Influence of Numerical Control Cutting Parameters on Performance of Numerical Control Tool

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Abstract. As China has stepped into a new era of development, the popularity of computer applications is becoming more and more profound. Especially in the machinery manufacturing industry, the current market has put forward a higher requirement for the accuracy and toughness of machinery manufacturing, and the traditional artificial manufacturing has not been adapted to the development of the industry. Through numerical control technology, numerical control tool manufacturing process can become very standardized, its accuracy and toughness is also guaranteed. This paper will from the numerical control this point of view, to explore the influence of numerical control cutting parameters on the numerical control tool.

Keywords: CNC, Cutting Parameters, CNC Tools

1. Introduction
Cutlery this tool is created by human invention, the original cutting tool is composed of natural sharp stone. So far, the development of the tool has a long history, all kinds of tools are born, in China's tool production industry, numerical control tool is undoubtedly the leading position of the product, to aerospace manufacturing, down to cutting vegetables and meat, have to use numerical control tool. Therefore, the study of the influence of CNC cutting tool sharpness and toughness and durability, for the production and application of this kind of products has great significance, the same, it is also conducive to the development of the economy, is conducive to the manufacturing industry in China to the advanced manufacturing industry conversion.

2. Introduction to related concepts
2.1. CNC
Numerical control technology has a distinct characteristics of The Times. In today's computer age, it is: the definition of "computer digital control", it is using digital technology to fully automatic control of mechanical processing, and digital technology depends on the development of computer technology, based on some computer programs that have been programmed, the manipulation of the related numerical control equipment, hardware products and parts for processing [1]. There is no doubt that the use of numerical control technology for machining, which has become the consensus of all
machinery production and manufacturing industry. This technology can greatly improve work efficiency, save human, material and financial resources, and at the same time improve the precision of product parts to better meet the market demand [2]. The classification of CNC machine tools is shown in Figure 1.

Figure 1. Classification of CNC machine tools

2.2. Cutting parameters
In today's mechanical production and processing field, cutting parameters is undoubtedly a very important concept, then what is the cutting parameters? Generally speaking, cutting parameters refer to a series of values affecting the production of machine tools, such as spindle speed, feed speed, cutting width, cutting depth, etc., which are related to the quality of the final product, the cost of the production process and the efficiency of the whole processing [3]. As a result, every company in the machine building industry has an accurate understanding of the cutting parameters, and to a certain extent, it is fair to say that the cutting parameters are a trade secret. The calculation formula of cutting speed (turnover) is as follows:

\[ V = (\pi \times D \times N)_{(1)} \]  

(1)

2.3. CNC tool
As a kind of human invention creation tools, CNC cutting tools from birth to now, less than one hundred years of history, but the depth of its application, is beyond any kind of cutting tool, has dozens of its classification alone, such as coming up from the application of nc tool cutting process classification, can be divided into cutting and drilling, etc., each kind of nc tool has the characteristics of different On this basis, it can adapt to the production of parts of different products [4]. For all CNC tools, the parameters set during cutting will have a great impact on the actual production efficiency and quality. The process table of CNC turning tool is shown in Table 1.

Table 1. NC turning tool process sheet

| Tool Process Category | Process to form               | Process category           |
|-----------------------|-------------------------------|----------------------------|
| CNC turning tools     | Cylindrical turning           | Cylindrical turning tool   |
|                       | Within the circle turning     | The turning tool           |
|                       | Slotting and cutting off turning | Slotting and end cutting knife |
|                       | The thread turning            | Threading tool             |

3. Numerical control cutting parameters related experimental analysis

3.1. Related materials used in cutting
During the use of CNC tools, the tool is constantly grinding, just like grinding on sandstone. The difference is that sandstone produces less total resistance than the blade [5]. In the process of nc tool grinding constantly, in order to solve all the sand materials has been the problem of mutual collision, block and circling of the detection with high purity, high concealment and high quantity of heat of polycrystal equipment: the equipment surface friction force is small, can effectively reduce the friction
and wear problems, and also has high wear resistance can meet the needs of use for a long time, Its high toughness can also cope with some sudden abnormal states [6].

3.2. Numerical control cutting experiment

Before the experiment, relevant experimental materials need to be prepared, and the staff must take safety precautions [7]. The experiment begins by calculating a specific cut Angle to measure the required force and determining the relationship between the specific cut Angle and the depth. The next problem is to build a simplified internal force analysis model. Finding the right cut point is the goal of the experiment. Compared with traditional experimental methods, it can provide a more stable and accurate acceleration model [8]. However, since the axial cutting depth is not taken into account, this method does not apply to changing the axial cutting depth.

3.3. Analysis of experimental results

The above experimental process is abstracted: firstly, the interface model is simplified and the test data for working parameters is output. Secondly, the machine numerical control system is fully used to operate the production equipment, and then according to the geometric properties of the contact Angle to calculate the shape to determine the cut strength to achieve the best forward speed. In general, it is the quality of work and the number of tools to determine the number of tools, according to the friction resistance to determine the cutting speed. This propelling speed is usually slow because, if the propelling speed is fast enough, the surface quality will deteriorate and the tool will wear out or even break. The conservative feed rate does not change with the change of cutting force, so the feed rate must be adjusted to achieve adaptability [9].

4. Analysis of influence of cutting parameters on tool performance

4.1. The specific impact

In the manufacturing process, the following conditions should also be met: first, the cutting speed of the machine tool should meet the shaft speed. The second is that the power supply of each tool must be connected. Third: the maximum feed of the machine shaft. Between feed and cutting feed, the former is greater than the latter. Fourth: the actual power and cutting force of the machine tool, the former is greater than the latter. Fifth: the processed parts should meet the relevant requirements, that is, the surface roughness should reach the required level [10]. According to the optimization algorithm of cutting parameters, the digital control unit, which provides virtual processing information, is optimized to meet the requirements. According to the calculation, the optimal efficiency parameters of the original mining scheme are changed [11]. Therefore, the optimization process is not supervised until it is actually processed. Another advantage of this approach is that it saves money, simplifies processing procedures, and is easier to use than using adaptive control techniques to optimize cutting production parameters. Therefore, in the machine tool processing process, each process is different in its purpose, some are mainly to adjust the cutting parameters of the machine tool, some are to adjust the work of tools, accessories and so on. The quality of production works can be effectively improved by building the proper relationship between parameters and efficiency. In the process of metal cutting, the cutting force of the tool is still the main factor of cutting parameters, the quality of CNC tool is an important link to ensure the quality of CNC machining. As a result, the cutting forces used vary from material to tool. Through the use of better quality materials and tools, CNC machining accuracy has been effectively improved [12].

4.2. Significance analysis

To sum up, through the analysis of the optimization process of CNC cutting parameters and the setting and definition of cutting parameters, the production and processing efficiency are improved, the production cost is reduced and the processing quality is improved [13]. Cutting parameters vary with cutting conditions. Once the location, material, and roughness of the tool are specified, machining
begins. The optimization of cutting parameters should be carried out according to the maximum operating target and limited operating state, so as to achieve the goal of reducing cost and improving product quality. Rational analysis of numerical control machining parameters optimization plays a positive role in improving the level of manufacturing industry and manufacturing industry, changing the status quo of manufacturing industry, supporting the scientific and rational development of engineering industry, and bringing good benefits for the interests of enterprises [14].

5. Conclusion
This paper discusses the computer digital technology in today's rapid penetration of all walks of life today, through the adjustment of numerical control cutting parameters, discuss its specific impact on the performance of numerical control tool. Firstly, this paper introduces the concepts of numerical control, cutting parameters and numerical control tools. Secondly, an experiment is constructed in the current industry background. After completing the experiment, the experimental results are analyzed and some relevant suggestions are put forward.

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