parts, processing technology of project of changing to formulate NC machine tools used in machining efficiency and technical reformation direction finding, now affect the machining quality and precision of the aviation industry in China. Then on the basis of innovating aviation industry machining technology, the processing quality of aviation products is further improved. At present, there are many technical transformation methods of machining in aviation industry in China, among which the more common ones are to rapidly improve the numerical control rate of equipment and the utilization rate of numerical control equipment, as well as to strengthen the technical management of machining. The details are as follows:

4.2.1 Rapidly improve the numerical control rate and the utilization rate of numerical control equipment

Nowadays, China's aviation industry machining department whether or not the use of numerical control equipment efficiency and allocative efficiency is low, the main factor that lead to this problem is the local computer development rate is lower than in developed countries. When programming becomes complex or the assigned employees must be fully replaced, mechanical processing cannot be achieved, CNC is used. To address this issue, many of China's aviation industry machining departments are rapidly introducing CNC processing equipment from developed countries, as well as high-level, high-quality CNC programming talents, to enable operators to better control CNC machine tools, improve work efficiency, and reduce personnel work pressure. In addition, on the basis of optimizing the numerical control equipment of the mechanical processing department of the aviation industry, the numerical control equipment's supervision level should also be improved in order to ensure the scientific nature and rationality of its use, as well as the effectiveness of its use, and to

ensure that the numerical control machine tool can further promote the aviation industry's mechanical processing efficiency.

4.2.2 Strengthen the management of machining technology

Processing technology and equipment together determine the precision and quality of products, so production staff must not only ensure the advanced nature of equipment, but also the accuracy of processing technology, which necessitates the department to improve processing technology management, which mainly includes the following points: First, consider the processing of the product early in the design phase, whether it is the workpiece structure or material to meet the processing needs of CNC machine tools, as well as the quality and precision of the workpiece must also consider the processing accuracy of the equipment; Second, to keep the processing technology of CNC equipment up to date, to provide regular training to CNC programmers and operators, to develop their CAD/CAM business skills, and to achieve free compilation of processing programs; Third, alternative measures should be utilized to ensure that the workpiece does not distort throughout the processing process.

5 Conclusion

To summarize, the development of the aviation industry plays an essential role in strengthening China's overall national strength, and the rapid expansion of the aircraft industry requires modern machining technology. Now, based on numerical control processing equipment analysis, China's aviation sector machining technology still has some issues, which is more typical of the need to strengthen the balance of numerical control technology development. Overall development planning has to be improved, and machine tool numerical control rate and numerical control machine tool utilization rates are relatively low. More research on these difficulties, to uncover the causes and formulate corresponding solutions, including increasing the utilization rate of equipment numerical control rate, is needed in China's aviation industry. Additionally, work on numerical control equipment management, strengthening mechanical processing technology, and full implementation of relevant personnel to achieve the specified goals. Thus, promoting the further development of China's aviation machinery manufacturing industry.

Disclosure statement

The author declares no conflict of interest.

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