

## Overseas Market Information



### Market Survey Report on Pumps and Fans Market in China

Over the last decade, due to its economic policies supporting reform and openness, China has experienced significant economic growth (as measured by GDP) increasing from US\$ 434 billion in 1991 to US\$ 1,041.8 billion in 2000, an annual average growth rate of 10.25 per cent. This growth trend is forecast to continue at about 7% per year through 2020.

China is currently the second largest energy consumer in the world behind the United States. In 1999, China consumed 37.02 quadrillion (10<sup>15</sup>) But representing about 9.5 per cent of world energy consumption while the United States accounted for 24.8 per cent. In China, coal was the dominant energy source, and the 1,075 million tons consumed was the highest in the world, accounting for 22.7% of global consumption. China's industrial sector has been the biggest energy consumer, accounting for 70% of national consumption. The transportation sector accounts for less than 10% of energy consumption, unlike other developing countries, such as Thailand, where the transportation sector is the largest energy consumer.

In terms of electricity consumption, China consumed 1,206.3 billion kWh in 2000, with a growth rate of about 8 per cent per year during the 1990's. In the industrial sector, motors and motor systems are the biggest electricity consumers. Essentially, motors are used in both production processes and facility end-use. For example, motor systems are an integral part of material processing, material handling, refrigeration, and compressed air. Pumps and fans are significant components and electricity consumers, generally accounting for about 40% of a motor system electricity use.

Generally, pumps are used in two basic functions, production processes and facility end-uses. Single-stage single-suction clean water pumps, have the biggest sales volume, accounting for 38% of all applications. In 2000, China produced 1,029,747 pump units. Of this amount, 899,619 units were centrifugal pumps (87.4%), used mainly for pumping water as opposed to production process applications. The national sales revenue of pumps was US\$ 537 million. The top ten manufacturers have a market share of US\$ 171 million, representing 32% of the total national sales revenue. The efficiency of the OEM's best selling application, single-stage single-suction clean water pump, compared to the Chinese national standard and average European efficiency level, at the same flow rate, is higher than the Chinese national standard B but less than 30% of them can achieve national standard A. Because of very close efficiency level between standard A and average European level, this means that most OEM products have lower efficiency than European products.

Like pumps, fans and blowers are widely used in both production processes and facility end-uses. Centrifugal fans have the largest market share at 34%, while axial-flow fans account for about a 23% of the market, and mixed flow and propeller fans have a combined market share of about 43%. In terms of fan applications, general application is the largest at about 46%. Fan national sales revenue is about US\$ 364 million. The top ten manufacturers account for 69% of the national sales revenue (about US\$ 251 million). There are 481 fan series covering more than 5,000 models of fan in China. One of the best selling models is 4-72 No. 5. It is estimated, based on the number of units sold, to account for 25-50% of all fan models sold. In addition, different vane structures mean different efficiency levels. Model 4-72 No. 5 has a vane with an airfoil structure while model T4-72's has a flat shape. At the same vane diameter, the airfoil structure of model 4-72 performs at a higher efficiency than the flat vane structure of model T4-72. Unlike pumps, there are no special standards for fan efficiency. Testing of efficiency is implemented by calculation of relative parameters. Standards prescribe that the variation between the tested value and the alleged efficiency should be within about 5%.

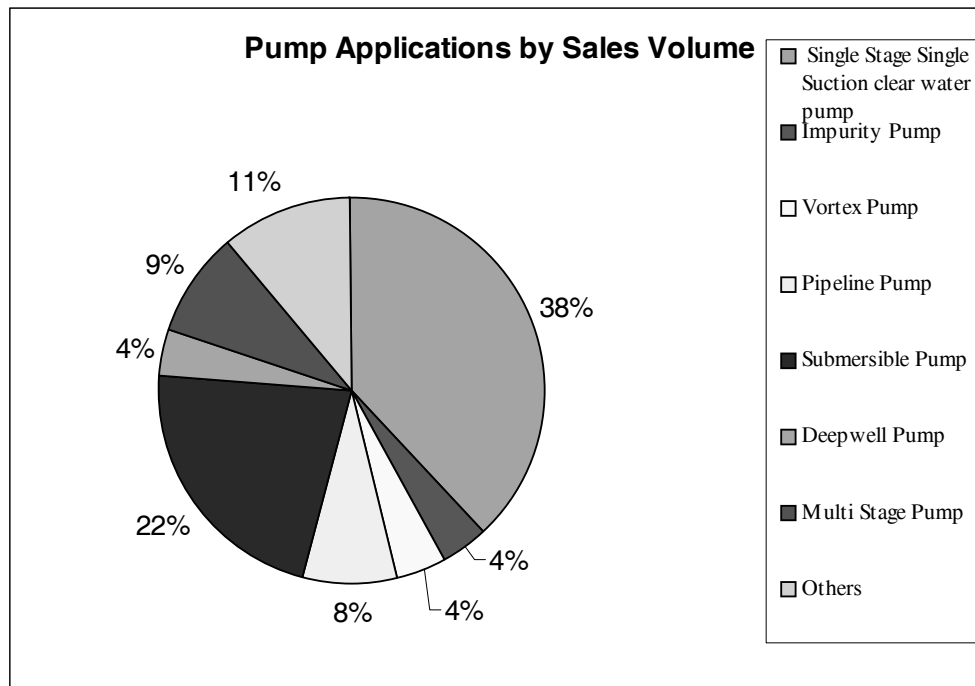
All pump and fan manufacturers in China can be divided into four levels : High Class, Middle Class-1, Middle Class-2 and Low Class. All manufacturers categorized in the High Class play a major role in the market. Their product qualities are usually more efficient than the other manufacturer products. The Middle Class-2 group of manufacturers is the largest group of both pumps and fan manufacturers. Low Class manufacturers are generally small, with few employees, generally

family members. The quality and efficiency of products from the Low Class of manufacturers is generally lower, as are their product prices. Many of their products are sold into the local agricultural market or to local electrical/mechanical companies. This is always a very open and competitive market, situated in combined urban/suburban locations. Further, most of these consumers pay little attention to energy efficiency, thus price is the most important decision factor. This situation has forced some large manufacturers to reconsider their products in the market. Some of them have repositioned their market from domestic to international market. Compared to exporters from other countries, large manufacturers from China have a competitive advantage because of their vast economies of scale, inexpensive labour and land, and China's rapidly improving skilled labour and infrastructure quality. These factors result in products with equally competitive international efficiency levels but lower prices. Further, low production cost manufacturers also produce low to medium quality products for sales in the China market and have been able to expand their markets to other developing countries, particularly in the South East Asia region. Although many of those countries also produce low to medium quality products, their production costs are more expensive than Chinese production. This results in direct competition between low cost product manufacturers from China and the rest of Asia.

## Product Segmentation

### Pumps

Generally, pumps are used in two basic functions in the industrial sector : production process and facility end-use. Production process pumps, which are normally integrated in the production machine, supply, transport, mix, and circulate raw materials throughout the process. Facility pumps are used in, for example, circulating chilled water and feeding treated water to boilers. *Figure 5* illustrates per centage of sale volume of pump applications. Clearly, single-stage single-suction clean water pump has the biggest sale volume. It is a fundamental application of pumps that are used in both production process and facility end-user.



Several types of pumps are used in the industrial sector in China, mainly for pumping different fluids at different flow rate, pressure, and total dynamic head. Three most common types of pump are;

**1. Centrifugal Pump :** The major component of a centrifugal pump is an impeller rotating inside a casing. The rotation of the impeller decreases the pump's inlet pressure making fluid flow into the pump. The accelerated fluid then exits the pump propelled by the blades. Centrifugal pumps are used with low viscosity fluids providing a more steady flow that does not work under a high amount of shear. Centrifugal pumps are low cost and low maintenance.

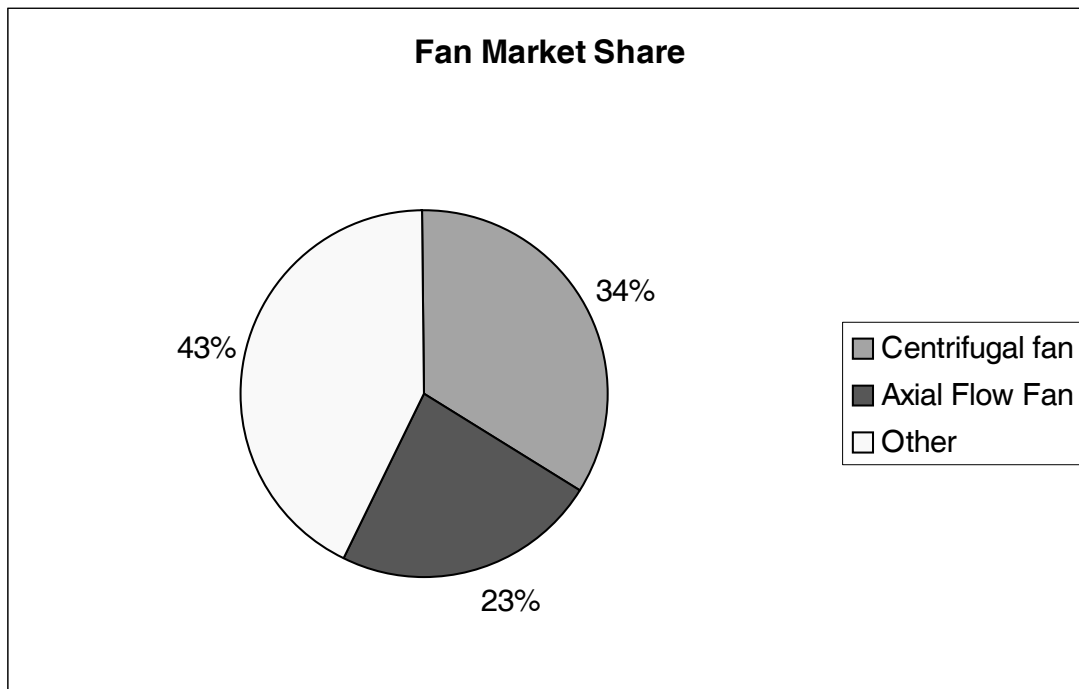


**2. Reciprocating Pump :** Reciprocating pumps are positive displacement pumps. These pumps fill and empty a cavity using pump action propelling the fluid forward. A reciprocating pump consists of pistons and plungers to pump the fluid. In general, reciprocating pumps are suitable to transfer viscous fluids and high-density fluids.

**3. Rotary Pump :** Rotary pump is another type of positive displacement pump and consists of two rotating impellers expanding and collapsing cavity at the pump inlet and outlet, respectively. Fluid flows into the expanding cavity, travels around the impeller, and moves to the outlet of the collapsing cavity. Rotary pumps are used for the same function as reciprocating pumps, but cannot provide steady fluid flows within a limited range of flow rate.

## Fans

Like pumps, fans and blowers are widely used in both production process and facility end-uses. Fan and blower use is determined by working pressure requirements. A fan's working pressure is below 34 kPa while a blower's optimal working pressure is higher than 34 kPa. Fans can be classified into four main categories, centrifugal, propeller, mixed flow, and axial-flow. As shown in the figure, centrifugal fans have the largest market share with 34%, while axial-flow fans account for 23%, and mixed flow and propeller fans account for 43%.



**1. Centrifugal Fan :** A centrifugal fan consists of an impeller with a number of blades rotating in a scroll or spiral shaped casing. The rotation of the impeller pushes air into the volute shaped casing and out through the discharge opening. Simultaneously, the impeller draws air through a central inlet opening, thus causing a continuous flow of air through the fan impeller and casing.

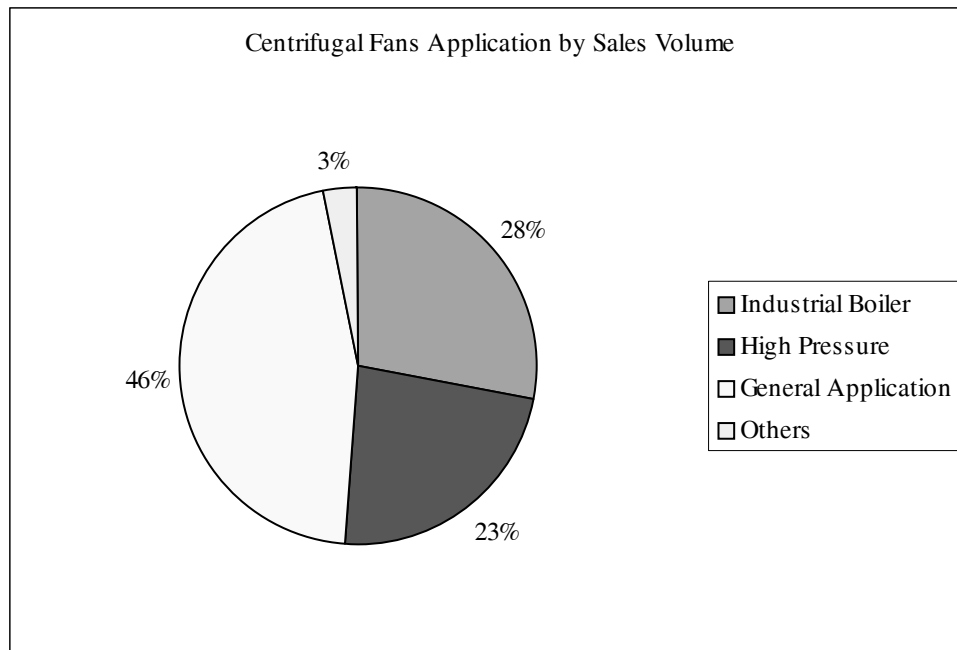
**2. Propeller Fan :** In a propeller fan, a curved sheet metal-bladed impeller is fitted to the motor spindle. The impeller draws air from all directions, and discharges air parallel to the axis of the fan. Its main application is for ventilation.

**3. Mixed-flow Fan :** The mixed-flow fan is a combination of centrifugal and propeller fan. It combines the ability to move large volumes of air of the propeller fan, and the higher pressure of the centrifugal fan. Radial propellers produce a static pressure increase because of the centrifugal force acting in a radial direction. There is no equivalent pressure increase with axial impellers because the airflow is normally axial. Mixed-flow fan is suitable for roof mounting where the direction of airflow through the fan cannot be reversed.



**4. Axial-flow Fan :** An axial flow fan is generally smaller than a centrifugal fan and more efficient than propeller fan for the same output because of the aerofoil section blades and finer clearances between the impeller blade tips and the cylindrical fan casing. However, an axial-flow fan has limited application with hot or moist fumes.

In terms of fan application, three out of six main applications – industrial boiler, high pressure and general application - make up 97% of the industrial market, as shown in *Figure 8*. Other applications include general axial-flow, power plant matching, and dust discharge.



## Market Size

### Pumps

In 2000, 1,029,747 units were produced in China. Of this, 899,619 units were centrifugal pumps, accounting for 87.4%, used mainly for pumping water rather than production process application. Centrifugal pumps that are used in process application normally require higher quality material than water pumping application due to their main function to transfer chemical substances. The overall sales revenue of pumps was US\$ 537.12 million. Model QY25-26-3 has the largest market share, accounting for 20% of the total pump market. The top ten manufacturers had 32% of the total market share, or US\$ 170.55 million.

### Fans

As mentioned in section 2.1.2, the centrifugal fan is the most commonly used in the industrial market. The national sales revenue of fans was US\$ 364 million. The top ten manufacturers controlled 69% of the market, or US\$ 251 million. There are 481 different fan types covering more than 5,000 models in China. One of the best selling models is 4-72 No. 5, which is estimated to control between 25-50% of the total fan market.

## Export and Import

### Export

Vicious competition from low cost manufacturers has had a negative impact on original equipment manufacturers (OEMs) and the whole market. While many OEMs have made capital investments into advanced technology, low cost manufacturers have simply copied OEM products. By manufacturing them using cheaper materials and processes, these manufacturers are able to offer lower cost models, which generally perform much lower efficiency. For their part, consumers have traditionally not paid much attention to energy efficiency when purchasing and using pumps and fans, which indicates that price remains the most important decision-making factor. The most important export market is developing countries, particularly South East Asia region. However, the export sales revenue from top ten and top eleven pump and fan manufactures in 2001



were US\$ 44.62 and US\$ 17.12 million, respectively. This represents about 25% and 28%, respectively; of the total export markets for each category, which indicates that this could be a significant growth area.

### Import

Detailed information and statistics on imports are not readily available. What is known is that total import revenue for pumps and fans are US\$ 364.8 million and US\$ 147.7 million, respectively. Thus, imports are roughly double exports. Imports tend to emphasize large and specialized pumps and fans which have a high value.

## Testing Methodology and Standard

### Pumps

The testing methodologies of pumps in China that contribute to the national standard can be summarized below :

**Table 2 : Testing Methodologies of Pumps**

<i>Reference Code</i>	<i>Description</i>	<i>Authority</i>
GB/T 13007-91	Efficiency for Centrifugal Pumps	Testing and Quarantine of the People's Republic of China
JB/T 8092-96	Small Submersible Motor Pumps	Previous Mechanical Industrial Department
CCEC/T ***-2001	Centrifugal Energy Saving Product Identification Technology Requirement	China National Institute of Standardization (under revision)

### Fans

Unlike pumps, there is no special standard for fan efficiency. Testing of efficiency is implemented by calculation of relative parameters. Standards prescribe that the variation between testing value and the alleged efficiency should be no more than 5%.

All requirements for testing are listed and limited by national standards, which determine the level of precision. So from a theoretical perspective, all the testing data have equal validity. But the truth is some small manufactories often do not carry out the rigorous testing under the terms of the national standards. Two thirds of all manufacturers do not have independent testing equipment at all. These conditions mean that low efficiency products often enter the market regardless of the national standards.

Testing method standards for fans are illustrated below :

- GB/T 1236-2000 industrial fan, implement performance testing by standard wind channel. Adopted from ISO 5801-1997 (laboratory tested).
- GB10178-88 : Site testing of fans. Equal to ISO/DIP 5802 (on site tested)

In addition, usage of in-house developed software has increased in testing methodology in China, for example :

- FAN 3.0 : Calculate data from testing and draw the performance curve, designed by Shenyang Blower Research Institute
- MGS : Utilize sensor and electrical signal to collect and process data, designed by Xi'an Jiaotong University (in test run)
- MCGS2.0 : Collect, process-testing data, flash display, and print table, designed by Beijing Zhongtai Computer Technology Research Institute.

*(Source : EEPC Singapore Office)*