

# Soft Ferrite Industry In China

As a fundamental functional material for IT industry, soft ferrites are widely used in home appliances, telecom and LAN, automotive, military and aerospace. There are three main functions for components made of soft ferrite materials: signal transmission, power switching and EMI or EMC. Soft ferrite material itself, which produced by similar traditional ceramic manufacturing process, can be divided into four basic types: MnZn, NiZn, MgZn and LiZn, which can be used for different applications based on their different characteristics.

In terms of applications, MnZn ferrite and NiZn ferrite are the two most widely-used materials that make up 80 percent of the whole world soft ferrite market share, and MnZn ferrite alone takes about 70 percent. Deflection yoke cores made with MgZn ferrite has been widely used in CRT TV and monitors in the past. With wide spreading of LCD PDP panel TV in the recent years, MgZn ferrite production is decreasing dramatically with less than five companies targeting for the low-end markets.

From a technology development point of view, as global trend for higher efficiency and miniaturization of the electronic devices, the application requirement for soft ferrite is getting more and more demanding and challenging. For power ferrite, it requires lower loss, higher saturation flux density, higher frequency and a wider temperature range. For high permeability ferrite, wider temperature stability and frequency stability, higher insert loss, higher impedance and lower THD (Total Harmonic Distortion) are general requirements from customers. It also requires no significant decreasing of the AL value under DC bias.

Soft ferrite manufacturing in China can be traced back to 1950s. But not until late 1990s had it attract the world's attention on its output and technology. Great changes have taken place in China soft ferrite industry since 1990s due to the joining of numbers of private firms and the shift of production base of the overseas companies, especially in the early years of this century. Soft ferrite output in China has experienced a dramatic increase and nearly doubled its capacity every five years. In 2007, the total soft ferrite output in China was more than 250,000 tons, which accounted for more than 50 percent of the world's total output. China, as a whole, has already become the largest soft ferrite producer in the world and will continue to grow steadily in the foreseeable

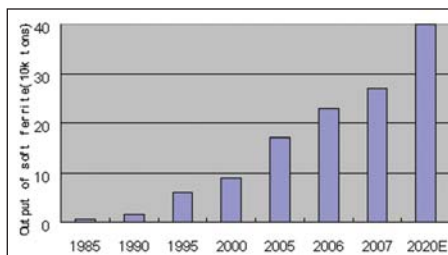


Chart 1. Growth of China soft ferrite output and its forecasted tonnage in 2020. (Unit: 10k tons)

future. The chart below shows the growing history of China soft ferrite output and its forecasted tonnage in 2020.

There are about 200 soft ferrite companies in China, mainly distributed in coastal provinces such as Zhejiang, Jiangsu and Guangdong. Some companies have the annual capacities of more than 5,000 tons. DMEGC Magnetics is one of the largest with annual output reaching of 40,000 tons. Chart 2 shows the output growing of DMEGC in the past five years.

**So what are the reasons behind the rapid growth of soft ferrite in China?**

**Lower cost labor forces:** As the labor intensive industry, the labor cost plays a decisive role in the products price competition in the soft ferrite manufacturing. In addition to that, low cost for highly trained engineers and technicians bring better improvement and development potential. There are more than 20 colleges, government research institutes and enterprise R&D centers engaged in the magnetic material research and education training. Moreover, the Chinese workers are well trained, compared with other developing countries.

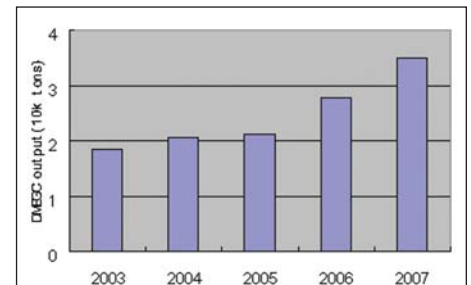


Chart 2. The output growing of DMEGC from 2003-2007. (Unit: 10k tons)

**Cheap and rich resources for raw material:** All raw materials for soft ferrite, including Fe<sub>2</sub>O<sub>3</sub>, Mn<sub>3</sub>O<sub>4</sub> and ZnO can be purchased at a relatively lower prices from China mainland. China raw material manufactures can produce these materials according to the demand from soft ferrite industry.

However, the prices of major raw materials for soft ferrite keep increasing since the end of 2005, which had an obvious influence on the price trend of soft ferrite. For example, Fe<sub>2</sub>O<sub>3</sub> has increased by 30 percent, Mn<sub>3</sub>O<sub>4</sub> has increased by 60 percent, ZnO has increased by 40 percent, NiO has increased by more than 150 percent in the past two and half years. Chart 3 shows the price changing of NiO from Q4 2005 to Q2 2008, which we found some similarity to the price change of soft ferrite. Apart from that, US dollar depreciation, increasing in labor cost, additives and energy resources, have combined to lower the profit margin of Chinese soft ferrite makers and caused the rising in fluctuation of soft ferrite prices in the past three years. Compare with the increased per-

centage of the manufacturing cost, price increasing of soft ferrite is not that dramatic in the market. To give an exact description of the price changing trend of soft ferrite is really a difficult and complex issue.

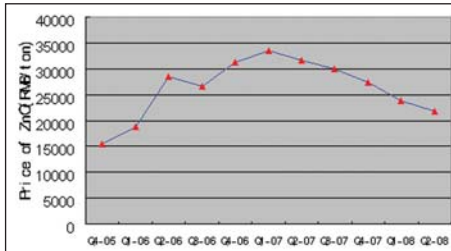


Chart 3. Soft ferrite raw material ZnO price change from Q4-05 to Q2-08

**Mature and specialized for the matching equipment markets:** Before the 1990s, the key manufacturing equipments for soft ferrite, such as sintering furnace and high precision grinding machine, were relying on the overseas import with high purchasing costs, high maintenance and repair cost and long lead time. In recent years, this situation

has been completely changed. Except for a few very special equipments, most equipments used for soft ferrite manufacturing processing have been localized, with much lower price for the same functions. With the increasing demand from the soft ferrite market, there are about 20 companies specialized in manufacturing the soft ferrite powder, which are supplied to ferrite core producers. So even without the powder production technology, ferrite core producers are able to produce quality soft ferrite core.

**Great market demand:** The main customers for soft ferrite are inductors and transformers producers. China has become the largest manufacturing country for inductors and transformers. For lower cost and quicker response time, it is more favorable for them to purchase the soft ferrite locally. Although 85 percent of DMEGC customer headquarters are located overseas, more than 80 percent of DMEGC soft ferrite cores are delivered to their Chinese manufacturing plants. As the new market

economy and the largest population country, China has a large internal demand for home appliances, network communications and automotive electronics, which provides a huge domestic market for soft ferrite producers. Chart 4 shows the output history of China panel TV sales and forecast. The annual growth rate has been more than 100 percent in nearly five years. Chart 5 shows the annual output history of china vehicles, the annual growth rate of vehicles is about 15 percent.

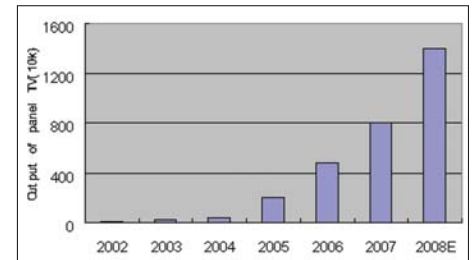


Chart 4. China panel TV sales and forecast. (Unit: 10k)

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