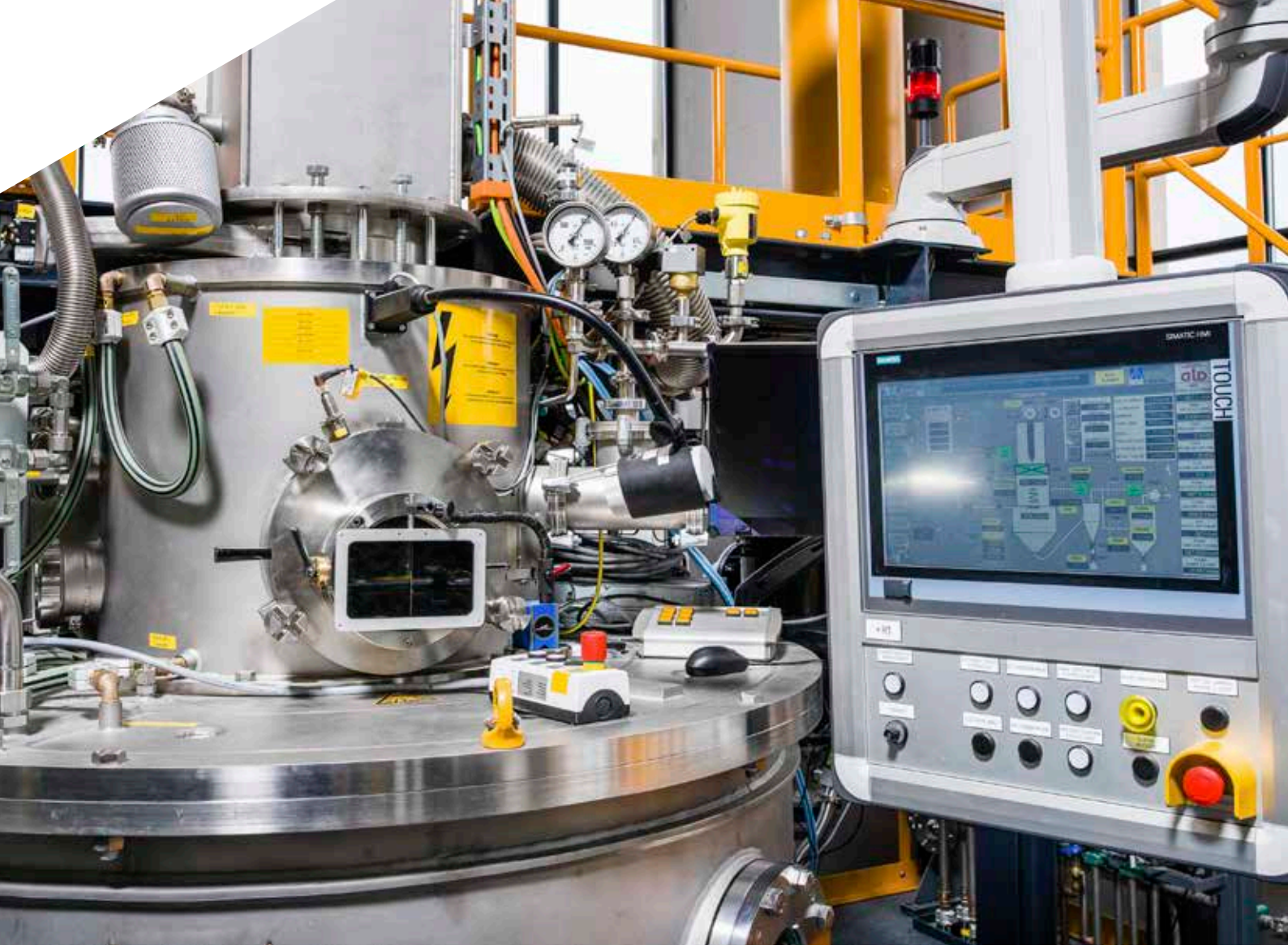
IRT M2P

Institut de Recherche Technologique
Matériaux Métallurgie et Procédés

METAL POWDERS

Production & characterization of high quality metal powders

Powder metallurgy allows new and creative ways to form metal: complex shapes, new properties, innovative coatings and reduced costs. This potential can be further unlocked with engineered metal powders produced using optimized atomization processes. Our powder platform, covering the entire range of metal compositions, consists of multiple pilot-scale processes with complementary technologies, allowing us to accompany our industrial partners in their product and process development projects. Our characterization facility provides insight into powder quality and behaviour to go beyond simply respecting technical specifications.



EXPERTISE & SERVICES

Production of metal powders using gas atomization in pilot or industrial-scale quantities

Customize chemistry from raw materials to final powder

Adapted physical properties (size, shape, porosity, surface) for various powder metallurgical techniques

Studies on the link between operating parameters and powder properties including liquid metal/gas interaction to optimize quality and yield

Process knowledge transfer and upscaling including industrial-scale installations

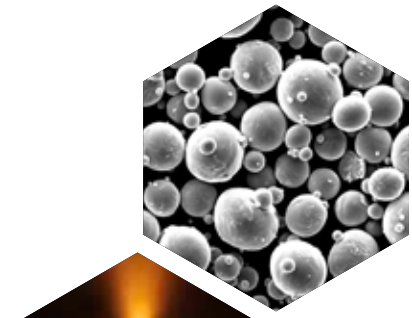
Post-additive manufacturing powder recycling via remelting

Studies on the surface passivation of reactive metal powders

Complete powder characterization
- Composition, flowability, particule size distribution, morphology
- Other techniques (spreadability, ageing, etc.) in order to link powder characteristics with performance in various forming processes

Our independence allows partners to take part in the various production and characterization steps, adding in-depth and first-hand experience

Quick reaction and turn-over time between your request and delivery



TECHNOLOGY

Gas atomization provides multiple advantages for metal powders including metal quality and sphericity for use in various processes. The technology at IRT M2P also allows maximum flexibility in terms of available metals, particle sizes and batch quantities between 5 and 200 kg (depending on alloy)

Electrode Induction melting Gas Atomization (EIGA)
- Crucible free induction melting: no refractory pollution resulting in ultra-high purity powders
- Free-fall argon atomization
- Feedstock = pre-existing ingots or electrodes with the possibility to produce these using other furnaces at IRT M2P
- Little or no oxygen/nitrogen pick-up between feedstock and powder

Vacuum Induction melting Gas Atomization (VIGA)
- Close-coupled atomization for reduced particle sizes
- Refractory crucible allows the production of a wide range of alloys and good chemical homogeneity prior to atomization
- Possibility to use argon or argon/O_2 atomization gas in order to optimize passivation

Sieving under protective atmosphere
- Customized batches for various powder metallurgy technologies (LBM, EBM, HIP, SPS, thermal spray etc.)

Chemical analysis, physical characterization & powder behaviour

Simulation
- The EIGA and VIGA contain multiple sensors and a system to store/analyze all data with the possibility to validate existing models
- Studies on liquid metal/gas interaction
- Thermal and high-speed cameras

APPLICATIONS

Our range of metal powders is suitable for all additive manufacturing techniques and other powder metallurgy processes, including:
Laser Beam Melting - Electron Beam Melting - Direct Metal Deposition – Hot Isostatic Pressing – Spark Plasma Sintering – Thermal Spray and other coatings

Principal markets:
- Aerospace: in particular motors and turbine blades using titanium, aluminium, superalloys or other alloys
- Medical: dental and orthopedic implants in titanium or other metal families
- Transportation: motorsports, rail, other
- Feedstock for various additive manufacturing technologies

EQUIPMENT @M2P

EIGA
- Reactive and refractory metals - including titanium and niobium - but also adapted to precious metals, superalloys and iron- or nickel-based alloys
- 10-75 kg/batch for titanium

VIGA
- Aluminum and also iron- and nickel-based alloys
- 5-80 kg/batch for aluminum

SIEVING
Ultrasonic sieving and storage under inert atmosphere

CHARACTERIZATION
- Chemical analysis by X-ray fluorescence or ICP
- Dissolved gas analysis : ONH, CS
- Particle size distribution analysis
- Particle shape analysis
- Flowability

Further information on our activities www.irt-m2p.fr

RELATED ACTIVITIES

ADVANCED FOUNDRY

Our advanced foundry platform is equipped to produce any alloy - including those not yet available on the market – as feedstock for our atomizers. Our furnaces also bring the circular economy to powder metallurgy by producing ingots from recycled materials and even remelting unused powders.

SURFACE TREATMENT & COATINGS

Linked with additive manufacturing, various surface treatments for 3D printed metal objects have been developed including those that allow a reduction in roughness on hard-to-reach surfaces.

About IRT M2P

The Institute of Research and Technology for Materials, Metallurgy & Processes (IRT M2P) is your partner for developing innovative products and processes to accelerate your company's growth.

We bring our expertise, a wide array of state-of-the-art semi-industrial technological platforms and a network of academic labs to the R&D projects we carry out with our more than 120 industrial partners.

Contact us to discover our 9 areas of technological expertise:

> Advanced Foundry
> Life Cycle Assessment & Recycling
> Metal Powders
> Surface Treatment & Coatings
> Mechanical Surface Treatment
> Heat & Thermochemical Treatment
> Composite Materials
> Multimaterials Joining
> Analysis & Characterization

Working together

- Multi-partner research projects with private/public co-funding
- Private research studies, tailor-made services
- Small series & prototype production
- Training

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