

# 3<sup>rd</sup> NEW CALEDONIA NICKEL CONFERENCE

Developments in the World Stainless Steel Industry and the  
Implications for Nickel Consumption

28<sup>th</sup> March 2007



## Hatch Consulting

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- **Past Predictions**
- Current Situation:
  - China
  - Price Volatility
- Strategies:
  - Product Substitution
  - Producer Strategies
- Future Possibilities
- Conclusions

## In 2003 Hatch presented a nickel industry audience with these statements about future stainless industry structure and growth...

### Industry structure

- The stainless steel business will no longer be a niche activity for carbon steel producers, but a concentrated and growing materials business with its own industry dynamics
- Concentration has further to go as stainless producers drive down production costs at 2-3% p.a. and seek supplier power

### Growth

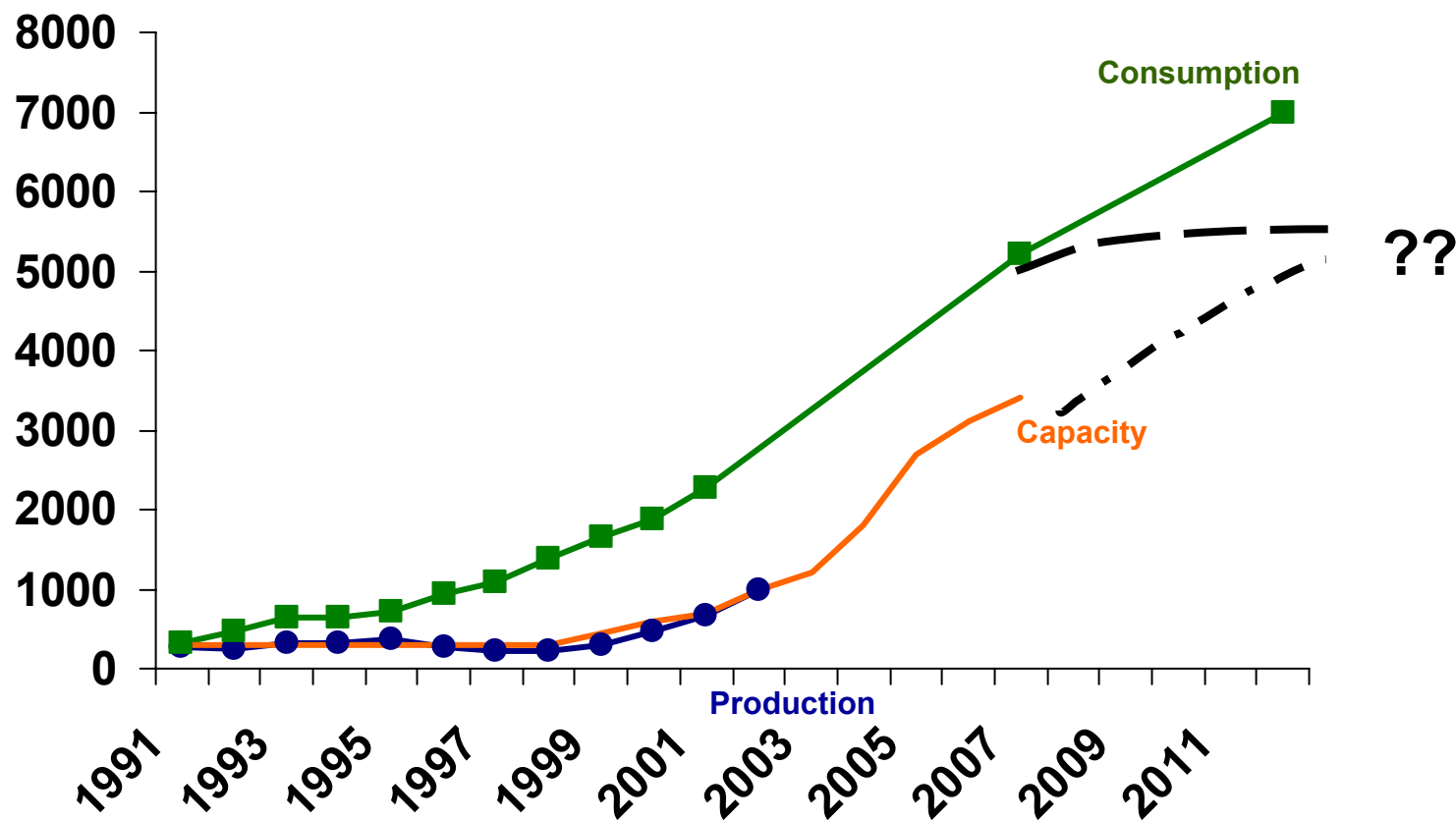
- Global stainless steel growth has been impressive in comparison with other materials – this trend is expected to continue and the gap to become wider
- Underpinned by robust economic growth, China will continue to be the epicentre of stainless steel demand growth for the next decade
- Despite already being the largest single market having overtaken Japan and the US, Chinese demand for stainless steel is still in its infancy
- Volume growth [in China] is occurring in hygiene and appearance related applications rather than technical knowledge intensive high margin applications

- Hatch Presentation to the 6<sup>th</sup> Annual World Nickel Congress September 2003

PAST PREDICTIONS

(the great driver of growth was China as it has been since the mid – 1990s)

2003 Forecast of the Supply and Demand Balance in PR  
China 1991 - 2012



- Hatch Presentation to the 6<sup>th</sup> Annual World Nickel Congress September 2003

## ...and the implications for the Nickel Industry

### Implications for the Nickel Industry

- The stainless steel industry will seek to improve margins, through exercising buyer power. This is a key driver for carbon steel companies
- Lower application intensity/commoditisation puts pressure on raw material suppliers as stainless steel becomes a cost and marketing game
- Structural changes in stainless steel demand and in the industry will require appropriate responses in the strategies of nickel participants

*- Hatch Presentation to the 6<sup>th</sup> Annual World Nickel Congress September 2006*

## So how did the nickel industry respond? By concentrating and gaining financial strength as global diversified miners acquired Ni specialists

2006 Estimated Finished Nickel Production by Company

Company	Tonnes (Ni)	Market share
Norilsk Nickel	290	22%
CVRD (incl Inco)	226	17%
BHP Billiton	148	11%
Xstrata (incl. Falconbridge)	116	9%
Jinchuan	102	8%
<b>Top 5</b>	<b>882</b>	<b>65%</b>
<b>Top 10</b>	<b>1080</b>	<b>80%</b>
<b>Total</b>	<b>1350</b>	<b>100%</b>

PAST PREDICTIONS

**Financial strength is needed to bring on new - especially laterite HPAL - projects that have scale and capital need several times the past industry norm**

**Potential New Nickel Projects**

Deposit	Tpa	Timing	Type	Deposit	Tpa	Timing	Type
<b>Sulphide - Greenfield Projects</b>				<b>Laterite - Greenfield Projects</b>			
Avebury - Allegiance Mining	8,000	2007	Concentrate	Berong - Toledo Mining	10,000	2007	Ore Production
Botswana Activox - LionOre Mining	23,000	2009/10	Metal	Caldag - European Nickel	21,000	2007	Heap leach
Enterprise - Albidon	8,000	2008	Concentrate	Ferronickel - Int. Mining/Alferon	10,000	2008/09	Smelting FeN
Flying Fox - Western Areas	12,000	2006/07	Concentrate	Goro - Inco	60,000	2008	HPAL
Nickel Rim South - Xstrata Nickel	12,000	2009	Concentrate	Onca-Puma-DVRD	57,000	2008	Smelting FeN
<b>Total</b>	<b>63,000</b>		<b>Total</b>	Ravensthorpe - BHP Billiton	45,000	2008	HPAL
<b>Brownfield Expansions</b>				Vermelho - CVRD	46,000	2009	HPAL
East Alpha - Consolidated Minerals	5,000	2007	Concentrate	<b>Total</b>	<b>249,000</b>		
Jilin - Jilin Huarong	15,000	2008/09	Matte	<b>Brownfield Expansions</b>			
Jinchang - Jinchuan	15,000	2007/08	Metal	Moa Bay / Sherritt	16,000	2007	HPAL
Maggie Hays - LionOre Mining	6,000	2007	Concentrate	PT Inco	19,000	2009	Smelting matte
Miitel South - Mincor Resources	2,000	2007	Concentrate	Rio Tuba II	10,000	2009	HPAL
Nkomati I - ARM/LionOre Mining	5,000	2007	Concentrate	<b>Total</b>	<b>45,000</b>		
Prospero - Jubilee Mines	8,000	2008	Concentrate	<b>Grand Total</b>			
Raglan - Xstrata Nickel	5,000	2008	Concentrate		<b>433,000</b>		
Tairnyr & Kola - Norilsk Nickel	15,000	2010/11	Metal				
<b>Total</b>	<b>76,000</b>						

**Also in 2003 Hatch challenged a nickel industry audience with these questions. One, at least for the moment, has been answered!**

- [Stainless steel] supply will grow faster than demand 2003-2005, shrinking the [Chinese] imports gap:
  - What will happen if demand falters, particularly after 2008?
  - Will the domestic supply in China over-spill and flood the global market?
  - In the next ten years? In the next 15 years?
- Will thin strip casting technology transform stainless steel industry dynamics and result in a paradigm shift in structure and margins?
- The real price of nickel has been stable for half a century. How long can this continue?

*- Hatch Presentation to the 6<sup>th</sup> Annual World Nickel Congress September 2003*

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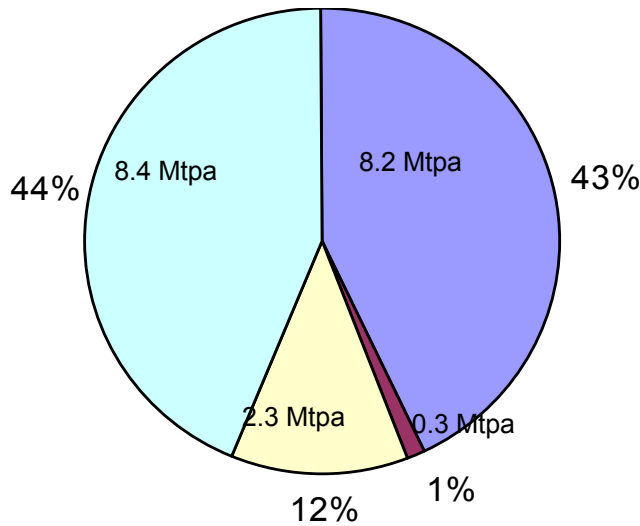
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- Past Predictions
- **Current Situation:**
  - **China**
  - **Price Volatility**
- Strategies:
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CURRENT SITUATION: CHINA

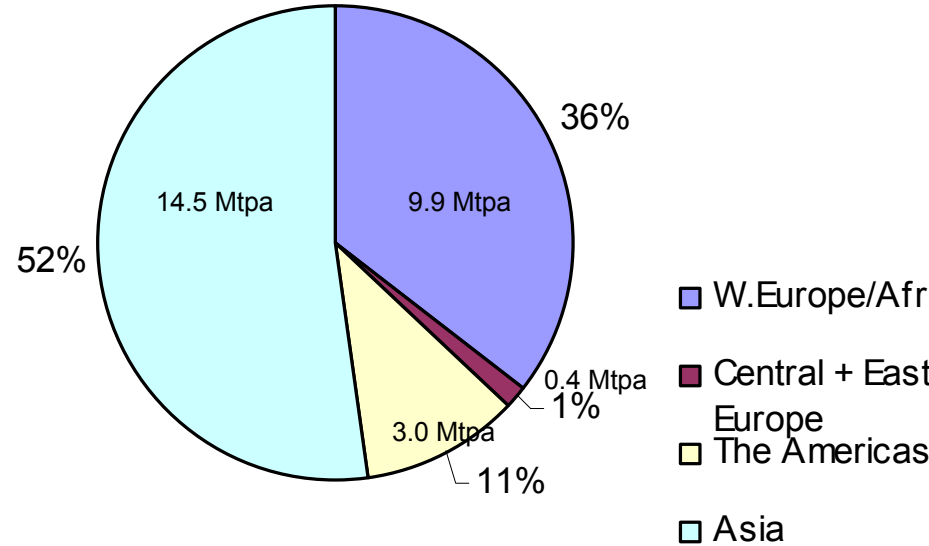
In five years stainless production volume has increased 45 % and over half the volume is now produced in Asia – including China, Japan and Korea

Regional Stainless Steel Production 2001



Production Total 19.2 Mtpa

Regional Stainless Steel Production 2006

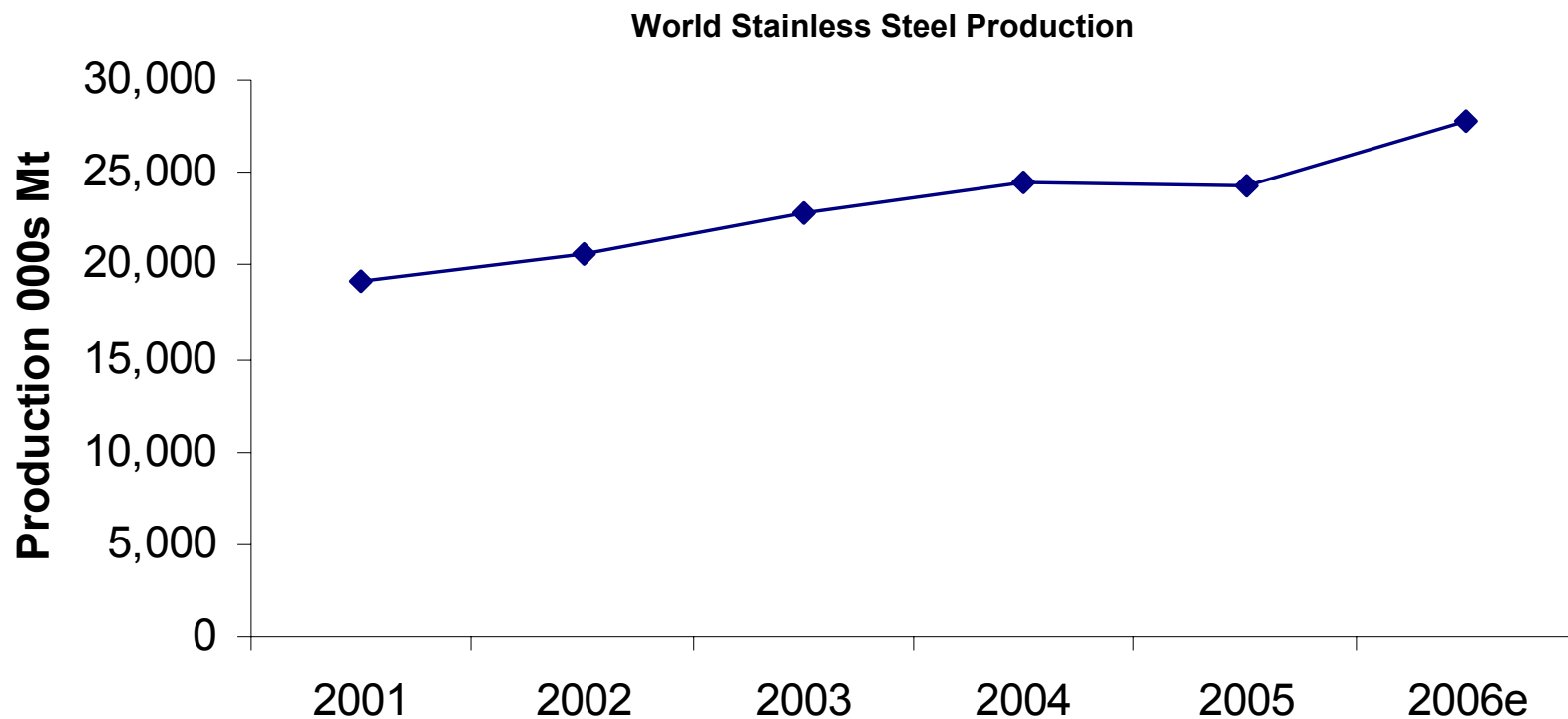


Production Total 27.8 Mtpa

Source: ISSF

CURRENT SITUATION: CHINA

**14 % growth 2006 / 05 put stainless production back above the 7 % long term trend confirming stainless steel as an immature growth market**



Source: ISSF

CURRENT SITUATION: CHINA

**China has added stainless steel melting capacity at a remarkable rate. The scale of these increments to capacity reflects the new scale of the industry**

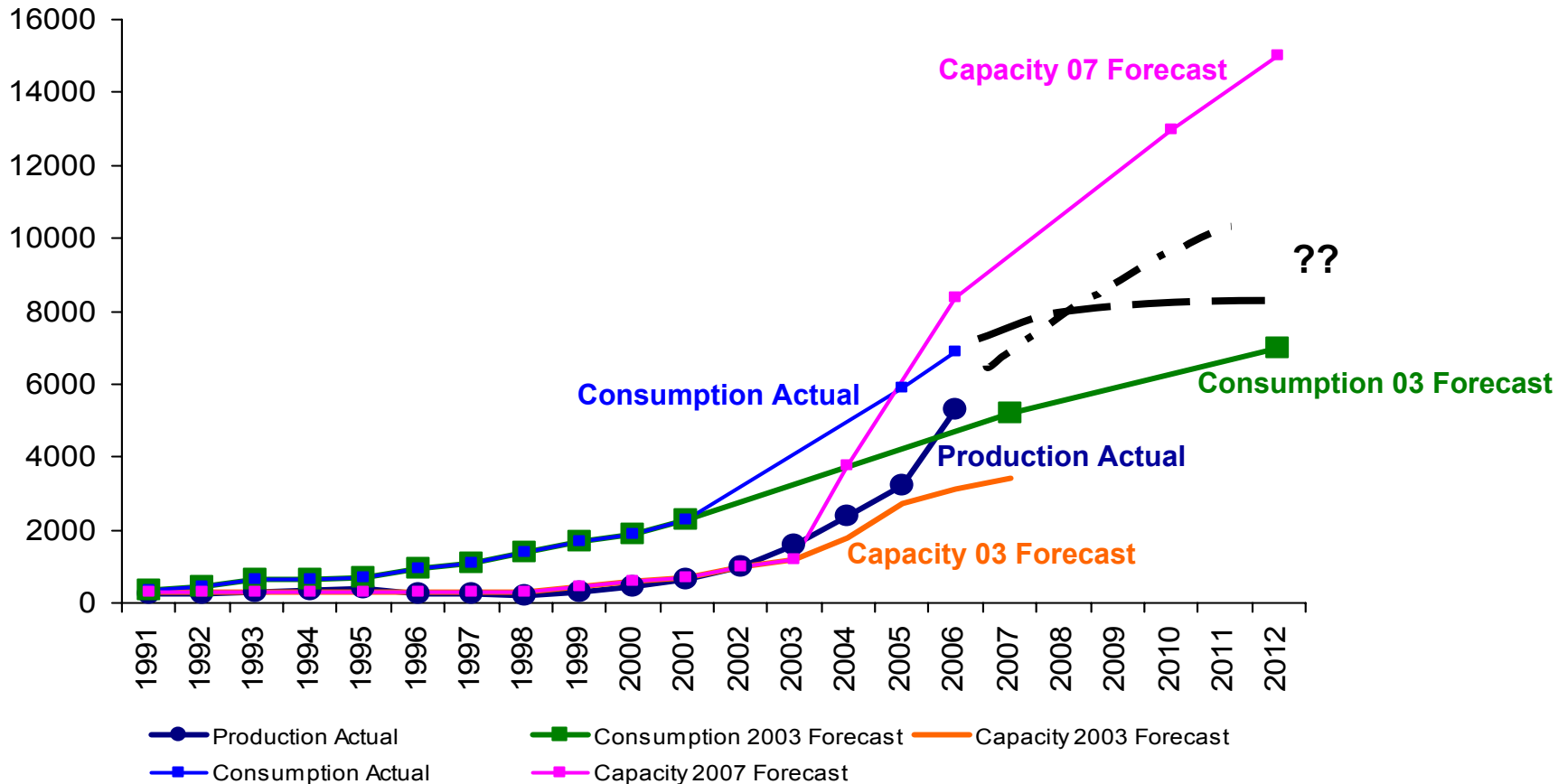
**Stainless Steel Slab Capacity 2004 - 2006**

<b>Expansions</b>	<b>End 2004 Kt/yr</b>	<b>Added Kt/yr</b>	<b>Capacity end 2006</b>
Taiyuan	1000	+2000	3000
Baosteel #1	750	+750	1500
Dinxi Tegang	300	--	300
Ninbo Huaguang	300	--	300
Wuxi Zhaoshun	300	--	300
Shanghai Krupp	--	+450	450
Jinquan	--	+500	500
Baotou Times	--	+300	300
Zhuangiangang PS	--	+800	600
Others	110	--	110
<b>Total</b>	<b>3750</b>	<b>4800</b>	<b>8560</b>

Source: Hatch Analysis

# Stainless steel supply did grow faster than demand 2003-2005, but the Chinese imports gap did not shrink as exports expanded to 0.9 Mtpa in 2006

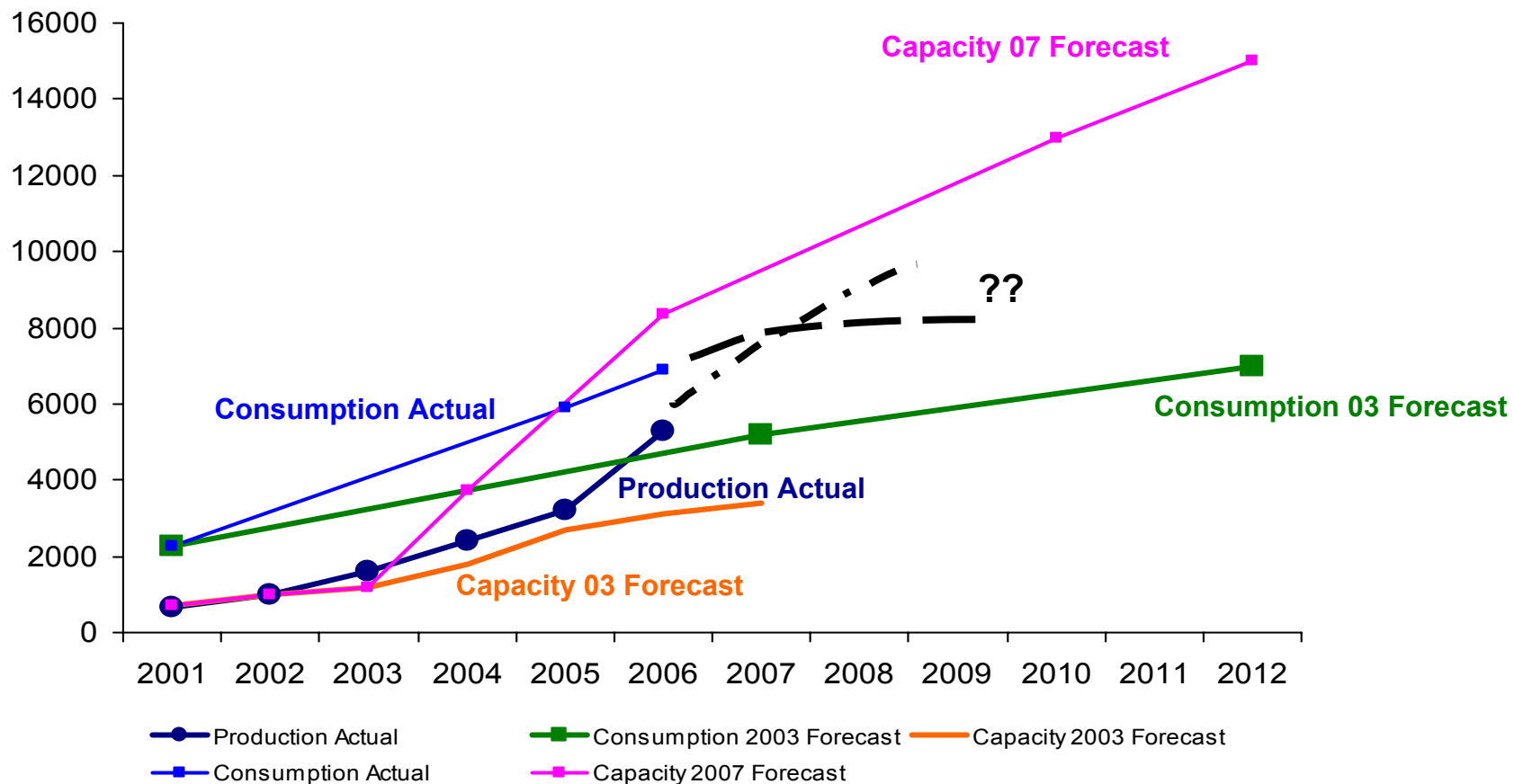
Stainless Steel Supply and Demand Balance in PR China



- Hatch Presentation to the 6<sup>th</sup> Annual World Nickel Congress September 2006

# The question remains. What if consumption growth falters and capacity and production continue to rise particularly after 2008?

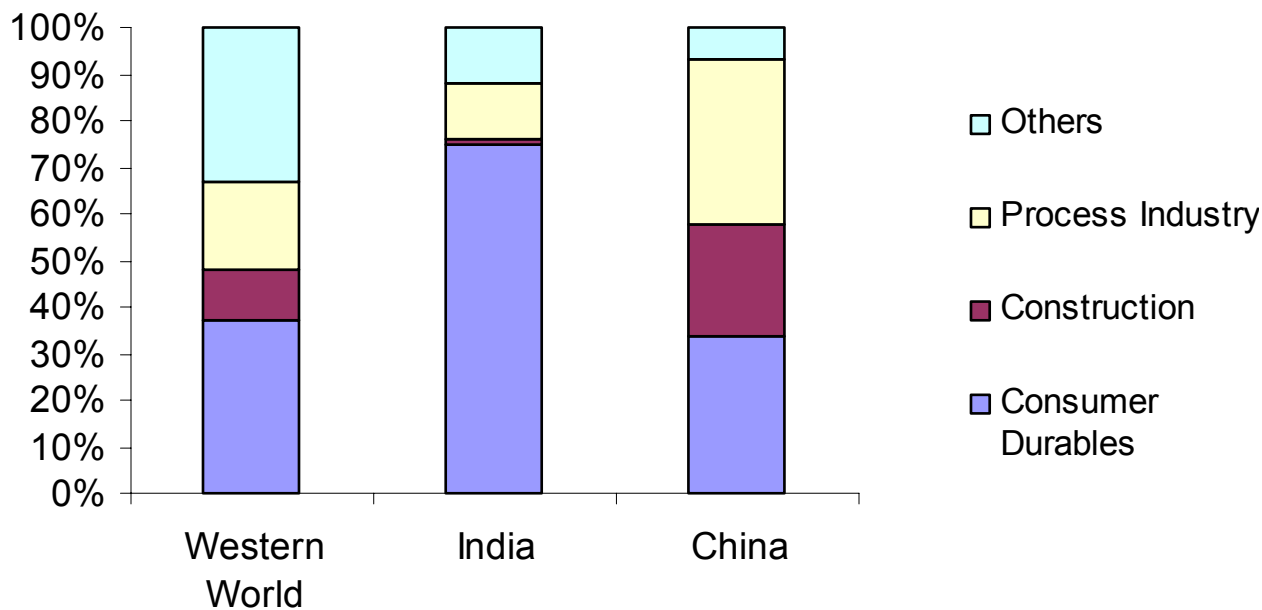
The Supply and Demand Balance in PR China 2001 - 2012



Source: Hatch Analysis, China Special Steels Association

## Whilst industrialisation and urbanisation remain the drivers of the Chinese economy, stainless steel consumption will expand along all dimensions

Stainless Steel Consumption by Sector Comparison India, China and the Western world



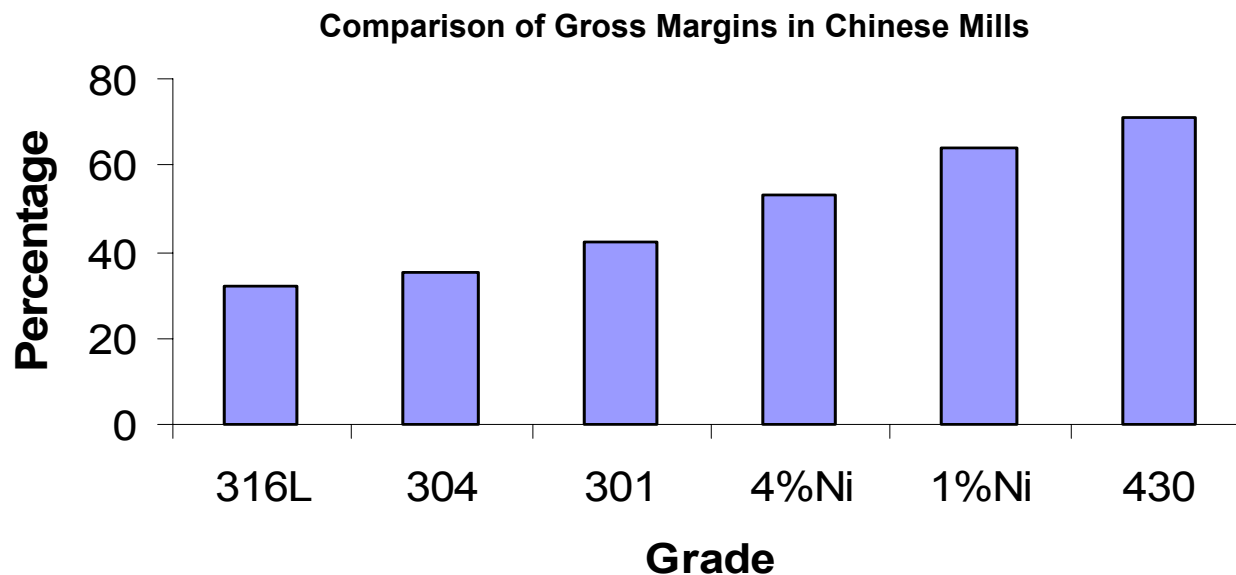
Source: BHP Billiton and OECD

CURRENT SITUATION: CHINA

## Stainless steel plays an important part in construction – here in the homes of China's affluent urban population



**Also Chinese stainless producers appear to have a margin incentive to produce non / low nickel content stainless grades in a delivered price market**



Source: SMR

## CURRENT SITUATION: PRICE VOLATILITY

Apart from China's demand, the biggest issue for the stainless steel industry in the past, most recently and in the future is the nickel price and its volatility



Source: LME

## **If sustained, high nickel prices will have economic consequences for nickel consumption by the stainless steel industry**

Increases of a number of times in the price of any commodity has economic consequences:

- Consumers look for substitutes:
  - human ingenuity overcomes barriers to switching
- Producers constantly look for ways to drive down their production and raw material costs to supply products reliably at declining prices and increasing quality
- Neither likes the sort of uncertainty that price volatility introduces

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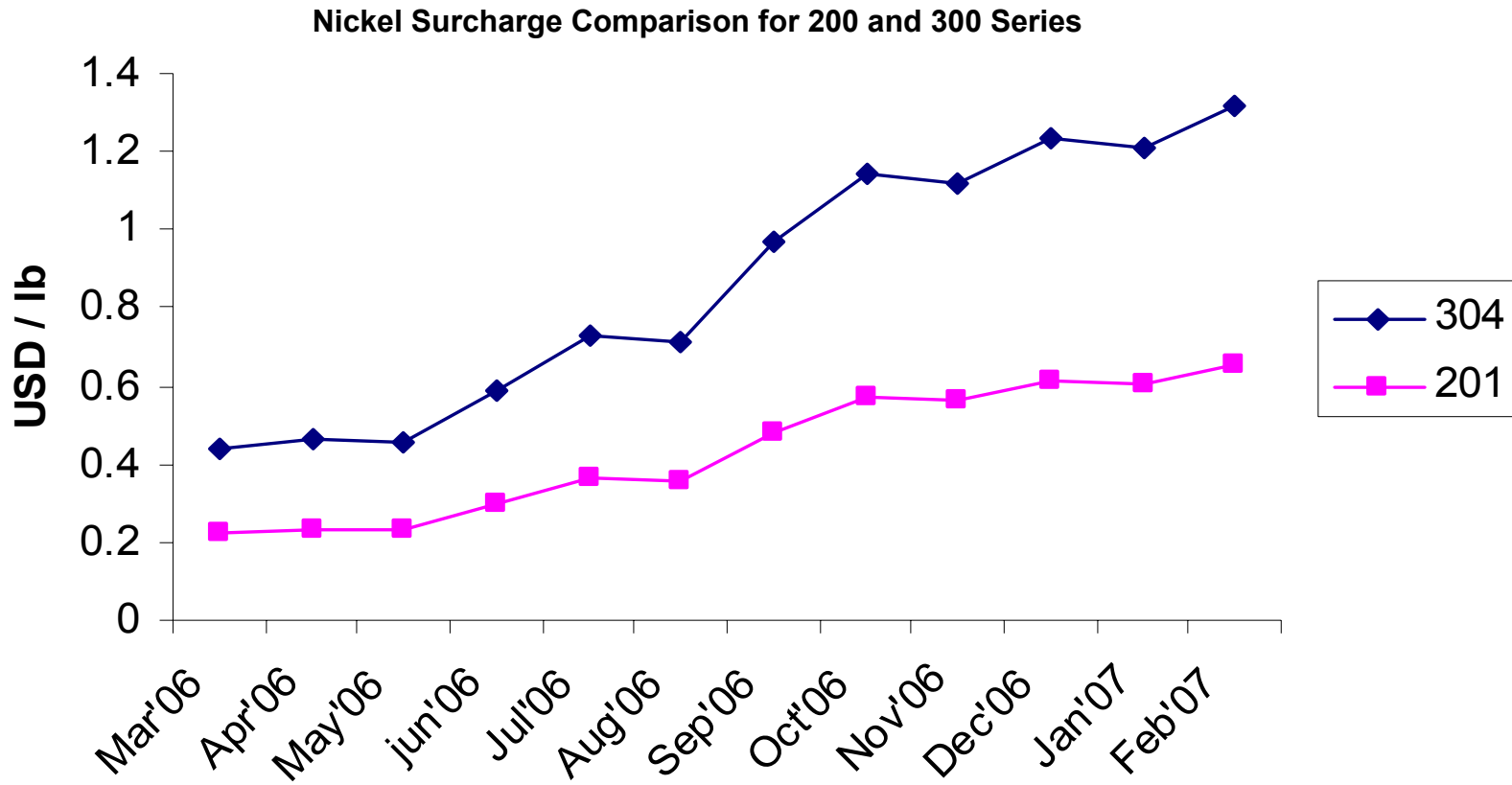
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## Will sustained high nickel prices and surcharges result in a permanent shift in the share of no, and low, nickel grades in stainless steel consumption?

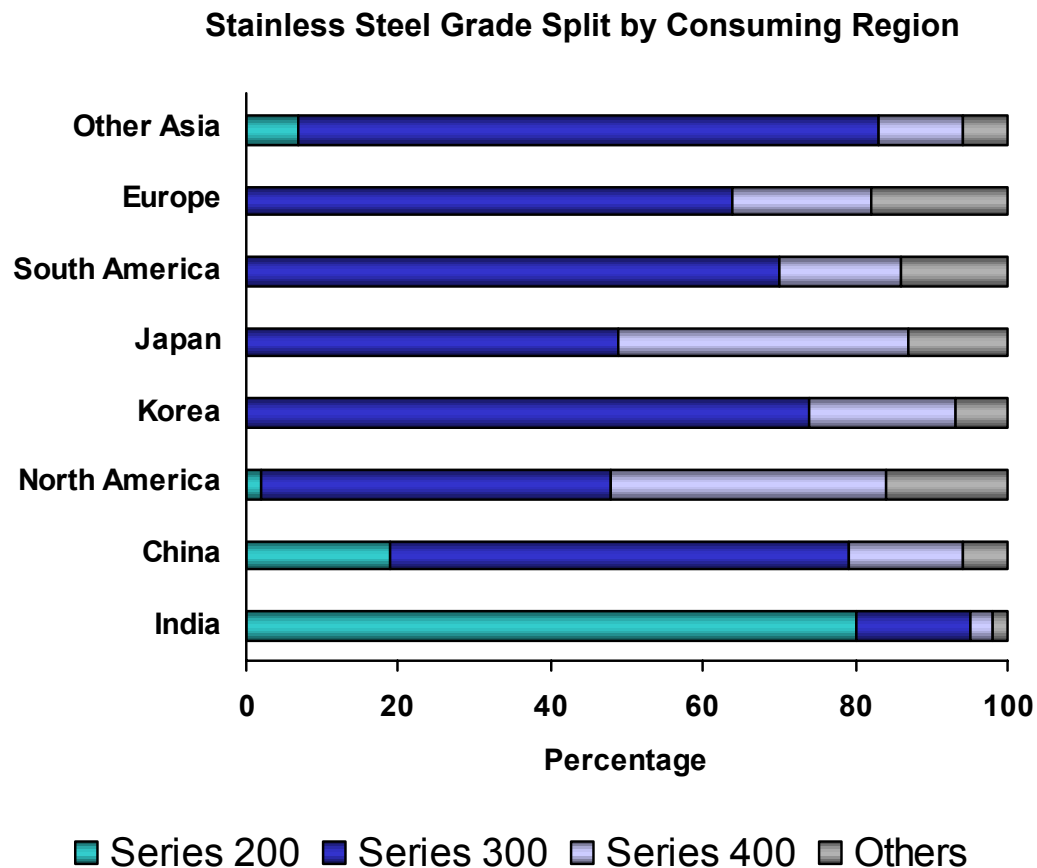
- The share of the 200 series stainless steel in the total stainless steel output is increasing. In 2003, it was 10 % of total output and by 2010, it is expected to reach 17 %.
- It is not just about India and China:
  - Outokumpu is re-entering the ferritic market in 2007, after a three year gap. They will be able to supply around 50 – 60 ktpa of ferritic grade stainless steel
  - Similarly JFE is reported to be doubling nickel free output to 70 ktpa this year and 120 ktpa by 2009
- The nickel free grades already have a head start in automotive, petrochemical and thermal power plants
- The rapid growth in consumer and manufacturing sectors of China and India point towards greater demand in the auto sector, construction and infrastructure. This provides an opportunity for higher absolute production of ferritic grades
- Meanwhile the developed country producers are fighting the commoditisation of 300 series by developing duplex grades for specific applications with higher margins to compensate for their development effort

Comparing the steep recent price rise of the most popular 304 grade with that of 201, the surprise is not that 200 series is growing, but the resilience of 300



Source: Allegheny Ludlum

**Consumption of 200 series is dominated by India and China, although consumption is much lower in volume terms than the ubiquitous 300 series**

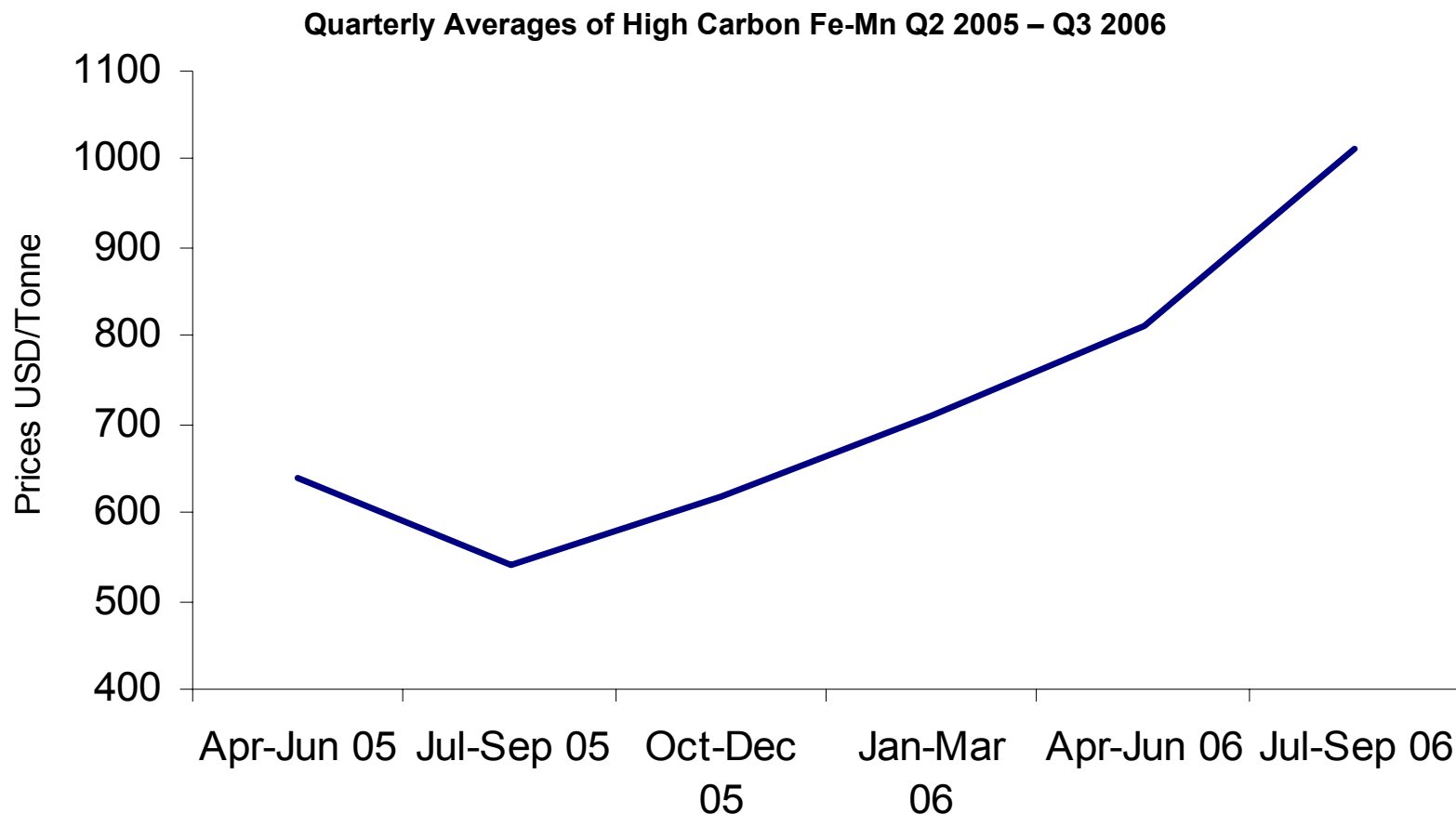


Source: ISSF

## **200 series has drawbacks which, combined with product innovation and market realities, limits substitution. Series growth is driven by geography**

- Reduction in nickel in 200 series stainless is compensated for by an increase in manganese, with reductions in corrosion resistance and ductility limiting substitution
- 200 series is non-magnetic, making scrap separation difficult. A problem exacerbated by small additions of copper to overcome ductility problems
- India is the largest producer of 200 series at 1.2 Mt, out of which the domestic consumption is around 850 Ktpa. China imports most of the balance
- The greater acceptance of 200 series stainless is not helped by Indian and Chinese manufacturers using their own grade standards rather than those of the AISI or other international bodies
- The high degree of specification of stainless steel for particular applications and the sometimes long time lag between specification and manufacture of a particular item are barriers to switching
- Stainless producers seek to expand volumes and margins by:
  - constant product grade and form innovation
  - improved service levels through technical service and owned distributiontying in processors / manufacturers for critical applications

**Higher manganese consumption has resulted in an upward trend in the prices of high carbon ferro-manganese, limiting the gain from raw material switch**



Source: ISSF

## **Stainless steel producers have adopted a number of strategies in response to high nickel prices aimed at increasing margins and reducing costs**

Stainless steel producers have sought to:

- Shift the responsibility in the minds of their customers for higher prices to the nickel and ferroalloy producers through the introduction of the alloy surcharge
- Increase the integration of their production facilities – Acerinox's Campo de Gibraltar model
- Reduce the cost of other inputs – Tornio's hot charging FeCr model
- Find lower cost sources of nickel – scrap, nickel pig iron

**Stainless producers have been able to increase base prices in developed country markets as the nickel surcharge has risen**

Stainless Steel Cold Rolled 304 2mm Sheet Prices



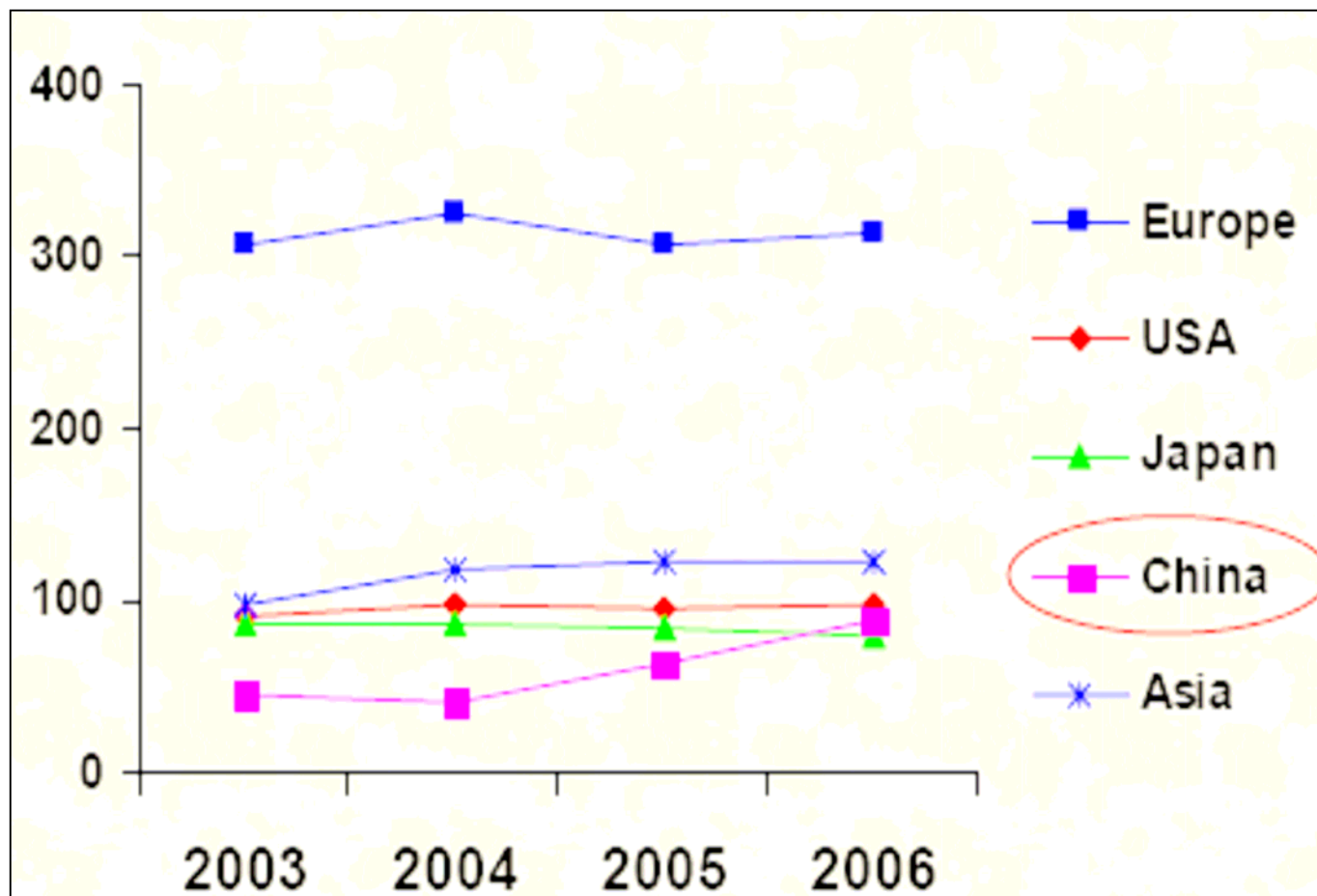
Source: Acerinox Annual Report 2006

## China has tried to meet the fundamental nickel price challenge by developing an alternate production route for stainless, using low-grade nickel pig iron

- China sourced 3.34 million tonnes t of nickel laterite ore (0.9 – 1.1 % Ni, 40 – 45 % Fe) from Philippines and Indonesia in 2006 for making nickel pig iron (2 – 4 % Ni):
  - Higher in sulphur and phosphorous than FeNi
  - Moisture content 30 – 35 %
  - Replacing 30,000 tonnes of refined Ni imports in 2006
  - Expected to grow to 50 – 70 ktpa of nickel replacement in 2007
- Ores smelted in the old fashioned mini-blast furnaces with high and low level slag tapping that the Chinese government has tried to close as inefficient and polluting
- Use of low-nickel pig iron is not restricted to small stainless producers
  - Baosteel trial production 300 series
  - Posco Zhangjiagang reported as user

China has also increased scrap usage, but the pool is limited and construction sector stainless consumption takes longer to re-enter the scrap market

2003 – 2006 Regional Scrap Usage Trends 000t



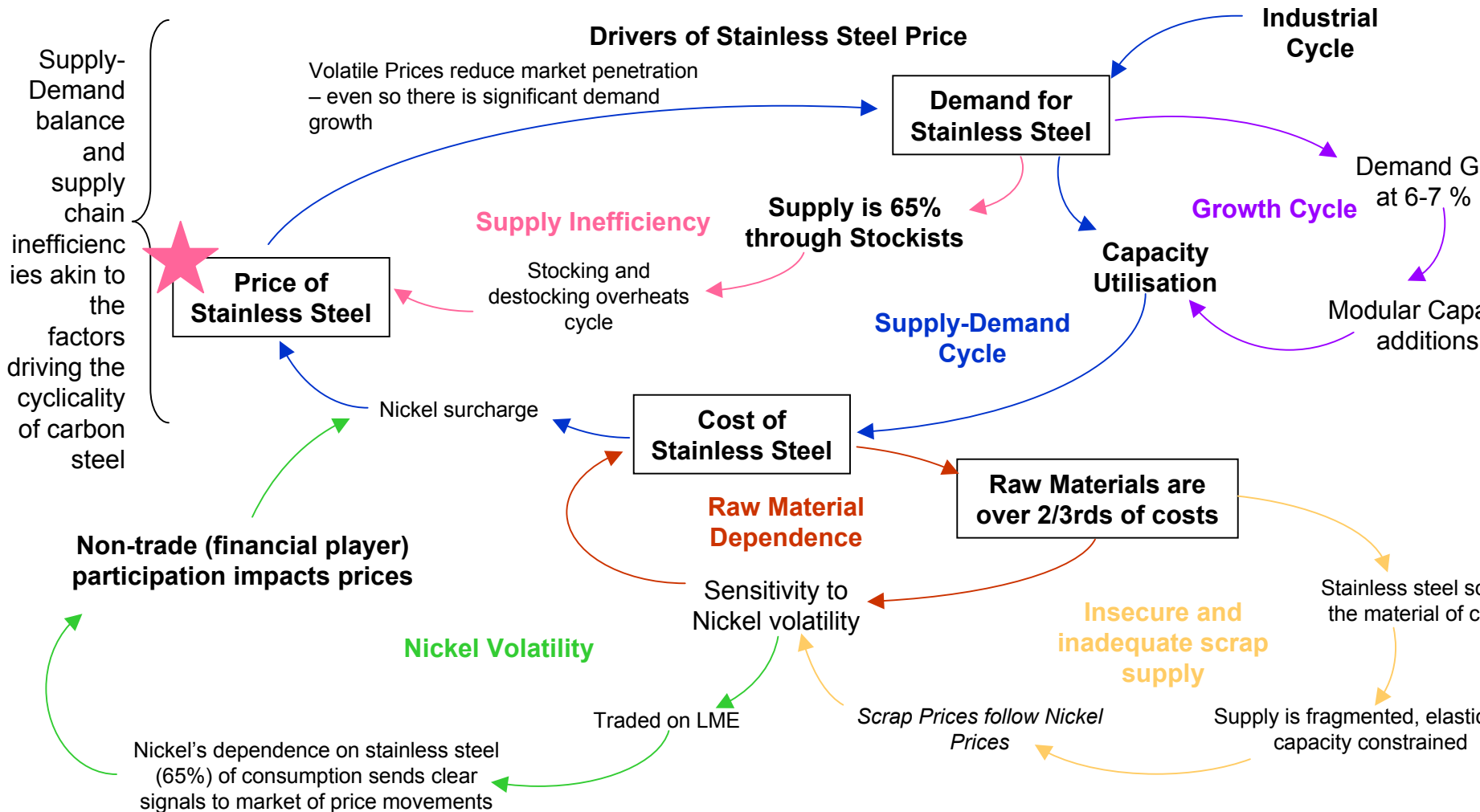
Source: ERAMET

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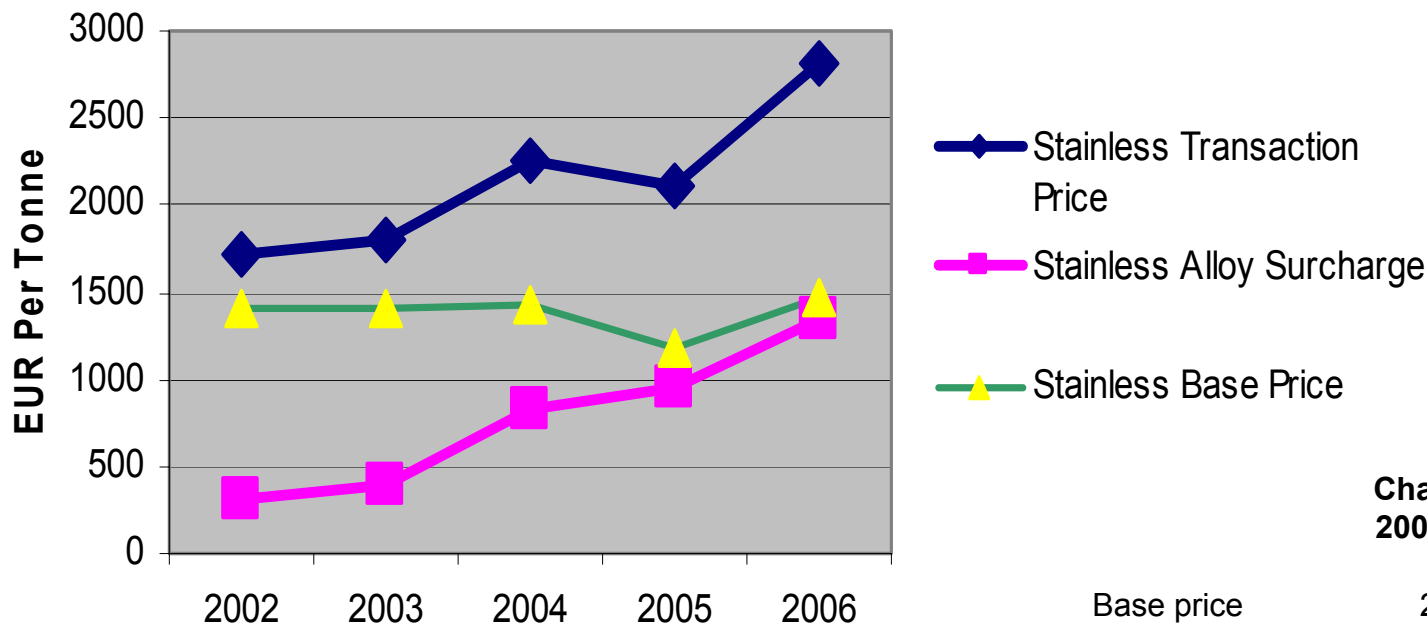
# Inadequate scrap supply is only one of the systemic factors driving stainless steel price volatility. Can producers fundamentally address nickel price volatility?



Source: Hatch analysis

**Stainless steel price volatility is not as great as nickel price volatility. But sufficient to discourage greater growth in consumption and...**

Annual Average Market Prices



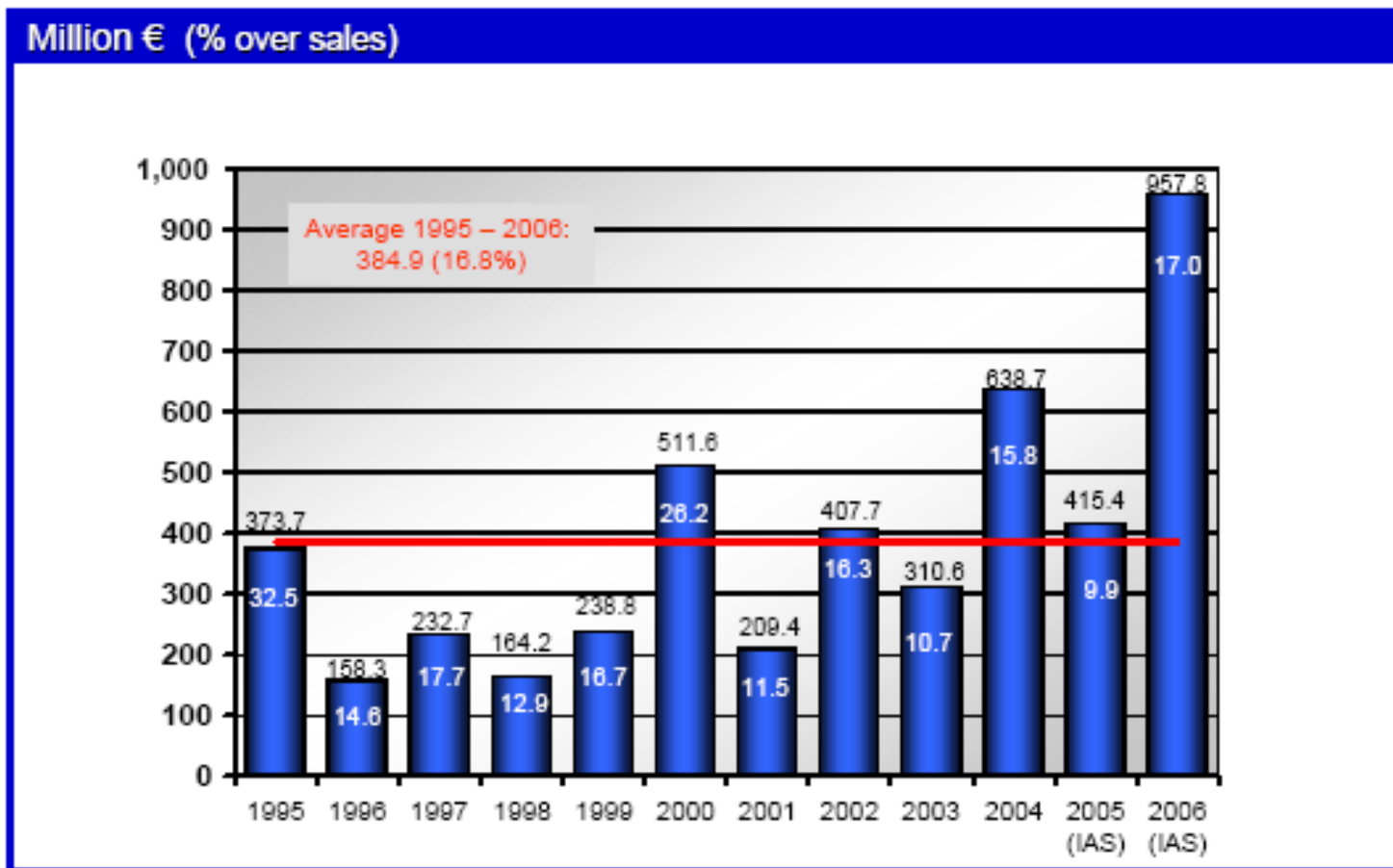
	Change % 2006/2005	Change % 2002-2006
Base price	25.2	4.8
Alloy Surcharge	42.4	330
Transaction price	32.8	64

Source: CRU, LME, Metal Bulletin and Hatch analysis

## FUTURE POSSIBILITIES

...make the margins and earnings of stainless producers volatile, discouraging investment

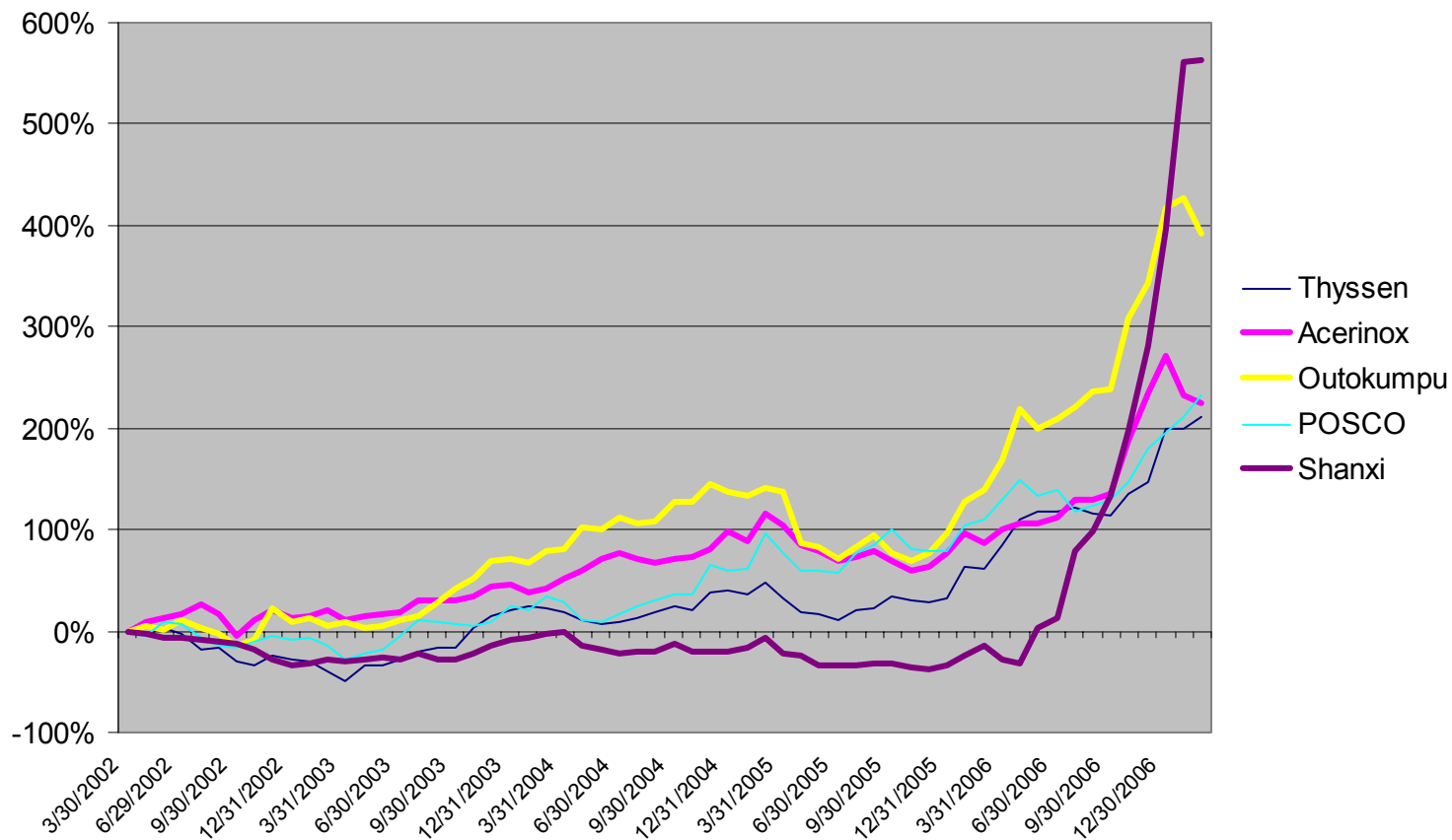
Acerinox Earnings Before Interest Tax Depreciation and Amortisation (EBITDA) 1995 - 2006



Source: Acerinox Annual Report 2006

# Recently, improved profitability and prospects have increased the market capitalisations of pure stainless producers more than their carbon steel peers

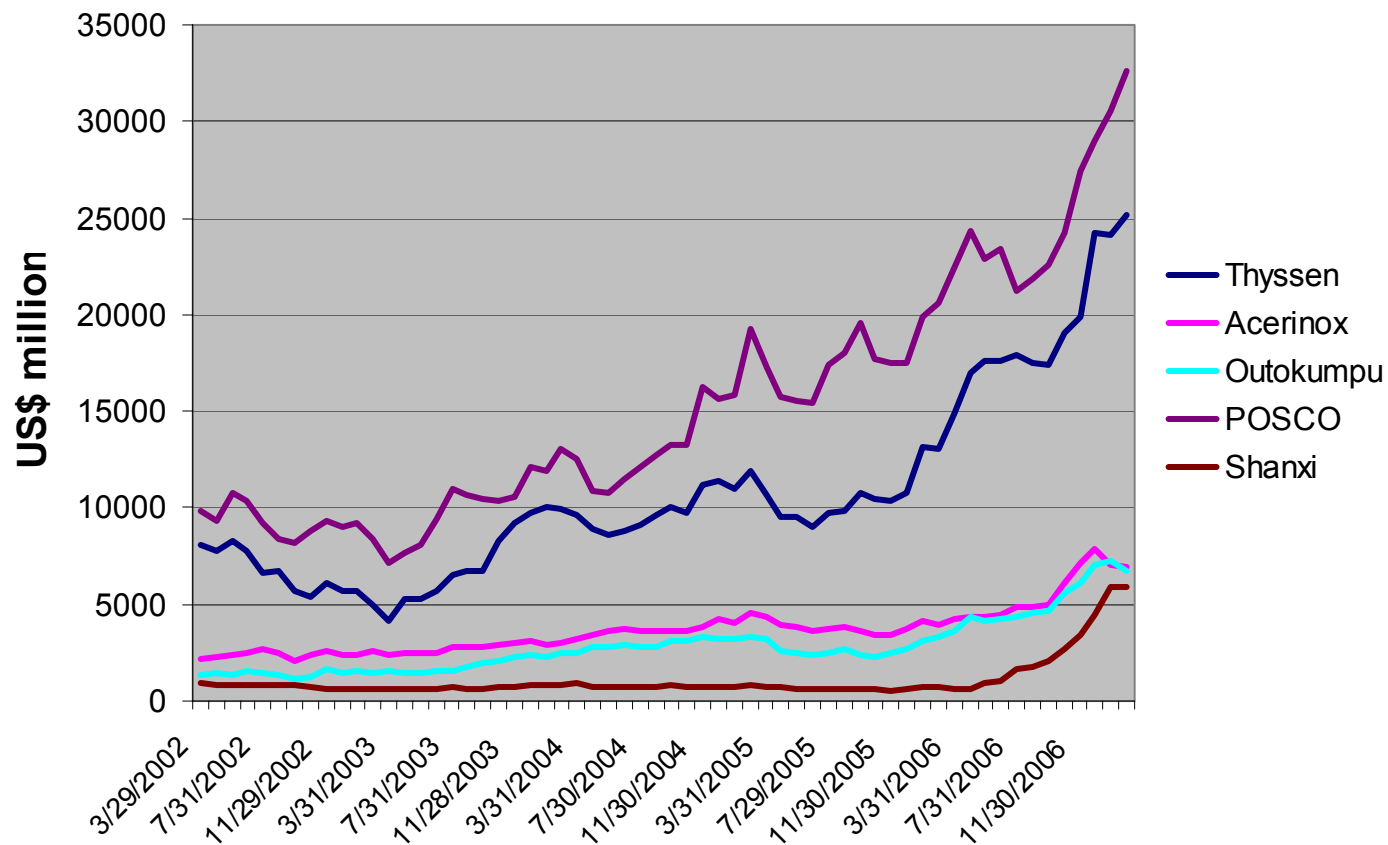
Percentage Increase in Market Capitalisation of Major Stainless Steel Producers (excl. Arcelor Mittal) 2002 - 2006



Source: Bloomberg

# Major stainless steel producers now have the financial strength to consider forward and backward integration as they seek solutions to volatility

Market Capitalisation of Major Stainless Steel Producers (excl. Arcelor Mittal) 2002 - 2007



Source: Bloomberg

## Long term expansion of the stainless steel market and producer profitability is dependent upon reducing price volatility through structural change

- Major stainless steel producers (outside China) are exposed to the capital markets, which expect a steady expansion in earnings. The EBITDA performance of producers has been highly variable due to volatility:
  - Nickel price
  - Stainless demand
- LME nickel market instruments and price surcharge mechanisms do not offer a long term solution to the problem of stainless steel volatility
- There is an operational imperative to secure nickel supplies at a known cost
- Long term growth and sustainability of the industry is dependent upon delivering value to the customers
- Carbon steel producers are consolidating and taking control of their value chain:
  - iron ore, coking coal
  - distribution channelsTo increase margins
- Posco JV New Caledonia nickel mine and Gwangyang refinery – 30 ktpa stable, cheap supply of nickel

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## CONCLUSIONS

# The outlook for nickel consumption by the stainless steel industry remains very positive, but there are some major structural issues to address

- Stainless steel remains an immature growth industry with continued changes in:
  - Products
  - Consumption patterns
  - Geographies
  - Concentration
  - Structure models
- China remains the key risk to stainless consumption growth – responsible for more than half the industry's volume growth in the last decade
- Despite the growth of ferritic grades in China and India, nickel consumption will continue to grow - though not as fast as the stainless steel industry's growth
- If sustained, the nickel price rise may accelerate and magnify changes in the ownership of the value chain, impacting nickel industry structure and competition
- Is the Jinchuan model – ownership of nickel assets from mine to refinery by stainless producers -, or some version of it, the future of the stainless and the nickel industry?