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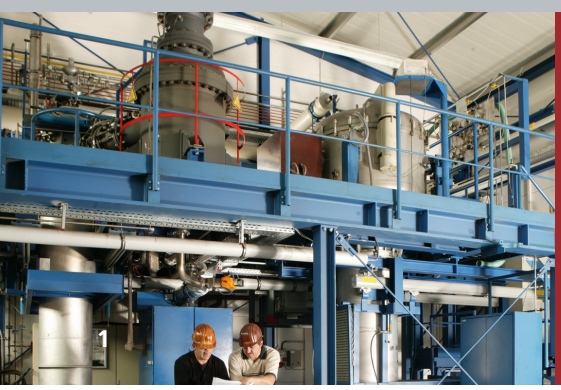
FRAUNHOFER INSTITUTE FOR ENVIRONMENTAL, SAFETY, AND ENERGY TECHNOLOGY UMSICHT
INSTITUTE BRANCH SULZBACH-ROSENBERG



1 *In-house engineered plants for melt atomization with hot gas up to 1000 °C at 25 bar atomizing gas pressure.*
2 *Made-to-measure powders with desired alloy compositions, melt capacities up to 100 kg per batch.*

POWDER MATERIALS

ENGINEERING AND MATERIALS FOR MADE-TO-MEASURE POWDERS

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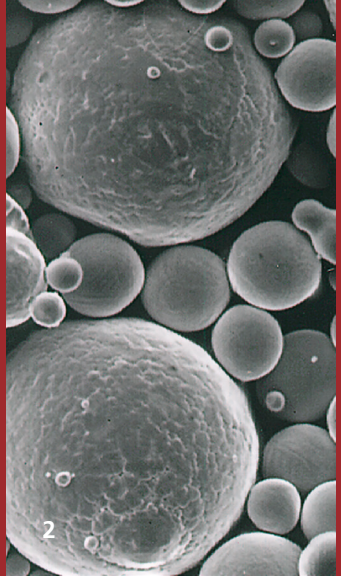
Powdered materials make the base for a multitude of applications. Consequently, a large spectrum of powder processing techniques exists which needs special, made-to-measure powders and materials: the spectrum starts with the direct use of powders, e. g. in chemical processes and formulations, and leads via joining techniques like soldering and welding, and via coating processes, e. g. via thermal spraying, PVD or screen printing, to end up into finished parts fabricated via sintering techniques. These include the newer ones, such as the so-called additive processes (e. g. selective laser melting SLM) or the powder injection molding (PIM). With specifically developed processing techniques and operating units, Fraunhofer UMSICHT in Sulzbach-Rosenberg and in Oberhausen provides a manifold repertoire for powder development and manufacturing.

Keywords

- Melt atomization
- Hot gas atomization – inert/ reactive
- Rotating disk atomization
- Powders from highly viscous melts
- Materials development
- Process engineering
- Powder manufacturing designed up to the pilot scale
- Pure metals, alloys, oxides, glass, plastics, composites

Industrial sectors

- Automotive
- Machine and tools industry
- Chemical industry
- Electronics
- Aviation and astronautics



1 *Fine powders through high pressure and hot gas atomization.*
2 *Made-to-measure powders.*
3 *Rotating disk atomization for spherical particles up to the millimeter-range.*

Technical equipment

- 2 inert gas atomization units, batch sizes starting from 2 kg up to 100 kg
- Hot gas atomization at 25 bar with up to 1000 °C gas temperature
- Special features for the atomization of highly reactive materials, such as Al, Mg, Ti alloys
- Rotating disk atomization unit with batch sizes up to 250 kg
- Inert sieving and (wind) sifting units
- Intensive mixing/ granulating apparatus
- Oven chambers up to 1800 °C for the modification of powders under defined atmospheres
- Thermal spraying laboratory for further powder processing
- Analytical laboratory (Laser granulometry, SEM/EDX, image analysis, thermal analysis DTA/TG, X-ray diffractometry, hardness measurement)

Our service

From the consulting via the development to the product:

- Feasibility and process studies
- Process development
- Powder and alloy development
- Powder manufacturing at the laboratory and the pilot scale
- Powder processing (granulation, classification, heat treatments under specific atmospheres)
- Evaluation of process concepts
- Developments up to the pilot state
- Characterization of powders (size distribution analysis, flowability, apparent density, morphology)
- Materials analysis (hardness, microstructure, elemental and phase analysis, thermophysical properties)
- Job-shop
  - flexible
  - fast
  - reliable

Your benefits

- Demand-oriented development and optimization of powders
- Materials and innovative manufacturing routes oriented on your specific requirements (atomization of highly viscous melts, chemical conversion during reactive hot gas atomization, coarse powder via rotating disk atomization)
- Advanced competiveness due to the development of new materials and processes
- Made-to-measure powders for better finishing processes and enhanced application properties
- Knowledge gain in questions related to powder manufacturing and preparation