DEVELOPMENT ALONG THE VALUE CHAIN THROUGH EU FUNDING

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President

THE TECHNOLOGY OF NANOSTRUCTURED MATERIALS

Powders for industry, research and innovation
The Company

MBN offer new technological solutions to Powder Metal industry, supporting customers to improve quality and to innovate products.

MBN produce a new generation of "nanostructured" materials, which show superior physical and mechanical properties.

Applications and Markets
- Materials for Powder Metallurgy
- Materials for Thermal Spraying
- Powders for and laser deposition

Date of Founding: 1994
Production of nanostructured powders: 100 ton/year

Focus on Product Quality
Process Control
Unique powder solutions
Powders for Industry, Research and Innovation

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• Solid State Process compositions not accessible by solidification routes

Advanced Materials
MBN Nanostructured powders

Proprietary mechanical alloying

Engineered powder

50µm

Materials systems by MBN

- Metal alloys
- Oxide Dispersion Strengthened
- Intermetallics & CerMets
- Metal Matrix Composites

Stable nanostructures in micro-aggregated powder

Nano-oxides dispersion

ODS

Metal Composite

100 nm

γ-TiAl

Cermets

FeCr-TiC

500 nm

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Advanced Materials in Advanced Products
Downstream manufacturing chains

- **Materials for Abrasive Tools**
  - Sintering and hot pressing ➡ Nanostructured composites

- **High Temperature ODS**
  - Extrusion and forging ➡ Superalloys, Light weight MMC’s

- **Materials for Biomedical devices**
  - Vacuum Plasma spraying ➡ Titanium alloy

- **Materials for Additive Manufacturing**
  - Metal Laser Deposition ➡ Direct additive manufacturing

**Continuous transfer of R&D into advanced products**

**Powders for Tools**

**Powders for High T components**

**Powders for Biomedical devices**

**Powders for laser processing**

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This GAP in VC is critical

From powder material to product made out of powder:

- Consolidation/"go to solid" process must be co-developed with powder design
- Collaborations with RTO or customer can’t fully support the development
- Need of integration in the VC: powder + process industrial prototyping
Advanced Materials in the Value Chain
Materials for powder metallurgy

POWDER DEVELOPMENT ITERATION

Design  Powder Material  Consolidation  Assembly  Product

MBN nanomaterialia

Filling the GAP with prototyping capabilities:
- to include consolidation variables on material design for higher quality product and economical viability
- for better customer support
- to enable quicker development based on customer needs

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Advanced Materials in the Value Chain
Materials for powder metallurgy

POWDER DEVELOPMENT ITERATION

PRODUCT DEVELOPMENT ITERATION

• Customized performance
• Meet cost targets
• Environmental and safety constrains

to enable quicker development based on customer needs
Advanced Materials in the Value Chain
Materials for powder metallurgy

MATERIALS PRODUCTS SUCCESS CASEs:

Oxide Dispersion Strengthened Alloys
- FeCrAlY₂O₃ Oxidation and creep resistance
- CuAl₂O₃ High conductivity reinforced Cu

Metal Metal Composites
- TiSn Low T forming High strength Ti
- FeAl Cu free for braking pads

Metal Bonds for Stone Working
- FeCu, FeP Co free alloys for cutting rims
- FeCuSn Low T sintering and self brazing
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Our experience

EU funding of VC

TRL-3 to TRL-9
TRL-9: SMEinst ph2
TRL-8: Industrial Demonstration and Commercialization
TRL-7: Materials for Coatings
TRL-6: Materials for Additive Manufacturing
TRL-5: Materials for Powder Metallurgy
TRL-4: Design and Proof of Concepts
TRL-3: High Energy Ball Milling

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Development does not arise from direct Industrial needs
The project does not necessarily deliver a product
Great potential of seeding new value chains and products

FUTURE EMERGING MATERIALS

MAIN OBJECTIVE:
Demonstrate the principle of thermodynamic stability of nanostructures in alloys of immiscible elements

FETopen Project ICARUS
Innovative Coarsening-resistant Alloys with enhanced Radiation tolerance and Ultra-fine grained Structure for aerospace application

END: Aug. 2019
BOOSTing the industrial application of green carbides by thermal spraying in protective coatings

START: Feb.2018
END: Gen.2020
**Before Boost:**
difficulty in transferring materials development to coatings and commercialized products

**The GAP in this VC is critical to:**
- validate of powders in the coating process
- support the commercialization of the powders with process recipes and coating prototypes

**Boost**
Address this issues supporting MBN’s integration in the coating value chain
Advanced Materials in the Value Chain
Materials for Surface Technologies

CERMETS & MMC’s
- TiWC  Co free wear resistant
- TiSiC  Light weight cermet
- FeCr-TiC  Green Cermet
- NiCr-TiC  Wear & corrosion resistant

SPECIAL METAL & COMPOSITES
- WCu  Electrical application
- NiSn  Self lubricating, low friction
- WNi, WAl  Sputtering targets

Powder production and Thermal Spraying plants

MATERIALS DEVELOPMENT
ITERATION

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Before "BOOST"

- Many different materials but few products
- Coating trials limited to few collaboration with RTO
- Small production volumes
- 1–2 tons/y powder produced for coatings

Boost PLUS:

- Direct address of market needs
- Fast validation and demonstration of new material for coatings
- Increased production capacity of powders for coatings up to 30 ton/y
- Currently 8 tons/y on 4 different market applications
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BoostT

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PLUS:

- Coating Shops Services with all materials
- Improvement of Business Plan
- Seeding of new market opportunities not envisaged initially

CONCLUDING

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Thanks,

Questions

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