

Restructure of Chinese Ferroalloy Industry

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Mr. Chairman, ladies and gentlemen,

It is a great honor to make this presentation in the 9th International Ferroalloys Congress to introduce the development of the re-structure of Chinese ferroalloy industry.

Chinese ferroalloys industry has been developed with the growth of national iron and steel industry. Since 80's the growth rate of Chinese ferroalloy industry exceeded the development of steel industry.

Ferroalloy production has been expanded un-proportionally, which makes ferroalloy production be over the demand of the market. The construction of backward facilities has brought Chinese ferroalloy industry many difficulties in production efficiency, enterprise management and market competition.

In order to get rid of the difficult situation the authorities accepted the proposal made by the Chinese Ferroalloy Industry Association and issued a document of "Proposal on Acceleration of Restructure of Chinese Ferroalloy Industry". The document required to eliminate backward facilities, to

terminate the expansion of production capacity, to control pollution, to control the overall production, to restructure product types, to innovate the production facilities and to reconstruct the unreasonable, the backward and the scattered production structure. The restructure of Chinese ferroalloys industry has been focused on the innovation of production facilities, the quality control, the improvement of efficiency, the improvement of resource and energy consumption and the environment protection. Through arduous efforts in 3 years the progress of restructure in the initial stage has been arrived.

1. CONTROL OF OVERALL PRODUCTION AND RESTRUCTURE OF PRODUCTS

In 1995 Chinese ferroalloy production capacity exceeded 5 million tons. Since 1995 Chinese ferroalloys production has been around 4 million tons and the export has been around 1 million tons, ranked number one ferroalloy production and export country in the world (See Table 1).

Table 1 Ferroalloys Production and Export in China

Unit: kt

Year	1990	1991	1992	1993	1994
Production	2459.6	2463.5	2657.5	2963.6	3361.5
Export	448.4	622.4	623.1	874.0	927.0
Year	1995	1996	1997	1998	1999
Production	4329.0	4188.4	4035.4	3547.8*	3814.3*
Export	1475.4	1036.3	1062.8	960.0	963.9

However, Chinese ferroalloy production has exceeded the demand of the market, especially those bulk ferroalloy products. According to the statistics in 1997 excess production of ferrosilicon, ferromanganese and siliconmanganese, blast furnace ferromanganese and high carbon ferrochrome is 30%, 40%, 20% and 50% respectively. The surplus production has resulted in production cutting in many plants. Many furnaces are idle or have been partly idle for years.

Now Chinese ferroalloy products cover almost all the required ferroalloys, totaling more than 60 varieties and 300 grades. However, the product structure is not rational yet. The proportions of ferrosilicon and ferromanganese production are still too large. While the proportion of special ferroalloy production is relatively less than the optimized demand of steel production.

The restructure requires that the annual ferroalloy production volume be controlled within 4 million tons. This figure will keep the balance of demand and production. The production ratio of ferrosilicon, ferromanganese and special ferroalloys will be changed from the present 2:3:1 to the ratio of 2:2:1. Low sulfur and low phosphorus refined ferroalloys are to be developed. It is also expected to develop the ferroalloys with particular elements rich in our country, ferroalloy powders and composite ferroalloys.

2. ELIMINATION OF BACKWARD FACILITIES AND ACCELERATION OF TECHNOLOGY INNOVATION

The statistics of the production ratio of various electric and blast furnace ratings is shown in Tables 2 and 3.

Table 2 Production ratio of various electric furnaces, %

< 1.8MVA	>1.8-2.7MVA	>2.7-3.2MVA	>3.2-6.3MVA	> 6.3MVA	Refining furnaces	Other Furnaces	Total
38.35	2.89	10.34	15.94	25.6	0.92	5.46	100

Table 3 Production ratio of blast furnaces, %

13-33m ³	40-60 m ³	75-82 m ³	100 m ³	120 m ³	255 m ³	300 m ³	Total
5.53	5.67	14.8	39.5	2.79	17.77	13.94	100

Now the production of electric furnaces less than 3200kVA takes a share of 53.08% of total EF production, and 44.64 % of the overall production. The production of the blast furnaces of less than 100 m³ takes a share of 26% of total blast furnace production, and 3.6%of the overall ferroalloy production capacity. Those small electric furnaces, small blast furnaces and other small furnaces are backward in production technology making serious pollution, resulting in poor product quality, inefficient energy utilization and resource losses. The existence of too many small furnaces is disrupting ferroalloy market. The industry restructure requires that the elimination of furnaces be carried out in 2 stages. By the end of 2000 the furnaces of less than 1800 kVA for bulk ferroalloys, the FeMn blast furnaces less than 100 m³, FeTi smelting furnaces less than 5t/ tap and the reverberatory furnaces for roasting process should be eliminated. By the end of 2001 the furnaces less than 3200 kVA for bulk ferroalloys and the refining furnaces and DC

furnaces less than 3000 kVA should be eliminated.

The progress of large, closed and automatic electric furnaces should be realized. The capacity ratio of submerged arc furnace with the capacity more than 9MA is to be increased from the present 25.6% to 42.4% after the restructure. The restructure proposal encourages the enterprises to develop the new process, like the process of ladle refining and the process of utilization of low-grade manganese resource. Casting process, crushing and sizing process will also be improved. The aim is to improve the process facilities, to increase production efficiency, to double the productivity and to decrease overall energy consumption by 14%.

3. POLLUTION CONTROL AND ENVIRONMENT IMPROVEMENT

Furnace fume pollution of the industry in China is a serious problem since most of the ore smelting furnaces in China are open or

semi-open furnaces. Among the furnaces of over 5 MVA, around 55% in the state owned key enterprises and 25% in local plants, are equipped with fume cleaning facilities. Regarding to the furnace of less than 5 MVA, only a small portion in the key enterprises are equipped with fume cleaning systems, and only few of them in local plants have pollution abatement systems.

According to the requirement of Environment Protection by the Chinese State Departments, the Industry Restructure requires that pollution control should be done within a specified time. The furnace fume should be cleaned by dry or wet processes.

The industrial wastewater and waste slag should also be treated or be reused. The discharge of furnace gas and wastewater should conform to the State Environment Standard. The environment in the plant area should be much improved.

4. RESTRUCTURING FERROALLOY ENTERPRISES, IMPROVING COMPETITION CAPABILITY

The preliminary investigation shows that there are 18 State owned key enterprises, the major large ferroalloy enterprises, 54 local key enterprises and 2000 small local plants. In 1980 the state-owned key enterprises produced 67.6% of the overall ferroalloys.

In 1990 it became 46.9%, and in 1997 it fell to 40%. The existence of too many small enterprises makes the market competition chaos. It also exerts bad influence on the import of raw materials and export of ferroalloys.

The Industry restructure will eliminate numerous small enterprises, which cause environment pollution and waste of energy and resources. On the other hand a number of ferroalloys enterprise groups will be organized based on the principle of superiority combination of resource, energy, personnel, technology and administration. It will thoroughly resolve the unreasonable industry structure and reduce the number of scattered and backward enterprises.

It is also required to strengthen the enterprises administration aiming to intensify the management. It is further required to carry out ISO 9000 series in the administration in order to improve the overall enterprise quality and to strengthen the competition capability.

5. TO STRENGTHEN EXPORT ADMINISTRATION AND TO MEET THE NEW CHALLENGE

China is to enter WTO this year. It is a chance for the development of Chinese ferroalloy industry and it is also a new

challenge. China lacks of chrome ore resource and rich manganese ore resource. A great amount of chrome and manganese ores

for ferroalloy production has been imported. Table 4 shows the import volume in recent years.

Table 4 Statistics of import of chrome ore and manganese ore, kt

Year	1996	1997	1998	1999
Chrome ore	764.4	894.0	715.4	816.2
Mn ore	1505.2	1316.7	1079.1	1056.0

Because of lack of strong administration in export of ferroalloys and in import of chrome ore and Mn ore the benefit of enterprises and the reputation of the country have been injured.

It is essential to strengthen the administration of the domestic market and to carry out the self-discipline of product prices and quality. A fair, open and legal competition system will therefore be established. On the aspect of the international trade it is necessary to coordinate the export and the import on the international trade rules and regulations under the support of the authorities. Therefore it is expected to increase international cooperation and to reduce trade clashes and antidumping claims.

6. OPTIMIZATION OF CHINESE FERROALLOY INDUSTRY DISTRIBUTION

Chinese ferroalloy industry has been developed at a relatively high rate in the past

20 years. Now, Chinese ferrosilicon industry shifted from the east part toward the western part of the country, where energy is cheap. The production of ferromanganese shifted toward the areas of manganese ore resource. The present ferrochrome producers concentrate in the east and in the north-east of China. Ferromanganese producers concentrate in Central China and in the south-west of China. Ferrosilicon producers concentrate in the west and in the south-west of China. The special ferroalloy and complex ferroalloy are mainly produced in the state owned key enterprises in the coast areas.

Ferroalloy industry was initially developed in the east and the north-east of China, where Jilin Ferroalloys Corp., Jinzhou Ferroalloys Corp., Shanghai Shenjia Ferroalloys Company and Hengshan Ferroalloy Company and many other state-owned key producers are located. The advantage of these enterprises is that they own strong technical teams and the plants are close to ports and steel producers. These

producers had switched their ferrosilicon production to ferrochrome and other special alloys.

It is sure that the restructure will promote the development of chrome and special ferroalloy production in these plants.

In Central China and the south-west of China, which are relatively rich in manganese deposits, ferromanganese manufacture had been rapidly developed in recent years. Blast furnaces for ferromanganese in large scale were erected in manganese mines. Big ferrosilicon and SiMn electric furnaces were introduced from the Western World or engineered by Chinese manufacturers in Hunan, Zunyi, Emei Ferroalloys. Many local enterprises also increased their ferromanganese production. Now, ferromanganese output in these areas covers almost 75% of the overall ferromanganese production of China. It is expected that the output of FeMn in these areas be increased furthermore.

In the north-west and the south-west of China, which are rich in coke and quartz resources and hydroelectric power, silicon

metal and ferrosilicon production had been developed rapidly. Xibei and Zunyi Ferroalloys introduced Demag silicon furnaces. Many local plants were developed rapidly and they are transforming the small furnaces to large ones. At present ferrosilicon output in these areas is around 75% of the overall ferrosilicon production of China. The development tendency will continue for some years.

CONCLUSION

The Chinese government has paid great attention to the ferroalloy industry restructure and has supported its implementation. The local governments are organizing the restructure. The task of the Chinese Ferroalloy Industry Association is to assist the governments implementing and monitoring the restructure. It is anticipated that the target of industry restructure will be realized through our constant efforts in the coming years. In the new century the Chinese ferroalloy industry will continue its development. The industry will make new contribution to the development of the world industry.