

# Review and Prospect of China EMM Industry

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# EMM Industry's Development Situation of China during the 11<sup>th</sup> "Five-Year" Period

- I . Major Achievements:

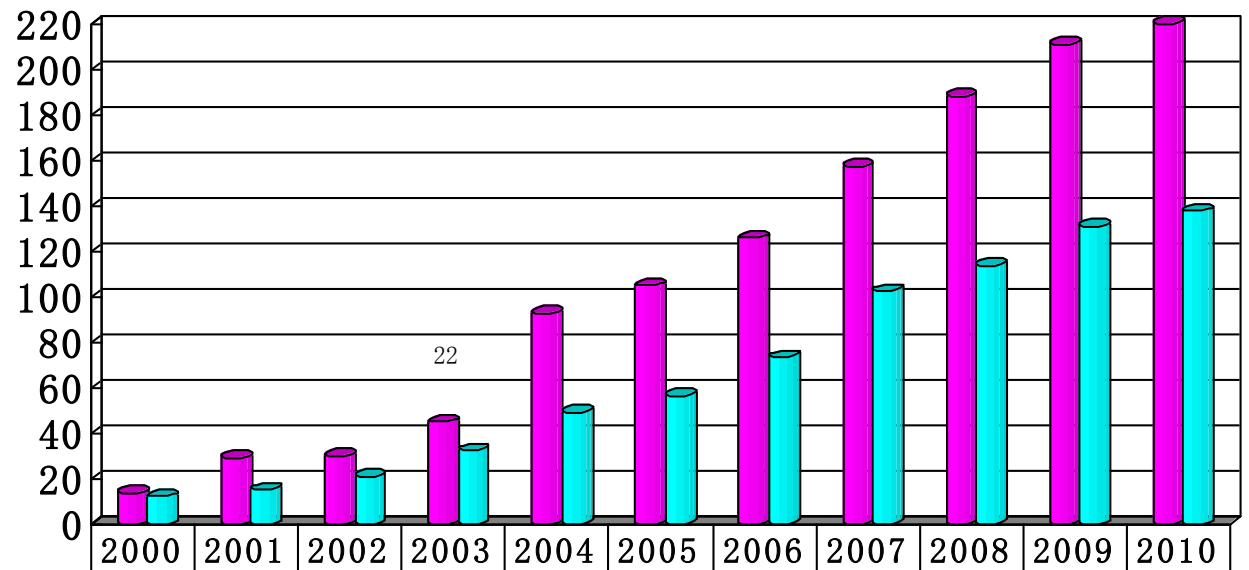
1. Capacity and output had been largely improved

During the 11<sup>th</sup> "five-year" period, EMM industry continuous rapid growth, capacity had been increased from 1.04 million tons to 2.2 million tons, the rate of growth was above 100 percent, even without accounting 0.3 million tons projects in construction.

Output had been increased to 1.28 million t/y in 2010, which is 1.44 times larger than the output of 2005 – 0.566 million t/y.

# Capacity and output of China EMM Industry

■ capacity (10 thousand tons)    ■ output (10 thousand tons)

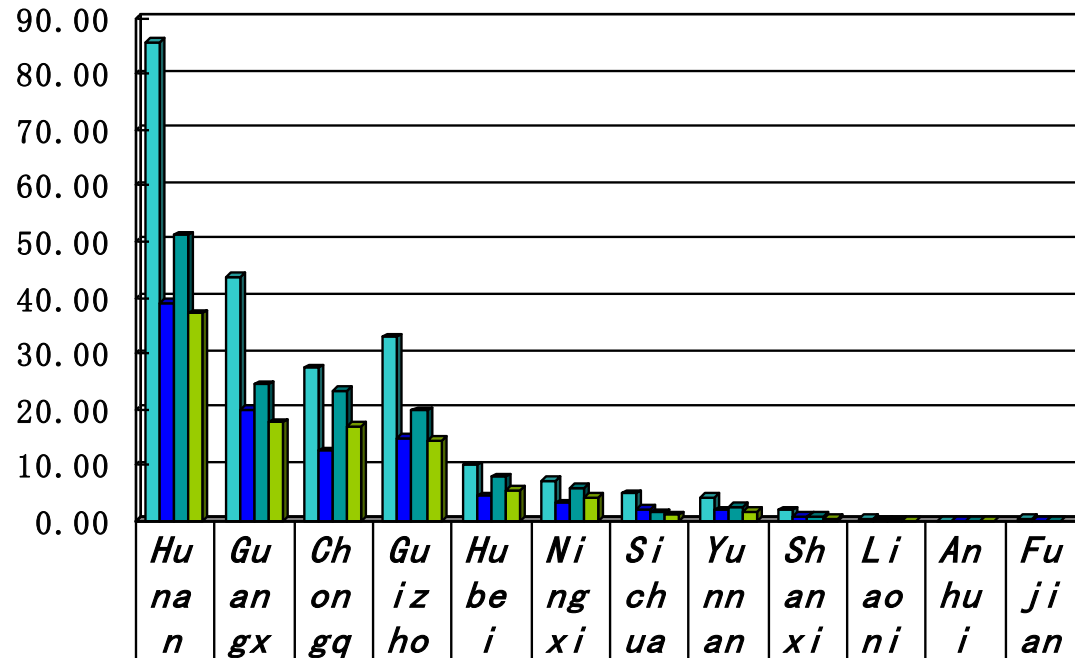


■ capacity (10 thousand tons)	14	29	30	45	92.5	104.9	125.8	157	187.9	211	220
■ output (10 thousand tons)	12.3	15.17	21.2	32.5	49.43	56.64	73.26	102.4	113.9	130.7	137.6

※ Capacity of 2006 include 71.4 thousand tons capacity which was suspended

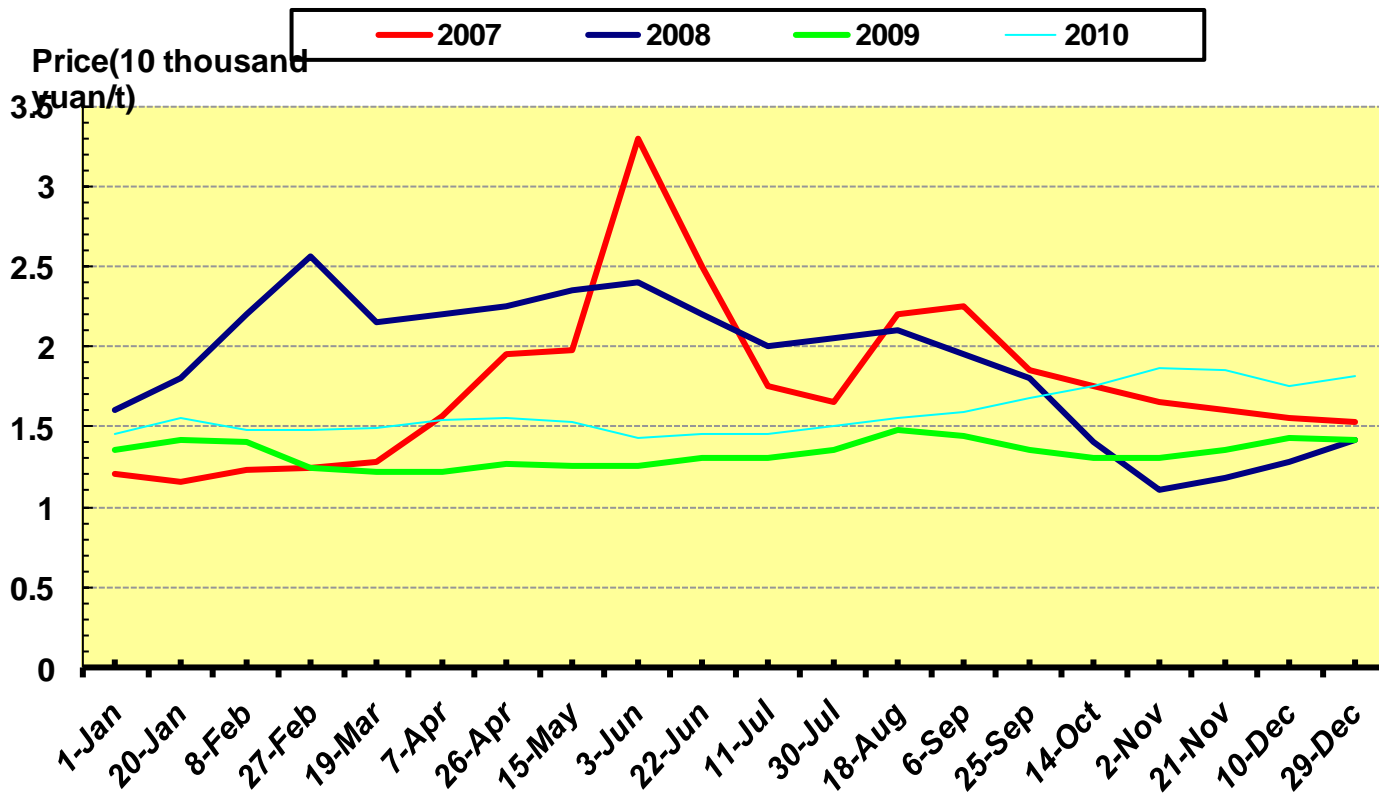
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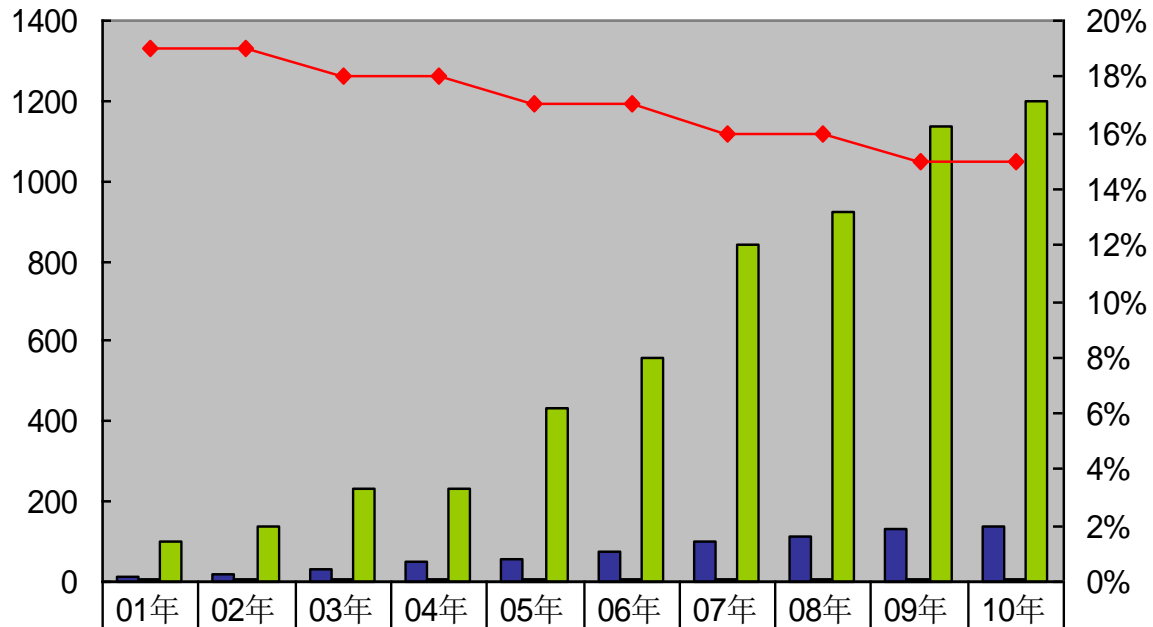
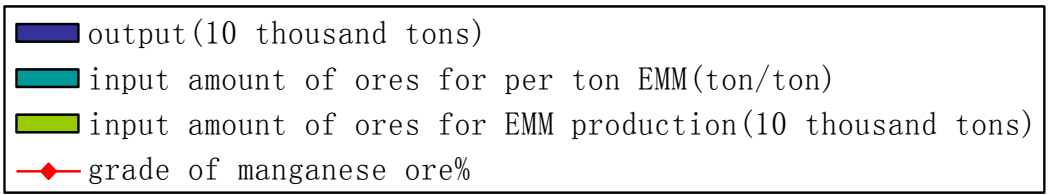
# EMM industry pattern of China in 2010



	<i>Hu nan</i>	<i>Gu an gx</i>	<i>Ch on gq</i>	<i>Gu iz ho</i>	<i>Hu be i</i>	<i>Ni ng xi</i>	<i>Si ch ua</i>	<i>Yu nn an</i>	<i>Sh an xi</i>	<i>Li ao ni</i>	<i>An hu i</i>	<i>Fu ji an</i>
<span style="color: cyan;">■</span> <i>capacity (10 thousand tons/year)</i>	85.70	43.80	27.50	32.95	10.00	7.20	5.00	4.40	2.00	0.60	0.05	0.40
<span style="color: blue;">■</span> <i>proportion</i>	38.	19.	12.	14.	4.5	3.2	2.2	2.0	0.9	0.2	0.0	0.1
<span style="color: teal;">■</span> <i>output (10 thousand tons/year)</i>	51	24	24	20	7.9	6.1	1.5	2.6	0.8	0.3	0	0
<span style="color: green;">■</span> <i>proportion</i>	37	18	17	14	5.7	4.4	1.1	1.9	0.6	0.2	0	

# EMM price chart by year





<span style="color: blue;">■</span> output(10 thousand tons)	15.2	21.2	32.5	49.45	56.64	73.26	102.4	113.8	130.7	138.2
<span style="color: teal;">■</span> input amount of ores for per ton EMM(ton/ton)	6.57	6.57	7.12	7.12	7.63	7.63	8.22	8.22	8.7	8.7
<span style="color: lime;">■</span> input amount of ores for EMM production(10 thousand tons)	99.67	139.2	231.4	231.4	432.2	558.9	841.7	925.4	1137	1202
<span style="color: red;">◆</span> grade of manganese ore%	19%	19%	18%	18%	17%	17%	16%	16%	15%	15%

- 2, equipment performance and material property had been constantly improved.
- Major equipments had been upgraded to Large-size during 11<sup>th</sup> “five-year” period. For example: capacity of single combined bath had exceed 350 cubic meter; filter area of single pressure filtration had exceed 500 square meter; the negative plate which size is 400x500mm used less in electro bath; number of plates in single bath raised from 38 to the interval of 48 to 68; production line which capacity is 5000 t/y have been popularized, some companies even have ten thousand tons production line; new material be put into service, such as positive and negative plate, offer support for energy saving.

- **3 Significant improvement in major production index**
- during the 11th "five-year" period, economic index of China EMM production technology had been improved significantly because of improvements in material, equipment, and optimization of process parameters. Compare with the 10th "five-year" period, average direct current power consumption off 300KWh/t to 6400KWh/t, the lowest DC power consumption down to 5800KWh/t, and the gross electricity consumption reduce from 7000KWh/t to 6700KWh/t. Metal recovery rate of manganoous carbonate ore which manganese grade of concentrate is 18% can be over 82%.

- **4Less environmental pollution**
- environmental governance started since 2007 had revolutionized the state of high pollution. all waste slag be stored in anti-seepage tailing pond which is impermeable. wastewater be reused after central treatment, waste gas given off by combined bath be exhausted after leaching. Some company achieve production without selenium and chromium, completely avoid pollution generated by the two elements. New enterprises fulfilled three goals: split flow of clean and waste water, ground(except afforestation area) hardened up, all electrobaths and pipelines are made of RPP material. Phenomena of gas and water leakage are greatly reduced in workshop.

- Industry concentration ratio increased significantly
- only two enterprises' capacity was above 30 thousand tons per year during the 10th "five-year" period, and the largest one's capacity is only 50 thousand tons per year. But during the 11th "five-year" period, the number of enterprises whose capacity is above 30 thousand tons per year is 11, and the largest one's scale reach 120 thousand tons per year. In 2010, six enterprises' output was exceed 30 thousand tons, and CITIC Dameng's output had reached 100 thousand tons. The government of Xiangxi autonomous prefecture of Hunan province had decided to enhance the concentration ratio by reshuffle of the enterprises and reallocate resources, EMM industry concentration ratio of our national would increased significantly if the decision could be finished.

- 6. Breakthrough on reduction process of oxide ore

Manganese oxide ore insoluble in sulphuric acid unless it has been reduced, it drives up the cost of investment and production.

Therefore, most domestic EMM enterprises use manganous carbonate ore in production. But the price of manganous carbonate ore keeping surging and the concentrate grade is dwindling because of resource shrinkage. The purchase price of manganous carbonate ore (16% of Mn units) have already reach 60 yuan/mtu, but the price of manganese oxide ore (20% of Mn units) is only 25 yuan/mtu which is nearly half of former's price.

- Technician have developed new reduction technique which is suitable to for manganese ore of different regions or grade. This Technique creates necessary condition to put importing rich manganese oxide ore and lean manganese oxide ore of China into use on a large scale during 12th "five-year" period. The tightening supplies of manganous carbonate ore will be easing, and national EMM industrial pattern will be adjustment.
- There will be a lot of works to popularize the technique and make it perfect.

- 7, Breakthrough on automatic detect and mechanized testing
- EMM enterprises development in a extensive mode for a long time, exists matters such as scarcity plant conditions, poor working conditions and intensive workloads. This situation will be improved during the 12th "five-year" period, as national enterprises have already got success the test of broad leafing machine and broad washing machine. These machines intergrate processes such as broad carrying, washing, leafing and passivating into a single process. The last problem is how to make these machines perfect and popularized.

- 8. Complete range of products and increased quality
- our enterprises have been able to produce all kinds of electrolytic manganese chips
- low-sulfur, low-phosphorus, low-carbon high-purity manganese chip, which is mainly used in iron and steel industry;
- low-silicate manganese chip, which is adequate for manganese-zinc ferrite;
- low-selenium, selenium-free, selenium-containing, nitrogen-bearing, dehydrogenation chip and etc., can satisfy various demands of different industrial departments.

- **9, domestic sale largely increased**
- during 10th "five-year" period, output increased from 123 thousand tons of year 2000 to 566.4 thousand tons of 2005, and volume of exports also increased from 92.9 thousand tons to 284 thousand tons. The volume of exports is above 50% of total output. The output increased from 730 thousand tons to 1382 thousand tons in 11th "five-year" period, but the volume of exports decreased from 310 thousand tons of year 2007 to 220 thousand tons of year 2010, which means China EMM industry switch from "export sale type" to "domestic sale type", 80% EMM are used for internal economic development, this is a significant change.

- major problems
- 1.capacity growing too fast
- 2.material supply slightly tight
- 3.concentration ratio is on the low side
- 4.how to eliminate backward production capacity
- 5.how to accelerate the adoption of new techniques, new equipments and new material.

# Prospect of China EMM industry in the 12th "five-year" period

- The developing direction and goal of China EMM industry during 12th "five-year" period:
- Quicken the transformation of means of development;
- Adjustment the industrial structure and pattern;
- Achieve technical reconstruction and increase the degree of industrial concentration;
- Ease the resources shortage by using two kinds of ores(manganese oxide ore and manganous carbonate ore) of home and abroad;
- Achieve whole process mechanization, save energy and reduce the cost effectively, cleaner production basically.

- The longtime situation of blind expansion of China EMM industry might be changed in the 12th "five-year" period .
- Government might issue drastic measures to suppress resource-related industry of high energy-consuming;
- Eliminate backward production capacity by strengthen the effort of entry condition, product line whose capacity is below 4 thousand tons per year should be closed down in this year, according to the rules publiced by ministry of industry and information technology;
- Shortage of resources would make investment behavior more discreet;
- Subject to the restriction of keep or decrease the total amount of pollutats discharged, local government would allow enterprises to upgrade

- 2. Most enterprises will upgrade equipments
- New technics, equipments and materials with the function of energy saving, cost reducing and environment protective will be popularized rapidly, techno-economic indicators will reach a new height.
- Entry condition will be carried out fully
- Speed of technological change during 11th "five-year" period is highest than ever before, research on energy-saving and cost-reducing techniques, equipments and Materials have got success, such as crusher, flour mill, dasher, electrobath, positive plate, negative plate, broad leafing machine, broad washing machine, magnetic extractor, high-pressure diaphragm filter, technology of subsequent process mechanization, slag reuse and reduction. These results of research will be popularized quickly and improve the major techno-economic indicators of EMM industry. Expectedly, DC power consumption will reduce to 5600 KWh/t, metal recovery rate will increase 2% or 3%, and the labor capacity will largely improved.

- 3 More manganese oxide ores will be used for EMM production, the phase in which oxide and carbonate ores of home and abroad used for production will emerge, but ore price will stay at high position.
- however, as reduction process of oxide ore get breakthrough, the output of EMM that product by oxide ores will increase, especially the increase in Guangxi, Yunnan and Hunan will be prominent. More rich manganese oxide ore of abroad will be used for EMM producing as demand of oxide ores increase.
- Domestic price won't decline to a great extent, although there will be fluctuation in prices, Because large-sized manganese mineral resources of abroad monopolized by few mining industry groups, and the ores supply of domestic is far cry from meeting demands.

- 4, Some sizeable enterprises or groups will emerge, industrial concentration will increase remarkably, and competition will be more fierce.
- There are only one enterprise's output was above 100 thousand tons and six enterprises' output was above 30 thousand tons in 2010, but the number of enterprises whose output is above 200 thousand tons per year will be 3, and 20 enterprises' output will exceed 30 thousand tons per year during the 12th "five-year" period. Enterprises whose capacity less than 5 thousand tons per year will be phased out, the concentration ratio will increase significantly. 4 provinces and cities(Hunan, Guangxi, Guizhou, Chongqin) will be main producing regions as before.

- 5, Capacity of cleaner producing will be increased greatly
- Enterprises had improved their cleaner production ability by effort at the 11th "five-year" period, but some research projects hasn't be finished, which is important for the goal of accomplish cleaner producing completely. Some of these projects will be finished or popularized by the middle of the 12th "five-year" period. The production situation of our enterprises will be completely changed while these projects be finished. It can be sure that capacity of cleaner producing will be increased greatly.

- 6, EMM price will rise steadily
- Wider fluctuation of EMM price was stunting the development of EMM industry and obstructing management of enterprises during the 11th "five-year" period. Conversely, the price will be stable during the 12th "five-year" period as increasing of concentration ratio, eliminating of backward production capability, improving of self-regulation ability.
- EMM price will rise and fluctuate between 19.5 thousand to 21 thousand yuan per ton because of cost increase due to the rise of electricity price, materials prices, labour and management cost.

- export situation will show a trend of high to low
- The export will increase year by year in earlier stage of the 12th "five-year" period, and it will reduce after commissioning of EMM projects of Gabon, Ukraine and other countries in 2013.
- differences between export policies of EMM products will be ironed out and export policies of EMM products will be unified.

The end