

## Status

Machinery industry is the provision of technical equipment for the national economy and people's lives for the provision of consumer durable goods, equipment industry. National economic departments production and technological progress and economic benefits of high and low, to a large extent it depends on the use of the machinery and equipment and the performance and quality, machine-building industry is the skill level of a country's technological level and economic strength of one of the important symbols.

After nearly 50 years of development, China's machinery industry has become a considerable size in the industry and certain technical basis of one of the largest industries. 1997 sales income 1.3651 trillion yuan, accounting for 21 percent of the national industry; profits 25.7 billion yuan, 62.1 billion yuan tax, which accounted for 15 percent of the national industry; export 36.3 billion U.S. dollars, accounting for 20 percent of foreign trade exports. Its growth rate higher than the same period the average industrial growth rate.

In recent years, the machinery industrial enterprises in the development of independent innovation capability has increased, scientific and technical personnel in 1997 amounted to 480,000 the total number of people, technology development expenditures amounted to 8.5 billion yuan, the industry-wide sales revenue of 0.62 percent, with 57 large enterprises to establish a national - Class technology center, nine percent of the enterprises set up special technology development

significant progress, the main problems: the national economy to provide complete sets of equipment and vehicles have greater ability to improve the product structure being rationalized Direction.

Although the machinery industry's integrated technical level in recent years has significantly increased, compared with the industrialized countries, there is a stage in the gap. The main question is:

1. Scientific and technological progress of the machinery industry's contribution to the growth rate at present is only 34 percent in advanced countries are as high as 70 percent.

2. Product design technology, manufacturing technology and equipment, manufacturing process automation technology, management, backward technology, mechanical products is restricting the level of the main factors.

3. Mechanical products of high technological level, to the late 1980s and early 1990s, the international advanced level of only 18 percent to the mid-1980s the international level of 27 percent and the remaining products in the 1980s before the level of online.

Overall, machinery industrial technological development capability and technical foundation is weak, the development potential shortage of technology sources rely mainly on the introduction of foreign technology, the higher the degree of dependence on foreign technology, the introduction of technology digestion and absorption are still in control technology and has been Guochanhuashuai increase, the products did not rise to the formation of independent

innovation capability

## technological development

To CNC machine tools, power electronics applications and automation technology, large-scale agricultural machinery and construction machinery, car key technology, environmental protection equipment in five aspects as a key to the development and application of advanced manufacturing technology as a means to high-tech industries and products into The breakthrough point, to enhance their technological innovation capacity and competitiveness as the goal, enhance their level of technological innovation. By 2001, to provide 1,000 kinds of independent intellectual property rights and greater potential for market demand of products. The main products reached 40 percent of species of the early 1990s, the international standard, five percent up to international advanced level, 90 percent of key enterprise product standards close to or reached advanced international business standards.

## direction and focus

### 3.1 to CNC machine tools as the representative of the basic machinery

NC machine tools is the foundation of advanced manufacturing machinery, is the most typical variety, low-volume, high-tech electromechanical integration of the products. The world annual production of CNC machine tools more than 150,000 Taiwan, more than 1,500 kinds of species. 1997 China's output of CNC machine tools has reached 9051 Taiwan (accounting for over 20 percent of total output value of machine tools), but because China-made CNC machine tools can not meet the market demand in the domestic market share decline year by year, a year still importing large quantities of CNC machine tools, A substantial increase in the amount of imports. 1996 imports amounted to 13,924 Taiwan (worth 1.246 billion U.S. dollars).

At present, China's CNC machine tool technology in the development of the main problems are:

(1) maturity poor, reliability is not high  
CNC average foreign trouble-free time (MTBF) in more than 10,000 hours, the domestic independent development of numerical control system only 3,000 to 5,000 hours; 整机 trouble-free an average working hours of 800 hours over foreign and domestic best only 300 hours.

(2) less product variety, can not meet the market demand  
Foreign NC machine tools has reached 1,500 kinds of species, only 500 domestic and low levels of performance, high-speed, highly

(3) low innovation capacity, are on the market

CNC machine tool production of the enterprises must raise about 8 per cent though, but most have failed to scale production, poor corporate efficiency, low innovation capacity, high manufacturing costs, product market competitiveness is not strong.

(4) the professionalization of CNC machine tools industry spare parts and components produced in collaboration supporting system

CNC machine tools in China's recent development, to take the High-tracking the development of universal, and expand economic, universal-oriented strategy, focusing on development:

(1) application of economic, Damian-volume products

The universal application of economic CNC lathes, machining centers, CNC milling machine.

(2) high-speed, efficient and dedicated, complete sets of CNC machine tools

High-speed, efficient CNC lathes and machining centers; efficient NC forging equipment, including that automatically for the first punching machine, the composite flexible stamping center, four sides bending machines; large precision molds NC equipment, including several - Profile milling machines and gantry milling machine, intelligent processing, machine tools, etc..

(3) of CNC machine tools specialized support system

NC Servo System and a new generation of products, high-speed spindle CNC machine tools, electric spindle motor products; manipulator NC machine tools, knives and the driving force Turret

supporting products which Including, high-speed ball screw, high-speed ceramic bearings, protective devices, such as high-speed products.

Development Goals:

- (1) to foster the economic development of key enterprises apply, Damian wide of the NC machine tools and of mass production, so that the products of these enterprises have significantly increased market share, a brand-name products;
- (2) the development of dozens of high-speed, highly efficient, dedicated, complete sets of CNC machine tools series of new varieties to meet the automotive, agricultural machinery, aviation, mold, and other industry needs;
- (3) of CNC machine tools supporting key products: NC system, meet the domestic CNC machine tools 50 percent of the matching demand and high-speed main spindle with an annual output of 1,000 sets of mechanical hand, the knife, power tool carrier and supporting high-speed CNC machine tools Parts, accessories series of products to meet domestic demand for 50% of the supporting

### 3.2 power electronic applications and automation technology

Power electronics technology is set microelectronics, computers and automation technology in an integrated technology, energy-saving materials is the one of the best technology. At present, foreign power electronics technology has been developed to the IGBT as the representative to the third generation, power electronics and smart development of the times, our country is still in the SCR as the representative to the second generation.

only 35 per cent, new products market is basically occupied by foreign products.

Field Bus-Bus smart instrumentation and automatic test system is set automation technology, computer technology and communication technology in one of the new generation of automated instrumentation systems, automation technology has become the worldwide development of the hot and contemporary industrial automation is the main hallmark. China still in the system from analog to digital dashboard instrumentation systems transition module hybrid instrument system stage, behind the level of 10 to 15, low-technology products in the market still occupied about 80 percent share, but in high-tech products market The share of less than 60 percent, the new product markets for foreign products for almost the entire occupation.

Therefore, seize the current opportunity in two to three years to IGBT, Fieldbus smart instrumentation and automatic test system for the breakthrough, capturing key technologies and products and to achieve industrialization. The key development areas:

(1) IGBT devices and devices, high-power devices and SCR  
Developing a new generation of bipolar transistors IGBT, high-quality high-current, such as high-power IGBT SCR manufacturing technology and the development of Frequency Control device, switch power inverter, high-capacity filter sources such as the entire application.

(2) Fieldbus intelligent instrument  
Development of transmission, implementation, support and other types of Fieldbus instrumentation. Products industrialization of technological development and demonstration projects of applied research.

Bus-developed the basis automatic test system products, a moderate scale, while machinery and electrical products and for the establishment of social welfare undertakings of the typical automatic test system, to model and promote the use of.

### 3.3 large-scale agricultural machinery and construction machinery

#### 3.31 Agricultural Machinery

Agricultural Machinery products in the industrialized countries continue to adopt a new technology based on the industry are environmental direction. China has been able to produce 14 categories, more than 3,000 varieties of agricultural machinery products, but products of integrated technical level equivalent to only the level of foreign 1970s. The main question is:

- 1) product level is not high, incomplete varieties comprehensive technical and economic indicators backward, poor reliability and short life. A tractor as an example, MTBF values abroad can reach more than 330 hours, but China only 100 hours.

Variety: the lack of large and small miscellaneous, not series.

- 2) The production to achieve economy of scale of less duplication of production, small-scale production, it is difficult to guarantee quality.

Farm Machinery key development areas:

- 1) To promote the industrialization of agricultural production of large and medium-sized tractor and a tractor tools trouble-free time from an average of 110 hours to 300 hours or more.

- 2) Combine the reliability coefficient of combine harvesters

3) major agricultural products processing machinery (including dry storage machinery) and the industrialization of rural central and western regions become prosperous in need of deep processing of agricultural machinery;

4) water-saving irrigation equipment spray, drip irrigation equipment will be the effective utilization of water from the flood Manguan 40 percent to more than 80 percent.

The use of agricultural machinery products and the reliability of life indicators generally improve more than doubled, the main products of the technical standards with international standards.

### 3.32 Construction Machinery

Construction machinery and the national economy is large-scale construction projects must be of key equipment. China has initially have 16 categories, more than 3,100 different specifications of the product production capacity of some products have begun to enter the international market. But with the development of the national economy and international advanced level, compared to the gap is big. First, the integrated products of high technological level, in particular the quality of the product, life expectancy, reliability, safety and comfort, and other indicators, such as high-tech electromechanical integration and application of advanced foreign standards also is a wide gap between the second is structural products Shortage of packages of services is poor, far can not meet the needs, such as road construction machinery largely depends on imports; Third, most of the production of small scale enterprises, constraining the industry to further improve economic efficiency.

Focus on the development of construction machinery:

- 2) truck crane, forklift large;
- 3) paver, roller;
- 4) No excavation for the laying of pipelines;
- 5) the rivers, lakes dredging equipment.

Development Goals:

Large-scale construction machinery reliability index reached 400 hours, life indicators have reached 10,000 hours.

### 3.4 sedan key technologies

China's automobile industry to long-term truck as the main product of reform and opening up, the car has been rapid development of products. 1998 car output reached 520,000.

China's automobile industry the main problems:

(1) duplicate construction, causing disorderly competition, difficult to concentrate on a power play of scale.

(2) Weak independent development capabilities, the majority of enterprises period is still a strong bias towards the production processes to be transformed, including the majority of Sino-foreign joint venture enterprises parts of the product development capacity-building almost no input. At present, the domestic passenger car products do not have the self-development capacity, electromechanical integration of high-tech parts must also introduce advanced technology products.

Car recent focus on development:

(1) economic cars

To car body to make a breakthrough, combining the use Jimao, cooperation with foreign companies, including through the body to grasp the joint development, economic cars and the establishment of the common design database, with the CAS, CAD,

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