

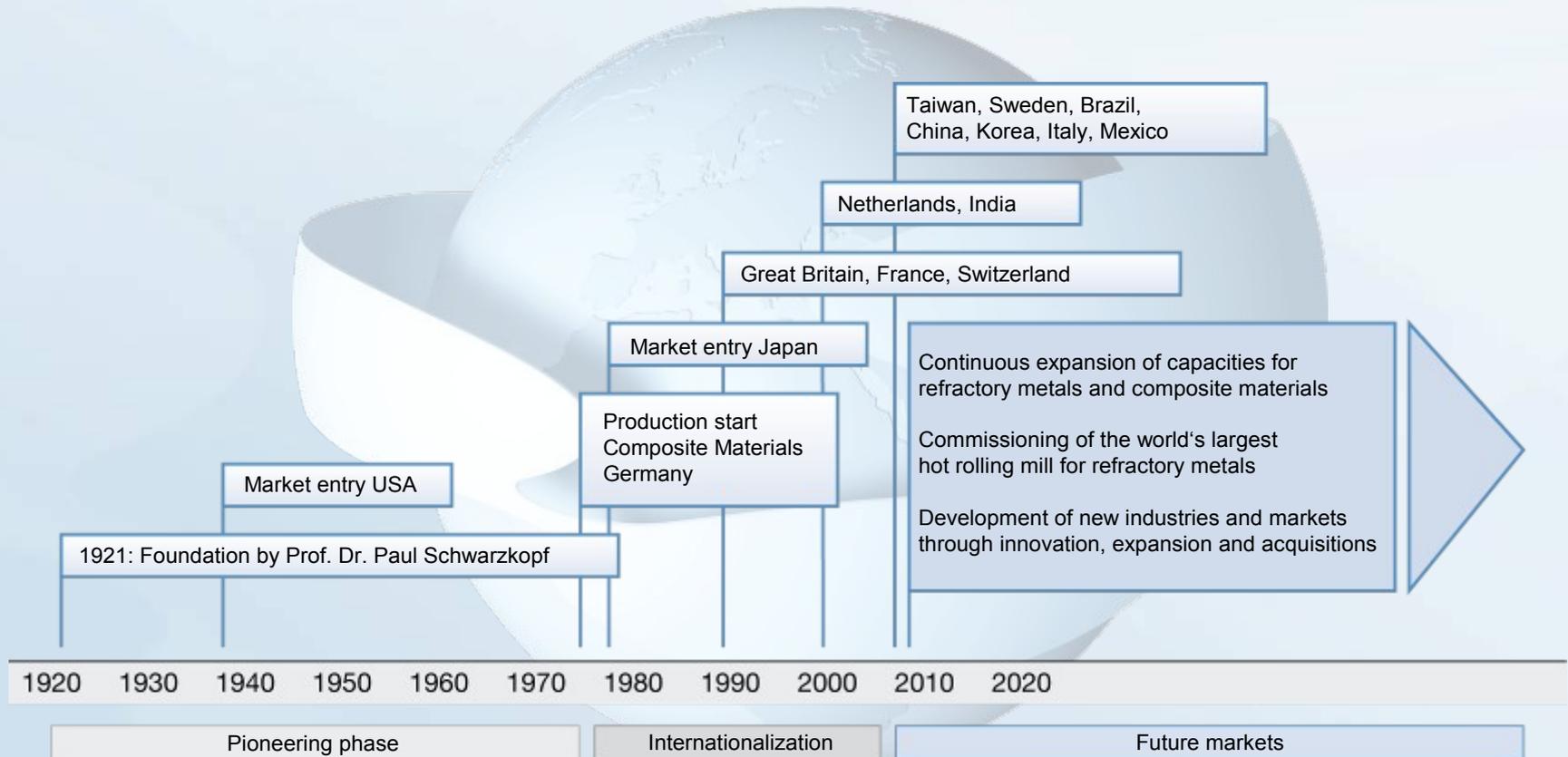
# Progress and Capability of Nb-RRR Sheet Production

2<sup>nd</sup> Workshop on SCRF Cavity Technology and Industrialization for the ILC,  
Chicago 2011

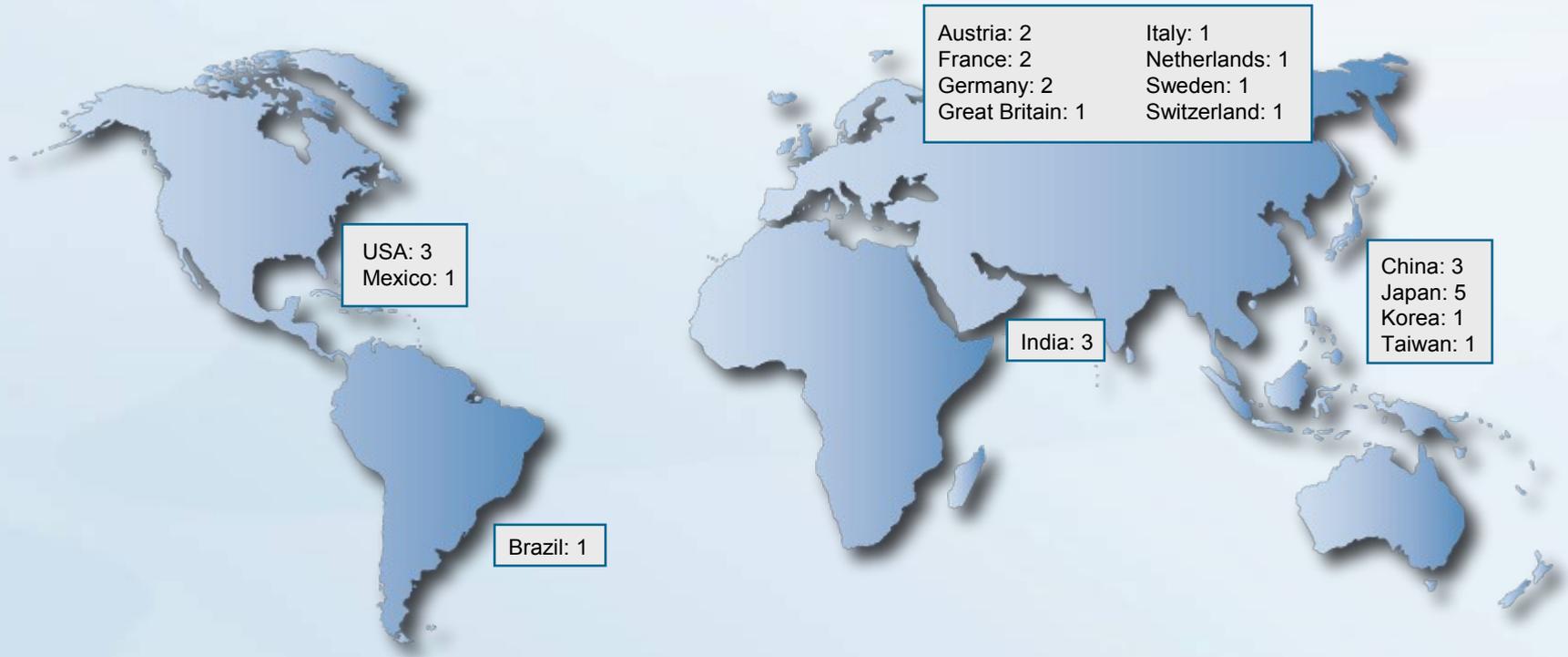
- **PLANSEE:**
  - Company profile
  - Core competences
  - Production program
  
- **Nb-RRR activities:**
  - Qualification as material supplier
  - Manufacturing line and capabilities
  - Material Properties
  - R&D activities

# Company history.

## Continuous development.



# PLANSEE High Performance Materials. Worldwide.



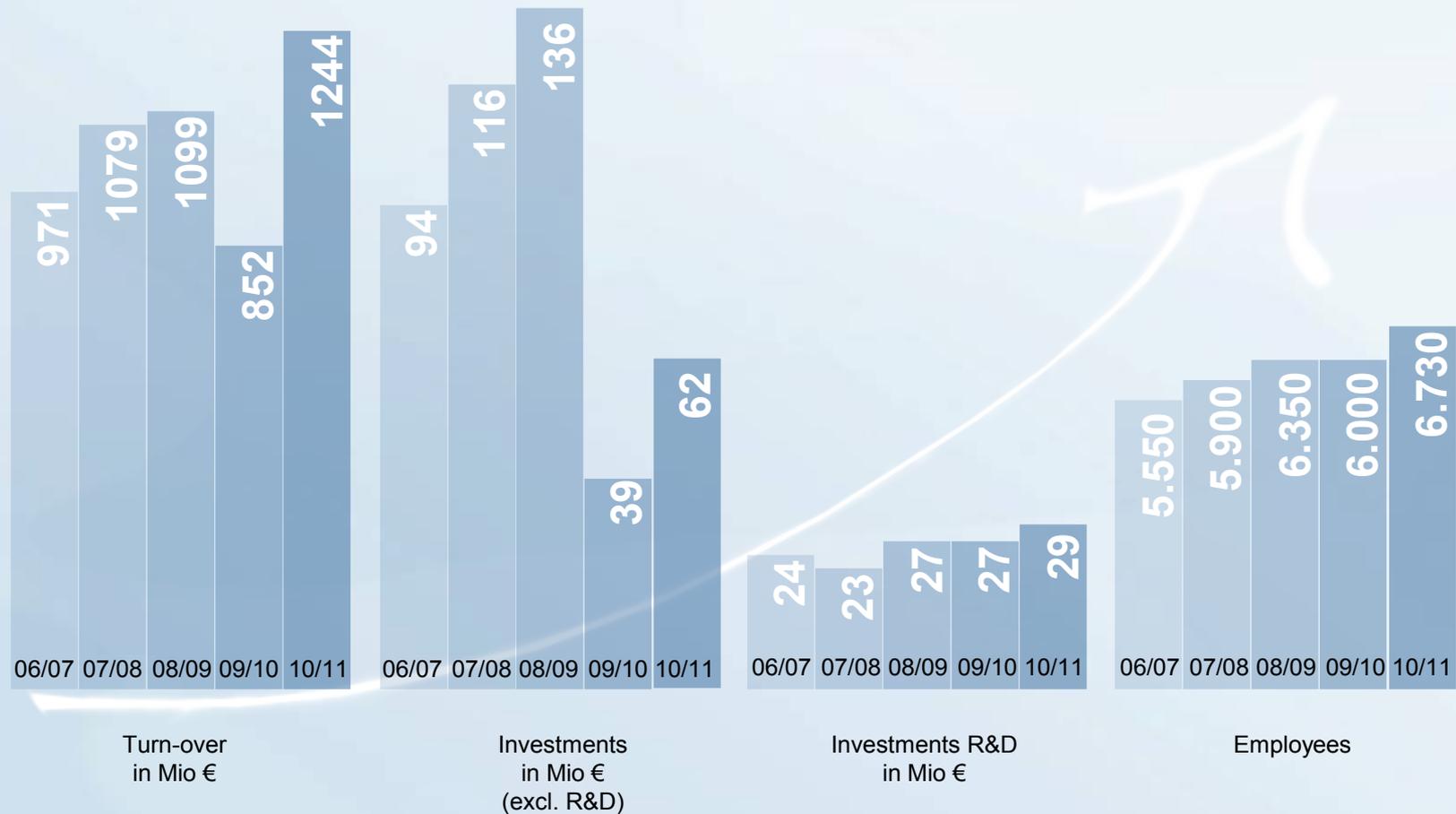
28 locations in 16 countries

# 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.

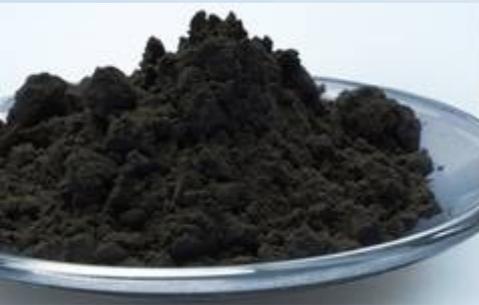
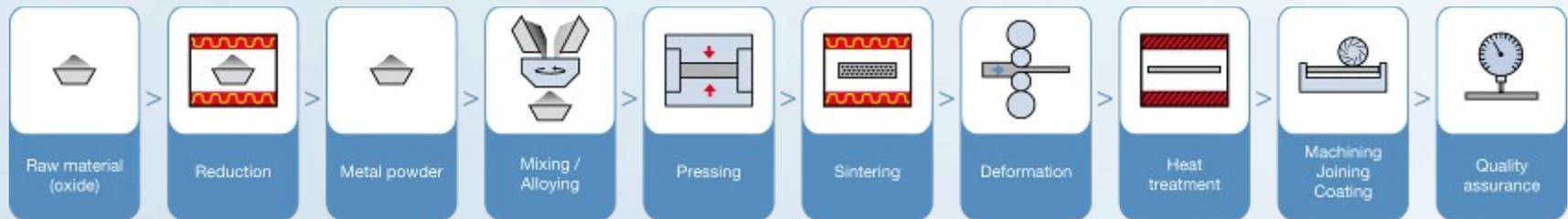
Aerial of the Plansee Group facility in Reutte, Austria.



# Highest performance.

## Powder-metallurgically manufactured.

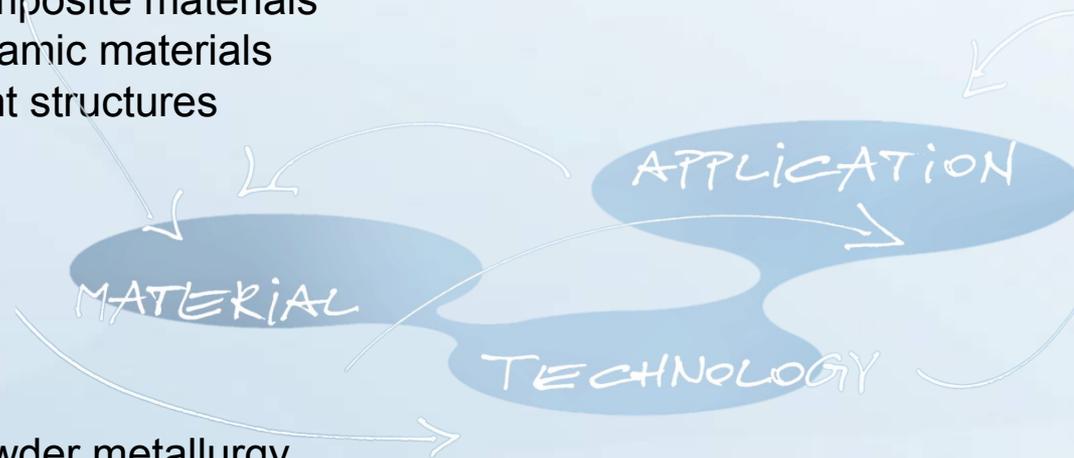
Production of semi-finished products, components and complex system solutions.



# 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

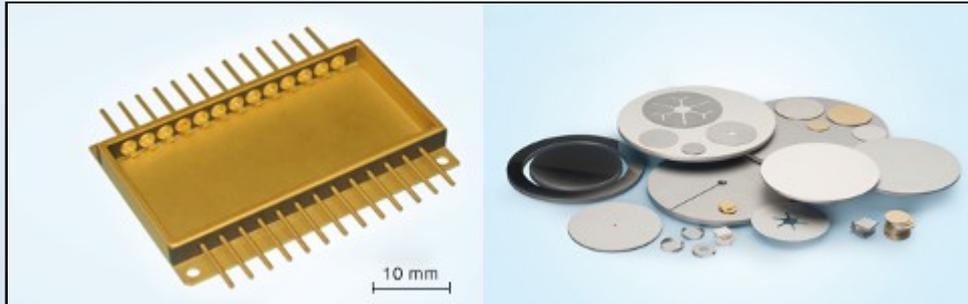
# Core Products Molybdenum / Tungsten



**Lighting Technology**



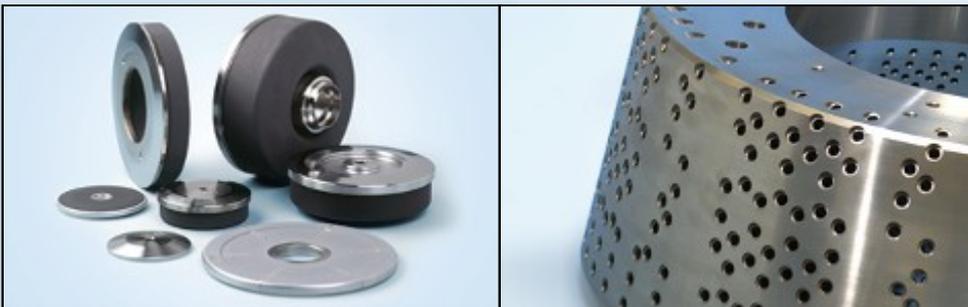
**Coating Technology**



**Electronics**



**Power Technology**



**Medical Technology**

# Tantalum / Niobium Products



**Ta-/Nb- wires for electronic industry**



Components for particle accelerators

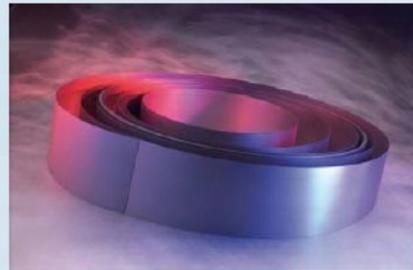
**Nb-RRR components for particle Accelerators**



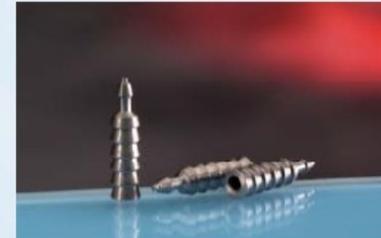
**Ta-/Nb- tubes for superconductors chemical engineering, and medical application**



**Nb insert for 25 Euro collectors coin (Austrian Mint)**



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

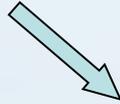


**Ta-/Nb- machined parts**

# 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**



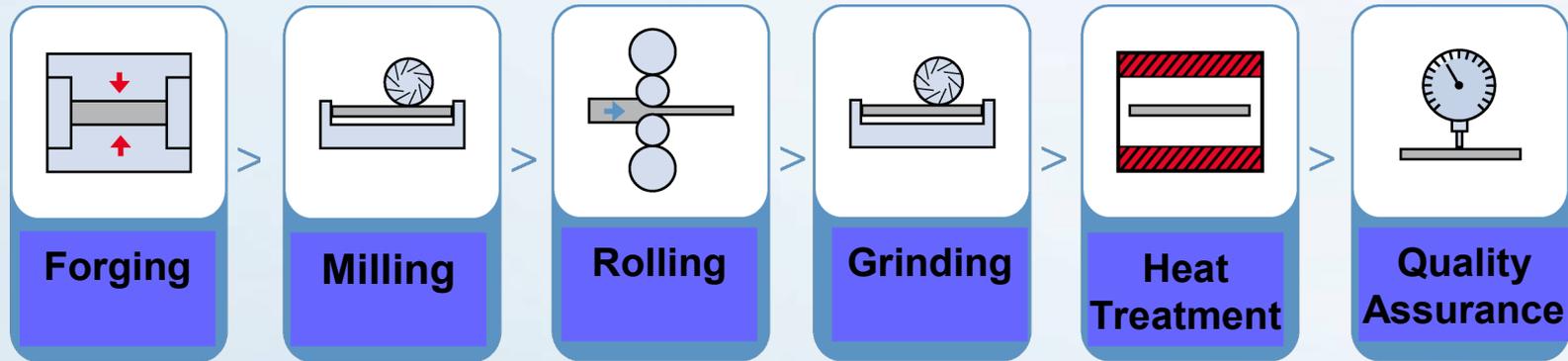
**XFEL**  
X-Ray Free-Electron Laser

The European X-Ray Laser Project XFEL

HELMHOLTZ  
GEMEINSCHAFT



# 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.