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Influence of CNC Tools on CNC Machining Technology

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Abstract: The continuous development of China's production technology has brought a broader space for the development of CNC technology, bringing a new intelligent development direction for the machinery manufacturing industry, which has a great impact on the production of tools. The birth of CNC tools has promoted the development of the CNC industry and promoted the CNC machining process. This paper aims to analyze and study the CNC tool and its machining process.

1. Brief analysis of CNC tools

CNC tools are also modern and efficient tools. The main form of practical tools is that the machine clamps can be converted into carbide tools and superhard tools. The CNC tool is actually the product of numerical control standardization. It needs to meet the requirements of CNC machine tools. The tool is generally not sharpened. If it is necessary to repair the CNC tool, it is only outsourcing. Modern CNC tools mainly achieve high efficiency, high precision and high reliability. Tool manufacturers no longer simply sell knives, but can provide complete processing solutions according to the needs of users and processing characteristics. This is a major reform for the CNC tool manufacturing industry. When purchasing a tool, the customer can not only purchase the tool that suits his or her needs, but also get a complete machining solution. Tool manufacturers should have done some experimentation on the tools they are selling, and can provide customers with reliable reference data, integrated into a tool sample, or used as a cutting manual. The traditional process is different from the modern one. It pays more attention to the process flow and the process, and its tool processing is simple, just written out.

CNC tool is a standardized product. In the tool market or the tool manufacturer's purchase, the standard tool holder suitable for machine tool system specifications should be selected, and the blade and the tool rod must be suitable. All the cutters are pre-installed in the tool library, and the desired tool change can be carried out through the tool selection and tool change instructions of the NC program. The automatic tool changing device is convenient and simple, and the tool can be installed on the spindle of the machine tool accurately and quickly. So the NC tool is different from the traditional tool process, it not only has the process flow and process, but also must have the tool card, with perfect tool number, tool repair and other model specifications information, marking the cutting tool processing parts, and attach the tool diagram, more intuitive. Therefore, a new technological process has been added, that is, tool selection. It is necessary to select the suitable tool from the tool manufacturer, to make tool cards, and to manage the tool warehouse.

With the continuous development of NC tool technology, a large number of new and efficient tools



have emerged. In order to improve the production efficiency, enterprises gradually adopt the measures of merging or reducing the processing technology. Some of them directly carry out fine processing after rough processing, which will reduce the process from roughness to fineness. This shows that the current rough processing should try to cut off the processing allowance and ensure that the quality of processing parameters meets the requirements in fine processing. This has created great challenges for CNC machine tools and tools, and has gradually changed the machining process. Machine tools and tools have changed the process specifications. There are also many modern companies that strongly advocate the use of new tools, and new tools can also directly generate new processes.

2. The influence of CNC tools on the machining process

2.1 Valve body mist structure

The influence of NC cutting tools on NC processing technology will be discussed in this paper with practical cases. As shown in the figure below, the valve body mist structure has five problems to be solved in the hole structure. First, how to cut the inner groove of the ring, the tool is needed to machine the inner groove of the ring, and the ring groove milling cutter is mainly used, which is similar to the inner groove cutter. The specific model data of the knife needs to be selected according to the diameter and width of the ring groove. The tool holder needs to be flattened. The second problem is a rough selection of 20° short inner cones. To solve this problem, you can use the interpolation milling method to flexibly select the tool. You can use a ball milling cutter, a spiral interpolation milling cutter, and a fillet milling cutter. The shank also uses a flattened shank, depending on the model. The third problem is the rough and fine inner hole. The key is the choice of the tool, followed by the selection of the rough head, the fine head and the handle.

The fourth is the problem of threading. In modern enterprises, thread milling is already very common. Thread milling has many advantages, that is, high production efficiency and less burrs. The choice of thread milling cutter can be based on the nominal thread size and pitch, and the shank is the flattening shank. The thread milling cutter has a clamping mechanism that allows it to be used for indexing inserts and solid carbide milling cutters. The carbide machine clamp can be indexed thread milling cutter, and the conversion between the blades enables the thread to be flexibly converted in the external thread processing and the internal thread processing to meet the requirements of various thread processing. This type of threaded milling cutter often has internal cooling through holes, which makes the coolant reach the cutting area quickly and efficiently. Thread milling cutter has great universality, that is, a multi-tooth thread milling cutter can process the same pitch threads on different holes. Single-end helical milling cutters with universal tooth profiles can also process different standard threads.

Moreover, thread milling can also solve many difficult problems, such as tool bending, wear, and elasticity of processed materials. Sometimes the chipping problem is encountered during the tapping process, and the chip flutes of the tap are blocked by the filaments, causing the tap to be broken in the hole, thereby causing the parts to be scrapped. In thread milling, this kind of problem can be solved without any difficulty to achieve efficient chip removal. For taps, most taps are not suitable for processing hard materials, but if thread milling is used, the whole carbide thread milling cutter can easily process hard materials.

In addition, for thread processing, thread whirlwind milling can also be used. Whirlwind milling is a high-speed spiral milling tool matched with precision lathe. The carbide forming knives that are transposed on the high-speed rotating cutter head are used to cut and thread the workpiece on the workpiece. Its milling speed is fast and high efficiency. The chips are cooled by compressed air, so that the processing speed is as fast as cyclone. However, the thread whirlwind milling also has its shortcomings. In the thread milling of small workpieces, small workpieces will have larger deformation, which needs to be corrected by screw. Such problems do not arise when large workpieces are accelerated. In the process of cyclone milling, there are usually five steps. The cutter head drives the high-speed operation of the carbide forming cutter as the main motion, while the auxiliary motion

is the slow selection of the workpiece driven by the lathe spindle. Cyclone milling moves along the workpiece axis according to the workpiece pitch, i.e. feeding motion. The strange motion of the lathe trawler drives cyclone milling is cutting motion. Cyclone milling automatically adjusts the helix in a certain atmosphere. The degree of freedom of elevation adjustment is also the choice of motion.

The fifth is the problem of countersunk holes. The traditional technology is to use the spool with guide pillars for processing, but in the numerical control processing, the use of such processing tools is gradually decreasing, and the use of end milling cutter interpolation milling technology for milling sink head milling is the development trend of modern numerical control processing technology. The traditional countersink drilling has a smaller processing surface and basically uses forming tools, while the cutting edge is long and easy to produce vibration. It does not require high dimensional accuracy. It is basically used for wickers, screws and other joints to maintain a reliable connection. The shape of the surface mainly depends on the shape of the end of the joints. In NC machining, forming processing based on this type is relatively rare, and it is generally used by milling methods using programming methods.

For example, in some cylindrical machining, the tool is usually a flat-bottom milling tool that uses a programmed milling process to complete the machining. The processing of the taper boring can be processed by a special taper boring. In the NC machining, the programming method can also be used to complete the machining process of the chamfer milling cutter. In general, the small hole is made by integral taper boring, and the large hole can be programmed by trajectory milling. In practical applications, the 90° taper boring drill is also often used for deburring and chamfering, and the chamfer is milled according to the programmed trajectory milling method. It is the same as the tool used for drilling, and the shank part of the boring should be selected as far as possible, and the clamping shank is less reliable.

2.2 Internal groove processing

The difficulty in machining the inner groove shown in the figure below lies in the cutting method at the beginning of the inner groove. Generally, there are several methods to choose from. One is the pre-drilling method of starting holes. Simply speaking, the hole with a larger diameter than the milling cutter is pre-drilled on the solid material. The milling cutter can first drill along the first hole and then milling according to the cutting method. Normally, this method is not advocated because the concave needle of the drill point will remain in the inner groove. Another milling method is also needed to remove the concave pins of drill tips, which may cause damage to the milling cutters when multiple cutters are used. The second is the interpolation milling method, which is also the axial milling method. The specific action is to lower the cutter vertically according to the front face of the milling cutter. If such a method is used, the cutting edge at the end of the milling cutter must pass through the center of the milling cutter when starting to cut the inner groove. Cutting speed must be slower, until the milling cutter cuts into the workpiece surface, it can gradually speed up, otherwise it is easy to cause milling cutter damage in cutting. It is suitable for machining by the plunge milling method, generally when the machining task requires the axial tool to be large. Because the use of insertion milling method can effectively reduce the strange cutting force, compared with side milling method, its stability is higher. In addition, the slope milling method is also one of the effective ways to start cutting the inner groove. Slope milling method is to use three-axis linkage, linear downhill tool for cutting, to achieve the effect of all the axial depth. Fourthly, spiral interpolation milling is also one of the best ways to start cutting inner grooves. Similar to the interpolation milling method, three-axis linkage is adopted to cut the tool in the form of spiral interpolation. This method has many advantages, such as smooth cutting surface, small cutting force, high tool durability, and small space for starting cutting.

3. Conclusion

In summary, the influence of CNC tools on the CNC machining process can be said to have a large impact on all aspects, especially for the selection and innovation of CNC machining processes, which has a profound impact. The application of CNC tools has promoted the innovation of CNC machining

technology to a certain extent. The use of new tools has simplified the processing steps and updated the processing technology, thus promoting the development of CNC technology.

References

- [1] Hao Huidong. Influence Analysis of CNC Machining Process Based on CNC Tool Selection[J]. Shandong Industrial Technology,2018(24):51.
- [2] Xu Bing. Research on the Application Value of Mirror Machining in NC Tool Manufacturing [J]. Science and Technology Information, 2017, 15(36): 62+64.
- [3] KONG Qingtao. Research on Classification System and Coding System of NC Based on Features[J]. Tool Engineering,2017,51(07):70-74.
- [4] Zheng Hong. On the Influence of CNC Cutting Tools on CNC Machining Process[J]. Internal Combustion Engines and Parts, 2017(03): 62-64.
- [5] Wang Bin. Analysis on the Management and Application of CNC Tool in Machine Shop[J]. Science and Technology Outlook,2016,26(29):162.
- [6] Zheng Hong. Comparative Study on Numerical Control Machining Process and Traditional Machining Process[J]. Value Engineering, 2016, 35(26): 166-167.