Mechanical Parts Processing Technology and Fixture Design

Pick to : the machining parts of the structure and process analysis, identified the machine-finishing craft route, fixture in the mechanical processing of the status and importance, as well as the fixture design. With the increasingly development of scientific progress and the adjustment of national industry policy, project machinery industry already became no policy barriers of perfectly competitive industry
Key words: technical background / development / process / positioning scheme

1 Mechanical Processing Historical Background and Its Significance

Machinery manufacturing industry is an old and eternal industry full of vitality. With the development of modern industry, the mechanical product of the increasingly high demand, machinery manufacturing technology are developing rapidly. Since the founding of new China, our country's manufacturing technology and manufacturing industry to obtain the considerable development, a considerable size and technical basis of mechanical industry system is formed basically. Years of reform and opening up, China's manufacturing industry to make full use of domestic and foreign two aspects of technological resources, there are plans to promote the technical transformation of enterprises, guide enterprises to take the road to rely on progress of science and technology, manufacturing technology, product quality and level and the economic benefit produced marked change, in order to promote the development of the national economy has made great contribution. Although our country manufacturing industry comprehensive technical level has been greatly improved, but compared with developed country, still have level sex difference. Enter the twenty-first Century, the economic development of our country 's leading industry still is the manufacturing industry, especially after our country joins WTO, the world's manufacturing center is developed from migration to Asia, China has cheap labor and the general consumer market, accordingly, industry of our country wants to develop, need to have appropriate technology and equipment support.

Machinery industry is the equipment industry of national economy; it is content of science and technology of foundation; is new and high technology industrialization; is the basis of national defense building; is to achieve rapid economic growth of the important pillar; is to improve people's living quality, provide consumer electrical products supply industry. It runs to national economy, the quality and efficiency of industrial structure adjustment and optimization is a very important role.

2 The Status of Machinery Industry and Development Trend

With the development of society, all kinds of machinery and gradually applied to the various industry, whether in the agricultural, military, industrial, mechanical operation, leaving no efficiency, therefore, in some sense, the strength of a country's economy, social status, and the development of machinery industry is close separable. The industrialized countries economic development course indicated that, without a strong equipment manufacturing industry, is impossible to achieve national economy industrialization, modernization and information [3]. At present, the equipment manufacturing industry development lag is restricting China's economic development and industrial upgrading of the important factors, increase structural adjustment strength, promote mechanical industry

lasts, healthy, steady development, to change the mode of economic growth, improve quality of national economy whole, enhance the international competitiveness of the economy, security and national defense security has important and far-reaching meaning of.

3 Of Machining Process Planning

3.1 Machining Process Definition

The machining process is the use of mechanical processing method of change in rough shape, size, the relative position and the nature, make its become finished or semi-finished products of the whole process. Machining process directly determines the parts and the quality and performance of products, product cost, production period has great influence, is an important part of the whole process.

3.2 Mechanical Processes

The composition of mechanical machining process of the basic unit is a process. Process and is formed by mounting, station, working steps and take the knife.

The process is a group of workers, in a work of the same or simultaneously on several workpieces are completed for that part of the process. Process is the formulation of labor quota, with workers and machine tool equipment, arranging operation plan and quality testing of the basic unit.

The installation is a workpiece by a fixture after the completion of the procedures.

The application of switch (or displacement) when processing machine tool (or fixture) processing, in a fixture, the workpiece (or cutter) relative to the machine tool passes through several locations in order processing, in each position is done on that part of the process, called station. The multi-station processing can reduce the times of clamping, reduce the mounting error, improve productivity.

The step is processing the surface in the cutting tool and the cutting parameters (only refers to the spindle speed and feed rate) are the same circumstances completed part of the process.

3.3 Machining Process Definition

Products or components manufacturing process and operation methods of the process, called process, it is the enterprise in the production of technical guidance document.

3.4 Machining Process Planning Function and Content

Machining process is ready for production work mainly on the basis of. According to its raw material and semifinished product supply, machine tool adjustment, special process equipment design and manufacturing, production scheduling, allocation of labor force, and the production cost accounting.

The machining process planning and organization of production, planning and scheduling based on. It can make production schedule and the corresponding scheduling, and can be connected to the scientific process, production is balanced, smooth, to realize high quality, high yield and low consumption.

Machining process card and machining process card, are the two main process documents. Machining process card, is illustrated parts machining process technology files. In a single, small batch production, to machining process card guiding production, process card various projects in the preparation of more detailed. Machining process card for each process detailed formulation, used to direct workers, used for mass production parts and

mass production of the important parts in the.

3.5 Making The Machining Process Planning Principles and Steps

Under certain production conditions, with minimal consumption of labor and the lowest cost, according to plans processing parts that meet requirements of the drawings, is to develop the basic principle of machining process.

Formulation of machining process steps are as follows:

The under parts of the production program decision production type;

The analysis of parts processing technology;

The choice of blank type and manufacturing method;

The technological process;

The process design;

The process documentation.

4 Fixture Design

4.1 Fixture Design Sense

In the machinery industry, how to guarantee the high precision of workpiece, the costs of processing and other substantive issues, has been engaged in the mechanical industry research questions, which in the design of fixture when we should consider the problems above, efficient fixture is the workpiece precision guarantee, how to make the fixture more efficient, more economical, the industry is the urgent need to resolve.

With the development of society, the continuous improvement of technology, various high-tech technology gradually infiltrated into all sectors, how to use these high-tech to serve mankind, how to make full use of the technology in mechanical industry, it also requires machinery industry staff continued efforts, innovation.

With the development of science and technology, and social needs of the market, the fixture design in progressive super to the flexible manufacturing system development. To date, the fixture is mechanical and electrical products manufacturing in the four indispensable tools, tool itself is already highly standardized, the user only needs to press varieties, specifications selection and procurement. While the mold and fixture and related products products, there is a need to make changes, usually belong to the special properties of the tool, mould has become an independent industry; fixture at home and abroad is also gradually form a dependent or independent small industry of machine tool industry. Combined clamp not only has the standardization, modularization, modular and other contemporary advanced design ideas, and in line with resource conservation principle, more suitable for green manufacturing environment protection principle. So the next fixture technology is an important direction of development unit.

Machine tool fixture is usually refers to the use of clamping workpiece clamping device: for the device with various tools, also known as "tool". The auxiliary tool is sometimes generalized to include in the range of machine tool fixture. According to the application range of machine tool fixture, generally can be divided into general jig, fixture and adjustable fixture.

Universal jig is on general machine tools are generally accompanied by a common fixture, such as a lathe chuck, milling machine rotary table, dividing head, top seat. They have a standardized, with certain universality, can be used to install certain shape and size within the range of the workpiece without the need for special adjustment. However, in actual

production, a universal fixture often can not meet the needs of various parts processing; or because of low productivity and must have the universal fixture for proper improvement; or because the shape of the workpiece, the processing requirements to be different specialized design and manufacture of a special jig, in order to solve the actual production needs.

Jig is adapted to a workpiece in a processing requirements and the design and manufacturing expertise, its function mainly has the following several aspects: 1 ensure that the surface of the workpiece being processed mainly includes processing workpieces need maneuvering time of loading and unloading workpieces need the auxiliary time of two part. 2 using a dedicated fixture, workpiece installation and conversion work work can be greatly simplified, no longer need to draw the line and to find it, to shorten the working procedure non-cutting time and save line drawing this process, thereby improving the labor productivity. In production due to the adoption of multiple parallel processing workpiece fixture, enabling the simultaneous processing several parts of the motor will time and processing time of the same motor. The rotary multi-station continuous processing fixture, can be used for machining a workpiece at the same time, other workpiece loading and unloading, thereby enabling the auxiliary time and motor time coincides. In short, with the special fixture using and further improvement, can effectively shorten the process time, production to meet the evolving needs of. 3 using a dedicated fixture can expand the scope of machine tool technology. For example in lathe boring jig attached, can replace boring work; special fixture can be installed after turning the molding surface, so as to give full play to the role of general machine tools. 4, reduce the labor intensity, and ensuring safety production. According to the demand of production, using pneumatic, hydraulic or other mechanical changes, a higher degree of automation of the special fixture, to reduce the labor intensity of workers, protection of production safety and the stability of product quality and high yield of a great role. Processing large workpieces, such as the lathe bed, the lower surfaces of the screw holes on the bed, need to flip several times for processing workpieces, high labor intensity and safety. The use of electric rotary drill furniture, can improve production efficiency, reduce labor intensity, ensure safety in production.

4.2 Fixture of The Development Trend

Industrial design is the development of human society and the progress of science and technology of the product, from Maurice's" the arts and Crafts Movement", to the German Bauhaus design revolution and the United States of America wide dissemination and promotion, industrial design after brewing, exploration, formation, development history of more than 100 years of vicissitudes. Today, industrial design has become an independent subject, and a complete set of research system.

In 1980 the International Council of societies of industrial design (ICSID) to the industry as a clearly defined:" production of industrial products, by training, technical knowledge, experience and visual experience, and indicates the material, structure, morphology, structure, color, surface processing, decoration to the new quality and specification, called industrial design. According to the specific circumstances of the time, industrial designer in the industry products are all side or a few aspects of the work, but also the need for industrial designers of packaging, publicity, display, market development and other issues to resolve pay their own technical knowledge and experience and ability of the visual

evaluation, which also belongs to the scope of industrial design".

Material, structure, technology is the product design material and technical basis, on one hand, technology restrict the design; on the other hand, technology is also promoting design. From the point of view of design aesthetics, technology is not only the material basis but also has its own" function" action, as long as good application properties of the materials, to the corresponding structure and suitable processing technology, can create a practical, aesthetic, economic products, namely in the product technology potential" function".

Any design are the product of the times, its different features, different features reflect the different historical periods of level of science and technology. Technology is the product of the morphological development of the pilot, new material, new technology products, is bound to bring new structure, new forms and new style. Materials, processing technology, structure, product image organic ground is contacted together, a part of the change, it will cause the whole body changes.

Now, the machining process and fixture with the development of manufacturing technology also make a spurt of progress. Machining process to the various factories in different circumstances, its processing procedures are very different. Break through the past death mode. Make it with different cases has more reasonable technological process. So that product quality greatly improved. Develop processing technology can be rational, but also to meet the basic requirements: guarantee product quality under the premise, as far as possible to improve labor productivity and reduce the processing cost. And to make full use of the existing factory production conditions, as far as possible, using domestic and foreign advanced technology and experience. Should also ensure that the good working conditions. But our country present stage still rely mainly on technology personnel experience to prepare process, often does not require step and cutting amount, man-hour quota is to be determined by experience, very rough, the lack of scientific basis, difficult to carry out reasonable economic accounting

International Journal of production Research Association statistics show that, at present, small batch production of many varieties of workpiece varieties accounted for about 85% of the total number of the kind of workpiece. Modern manufacturing requirements of enterprises manufacturing products constantly upgrading, to meet the needs of the market and competition. However, the general enterprises are still accustomed to the traditional special fixture, generally in the medium having a production capacity of the plant, some have thousands or even nearly 10000 sets of special fixture; on the other hand, in the production of many varieties of the company, every 3 to 4 years to update 50 ~ 80% special jig, fixture actual wear only 10 ~ 20% or so. Especially in recent years, CNC machine tools, machining center, group technology, flexible manufacturing system (FMS), a new processing technology of machine tool fixture, proposed the following new requirements:

1) can rapidly and conveniently and equipment of new products put into production, so as to shorten the production cycle, reduce the production cost;

2) capable of clamping a group with similar characteristics of the workpiece;

3) can be applied to precision machining of high precision machine tool fixture;

4) can be applied to all the modern manufacturing technology of new machine tool fixture;

5) adopts the hydraulic station for power efficient clamping device, in order to further reduce the labor intensity and improve labor productivity;
6) improve the standardization degree of machine tool fixture.
The development trend of modern machine tool fixture mainly for standardization, efficiency, precision and flexibility in four aspects.
Use better fixture, can improve labor productivity, improve processing accuracy, reduce waste, machine tool technology can expand the scope, improve the operation of labor conditions. Therefore, the fixture machinery manufacturing is an important process equipment. A good fixture is the processing of qualified products of the first condition, in order to allow the clamp has the better development, fixture industry should strengthen the production, learning and research, collaborative efforts, accelerate the use of high technology to transform and upgrade the level of technology to create the pace of jig, fixture professional technology website, make full use of modern information and network technology, and when in keeping with the innovation and development of fixture technology. Active and foreign fixture manufacturer, for joint venture and cooperation, the introduction of technology, it is the reform and development of our country industry is more effective ways of fixture.