Research on the Innovation of NC Machining Process Based on Programming Technology

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Abstract: With the continuous development of China's computer technology, China's numerical control technology has also been widely used, concentrated in the process of processing complex parts. In the actual application of digital control technology, its operability is relatively strong, and has a strong portability and scalability, is an important part of the manufacturing in the field of integrated and automated machinery. In this paper, first of all, the numerical control processing technology and the numerical control programming technology are summarized; secondly, the complex model numerical control processing process flow is analyzed; finally its practical application is explored.

1. Introduction

In the process of national economic development in China, its machinery manufacturing industry is a very important industry. Modern science and technology have developed rapidly. In the people's lives, the diversified demands for the products themselves have also become more and more. Therefore, it is necessary to continuously improve its manufacturing methods and use CNC technology to realize the rapid development of the manufacturing industry. In the actual application of numerical control technology, it is necessary to continuously integrate with the computer technology to improve the product's production efficiency and quality, while also minimizing the labor rate. It is mainly applied to aircrafts, ships, and automobiles. The industry ensures the stability of the overall product and realizes the economic and social benefits of the company.

2. Numerical control processing technology and numerical control programming technology

The numerical control processing technology is to prepare the machining program according to the drawings and basic requirements of the supplied parts and run the program into the CNC machine tool. The CNC machine tool can process the parts and realize the processing of the parts. In the process of applying CNC technology, the computer and digital automation control system are fully integrated, which saves their labor, and also improves the quality and efficiency of parts processing, which greatly reduces the parts manufacturing process. The resulting error phenomenon[1].

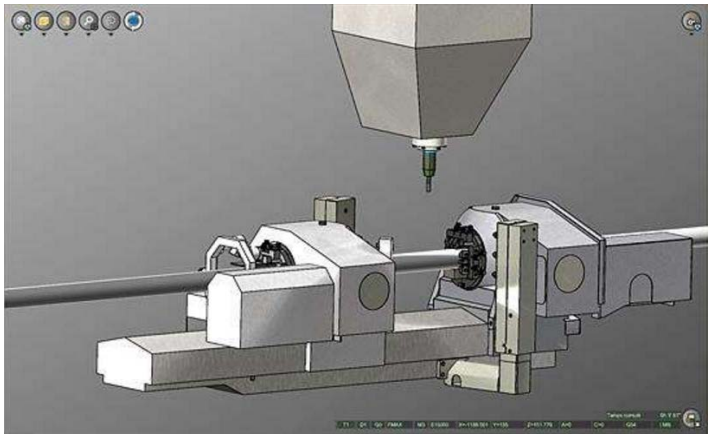

Fig.1 CNC machining software

Programming technology is mainly embodied in CAD/CAM. It mainly uses the establishment of coordinate system and the determination of cutting parameters to complete the program. It can be said that it is the basic part of complex surface NC machining. In its actual application process, it mainly includes the determination of the processing coordinate system, the determination of the processing area and the tool, and the design and control of the tool path. CNC machining software as shown below.

3. Complex profile CNC machining process

In the course of the development of CNC machining technology, it is necessary to realize full control of the equipment on the basis of the digital information technology, and finally achieve automatic control. In the actual operation process of CNC machining, NC programming is a very important part. According to the drawings, technology and technology of the processing parts, deep processing is needed. In terms of the trajectory and direction of tool movement, it is necessary to perform procedures according to actual conditions. The preparation, after the completion of the preparation, will be input into the control medium, the control medium can be processed according to the requirements of the parts in the programming document, including the processing of the part contours and the division of the complexity of the outline, etc., in the process of numerical control programming. Among them, the pattern needs to be analyzed to determine the process to be implemented. After the numerical values involved are calculated, they must be made and the numerical value verified and verified. However, during the processing of complex rated parts, the programming volume is relatively large, which may result in inaccurate programming. In the process of automatic programming, the use of professional programming software in the computer is mainly used to generate calculations and instructions, and the tool path can be accurately and directly processed on the curved surface[2].

4. The actual application

4.1 Establish a processing coordinate system

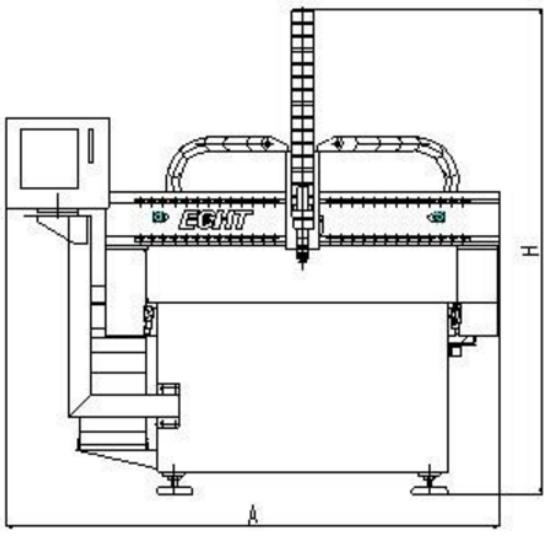

Fig.2 Processing example

In the process of establishing the solid model of the CAD stage, it is mainly established on the basis of the work coordinate system, in which two coordinate systems can be used to realize the coincidence phenomenon. The coordinate system can be defined according to actual conditions. In the actual application of its coordinate system and numerical control processing technology, the coordinate system of the numerical control machine tool includes the coordinate system, the

coordinate origin and the direction of movement. In the processing of the module, the bottom of the module is used for processing, and it needs to be placed in the workbench, so that the press board can be stored flexibly. In this way, it is possible to realize a one-time cutting process for all the profiles of the module. In this process, the coordinate direction to be machined needs to be defined according to the actual situation. Processing example as shown below.

4.2 Divide the processing area

In the process of the overall processing of the example module in this paper, it can be understood that the processed area is the complex outer shape of the shell, which needs to be performed on a variety of factors including the complex cavity structure area and the unique structural features of the mold. Analysis and understanding. In the processing of the module, if a relatively large definition of a processing range is required, the outer frame of the module needs to be defined as the entire processing area range. In this case, only one finishing arrangement is required during the programming process, that is to say, a complete tool path data can be obtained by performing a tool path calculation. However, in this case, the processing characteristics and cutting amount contained in each module are not clear, and no specific classification is made. Therefore, no specific analysis of the NC machining program is made. In this case, it is necessary to use the same prop to process different structures and profiles with different depths at the same time. This will result in a decrease in the machining efficiency and a decrease in the quality of the parts. It will also cause great harm. If you change to a method that is defined separately for the processing area range, you can arrange the four finishing operations during the programming calculation of the NC machining, and finally get all the finishing tool path data. In this way, the maximum optimization of process planning can be achieved, and the pertinence and practicality of the processing program and the efficiency of processing can be improved[3].

4.3 Defining machining tools

In the analysis process of the aviation fuel accessory casing metal mold, the forming shell has a relatively large external dimension. Therefore, the size of the cavity in the mold is relatively large and needs to be included in the mold. The excess amount is reduced and removed. In this case, it is possible to use a larger size tool for roughing, semi-finishing, and finishing of the mold. In the process of forming the cavity curved surface structure on the concave arc surface of the mold, a ball-end knife is needed to complete the process. At the same time, it is possible to use ρ=6mm to process the minimum radius of curvature of the inner contour surface of the mold inside the mold. In terms of actual cutting tool selection, a radius of $r = 0.9 \times 6 \approx 5$ mm can be used. Therefore, the SR5 ball nose knives can be selected as the finishing cutting tool of the die. In addition, during the roughing process, higher machining efficiency and more material removal are required. In this article, you need to use the φ20 corrugated end mill to perform the initial material removal and remove the excess amount. After roughing it, there will be a maximum machining allowance at the top of the die where the minimum radius of curvature of the inner contour surface of the die cavity needs to be taken[4].

5. Summary

In summary, in the process of implementing the numerical control processing of the complex surface, the designer and the programmer as the process need to analyze the existing equipment at the present stage, and optimize the process flow according to the actual situation. In the optimization process of its process line, the selection and analysis of various factors such as machine tools, processes, and programming can be performed according to actual conditions and scientific principles, and the optimization of the process line can be achieved. When designing its technological content, it is necessary to maintain the accuracy of the machining coordinate system so that it can continuously optimize the machining tools, cutting path and cutting amount. Finally, the design of the process simulation needs to be optimized. Different simulation data models are used to ensure the safety of the overall process. Finally, the processing advantages of the CNC

product equipment can be exerted to ensure the quality of complex surface processing and realize the economic benefits of the enterprise. And social benefits.

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