

Opportunities and Challenges of Domestic CNC Lathes Under the White-hot Technology Blockade

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Abstract

Machine tool manufacturing industry is the leading industry of national economy, including CNC lathe is the embodiment of the national basic equipment manufacturing capacity, with the support of national policy, domestic low-standard numerical control lathe, a series of achievements, also developed a high-grade CNC lathe parts, but still there is a big gap compared with developed countries, and the core parts and dependence on imported CNC system is serious, the lack of independent innovation, Has been subjected to foreign technology blockade, facing a huge opportunity and challenge. In such an environment, we should have a clear understanding of the situation, seize the opportunities, meet the challenges, overcome the difficulties, enhance the national equipment manufacturing strength, and develop the country into an independent power.

Keywords

Blockade on techniques; CNC lathe; intelligent manufacturing.

1. Introduction

CNC lathe, also known as CNC lathe, namely the computer digital control lathe, is the largest domestic usage, the most extensive coverage of a CNC machine tool, accounting for about 25% of the total number of CNC machine tools, is a collection of mechanical, electrical, hydraulic, pneumatic, microelectronics and information and other technologies as one of the mechatronics products. It is an industrial mother machine with high precision, high efficiency, high automation and high flexibility in mechanical manufacturing equipment. The technical level of CNC lathe and the percentage of the output and total ownership of the metal cutting machine tools is one of the important signs to measure the overall level of national economic development and industrial manufacturing of a country. Home-made numerical control lathe under the strong support of national policy has made a series of technical achievement, has the certain international competition strength, but on the development of high-grade intelligent precision lathe, there is still a large gap compared with abroad and dependence on imported main parts and nc system is serious, the lack of independent innovation, suffering from Japan, Germany, Switzerland and other developed countries technology blockade. If the country wants to develop into a powerful country with autonomy, it is necessary to improve the equipment manufacturing strength by leaps and leaps. As the embodiment of the national basic equipment manufacturing capacity, what kind of strategic opportunities and challenges will domestic-made CNC lathes face?

2. Strategic opportunities of domestic CNC lathes under technological blockade

Since the reform and opening up, advanced technology and machine tool into China, by the impact of foreign technology, the original backward machine tool technology has been unable to meet the production needs, once the machine tool industry "eighteen arhats" has also experienced bankruptcy, merger, reorganization, foreign-funded enterprises in China to build factories, private machine tool enterprises have formally entered the Chinese market. In the national policy ("Eleventh Five-Year Plan" period, by supporting 8 categories, 57 kinds of host product deployment task, focus on solving the problem of "with or without"; During the 12th Five-Year Plan period, we will focus on the research and development of high-grade CNC systems, functional components, complete sets of equipment and production lines. During the period of "much starker choices-and graver consequences-in", further focus on two fields: the aerospace, automotive, strive to overcome the numerical control system and features, reliability and accuracy stable technology, machining efficiency and technology level, etc.), under the support of such in the field of numerical control lathe, have achieved good results, numerical control lathe for the perfection of the current domestic market demand basic self-sufficient, Some enterprises also have independent intellectual property rights; We have also developed a number of high-grade CNC machine tools and basic manufacturing equipment, such as: Aviation large key complete sets of manufacturing equipment, large special manufacturing equipment of carrier rocket, key processing equipment of powertrain (automobile engine), complete sets of high-grade CNC machine tool equipment, high-grade CNC machine tool system, high-grade CNC machine tool functional components and supporting system, etc. [1], has accumulated a certain amount of high-grade CNC machine tool manufacturing technology, It provides a certain technical guarantee for the development of high-grade CNC lathe. However, the existing core technologies such as precision lathe parts and controllers are still dependent on imports, and there are few independent knowledge products. Once the machine tool products and technology cannot be imported from abroad, the national basic manufacturing industry will fall into a passive situation, in this case, for small and medium-sized enterprises, due to lack of funds, weak scientific research capacity and other reasons, may be on the verge of bankruptcy; For well-funded, scientific research personnel equipped, management measures and improve the large lathe manufacturing enterprises have not an opportunity, under the condition of top cannot rely on foreign technology, forced to the researchers working to develop our own sovereign product knowledge, promote national basic equipment manufacturing capacity, no longer subject to foreign countries.

According to the related data from 2003, our country machine tool industry is spending \$6.73 billion, as the world's first, CNC machine tool production volume average compound growth rate of 30.2% per year [2], according to the ccid | 2019 CNC machine tool industry data "[1], in 2019 China CNC machine imports fell, Imports of CNC metal cutting machine tools and CNC metal forming machine tools decreased by 30.6% and about 2.5% respectively, but exports of these two types of machine tools both increased by 9.0% and about 16.4% respectively. It can be seen that the production of domestic CNC machine tools is also rising sharply, not only the domestic demand is large, but also occupies a large market share in the international market.

In the current global "internet plus", "internet of things", "artificial intelligence" and other computer technology high speed development, and intelligent manufacturing technology is to manufacture technology, automation technology, system engineering and artificial intelligence are combined to form a comprehensive technology, precision processing of high-grade CNC lathe is used abroad for realization of intelligent manufacturing technology, In China, intelligent manufacturing and assembly exist only in part of the automobile industry and furniture industry, and there is almost no intelligent manufacturing and assembly in the machine tool

industry [3-5]. Research and development of high-grade CNC machine tools has become an urgent need to improve the national intelligent manufacturing strength and avoid foreign products entering the domestic market to form a monopoly, and it is also a big opportunity for domestic CNC lathe.

3. CNC lathe manufacturing industry is facing challenges

At present, domestic high-grade CNC lathe can not fully adapt to the market demand, reflected in the development of complete sets of line equipment, production capacity is limited, in the type, quantity, quality is difficult to ensure the market demand, need to speed up the research and development of high-grade CNC lathe, the author believes that domestic CNC lathe manufacturing is facing many challenges:

(1) The existing technology accumulation has not been well continued.

Due to the late start of the domestic machine tool industry, the early machine tool enterprises are mostly state-owned enterprises, although there has been the accumulation of technology but due to a variety of reasons and generation, after the various private enterprises have developed, but because the machine tool production enterprises compete with each other, their system technology secrecy, relatively conservative, no technical cooperation and exchange; Research and development on the same platform, instead of improving each other on the basis of each other, so that the research and development personnel can not promote each other, the research and development level can not be improved, so that the research and development speed is relatively slow, there is no virtuous cycle; Serious brain drain, lack of successors, large scale of engineering and technical education but limited quality of students, the basic disconnection between production, education and research, so that the existing technical accumulation can not be improved, resulting in slow product upgrading.

(2) The system is not open enough.

Really suitable for the actual production process flow and vehicle demand in a line skilled workers or the user's hands, and professional r&d staff is not the most widely effective channels to understand the latest firsthand material, and therefore cannot get manufacturing process data, and the products and technical services extend, not according to the needs of users in a timely manner to improve the design and innovation.

(3) The reliability is not high.

Domestic machine tool manufacturing basic materials, high-performance parts can not meet the high-grade demand, users of domestic high-grade CNC lathe trust is low, it can be seen that the reliability of domestic CNC lathe is low.

Moreover, reliability is the least studied and most difficult problem to solve in China, but it is also the most critical problem, which must be paid great attention to, especially reliability prediction, reliability test, maintainability prediction in the early design stage and reliability guarantee in the whole life cycle in the later stage [6].

(4) The degree of digitalization and intelligence is not enough.

Digitalization and intelligentization are the development direction of machine tool manufacturing in the future.

How precise driving, intelligent manufacture, the use of advanced manufacturing technology and process control processing carrier, how to use sensors and standard communication interface, perception and obtain machine status and signal processing and data, through the transformation process, modeling analysis and data mining to learning process, form the optimal decision support information and instructions [7], To realize the monitoring, forecasting and control of the machine tool and the processing process, to meet the requirements of high quality, high efficiency, flexible and adaptive processing, to achieve human-machine safe

interaction, machine-machine mutual linkage and so on, involves many aspects of technology and problems, need scientific research workers to solve one by one.

4. Conclusion

Above all, numerical control lathe in our country is in a big data under the new situation of the development of global informationization, in the face of foreign developed countries technology blockade and the urgent demand in the domestic market, has made domestic CNC lathe are faced with both good opportunity and face the challenge, greatly only really solve the problems facing currently, find out the future development direction, using all available resources, Discover and solve the problem, in order to make the development of domestic CNC lathe has a qualitative leap, catch up with the pace of developed countries.

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