

China's dominance of the electrolytic manganese metal industry

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IMnI EPD Conference

Guangzhou

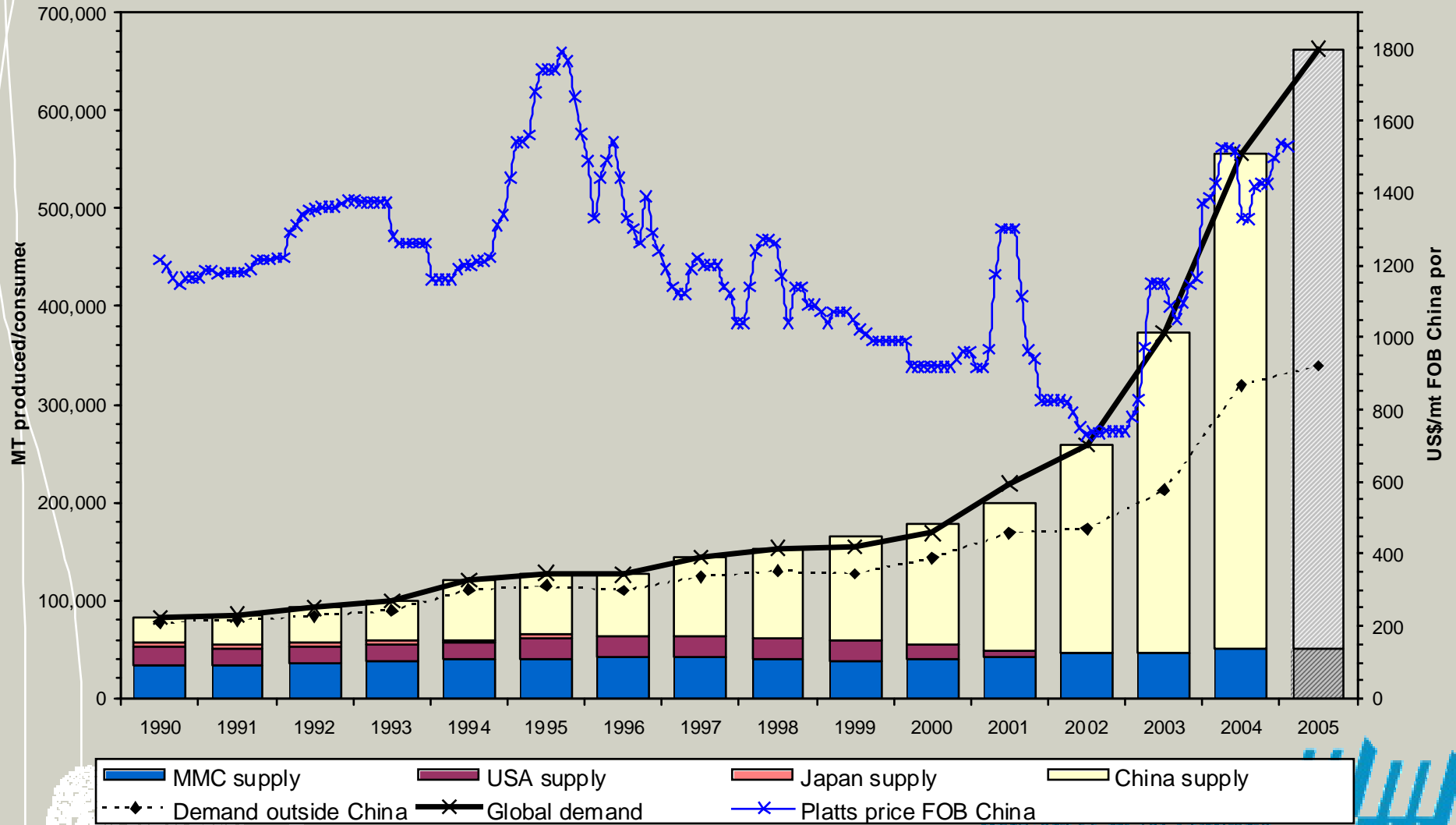
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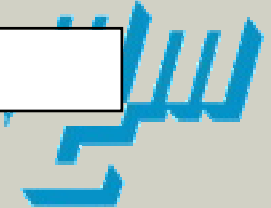
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World Supply / Demand of EMM, price f.o.b. China



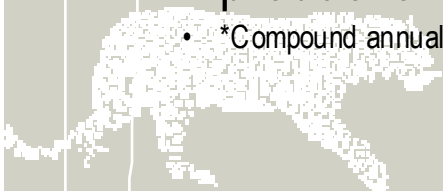
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Traditional Applications of EMM not main reason for growth

- The second largest use of EMM is for alloying of aluminium can sheet, which has experienced zero to modest growth in recent years
- In steel, stainless steel and special steel EMM is mostly used as a low carbon addition for trimming / alloying
- CAGR* for EMM from 2001 to 2004
 - Demand inside China - 80% *(Steel output in China 23%)*
 - Exports leaving China - 31% *(Steel output rest of world 4%)*
 - Total world production - 41% *(Steel output total 7%)*
- Growth outside China mostly due to increased substitution of ferromanganese alloys by EMM due to price attractiveness in 2004
- Steel-making production constraints in periods of high capacity utilisation favour the use of EMM
- Main engine driving EMM demand is the rapid growth inside China of production and consumption of 200-series Stainless Steel

• *Compound annual growth rate



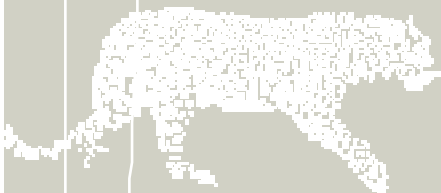
Typical applications of 200-series SS in China



Bus stop shelters



Display boards



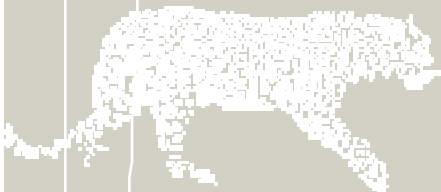
Typical applications of 200-series SS in China



Decorative tubes – taxi security



Structural tubes - handrails



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Typical applications of 200-series in China



House with stainless fittings



Wrist watch

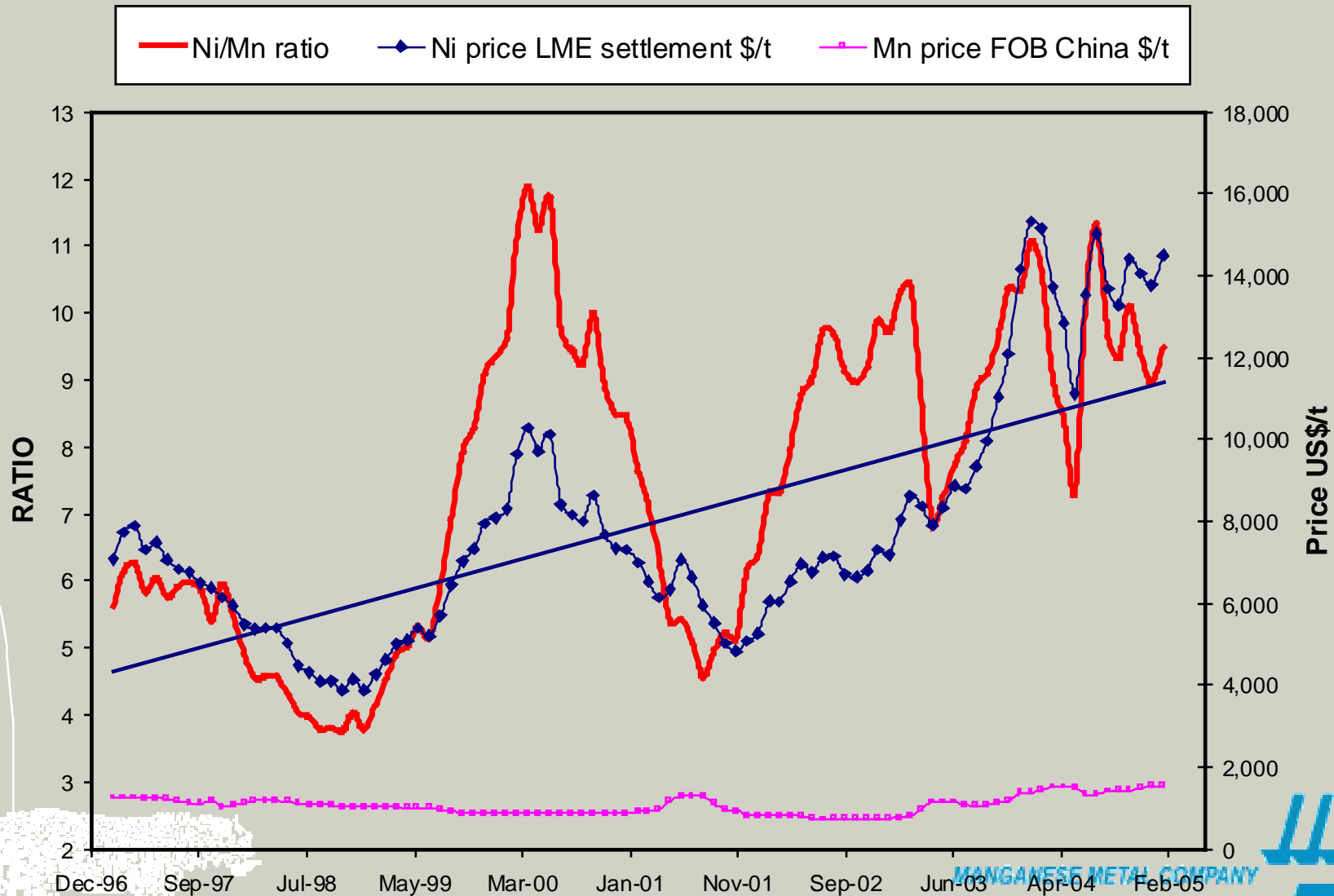


Utencils

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Ni / Mn price ratio supports growth of 200-series SS

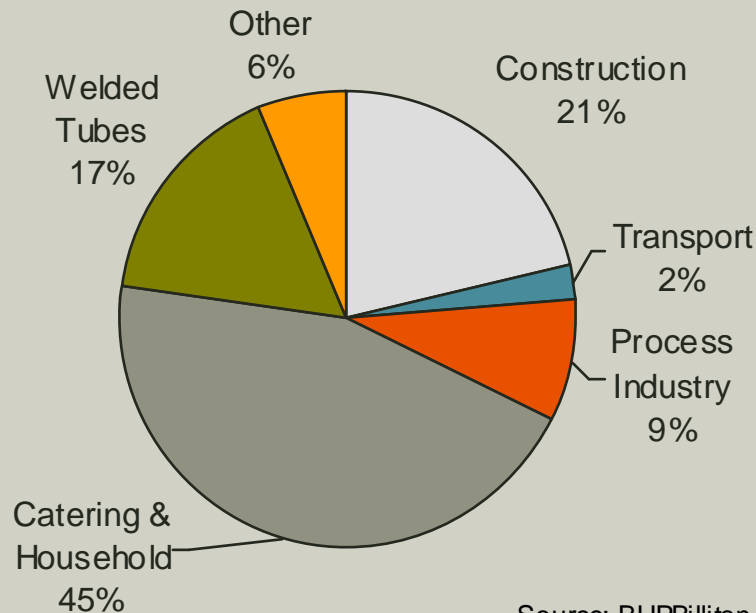


Source: MetalBulletin



China total stainless apparent consumption breakdown by use (first-use) – Cold rolled flat products only

2003 (2.9 Mt)



Source: BHPBilliton

CAGR (%)	Growth rates	2003-2013
	Construction	15%
	Transport	10%
	Process Industries	6%
	Catering and Hhld Prod.	9%
	Welded tubes	0%
	Other	6%
	Total	9%

- CAGR (03-13) for cold rolled flat products at 9% p.a.

- It is assumed that end-use (apparent consumption less material exported as manufactured products) has the same breakdown by use

- Approximately 25% of apparent consumption is exported as manufactured goods

- Catering & household plus the construction sector are sectors most suited to 200 series substitution

- Then roughly 60% of Chinese domestic consumption is potentially substitutable

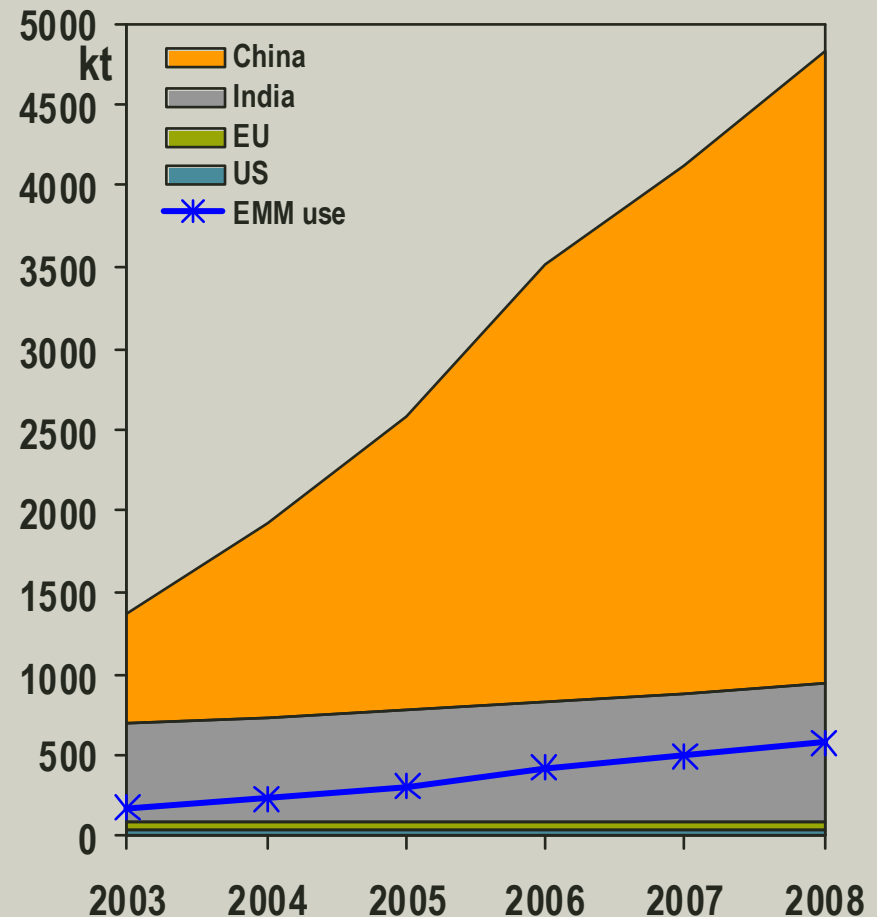
- Not all applications in these sectors are suited to using 200 series e.g. kitchen sinks

- Consumer goods are presently the most popular application

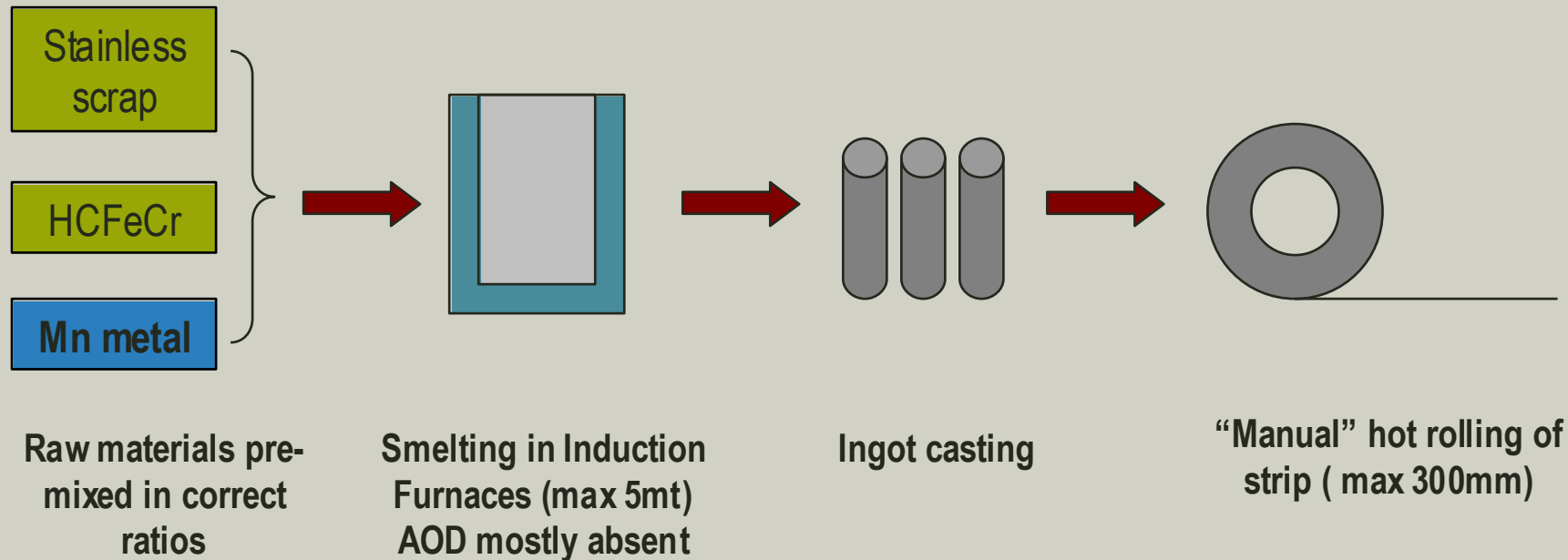


Stainless Steel Industry – 200-series growth

- 300-series being replaced by 200 & 400, mostly due to high Ni price and low Ni availability
- 200-series grows at 15 – 20% pa, mostly in China, India, Taiwan (developing countries)
- Applications for 200-series are consumer products such as cookware & cutlery, ornamental & structure tubes, structural automotive parts
- 200-series needs 12-14% Mn - will remain the single largest consumer of EMM, reaching 600kt in 2008
- China's production of 200-series does not make use of FeMn



200-series production technology in China requires EMM



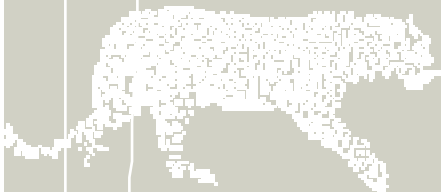
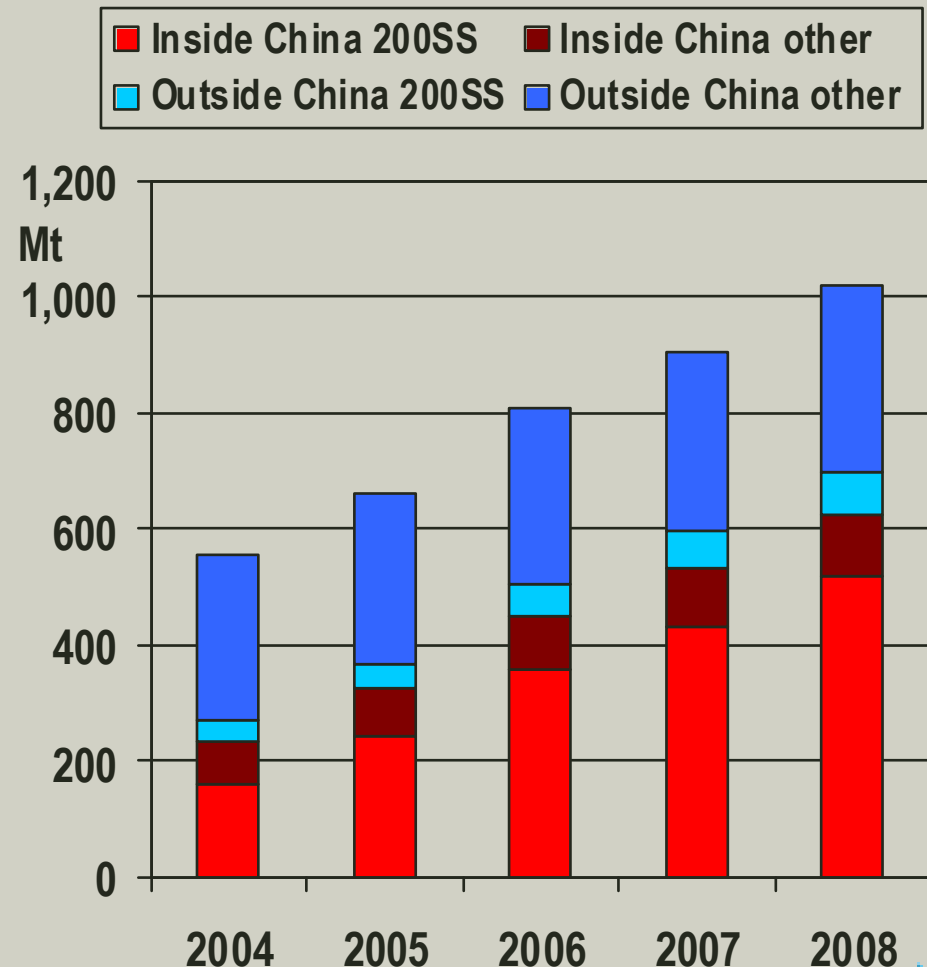
- Chinese producers of 200-series are mostly small, private enterprises
- Production technology based on Induction Furnaces without AOD means:
 - Limited variation in raw materials is allowed
 - EMM is used in preference to FeMn as dephosphorisation is problematic
 - Decarburisation cannot be done
- 3 large producers, located in Fuzhou (480ktpa capacity in 2004), Ningbo (240ktpa capacity in 2004) and Baotou (200ktpa capacity in 2005). Over 500 small producers, each typically 5 to 30ktpa capacity

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Forecast for future EMM demand

- 200-series SS contributes 32% of CAGR up to 2008
- Total CAGR up to 2008 is 16%
- China, India, Taiwan & Japan main production bases for 200-series SS
- China's consumption of EMM:
 - 42% of total in 2004
 - 61% of total in 2008
- 200-series consumption of EMM:
 - 35% of total in 2004
 - 58% of total in 2008



Conclusions

- The market for EMM has grown significantly – 44% growth in 2003, 49% in 2004.
- Demand is driven mainly by 200-series stainless steel production in Asia.
- Continued strong growth is anticipated for 200-series stainless steel driven by strong consumer demand for low cost alternatives.
- Ore availability is driving the relocation of Chinese plants.
- The fundamentals of production costs for EMM in China – the dominant supplier - have changed significantly and permanently.
- Price volatility will remain a function of capacity utilisation changes and power availability.

