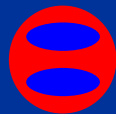


Stainless Steel 200 Series : An Opportunity for Mn

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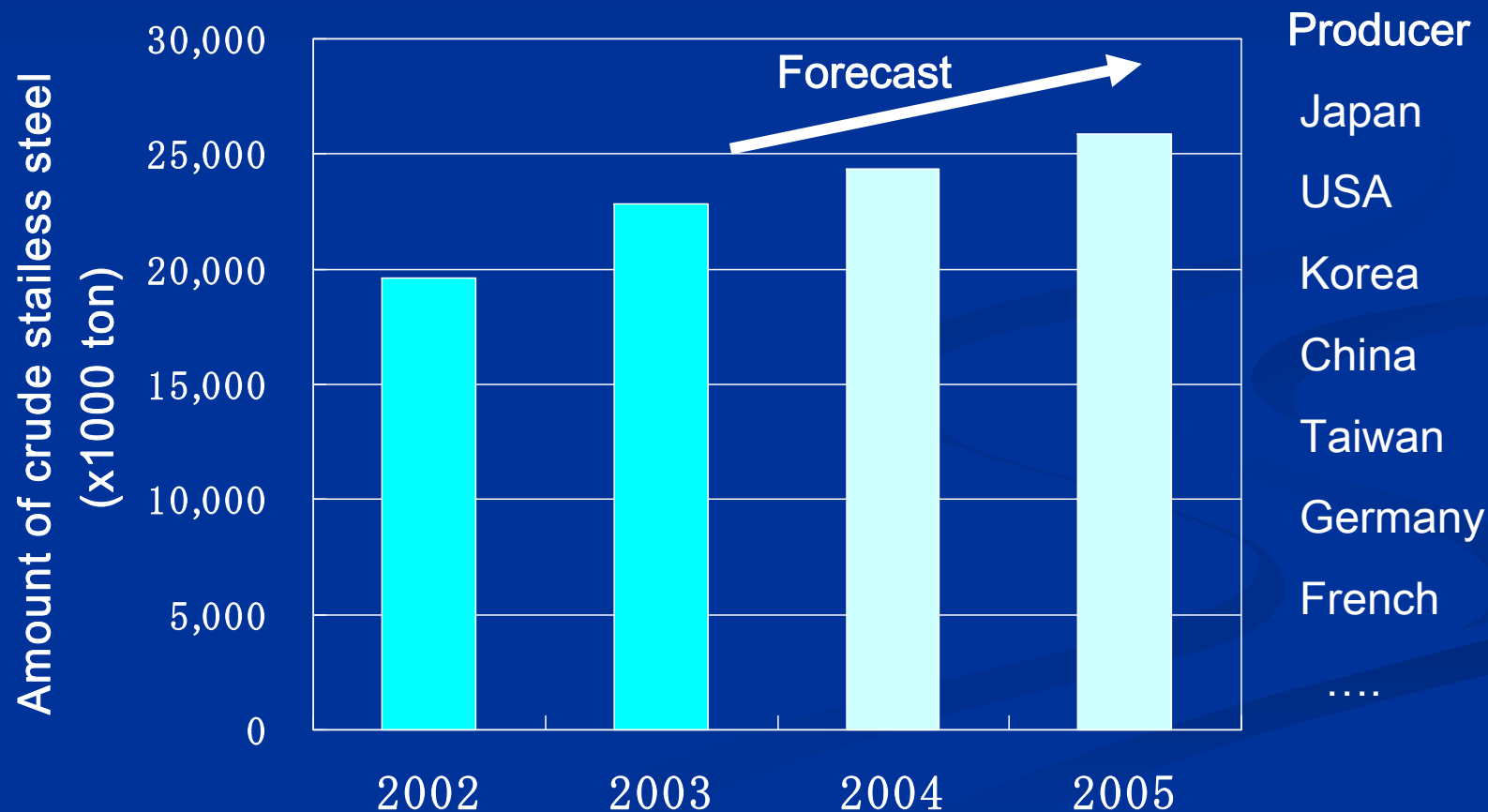


Outline

- Situation of Stainless steels
 - Amount of production
 - Topics
- “200 series” stainless steel
 - History
 - Background
- “Low nickel stainless steels containing Manganese” in our company
- Some issues

Output of global crude stainless steel

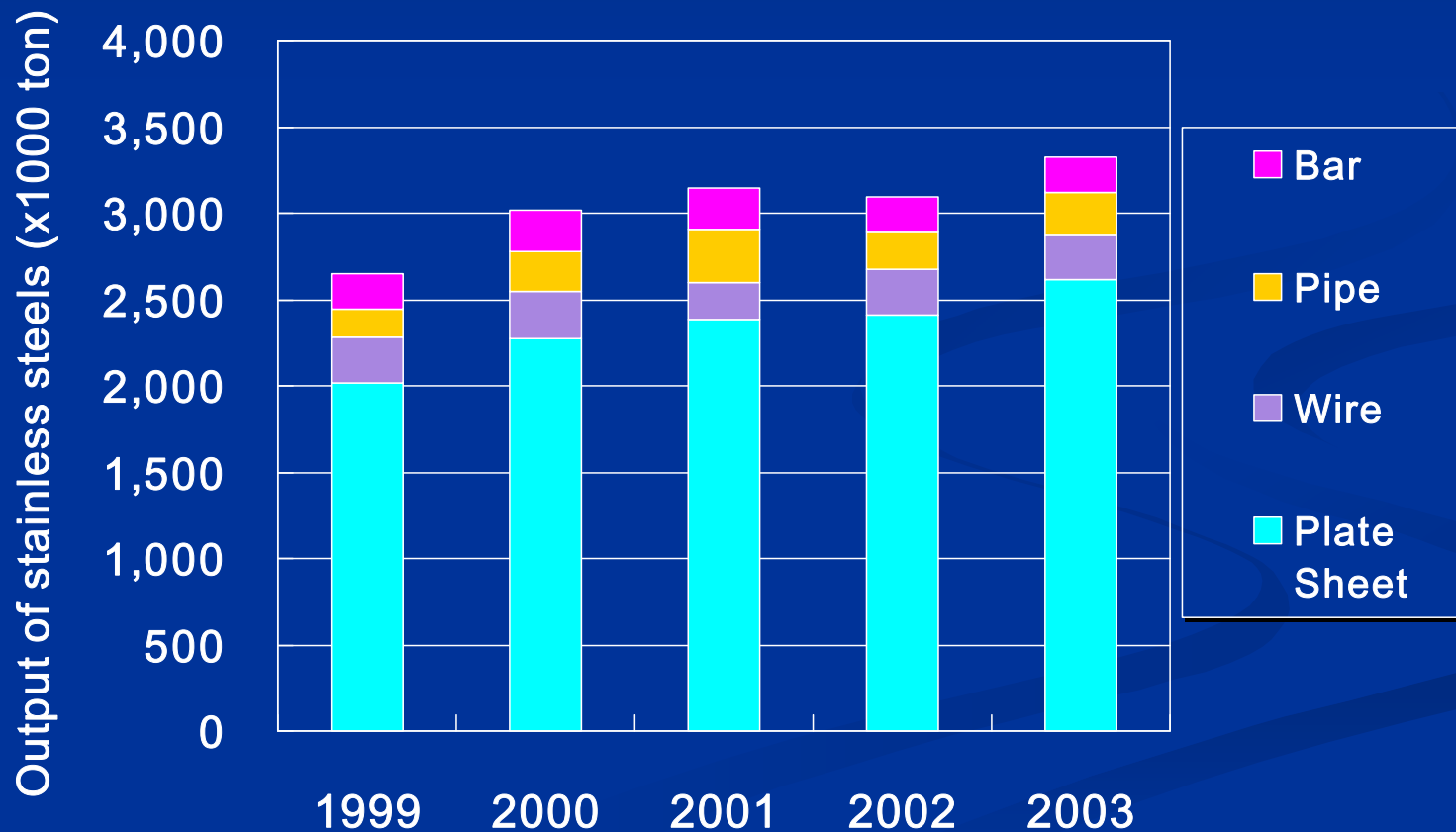
A stainless steel has been forecasted that the high growth is kept on in the future.



Output of stainless steel products in Japan

Japan 3,300,000 ton/year (Products)

World 22,800,000 ton/year (Crude stainless steel)



Kinds of stainless steels

200, 300, 400 series

| Classification Series | | Grade | Alloying element | | | |
|-----------------------|-----|----------|------------------|----|----|----|
| | | | Cr | Ni | Mn | Fe |
| Austenitic | 200 | 201,202, | ● | ● | ● | ● |
| | 300 | 304,301, | ● | ● | | ● |
| Ferritic | 400 | 430, | ● | | | ● |

“200 series” 1-5% low Nickel - high Manganese type

A part of Nickel in 300 series is replaced with Manganese.

Characteristics of “200 series” stainless steel

“Austenitic Chromium-Manganese-low Nickel
stainless steel”

- Low Nickel
Low price when a Nickel price is rising.
- Non-magnetic similarly “300 series”
- Corrosion resistance weak
- Press forming weak

However, “200 series” are available for some restricted
uses.

Increase of low nickel "200 series" stainless steel

Background

- Shortage of Nickel
- Rising in Nickel price
- In China , Demands of low nickel "200 series" stainless steels are increasing.



Ratio of global crude stainless steels in 2003

History of “200 series” stainless steel

- 1912

F. M. Becket (USA) researched austenitic stainless steels containing Manganese.

- Age of Nickel shortage

Low nickel stainless steels containing Manganese were used for the dishes, and a body of a train or a truck.

However, after Nickel supplied enough, 18-8Ni stainless steel had returned again.

- 1955 Type 201 and 202 were registered in AISI standard of stainless steels.

- Afterward,

Each time a Nickel price rose, 200 series stainless steels were noticed.

In India, 200 series were developed in the end of 1980s.

- 2000s

In Chinese market , demands of 200 series stainless steels increase.

Change of LME Nickel price

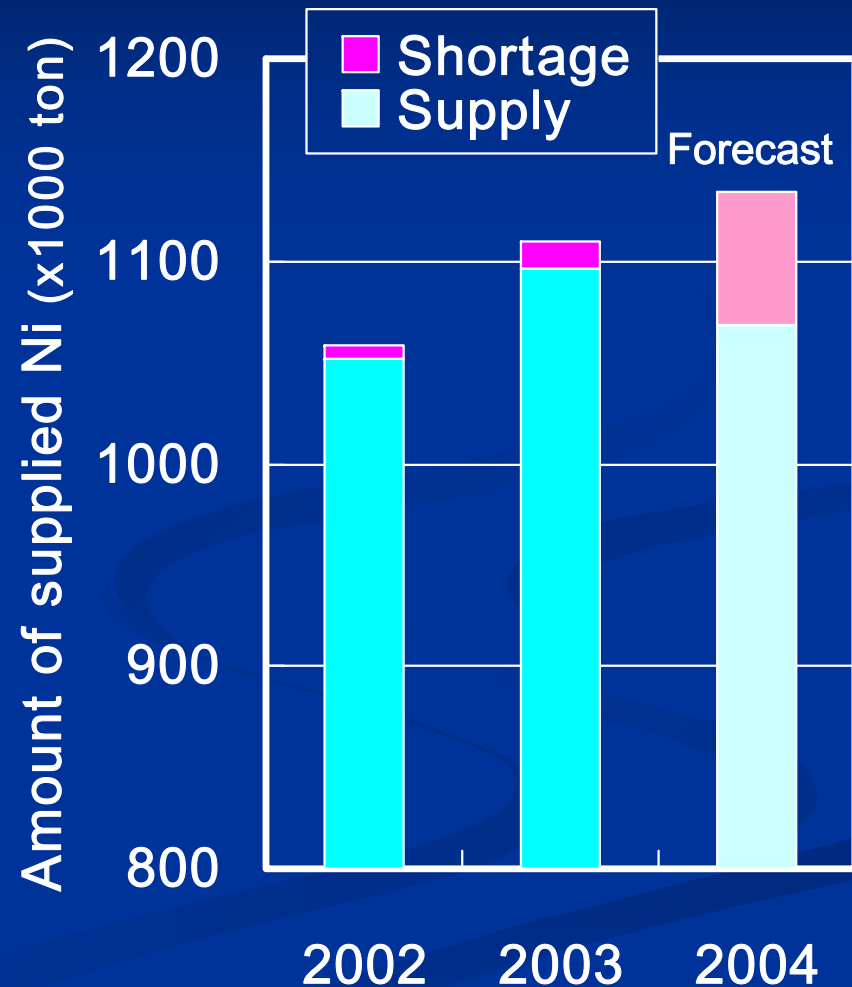
recent steep rise in the price



Demands of Nickel

- Demands of Nickel are increasing in stainless steels and Nickel alloys.
- Market in China is active, so it is forecasted that the demand of Nickel continues for 2 or 3 years.

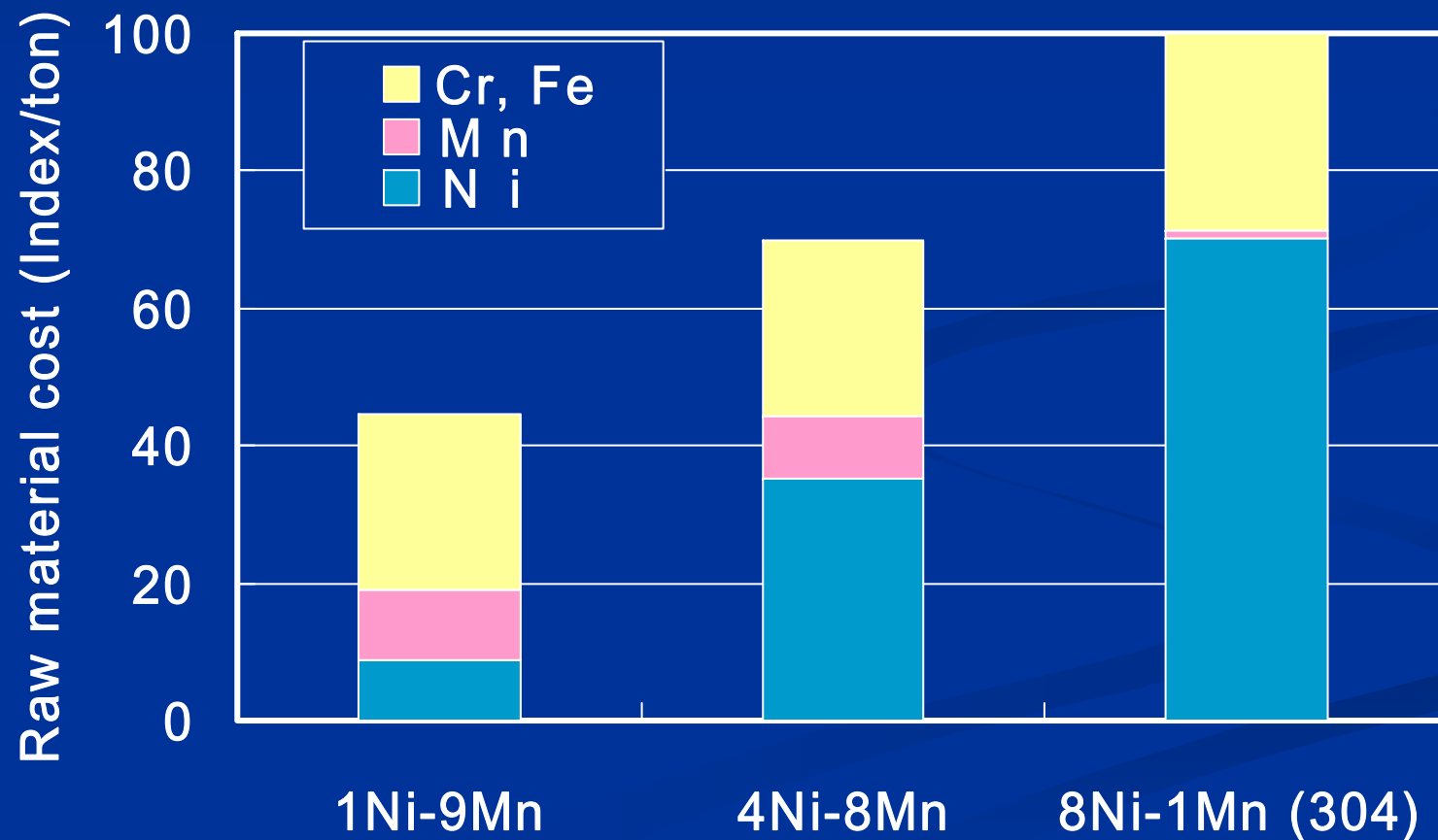
Beijing Olympic Games in 2008



Raw material cost of stainless steels in some Nickel and Manganese contents

Ni : 14,000 US\$/ton

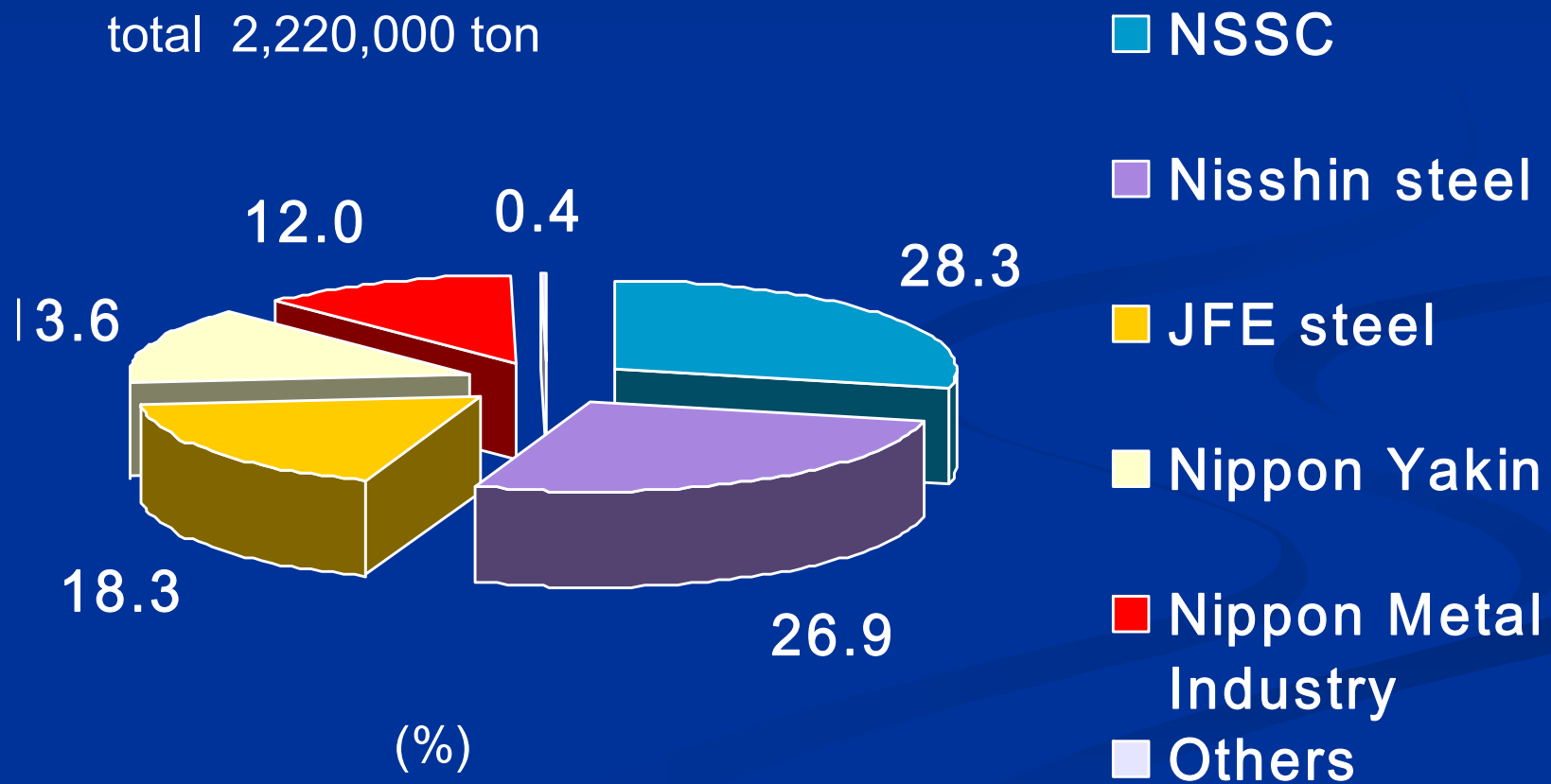
Mn : 1,800 US\$/ton



Stainless steel producer in Japan

Hot rolled stainless steel in 2002

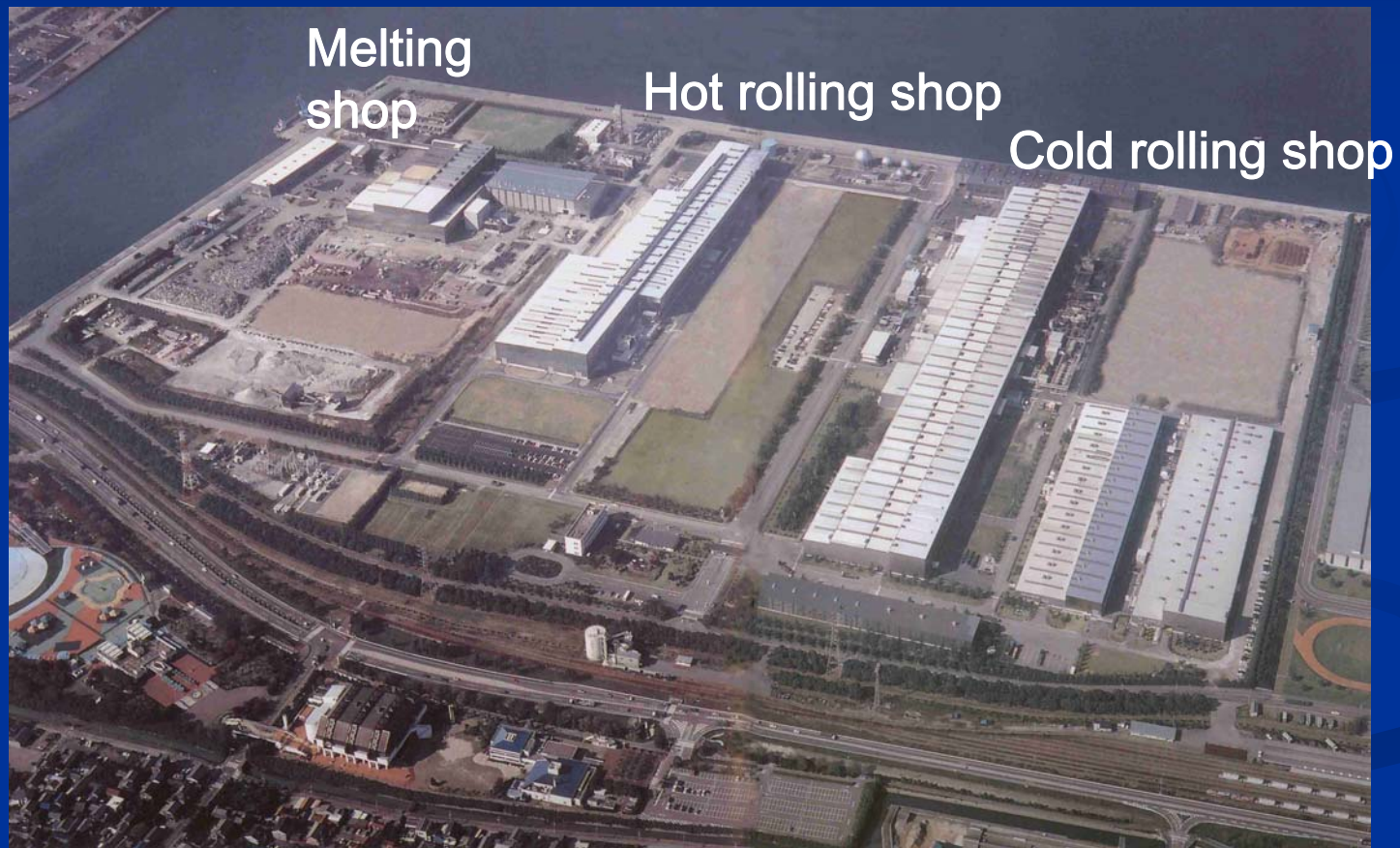
total 2,220,000 ton



Nippon Metal Industry, Kinuura Works

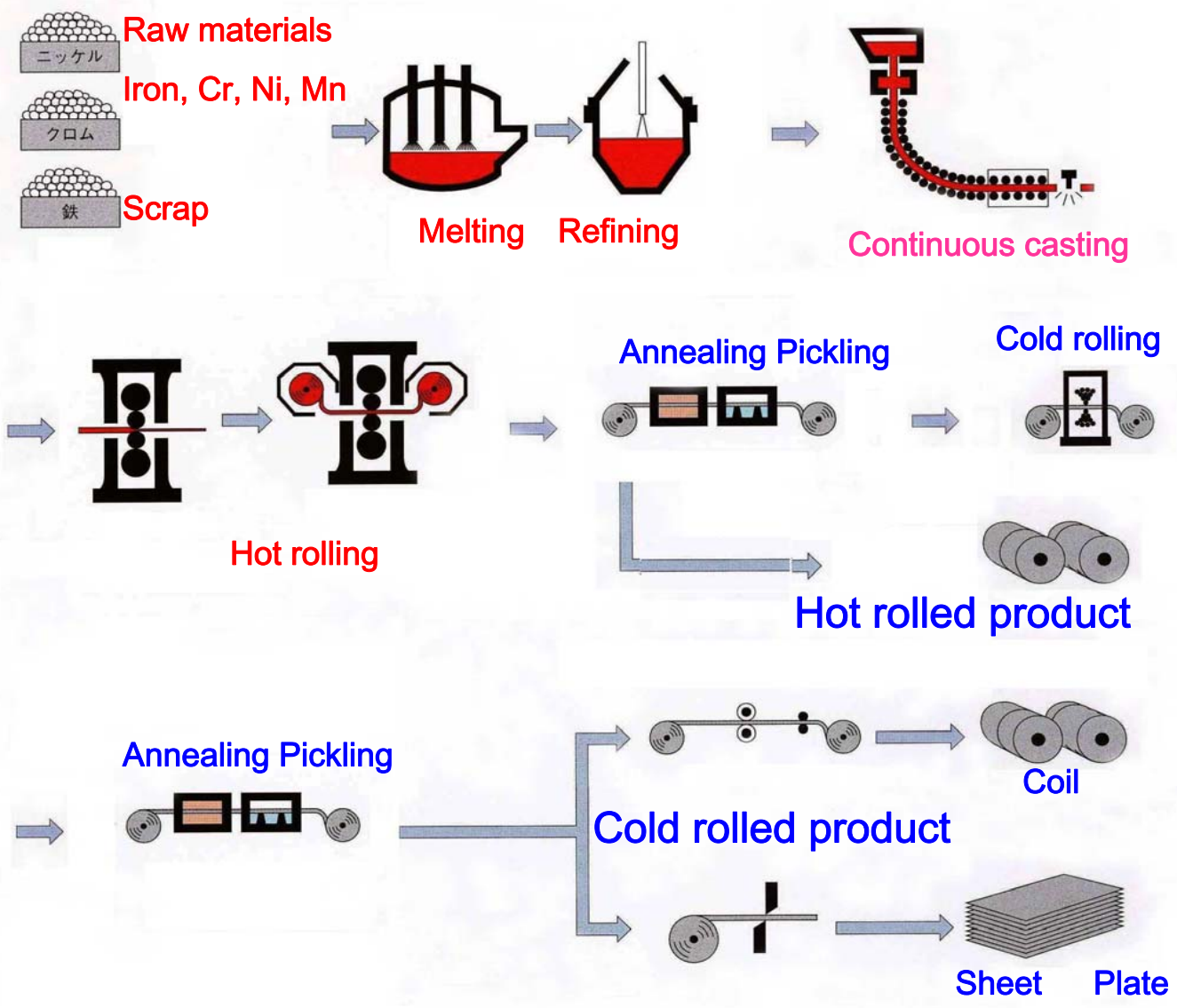
Area : 720,465 m²

Location : Hekinan city, Aichi



In Japan, Nippon Metal Industry succeeded in producing stainless steels in 1932.

Production process of Stainless steel



Nippon Metal Industry started exporting austenitic low nickel stainless steels

- Market in China 50,000 - 60,000 ton /month
- Our planning
 - 20% of the market
 - 3 grades of the stainless steel
- Exports
 - Jan 2004 start 5,000 ton
 - Feb 2004 - 7,000 ton/month
 - Apr 2004 - 10,000 ton/month (planning)

Composition and characteristics of the austenitic low nickel stainless steels

| NTK Grade | Chemical Composition(%) | | | Press Forming | Corrosion resistance | Price | Applications |
|-----------|-------------------------|----|----|---------------|----------------------|-------|--------------------------------|
| | Cr | Ni | Mn | | | | |
| NTK D-10 | 18 | 5 | 4 | A | A | ++++ | Home applications |
| NTK K-1 | 14 | 1 | 9 | C | B | ++ | Ornamental tube |
| NTK K-4 | 15 | 4 | 8 | B | B | +++ | Home applications, Kitchenware |
| 304 | 18 | 8 | 1 | A | A | +++++ | |

NTK : Nippon metal industry stainless steel

Rank : good A>B>C weak

These low nickel stainless steels are available for some restricted uses.

Applications of the low nickel stainless steel



Pipe

Cook pot, Pan



Special stainless steel containing high Manganese for spring use

| Grade | Composition(%) | | | | Applications |
|---------|----------------|----|----|------|--------------------------------------|
| | Mn | Ni | Cr | Fe | |
| NTK S-4 | 15 | 1 | 17 | Bal. | Engine metal gasket, Sheet spring |
| 301 | 1 | 7 | 17 | Bal. | |

NTK S-4 has characteristics of high strength.

“NTK” means “Nippon metal industry stainless steel”.

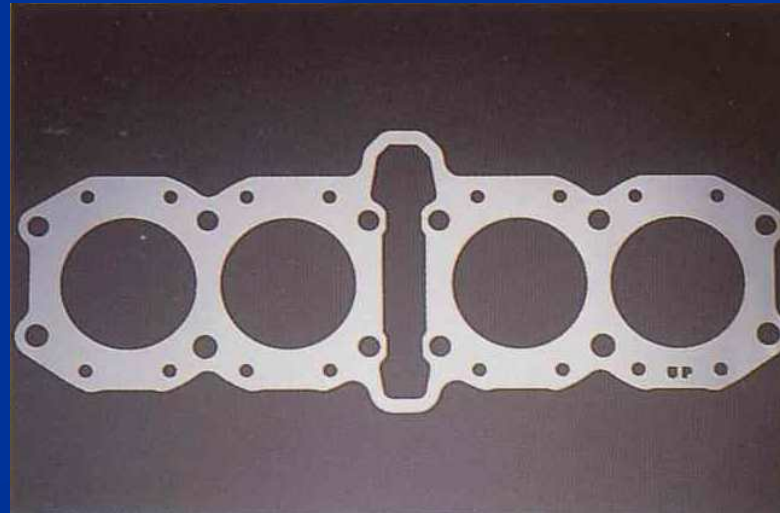
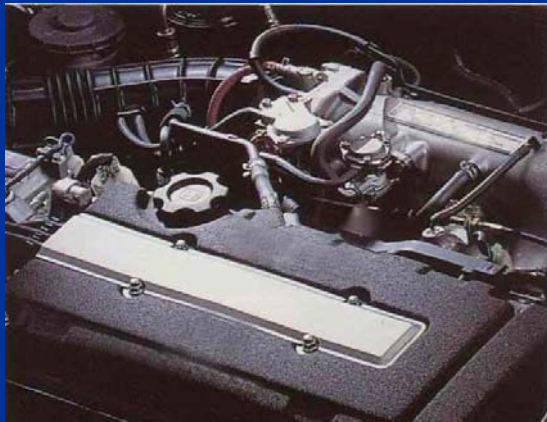
Applications of high manganese stainless steel for spring

- Characteristics of NTK S-4

 - high strength

 - non-magnetic (even as cold rolled)

Engine metal gasket
thickness 0.2mm



Issues of “low nickel stainless steel”

- Recycle Issue

200 and 300 series stainless steel have different compositions.

But, each scrap may be mixed.

Recycle rule to separate “200 series” scrap from “300 series” must be organized to avoid each contamination.

Scrap

Non-magnetic : Austenitic stainless steel (300 series) (200 series)

Magnetic : Ferritic stainless steel (400 series)

The 200 series are trying to be distinguished from 300 series by a X-ray or a chemical analysis method.

- Market for “low nickel stainless steel” relates to a price of raw nickel.

Summary

- Austenitic “200 series” stainless steels have been noticed when a Nickel price rises.
- In Chinese market , demands of “200 series” stainless steels increase.
- “200 series” are available for some restricted uses.
- Recycle rule to separate “200 series” scrap from “300 series” must be organized for various uses.