

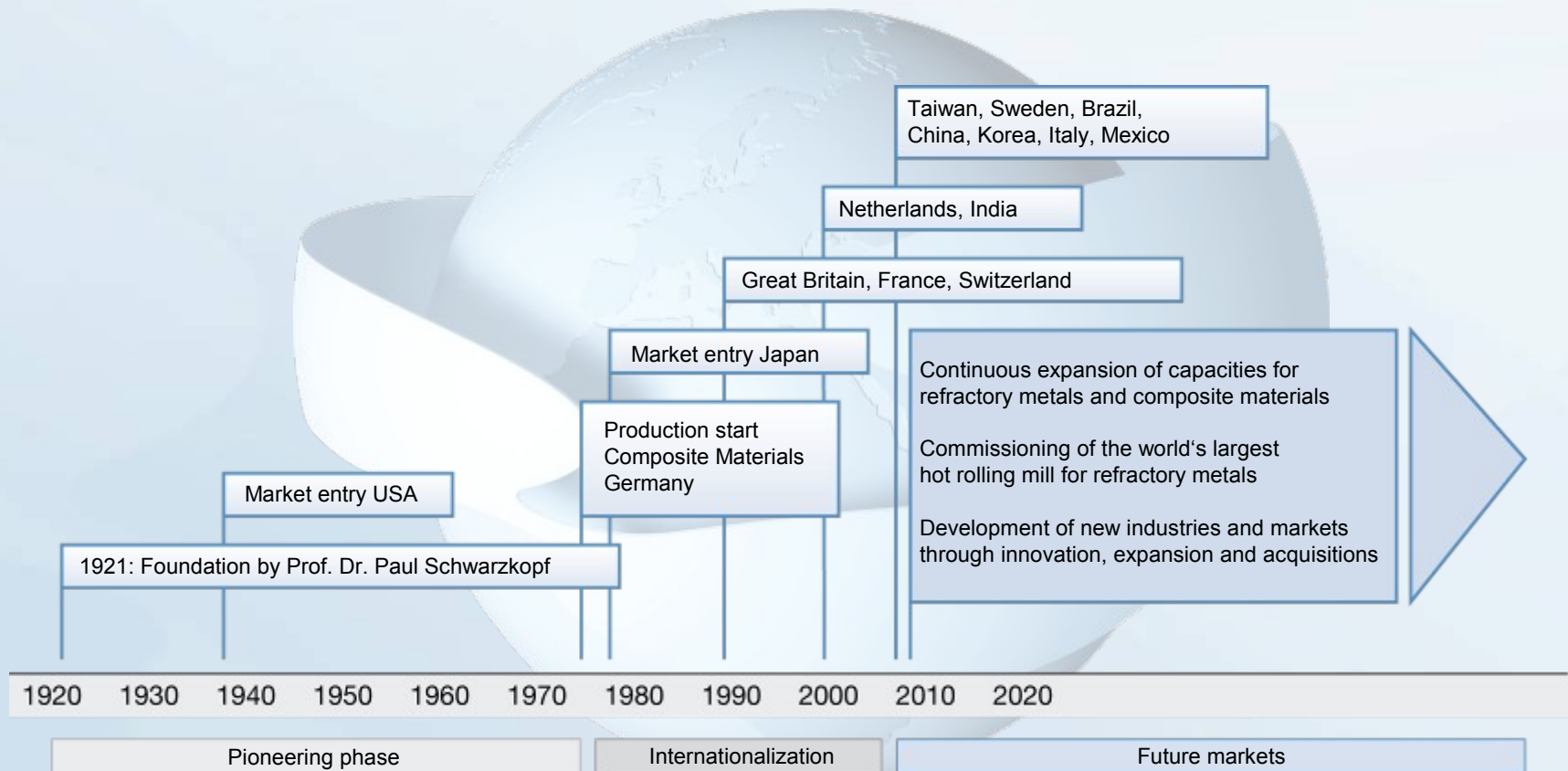
Progress and Capability of Nb-RRR Sheet Production

2nd Workshop on SCRF Cavity Technology and Industrialization for the ILC,
Chicago 2011

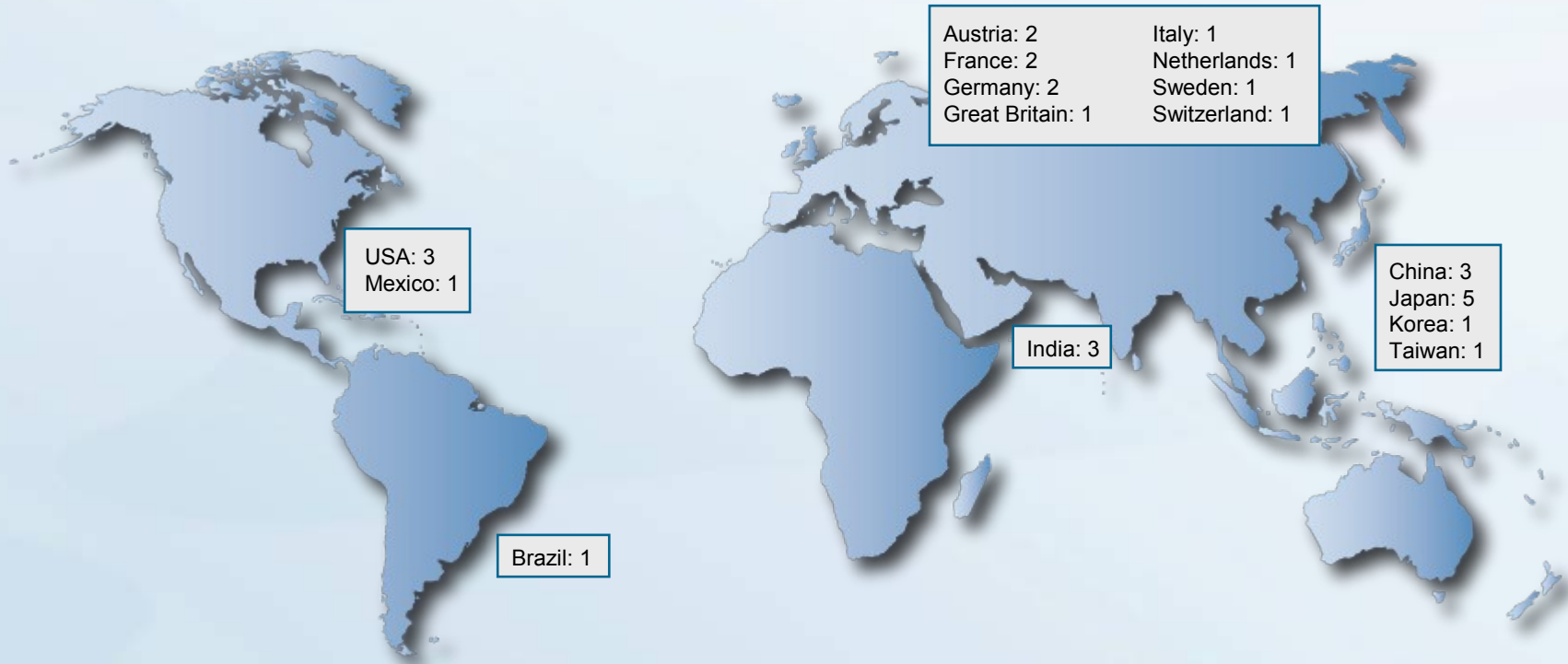
- **PLANSEE:**
 - Company profile
 - Core competences
 - Production program
- **Nb-RRR activities:**
 - Qualification as material supplier
 - Manufacturing line and capabilities
 - Material Properties
 - R&D activities

Company history.

Continuous development.



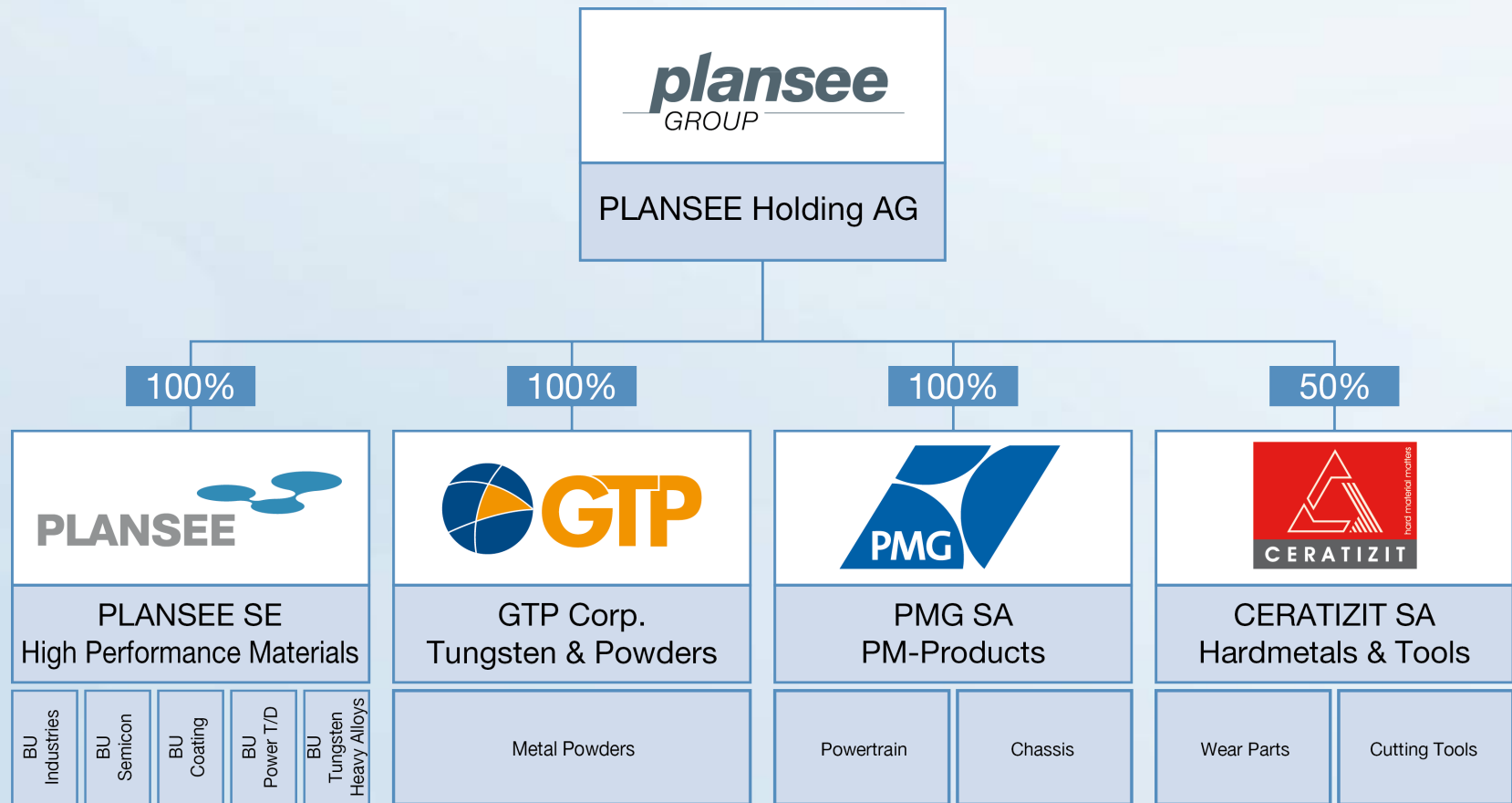
PLANSEE High Performance Materials. Worldwide.



28 locations in 16 countries

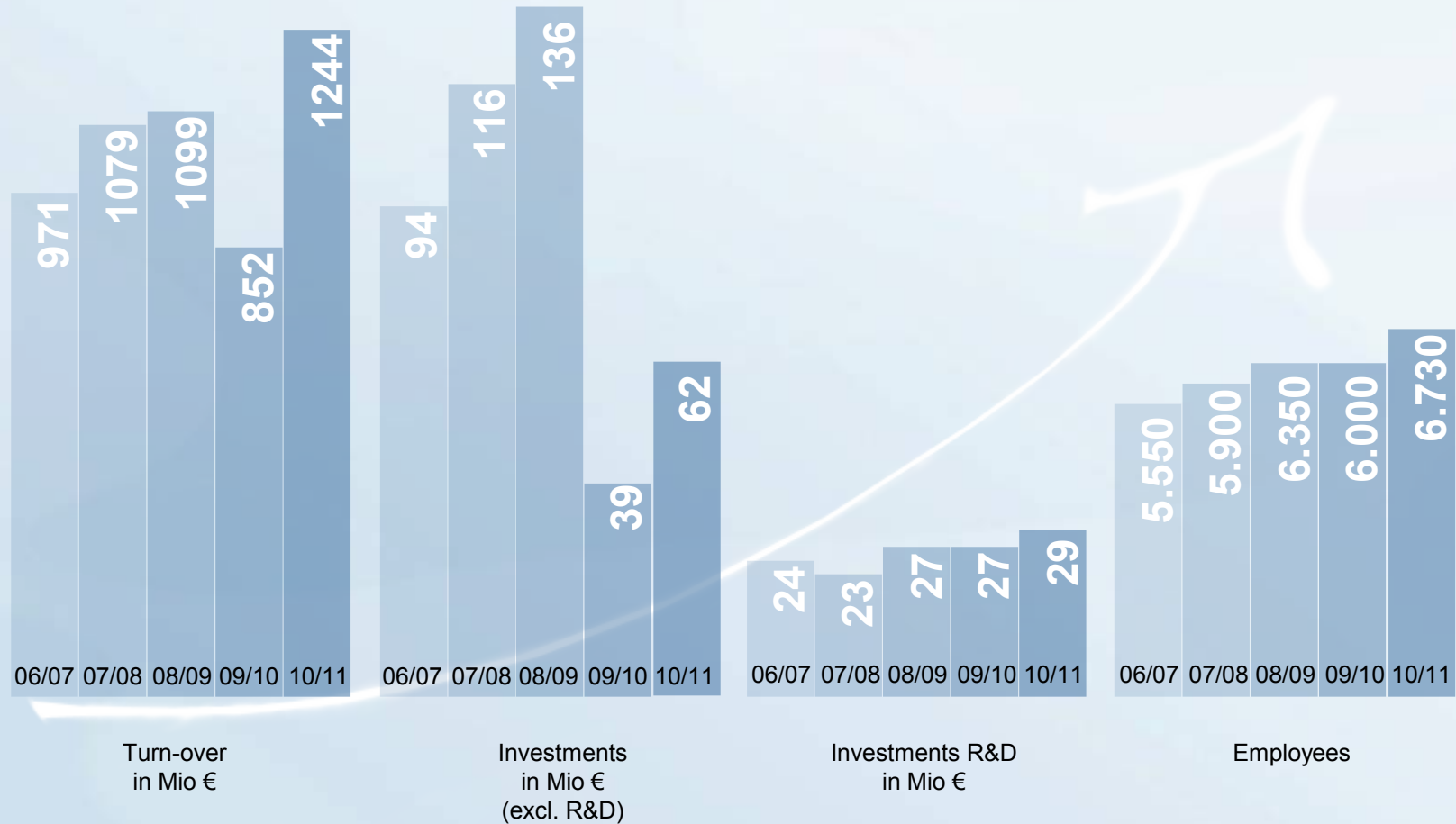
PLANSEE High Performance Materials.

Part of the Plansee Group.



PLANSEE Group.

The facts.



The fiscal year ends on the last day of February.

A global network. Company headquarters in Reutte.

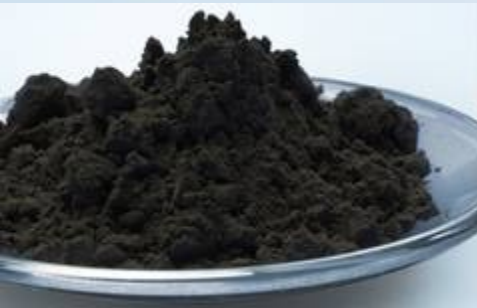
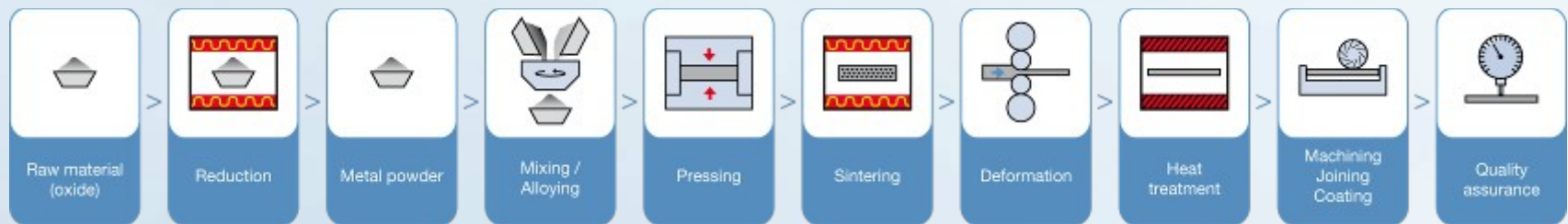
Aerial of the Plansee Group facility in Reutte, Austria.



Highest performance.

Powder-metallurgically manufactured.

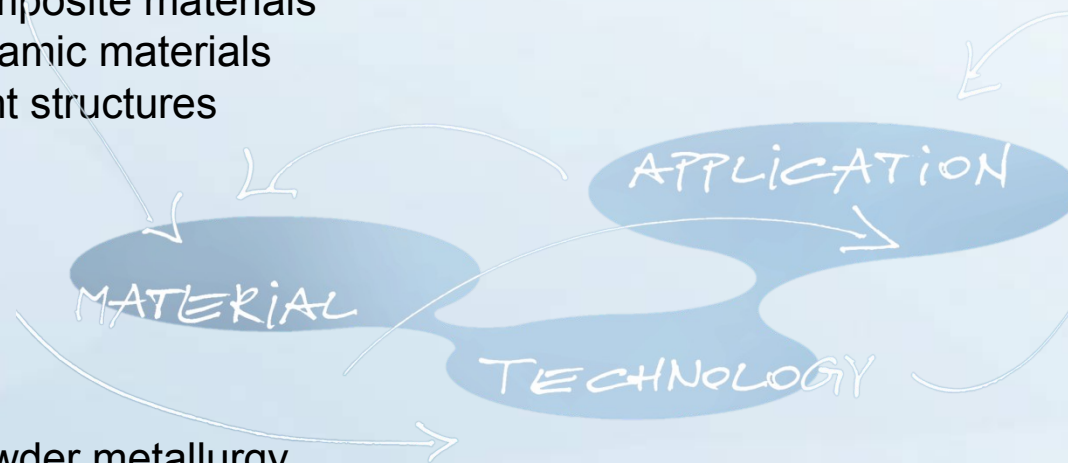
Production of semi-finished products, components and complex system solutions.



Experience and continuous research.

- Refractory metals
- Hard materials
- Hard metals
- PM steel products
- Composite materials
- Ceramic materials
- Joint structures

- Automotive industry
- Aerospace
- Medical systems
- Electronics
- Mechanical engineering and plant construction
- Power engineering
- Lighting
- Environment
- High-temperature furnaces and chemical apparatus
- Metal fabrication and forming
- Glass/ceramics
- Coating
- Wood and paper processing

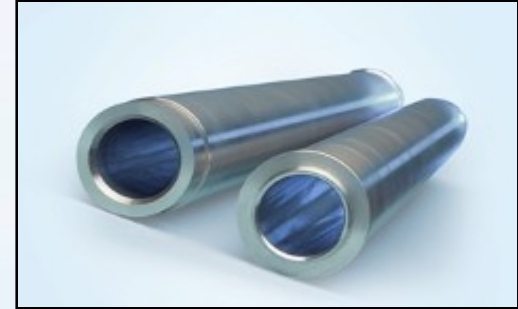


- Powder metallurgy
- Metal forming technology
- Metal working technology
- Joining technology
- Surface technology
- Modelling
- Design and engineering

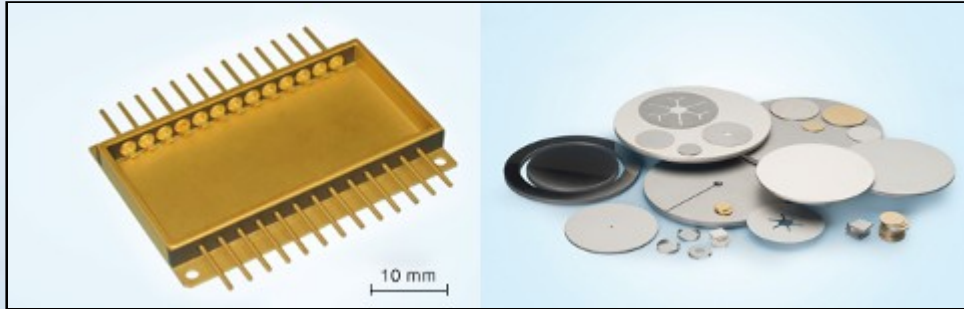
Core Products Molybdenum / Tungsten



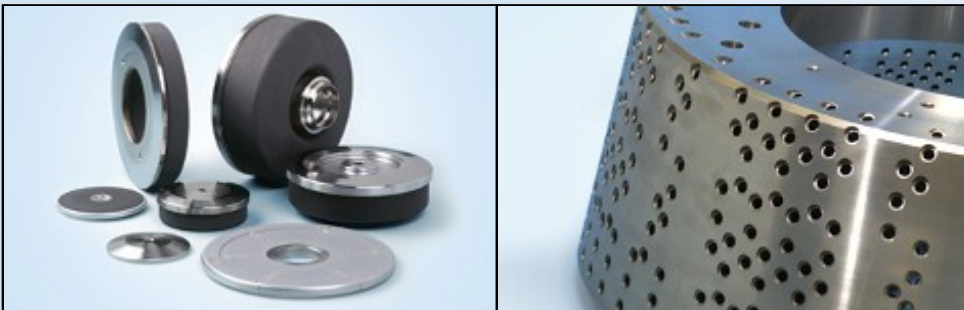
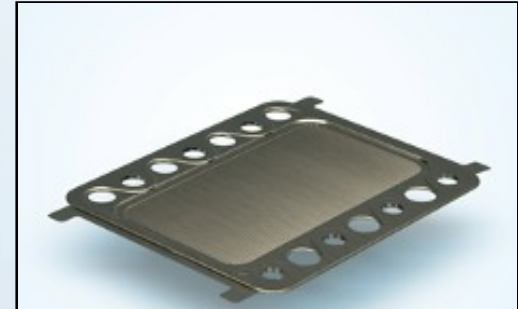
Lighting Technology



Coating Technology



Electronics



Medical Technology

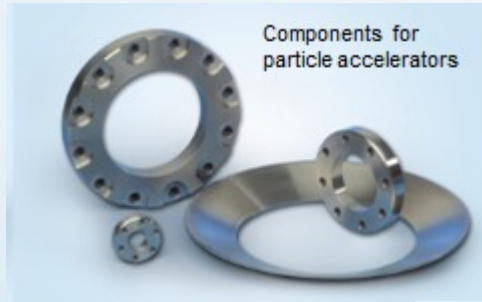


Power Technology

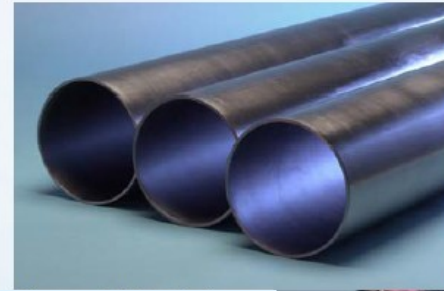
Tantalum / Niobium Products



Ta-/Nb- wires for electronic industry



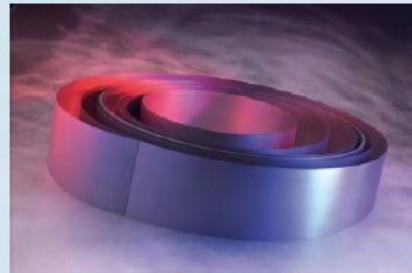
Nb-RRR components for particle Accelerators



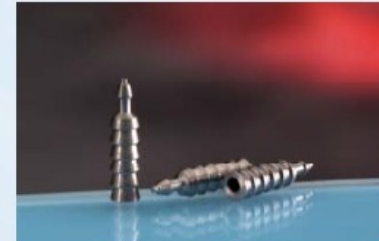
Ta-/Nb- tubes for superconductors chemical engineering, and medical application



Nb insert for 25 Euro collectors coin (Austrian Mint)



Ta-/Nb- foils and cups for lighting industry and production of PC diamonds

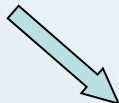


Ta-/Nb- machined parts

Nb-RRR activities at Plansee

- **2004: Start of Activities:**
 - in cooperation with W.C. Heraeus
- **Establishment of fabrication process**
- **Prototype production for qualification at DESY / XFEL**
 - sheet manufacturing in 3 production loops
 - fabrication of single-cell and 9-cell cavities acc. XFEL design (DESY)
 - performance testing acc. XFEL standard (DESY)
- **2007: Qualification as sheet manufacturer for XFEL**
- **2009: Start of production for Nb-RRR 300 sheets under industrial scale.**

Heraeus



PLANSEE

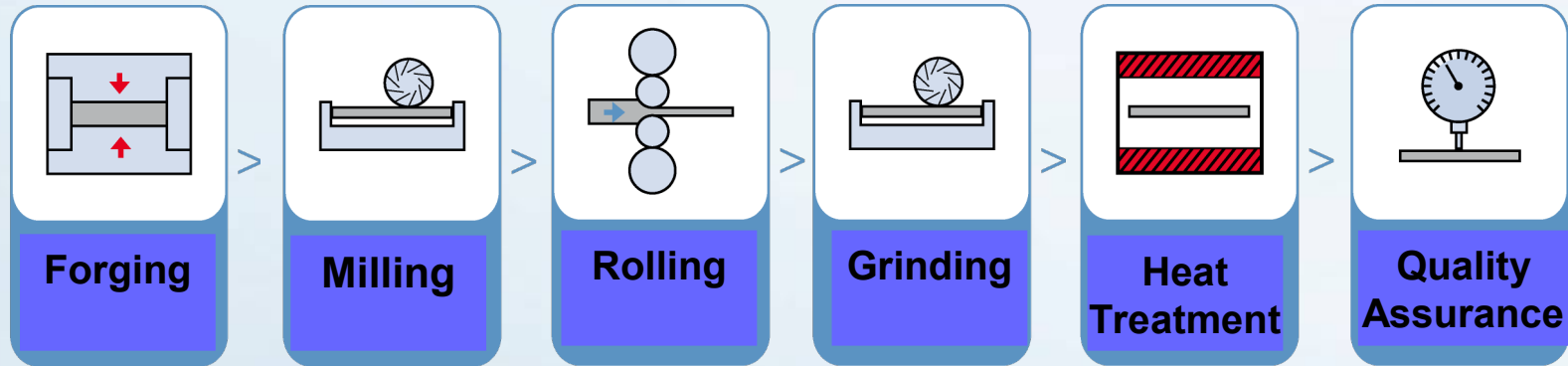


XFEL
X-Ray Free-Electron Laser

The European X-Ray Laser Project XFEL



Nb-RRR: Manufacturing Line / Capabilities



Rolling Mill:



- Width: 600 / 900 mm
- Force: 3000 t

Vacuum: $< 10^{-6}$ mbar –
Length: 3000 mm –
Width: 800 mm –

Heat Treatment:



Nb-RRR: Material Properties

Ingot – Nr.	XFEL	3206	3208NS	3209
RRR	> 300	336...422	416...501	369...472
Härte (HV5)	< 60	37...50	36...49	32...47
Grain Size (ASTM)	> 6	5,5	5,6	7,6
Grain Size (loc.)	4-5	5,0	4,7	4,9
Mech. Properties				
TS (MPa)	> 140	152...168	145...175	147...181
YS (MPa)	50...100	61...87	70...93	62...71
A (%)	> 30	35...72	43...72	38...70
Remark	Spec.	*)	*)	*)

*) Measured on sheet material # 2,8 mm (final inspection)

Nb-RRR: R&D Activities

- **Large Grain / Single Crystal sheet manufacturing (DESY)**
- **Investigation program: Influence of specific material properties on RRR value**
- **Establishment of production technology for seamless tubes ($\varnothing > 100$ mm)**

A step ahead.
For our customers.

Thank you.