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Behind Growth, New Chances and Challenges in China Printed Circuit Industry

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Abstract
After the world electronic circuit industry finally turned out from the unprecedented recession, the business management of today's printed circuit industry may possibly have a chance to take a comfortable breather for a while. However, looking into the trends and drivers of the industry, many people are still endeavoring to look for the next step in business development as the competition environment is changing so rapidly. Today, China's electronics market catches much attention for the business people both in China and around the world. Driven by relocation, restructuring and supply chain management and changes in China's electronics manufacturing market and printed circuit supply, there are more features of China printed circuit industry today, both with market opportunities as the industry is developing and with challenges which have to be watched and turned into business development opportunities. Behind the growth of the China printed circuit market, there is much more to improve and to collaborate.

Introduction
As the basic supporting component of electronic products, the development of the China printed circuit industry follows the track of the development of China's electronics information industry and is affected by the global electronics trends. During the period of the world down turn of electronics and IT industry since 2000 when world electronic circuit industry declined over 20%, China printed industry still kept marginal growth driven by the industry migration and domestic electronics information demand growth. Global purchasing and localization in supply chain management development pushed the development of the electronics information and printed circuit industry in China in the following years.

Growing Chinese Electronics Information Industry, Growing Market Opportunities
Although there are some difficulties for the electronics information industry in 2003 such as intensified global competition, IT slow growth, global trade conflicts and SARS in China, the Chinese Electronics Information Industry still sustained rapid healthy development.

Enterprises quantity has seen a 17.5% increase reaching 16110 total companies of which 10596 are electronics manufacturing enterprises. (Figure 1)

With the growing number of electronics information industries, the employee number in 2003 reached 4.08 million, with 0.82 million growth, in which electronics manufacturing grew by 10.4% (Figure 2).

The sales turnover of electronics information industry in 2003 reached 1880 billion RMB, 34.3% growth over 2002. (Figure 3)

Export of electronics information industry reached 142.1 billion USD, 54.4% growth over 2002. This growth rate is 19.8% higher than national export growth. The export of electronics information industry makes up 32.4% of national export total and is the leading driver for export growth. (Figure 4)

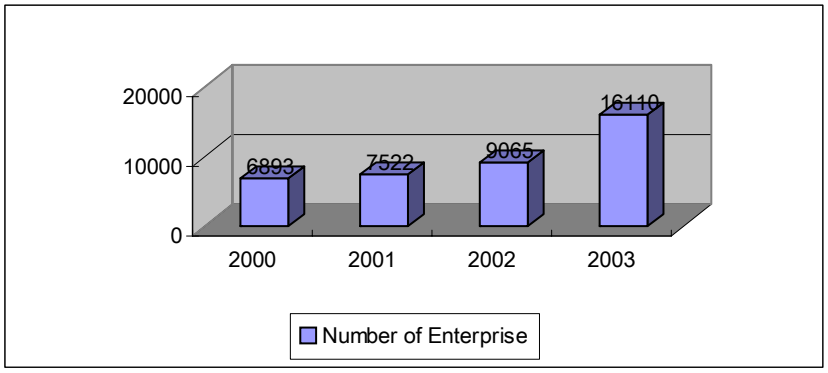
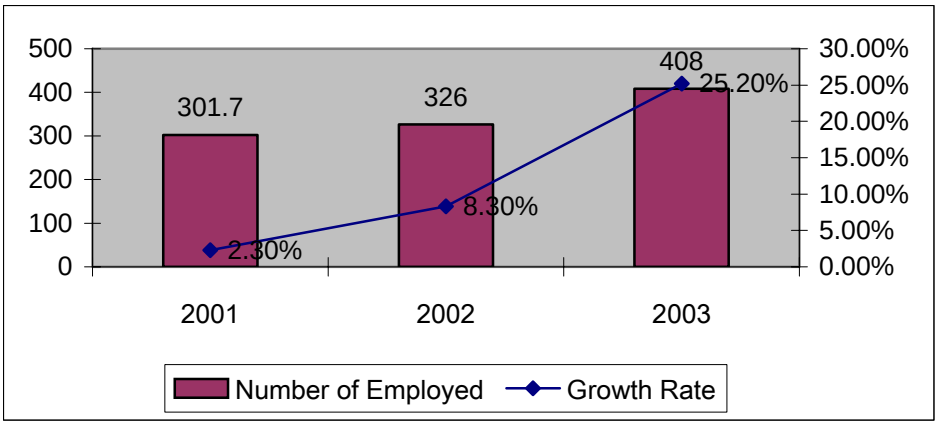
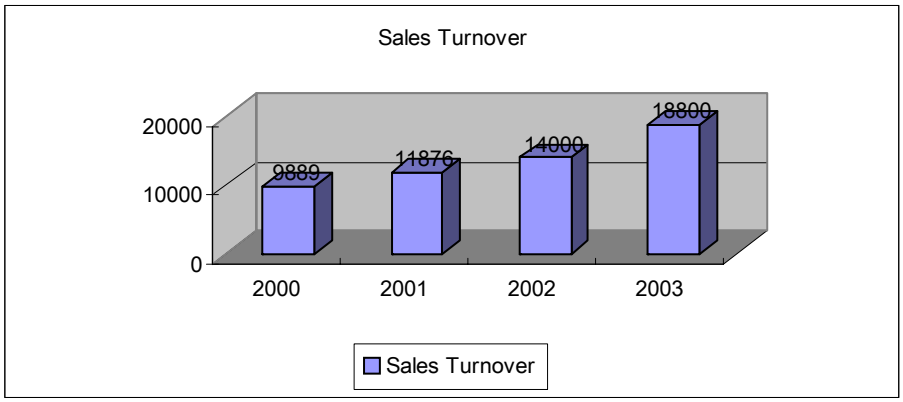


Figure 1 – Enterprise Number Growth[1]



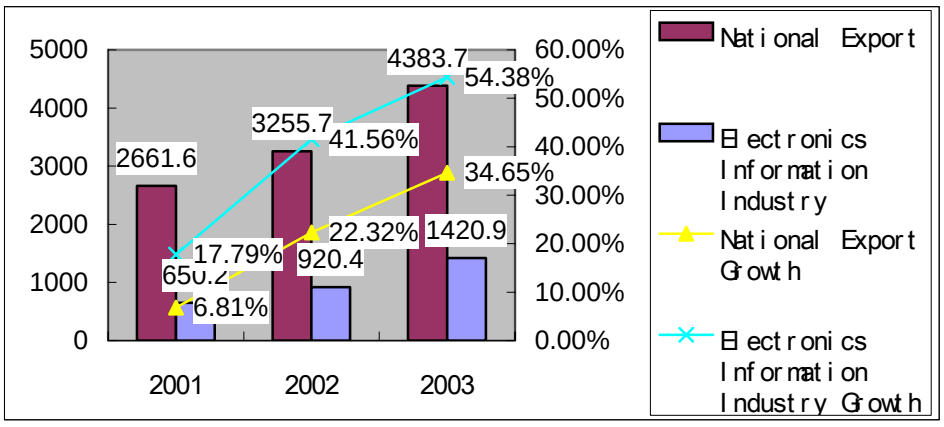
Unit: 100M RMB

Figure 2 – Employee Number Growth[1]



Unit: 100M RMB

Figure 3 – Sales Turnover[1]



Unit: 100M USD

Figure 4 – Export Growth Comparison[1]

The main electronics information products are shown in 2003 (Table 1)

Table 1- Main Electronics Information Products[1]

Product	Unit	Output Quantity		Sales Quantity		Export Value (100M USD)	
		Total	Growth%	Total	Growth%	Total	Growth%
Mobile Phone	10K	18644	54.5	18321	56.1	73.8	39.4
Tele Switching	10K Line	5807	39	5387	34.6	4.5	81.8
Color TV	10K	6521	30.3	6500	23.8	25.6	16.6
Personal Computer	10K	3216	98	3083	98.9	22	55.5
Display	10K	7326	56.2	7373	55.2	95.7	62.4
CRT	10K	9051	16.1	8906	15.7	7.5	17.7
IC	100M	124.1	37.5	122.5	40.5	59.7	165.7

It is still obvious the Yangtze Delta and Pearl River Delta still take the predominant position in the electronics information industry. These eight provinces take up 90.8% and 88.1% in terms of sales and profits respectively. (Figure 5)

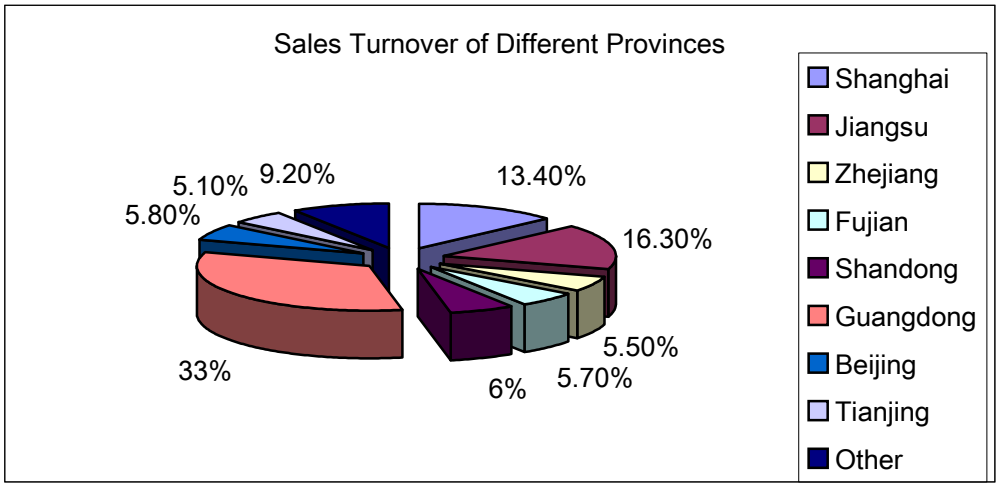


Figure 5 – Sales Turnover of Different Provinces[1]

Looking at the above electronics information industry development and the predictable growth of the following years, the domestic market demand for Chinese printed circuits will keep growing, even in this very difficult period.

Chinese Printed Circuit Industry in 2003

Driven by the fast growing Chinese electronics information industry, Chinese printed circuit industry turned back to the fast growth track after two years of slow development. The capacity built during the world down turn period was quickly filled up by strong market demand. In 2003, the sales turnover of Chinese printed circuit industry reached 6 billion USD and output reached 64 million square meters. For import and export, the total number also exceeded 6 billion USD. The market size increased driven by the development of electronics information industry.

The following is the key growth rate data of Chinese PCB industry in 2003 (Figure 6).

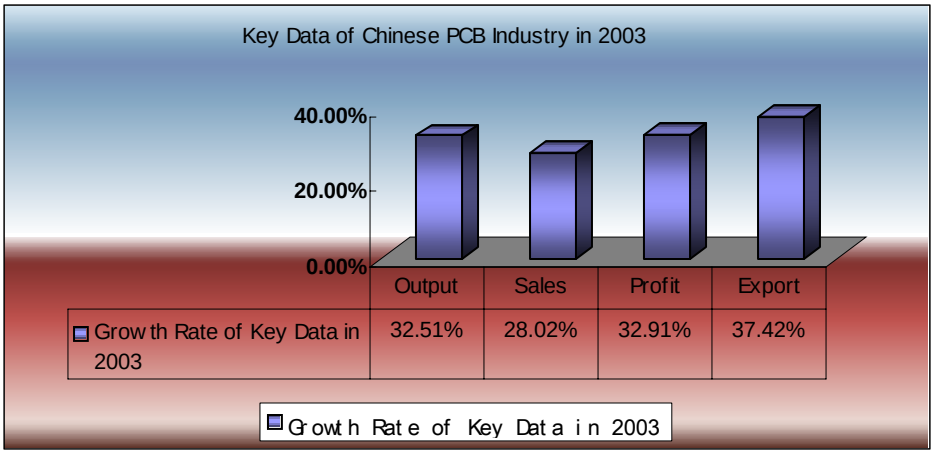


Figure 6 – Key Date of Chinese PCB Industry[2]

The following is the growth rate comparison between single-sided, double-sided and multiplayer printed circuit by output, sales turnover and export value in 2003. (See Figure 7) It is clear that single-sided and double-sided growth is flat, as China has been making most of these kinds of boards over the years. Multilayer, especially HDI and FPC are the driving forces.

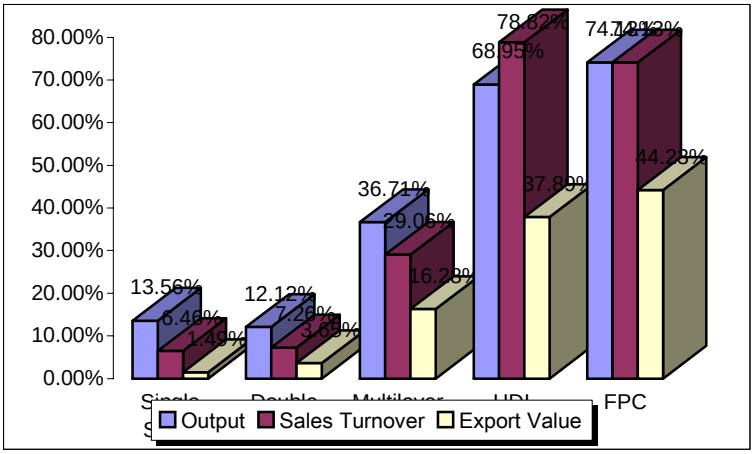


Figure 7 – Growth Rate Comparison[2]

When we take a look at the export growth figures, single and double-sided boards are mainly consumed in the domestic market where most of the products are low value-added. (Figure 8.)

With the fast growth of multilayer, HDI and FPC, the percentage of single and double-sided production value for total production value continued to shrink. HDI and FPC production value will maintain growth in the next few years.

In the early development stages of the Chinese printed circuit industry, there were many single and double-sided manufacturers. With their development, these factories added multilayer production capacity. However, the production process design, environment construction, equipment upgrading and maintenance etc. still needed a lot of improvement. For the number of medium size Chinese PCB manufacturers, it was the critical time in the highly intensified competition environment.

In 2003, the new investments are mainly centered in HDI capacity and FPC new plants which will drive the further percentage growth of HDI and FPC.

In 2003, the import and export total reached 6 billion. However, the import is 1.2 billion USD higher than export (Figure 9). A large number of printed circuit boards came back to China for assembly or packaging as major electronics OEMs and EMS producers have their production facility in China.

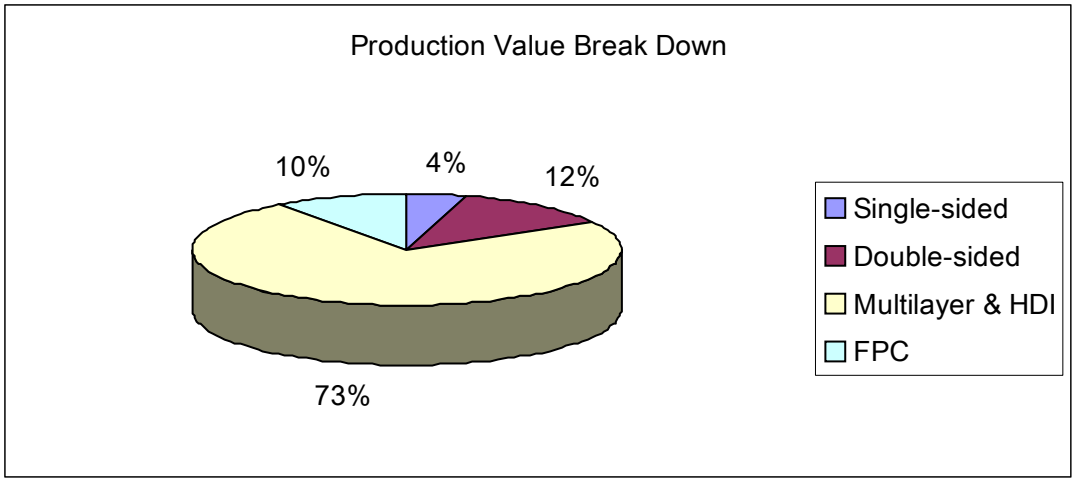
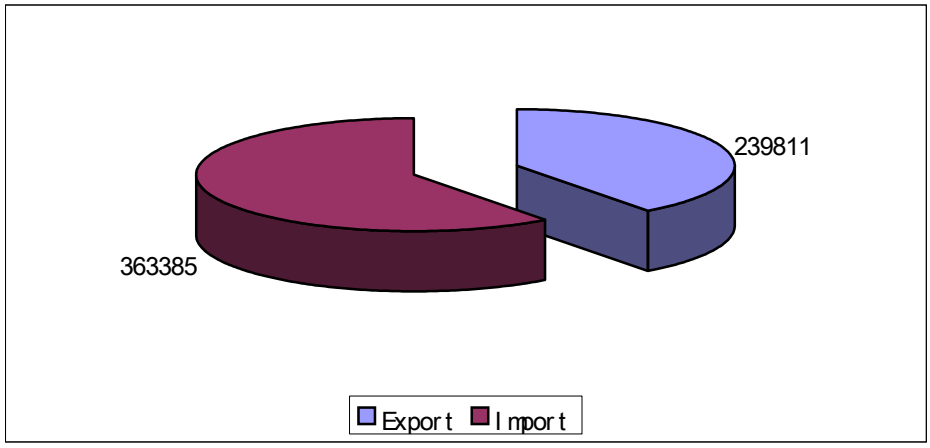


Figure 8 – Production Value Break Down[2]



Unit: 10K USD

Figure 9 – Import and Export[2]

Histories Tell the Future: Continued Growth Means Opportunities

The fast growing economy is important for every company intending to expand its business. Through out the year 2003, Chinese electronics information industry kept up its outstanding growth that provided opportunities for the growing business of electronics OEMs and electronic manufacturing companies. Besides the entry into WTO, China is also establishing trading blocks with Asian countries where the GDP growth is one of the fastest regions in the world.

One of the important drivers for the growth of Chinese printed circuit industry is the re-location and migration of international OEMs and electronic manufacturing service companies in the past years. No matter in terms of speed or scales, the trend is still on-going. The EMS companies are more and more focusing on the target market and search for cost reduction and manufacturing base re-location. In order to improve competitive strength and reduce delivery time, EMS companies increase the purchasing activities locally. This also attracted the foreign component and printed circuit suppliers to set up their supplying base in China.

Presently the top five largest EMS companies have set up production facilities in China. For example, Flextronics set up an industry park in Shanghai to concentrate the sources. Some medium Taiwan EMS companies are also active. For the local Chinese leading electronics manufacturing companies, none of them is only an EMS or an OEM, but the combination of both or to some extent like an ODM. These foreign or local electronics manufacturing companies are driving the continued growth in China. The Chinese printed circuit industry has sustained continuous growth in the past years and will grow in the coming years driven by strong market demand. (Figure 10 and Figure 11)

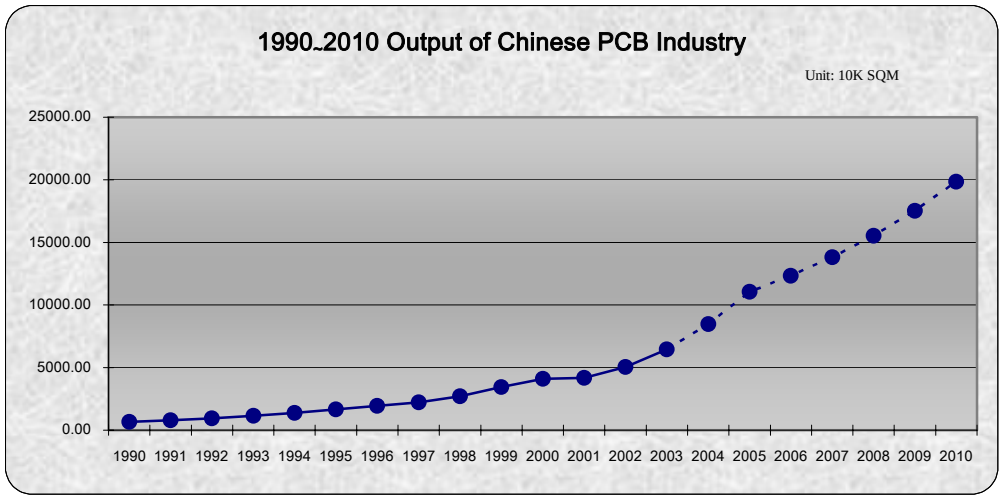


Figure 10 - Trend of Chinese PCB Industry by Output[2]

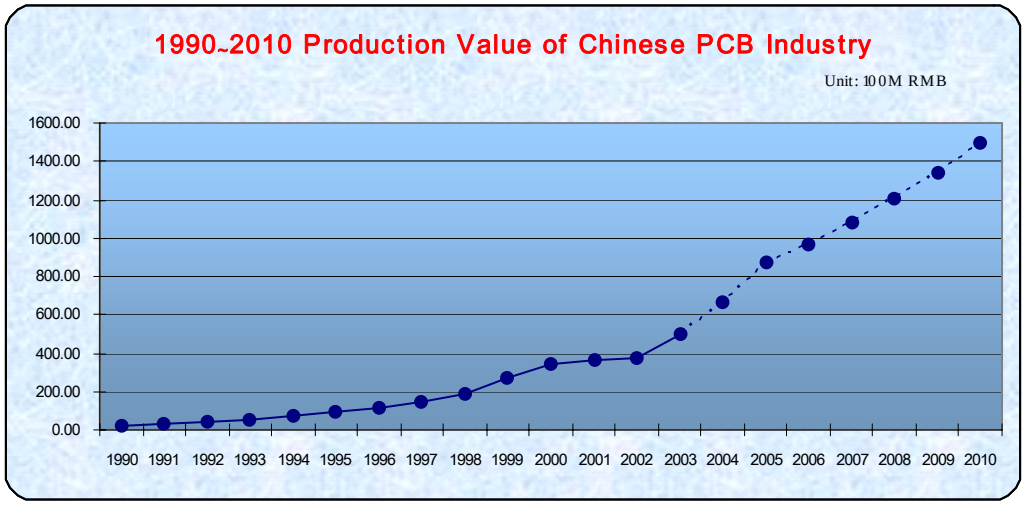


Figure 11 - Trend of Chinese PCB Industry by Production Value[2]

By looking to the prediction of the future of Chinese printed circuit industry, the output and production value in the coming five years will have significant growth. After a decade of development, China already has a big production base and the built capacity and building capacity are the biggest in the world. 75% of the top PCB producers have built their volume capacity in China; the local producers and newly invested private producers are in the process of capacity expansion. When these capacities are fully loaded, the output of this area will be much higher than the present. Following is a list of some of the present Chinese printed circuit producers. (Form 2)

Table 2 - The List of Printed Circuit Board Producers and Production Value in 2003[2]

Unit: Million USD

No.	Company	Production Value	No.	Company	Production Value
1	Viassytems	233	31	HT	34
2	Ya Hsin	137	32	Sung Wei	30
3	Topsearch	131	33	Suhang	28
4	M-Flex	130	34	AT&S	27
5	Compeq	129	35	Pacific	25
6	Wus	127	36	KYO	24
7	Unimicron	127	37	Huafeng Mircoline	23
8	Meadville Group	126	38	Wuzhou	23
9	Elec&Eltek	121	39	Unicap	23
10	GCE	120	40	Zhuhai MLB	22
11	Plato	108	41	AKM	22
12	Techwise	102	42	Danbang	22
13	Meiko	92	43	Tianjin Printronics	20
14	APCB	79	44	Yuandong	19
15	CMK	79	45	Yantat	18
16	Global Flex (Vertex)	74	46	Kinwong	17
17	Sony Chemicals	73	47	Sanben	17
18	CCTC	72	48	Suntak	17
19	Unitech	65	49	YKC	16
20	Brain Power	60	50	Huaxin	15
21	Multek	54	51	Tongchang	15
22	Shennan Circuits	54	52	Sincere Flex	15
23	Asus	54	53	Fast-Print	13
24	Ibiden	48	54	Guangda	13
25	Sentai	48	55	Fuqiang	13
26	EPC	43	56	Nam Hing	13
27	Gul Technology	40	57	Wuhan709	12
28	ACP Electronics	36	58	Qinji	12
29	Parlex	36	59	Hongyuen	12
30	New Time	34	60	Nanxing	12

The electronics and information industry and printed circuit industry will have ups and downs as in the past, but it is clear that by the end of next five years, the printed circuit industry production and output will see a big differences.

There is no doubt that the market opportunities for printed circuit equipment and material suppliers will grow in China in the following years, especially in HDI and FPC supply fields

Challenges Facing Chinese Printed Circuit Industry are also Good Opportunities for Development
Although in the past decades, the Chinese printed circuit industry developed from almost nothing to today a world-manufacturing-base, there are many fields for improvement and further development, which may take an even longer time. These are the challenges the industry is faced with, but they are also the opportunities of today.

Lack of self-developed technology, equipment and material: Although many Chinese printed circuit manufacturers intend to strengthen research and development, the quick market changes, survival and development pressure etc make them less able to invest in technology. This will eventually undermine Chinese printed circuit industry development. There is an example: one Chinese solder resist producer has a foreign technology partnership expert to direct the research and production of solder resist. For some reason, the partnership broke up and the Chinese company bought all the technology. For some period this is OK for the plant but when there are new problems and new requirements from customers, the factory can't continue to satisfy the market and eventually encounters big difficulties in operation.

The industry as a whole may not be in such a serious situation as the solder resist producer, but this make us consider the strength of the technology base of the industry.

The key high tech, high precision equipment like plating equipment, drilling machines including laser drilling machines, AOI, test equipment etc., are all made in foreign countries. Recently some foreign producers are either investigating or in the process of considering building research and production facilities in China. This will help Chinese printed circuit industry to improve its research and supply base. Locally there are some equipment producers that have developed their own technology and gradually have become famous names in the market such as Madson in Shenzhen for O/S test machines. The test machines like the following (Figure 12) are competitive and are gaining market share in China.

Figure 12 - An Example of Test Equipment Developed by Local Chinese Company

The Chinese printed circuit industry welcomes the foreign high tech equipment and chemical producers to establish partnerships with Chinese producers, or set up research and development or production center in China, which will build up the technology base for the future healthy development of the industry.

Standardization is just in beginning: In Siemens, the first principle of corporate standardization activities is that only international standards can create global markets. Chinese companies are competing globally, but have seldom participated in global standardization activities. On one hand, they are not aware of the importance of global standards and on the other hand, they are not familiar with the effect of the global standardization process and feedback on the development and technology of Chinese companies.

There are some activities in China in the past, but main companies are those big companies, and the focuses are in meeting the standards such as ISO, UL, QS and customer standards. National standards, industry standards, association standards systems in Chinese printed circuit industry need long and continuous hard work. (Figure 13.)

Figure 13 - An Example of Industry Standard Developed by China Printed Circuit Association

There is good news that many Chinese medium-sized private companies take standardization as an opportunity to improve their competitive strength, to reach international standards and participate in global competition. These are the driving forces behind the industry development.

But it is not the time to be over excited. Chinese printed circuit industry standardization efforts will continue, by learning from the experiences of other country, getting help from related industry association and fostering a generation of Chinese standardization expertise.

Global and domestic competition for resources, such as the power, water supply for printed circuit industry: There are a lot of reports about the shortage of power and water supply for a period of time in China that is important to printed circuit manufacturing. Chinese government has made efforts to increase the supply capability to reduce the impact to minimum level. As in the coming years, the industry is in rapid development period and the sufficient supply is one of the most important factors to be addressed.

Material price increase and printed circuit board price drop have put the PCB producers in difficult situation: In 2003, the main materials for printed circuit fabrication such as copper clad laminate, copper foil and fiberglass cloth etc. prices kept growing. In 2004, the material price increase is even faster. In the same time, the printed circuit board price is still at a low level and shows no sign of significant increase. This puts very high pressure on the printed circuit producers. Throughout of year 2004, international oil prices keep breaking price records and the impact of it on epoxy resin cost or other material costs have not been clearly addressed. The Chinese printed circuit material supply base is very weak and the impacts of international market are significant. Building of a healthy material supply base is still a challenge.

Trade and tariff, non-tariff barriers and currency issue have more or less impacts on the industry as Chinese enterprises are operating globally, or dealing with international markets. For example, a number of Chinese producers are not familiar with the foreign trade, regulations or doing business in overseas market. They wish to establish partner ship with foreign companies or producers to development in target markets.

Facing the competitive global purchasing trends, Chinese printed circuits suppliers have to upgrade their technology facility, restructure their process and re-consider their strategies to meet the new requirement of customers.

Chinese electronics and printed circuit industry are already in the global competition. To win in competitive market, the international OEMs and EMS companies are pushing constantly for cost reduction. There are four trends of procurement. First, increase volume to negotiate better price by grouping different departments or locations, buying from one supplier and standardizing product etc. Secondly, reduce the number of suppliers. EMS companies like Solectron and Flextronics etc benefit from this strategy. They also have higher requirements for total cost, reliability, on time delivery, flexibility and low inventory risk etc. Thirdly, using IT systems such as on line biding to gain lower price and source and evaluate suppliers. Fourthly, establish international procurement centers in China to conduct direct purchasing from manufacturers. These trends are clear in China.

Chinese printed circuit purchasing is a close part of the global supply chain. When global purchasing is focusing on a low cost region like China, it is the best opportunity for Chinese suppliers to develop and improve and catch up to the global standards in a short period of time.

Environment Protection and Lead Free Green Production Increase the Cost

With the publication of the EU directives of ROHS and WEEE as well as the drive to eliminate or reduce the environmentally hazardous substances in electronic products, the lead-free manufacture of electronics products has become un-negotiated and imperative. As an important part of electronics products, the lead-free PCB is also imperative globally.

In the past, environment protection seemed to not be very strict in China. The Chinese companies were not paying enough importance to the impact of lead-free or related environment protection regulations. It is important to study the impacts of the process technology, cost increase, standards and tests as well as the non-trade barriers. The industry is not preparing for the replacement technology, material and equipment etc.

Summary

Today the development of Chinese printed circuit industry is driven by globalization and in the same time is affected substantially by global trend and competition. The Chinese electronics information industry is in high-speed development stage and will drive the development of the printed circuit industry in China as the domestic electronics market and export are growing. Although there are still a lot of challenges faced today by the industry, it is believed that these challenges will be addressed and finally will be turned to opportunities by the industry during the process of evolution.

References

1. Source: MII
2. Source: CPCA Information Center