

TTC14 Workshop

KEK Japan

Dec 2nd - Dec 5th 2014





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CBMM

1. OVERVIEW

December, 3th, 2014



Industrial Facilities – Location



Araxá

600 Km from SP



Araxá

1000 Km from RJ



Industrial Facilities – General View



General Information

- ✓ Privately held company, located in the State of Minas Gerais, Brazil
- ✓ Controlled and managed by the Moreira Salles Group since 1965
- ✓ Fully integrated from mine to final products
- ✓ 40 years of investment in niobium technology and applications, creating new markets and patents
- ✓ Industry leader:
 - Ore deposits
 - Production capacity
 - Sales
 - Proprietary industrial processes
 - Applications technology



Important milestones in our history

TIMELINE

'50s	'60s	'70s	'80s	'90s	'00s
<p>1954 – Araxá Pyrochlore Ore discovered by Djalma Guimaraes from CNP</p>	<p>1965 – Shareholders Moreira Salles Group 50,5% and Molycorp Inc 49,5%</p> <p>1965 – FeNb start-up production (capacity 1,800 tpy)</p> <p>1966 – CBMM (New company name)</p> <p>1966 and 1970 – Plant Capacity Expansion (3,600 tpy and 9,000 tpy of FeNb)</p>	<p>1972 – Profit Sharing Agreement with CODEMIG and incorporation of COMIPA</p> <p>1975 – Technology program (Europe)</p> <p>1978 – Technology program (North America)</p> <p>1979 – Technological Cooperation Agreement with Russia and China</p> <p>1979 – Improvements to Expand (15,000 tpy of FeNb)</p>	<p>1980 and 1982 – Moreira Salles Group increased participation from 50,5% to 55%</p> <p>1981 – Capacity Expansion (26,000 tpy of FeNb)</p> <p>1989 – Electron-Beam Furnace (Niobium metal)</p>	<p>1992 – New Niobium Oxide Plant</p> <p>1994 – ISO 9002</p> <p>1997 – Vacuum grade Niobium master alloys – full integration</p> <p>1997 – ISO 14001</p>	<p>2000 – Special Niobium Oxide (150tpy)</p> <p>2000 – FeNb Capacity Expansion to 50,000 tpy</p> <p>2002 –OHSAS 18001</p> <p>2003 – Profit Sharing Agreement extension up to 2032</p> <p>2003 – FeNb Capacity Expansion to 60,000 tpy</p> <p>2007 – FeNb Capacity improvements to 70,000 tpy</p> <p>2008 – ISO 17025</p> <p>2008 – FeNb Capacity Expansion to 90,000 tpy</p>

Premium large, long-life, low cost niobium mine

- **CBMM operates the largest, highest grade, longest life and lowest cash cost niobium mine globally**
 - its reserve base is scalable and represents 100+ years at current production levels
 - the Company's FeNb production capacity of 90 ktpa is significantly larger than its next largest competitor with 7 ktpa
- **The Company's use of basic, mechanised, open-pit mining techniques results in low operating risk**
 - does not make use of any drilling, blasting or heavy machinery, which significantly reduces its operating cost and increases safety
- **CBMM benefits from a favourable geographic location and efficient global distribution**
 - the region is served by highways and rail with easy access to major ports of the country
- **Intention to increase production capacity from 90ktpa to 150ktpa by 2015**
 - low capital cost relative to cash flow potential
 - continue to provide excess capacity and security of global supply

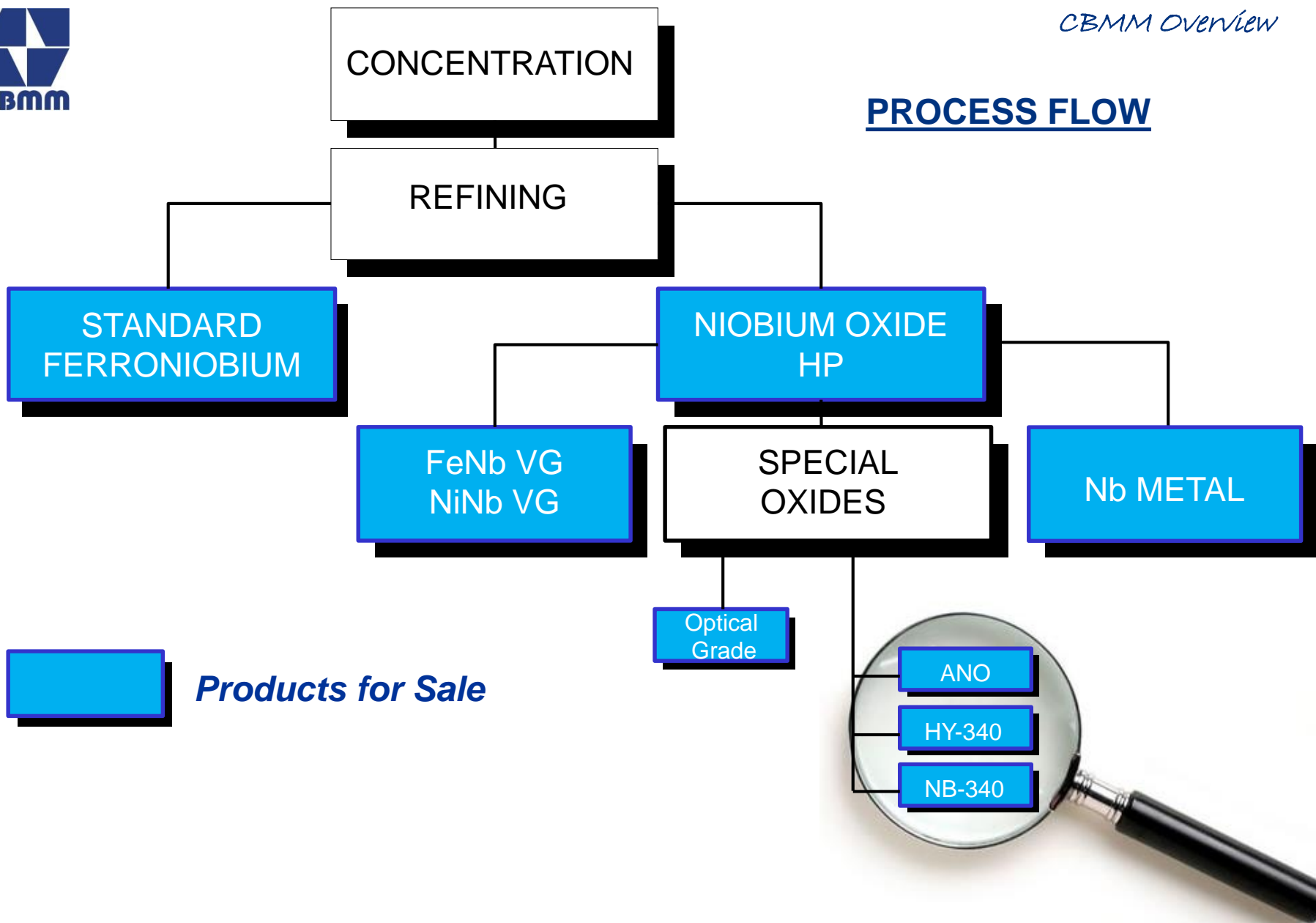


Map of operations



— Main roads — Main roads

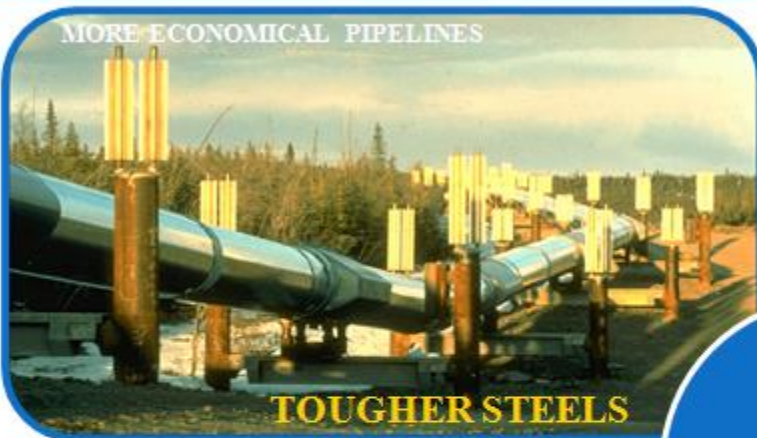
PROCESS FLOW



GLOBAL TECHNOLOGY PARTNER TO THE STEEL INDUSTRY

SUPERIOR PROPERTIES

MORE ECONOMICAL PIPELINES



TOUGHER STEELS

LEANER STRUCTURES



STRONGER STEELS

Niobium

STRONGER STEELS



HIGHER FUEL EFFICIENCY
BETTER EMISSIONS CONTROL

IMPROVED SUPER ALLOYS

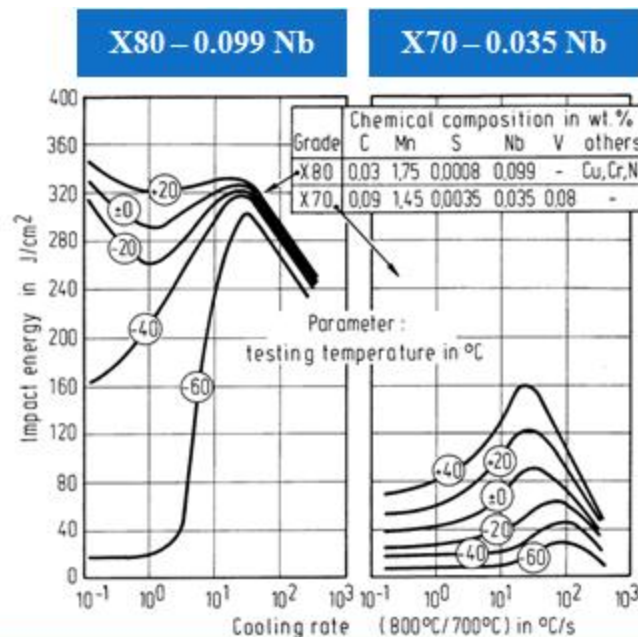


HIGHER ENERGY EFFICIENCY

Niobium is unchallenged for its main applications

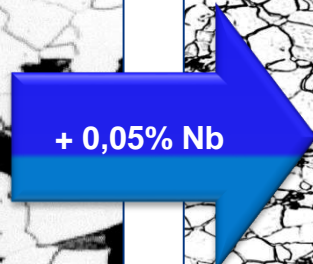
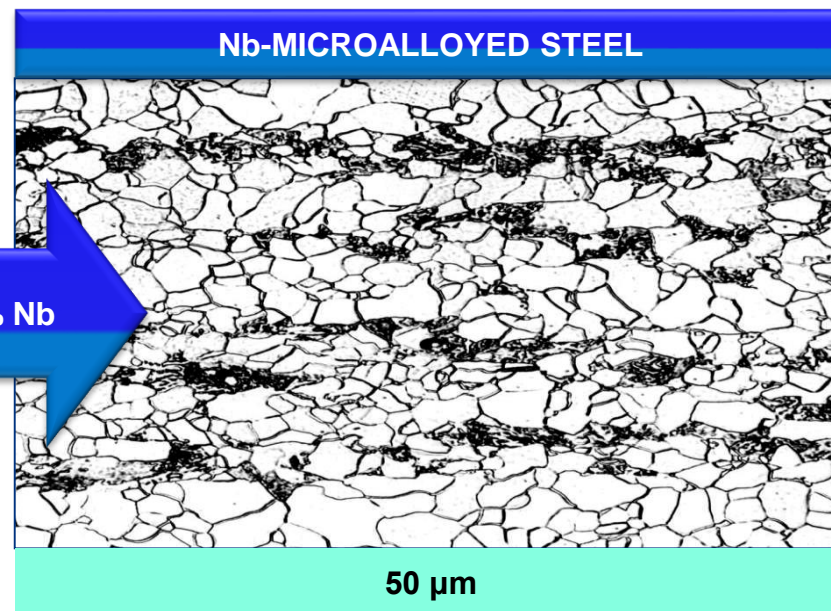
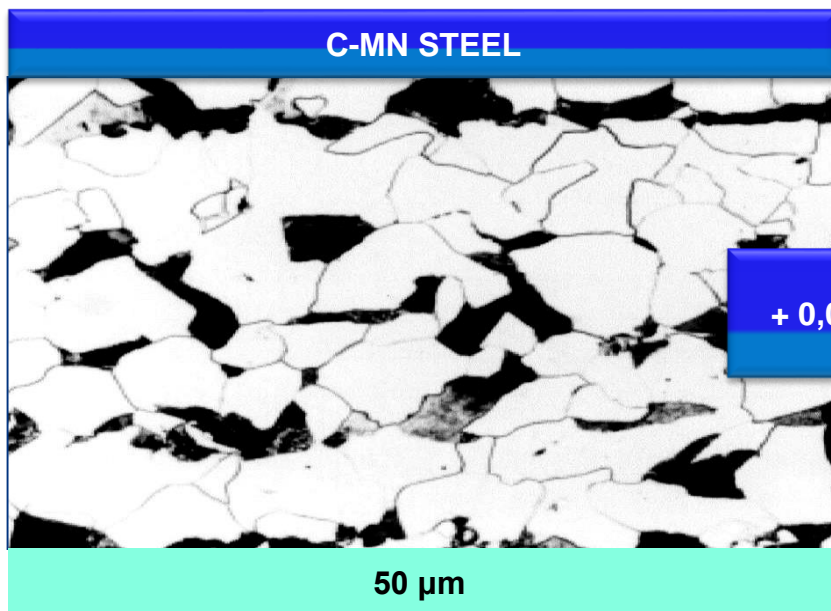
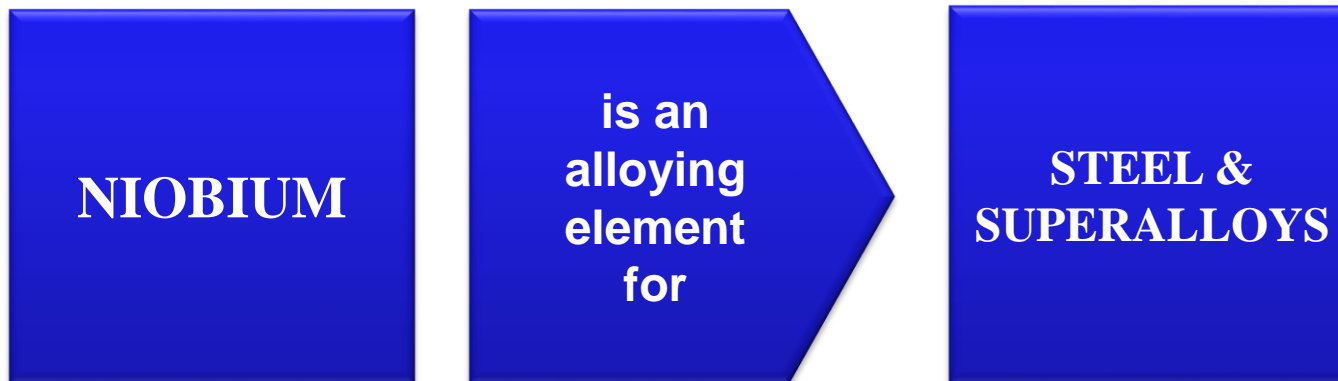


WITHOUT NIOBIUM – LOW RESISTANCE TO CRACK ADVANCE (TOUGHNESS)



NIOBIUM TECHNOLOGY ARRESTS CRACKS

WHAT ARE THE BENEFITS OF NIOBIUM ???



NIOBIUM APPLICATION: 90 % of Niobium is used in Steel

- ✓ **The most important application for niobium is as an alloying element to strengthen HSLA (high-strength-low-alloy) steels used to build automobiles, high pressure gas transmission pipelines and heavy structures. Niobium is also utilized in stainless steel applications such as automobile exhaust systems**
- ✓ **An important secondary role for niobium is to provide creep strength in superalloys (nickel-based) operating in the hot section of aircraft gas turbine engines**
- ✓ **It is also used in the production of superconducting niobium-titanium alloys for building MRI magnets. Minor applications include electronic ceramics and camera lenses**

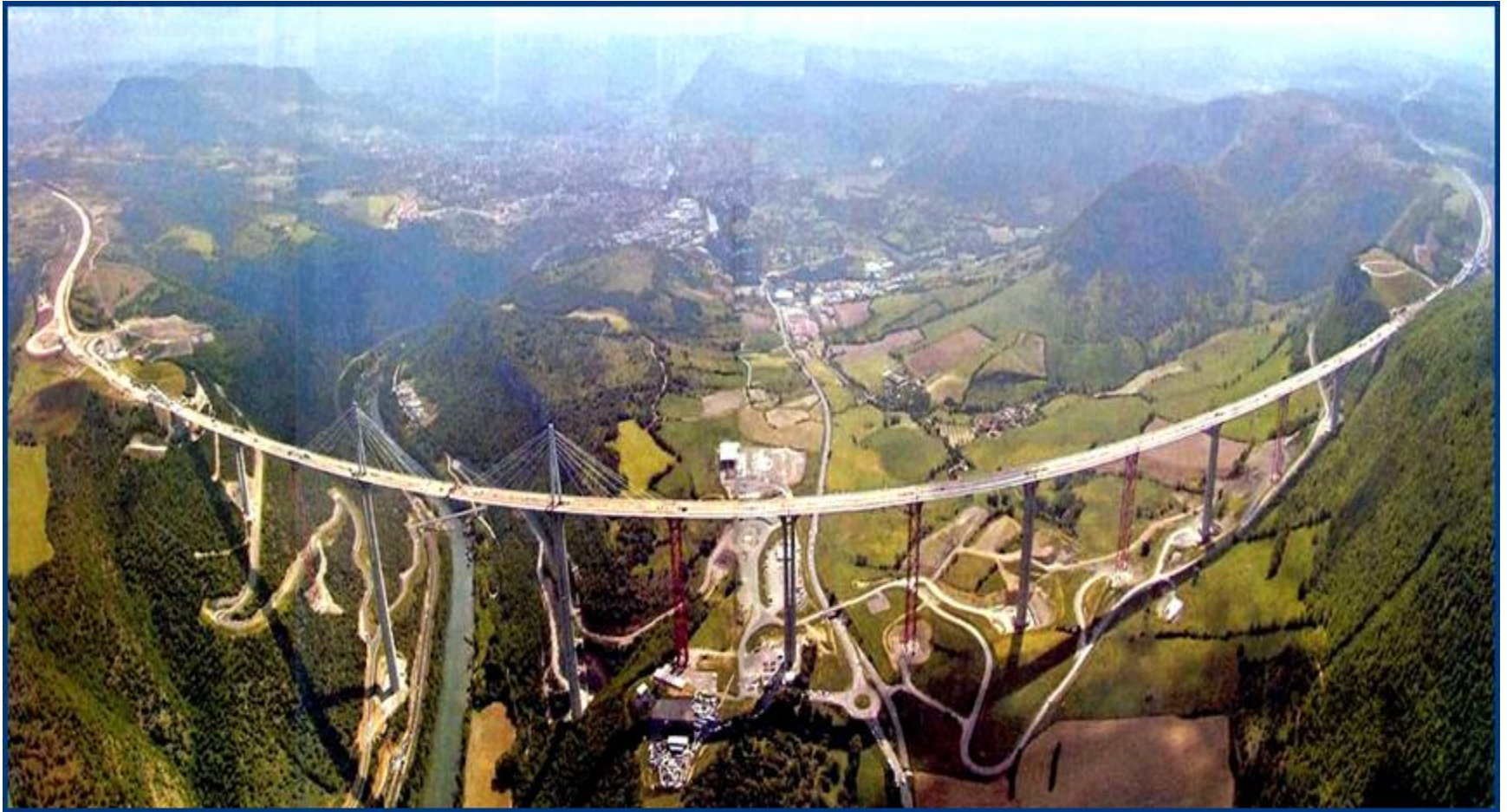


NIOBIUM APPLICATION: Oil and Gas Pipeline

CBMM PARTNERSHIP WITH CNPC AND STEELMAKERS LED TO UPGRADE IN SPEC



NIOBIUM APPLICATION: Structural Application

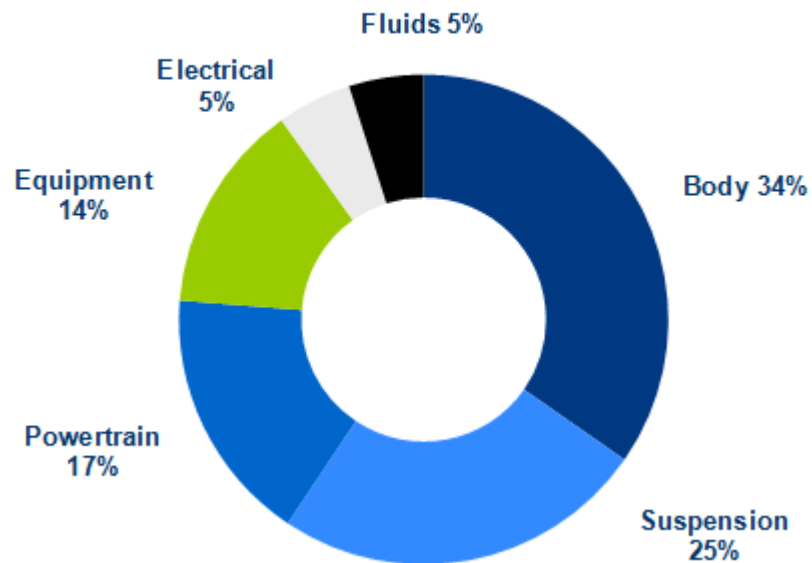


Millau Valley Bridge, France – Sir Norman Foster, architect

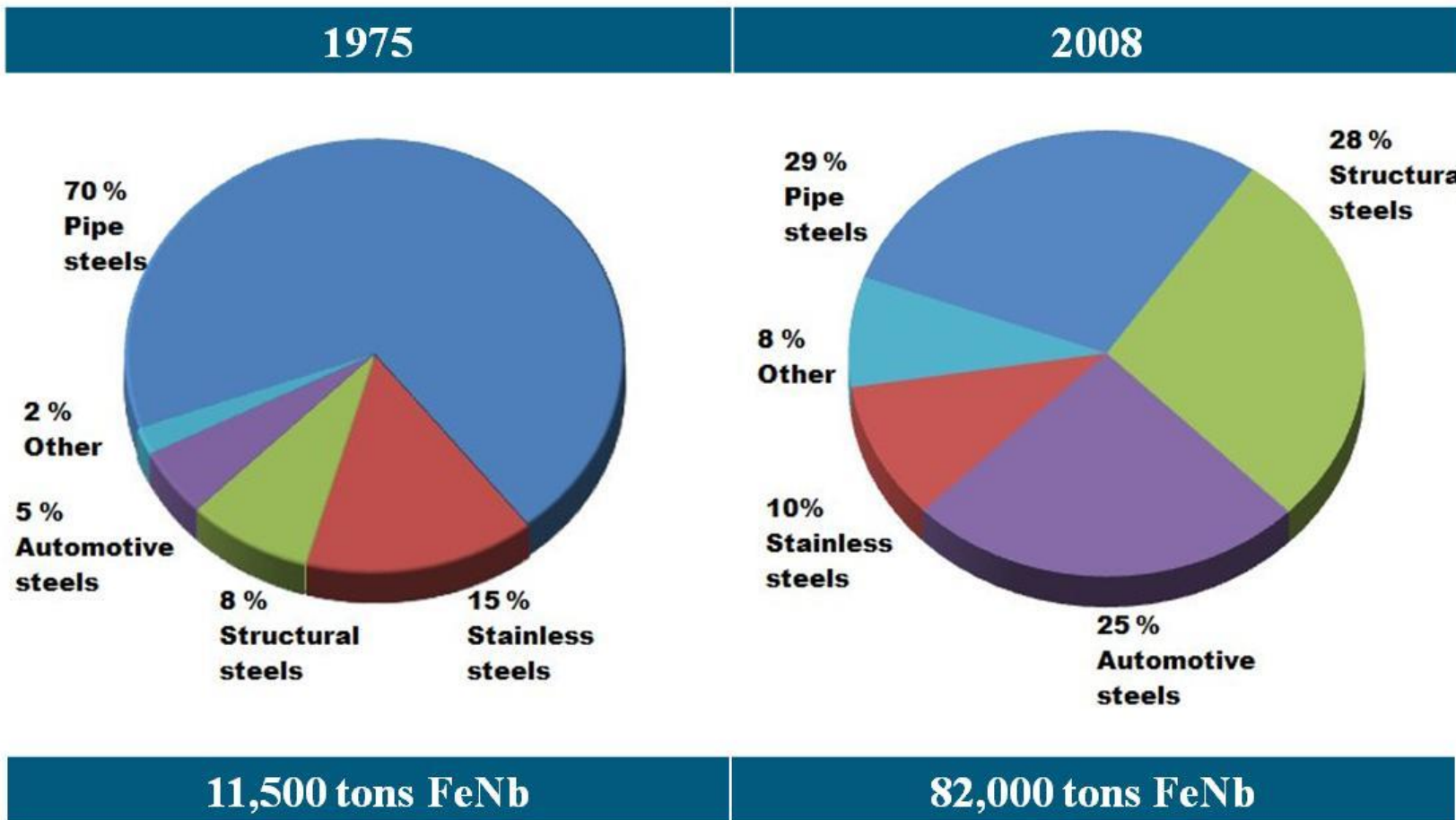
NIOBIUM APPLICATION: Auto Industry



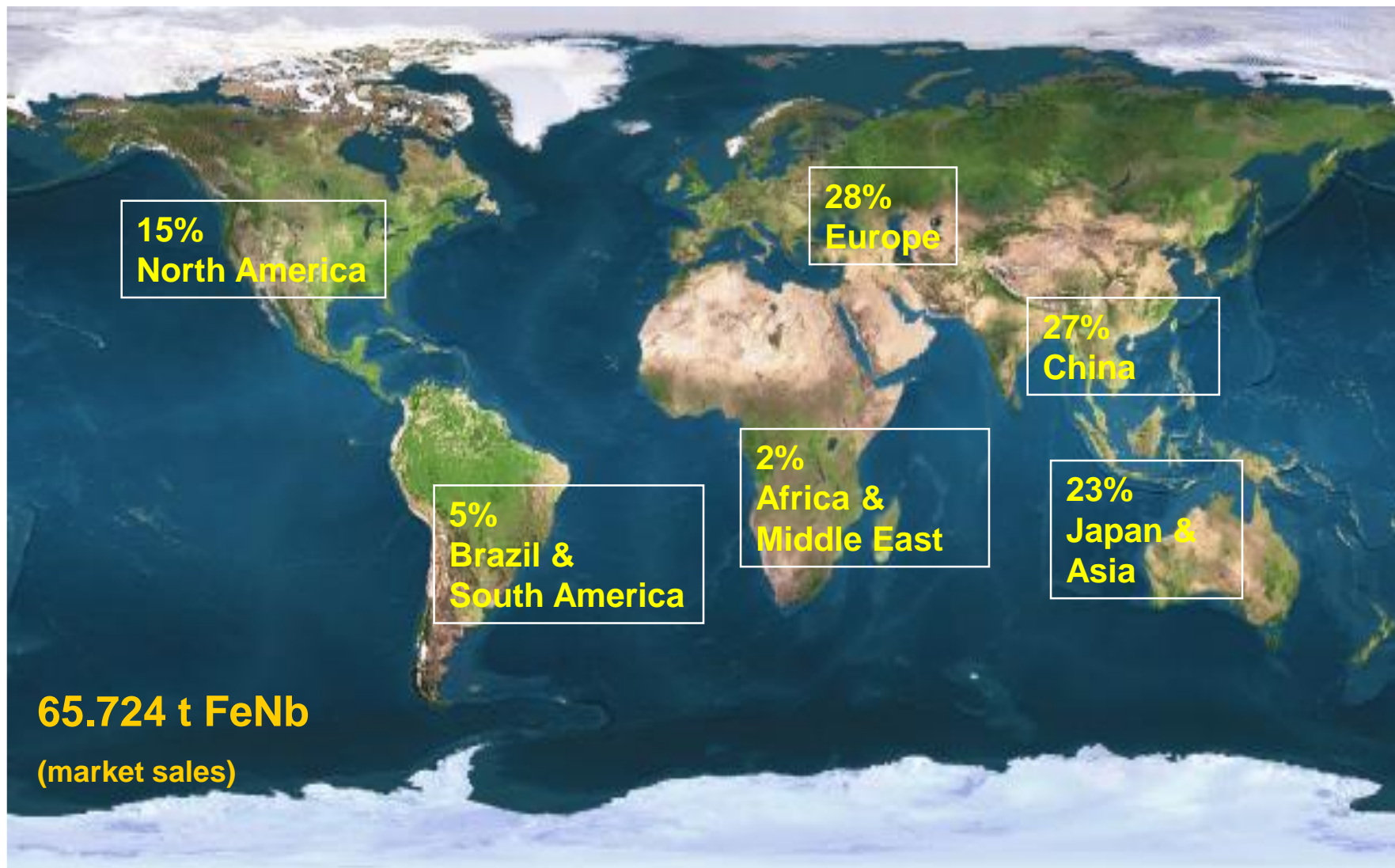
CONTRIBUTION TO TOTAL WEIGHT IN CARS



Diversification of Niobium Application



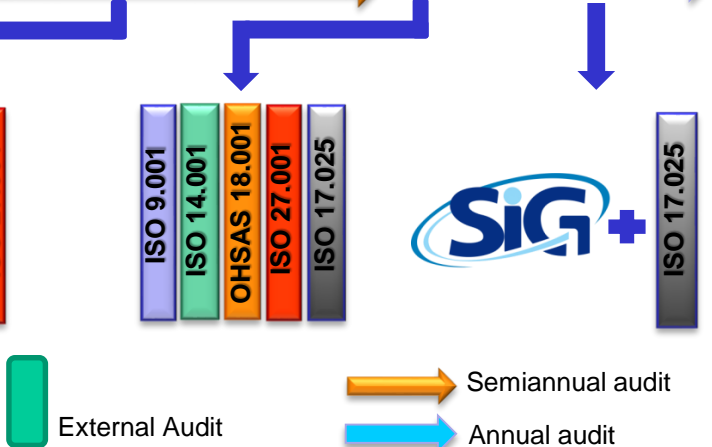
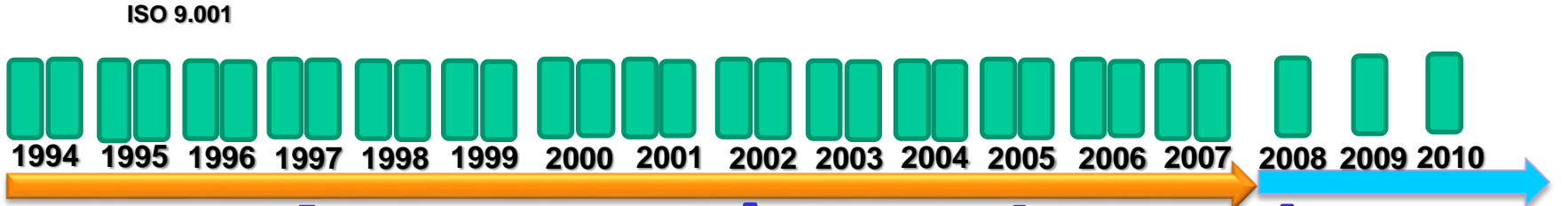
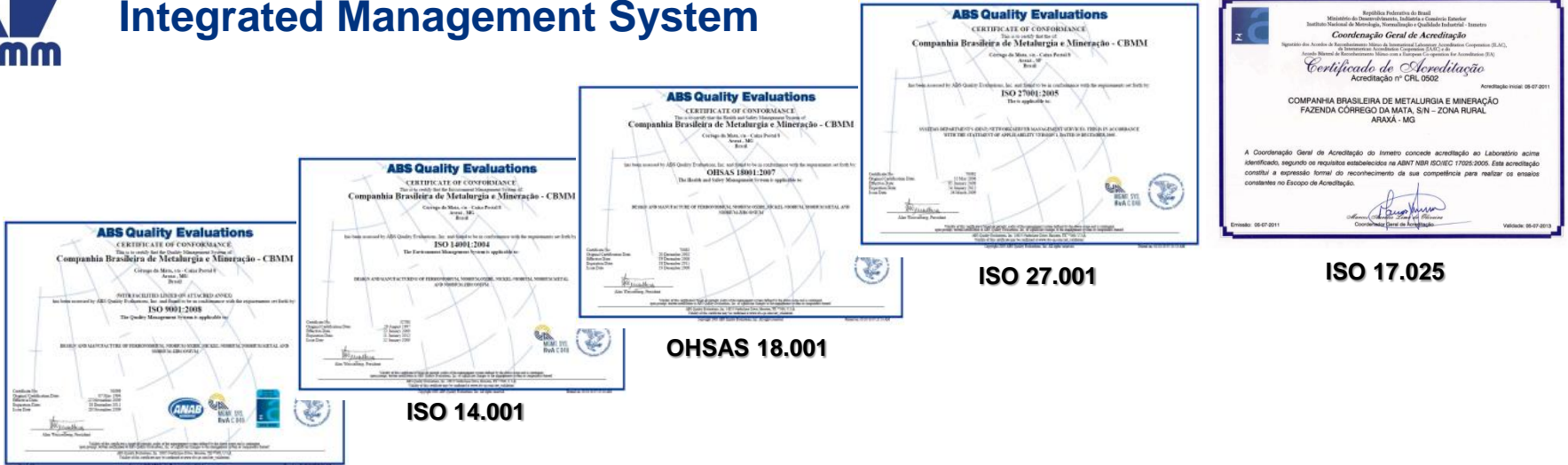
Market Sales – CBMM 2011



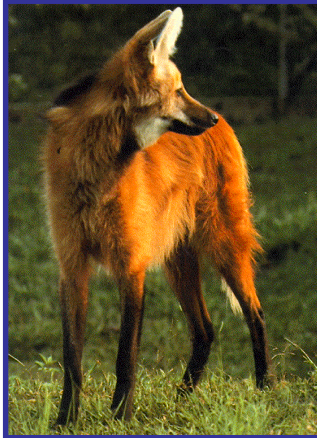


Integrated Management System

CBMM Overview



Development Environmental Center



Research, breeding in captivity and reintroducing to nature endangered species of *cerrado* from Minas Gerais.

Development Environmental Center



Grow plant species native to cerrado, endemic to Brazil, and exotic: reforestation, landscaping, donations to the Community.

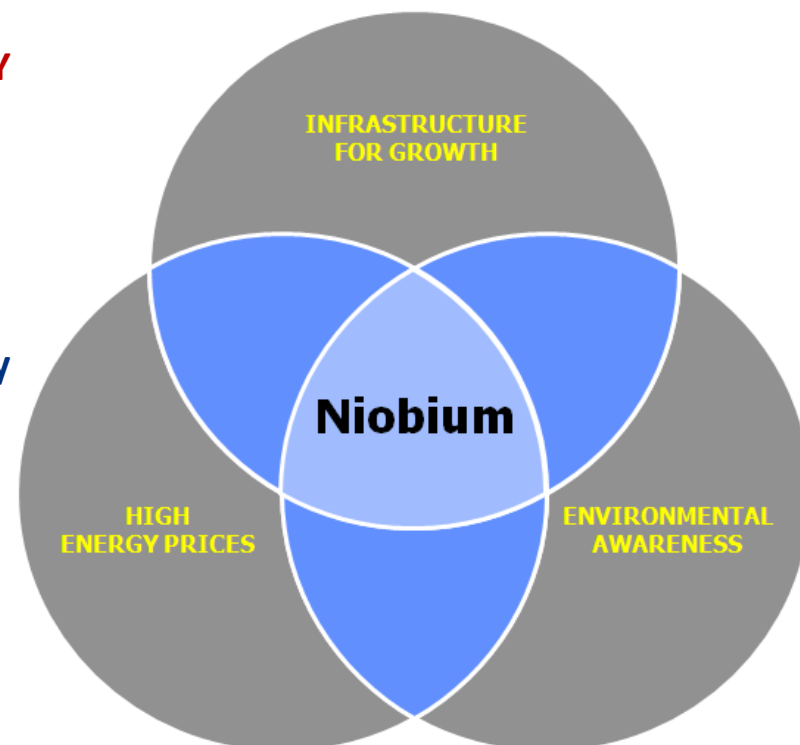
Development Environmental Center



Development of environmental education: teachers from local schools give courses, lectures, and instruction to visiting students on the flora and fauna of the region.

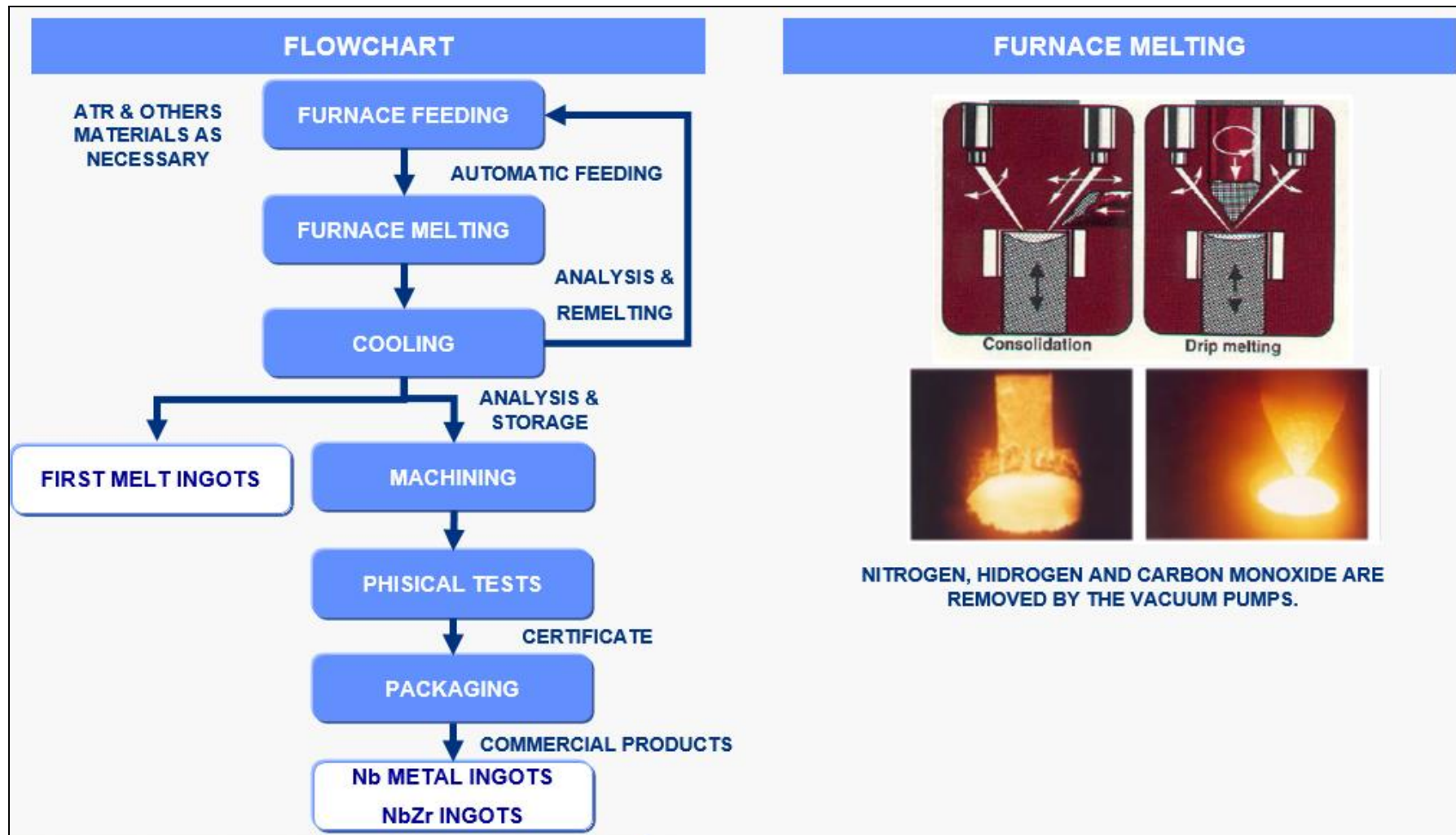
NIOBIUM – Technology for Today's Challenges

1. CBMM : raw material and **TECHNOLOGY** supplier;
2. 40 years invested in R&D projects
3. In order to help clients with Nb technology implementation CBMM can act as a partner in:
 - Co-operation projects ;
 - Providing technical assistance and process specialists;
 - Keeping all the information confidential





Pure Niobium Metal Facilities



EB01



Start up 1989
Capacity 60 ton/year (3th Melting)
Power: 2 X 250 Kw (2 guns)
Beam acceleration voltage 35 KV
Pumping capacity 50.000 liter per second

EB02



Start up 2003
Capacity 150 ton/year (3th Melting)
Power: 3 X 600 Kw (3 guns)
Beam acceleration voltage 45 KV
Pumping capacity 150.000 liter per second

CBMM NIOBIUM METAL PRODUCTS

- ✓ **Ingots diameter**
 - Ø 530mm EB2
 - Ø 400mm EB2
 - Ø 350mm EB2
 - Ø 300mm EB2
 - Ø 250mm EB1 and EB2
 - Ø 200mm EB1 and EB2

- ✓ **Ingots length up to 2200 mm**

- ✓ **As cast or machined**

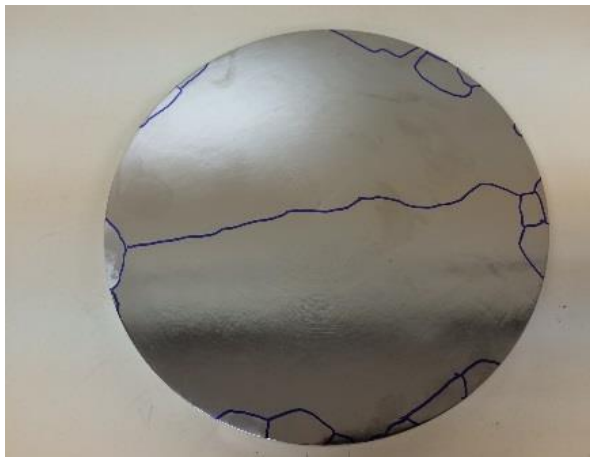
- **Reactor Grade** Ta < 300 ppm
- **Reactor Grade** Ta < 1000 ppm
- **Commercial grade** Ta < 2000 ppm



INGOTS PRODUCED FOR HIGH RRR EVALUATION



SAMPLES FOR RRR ANALYSIS – NIOBIUM APPEARANCE





Thank You