



Materials  
Processing  
Institute

Services Portfolio

# Powder Analysis and Additive Manufacturing



# Powder Analysis and Additive Manufacturing

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## Powder Analysis

### **Powder particle size distribution analysis**

Measure and characterise the size distribution of metal or ceramic powders to ensure they meet specifications for processing.

### **Powder morphology and shape characterisation**

Examine powder particle shape (sphericity, aspect ratio) to predict flowability and packing behaviour, crucial for additive manufacturing quality.

### **Powder flowability testing**

Assess how well a powder flows and spreads (important for 3D printing and powder handling) to anticipate performance in feeders or recoaters.

### **Powder tap density and packing density**

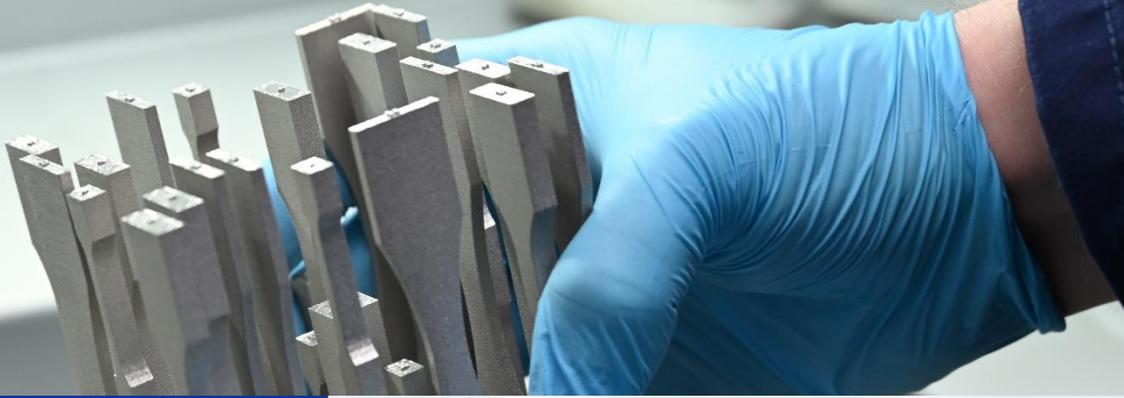
Determine how densely a powder packs under tapping, which impacts part density in pressing or layering processes.

### **Chemical composition analysis of powder**

Verify that powder has the correct alloy composition and impurity levels to ensure consistency and performance.

### **Comparative study of powders from different suppliers**

Test powders from multiple sources, providing independent quality benchmarking.



## Additive Manufacturing

### **Additive manufacturing prototype printing**

Use a Laser Powder Bed Fusion (LPBF) 3D printer to produce prototype parts from metal powder, to test new designs or materials.

### **Additive manufacturing process parameter optimisation**

Experiment with different 3D printing parameters for a given material to achieve optimal density and mechanical properties.

### **Printing with novel alloy powders**

Test the printability of newly developed or uncommon alloy powders in the LPBF machine.

### **Post-processing of printed parts (heat treatment)**

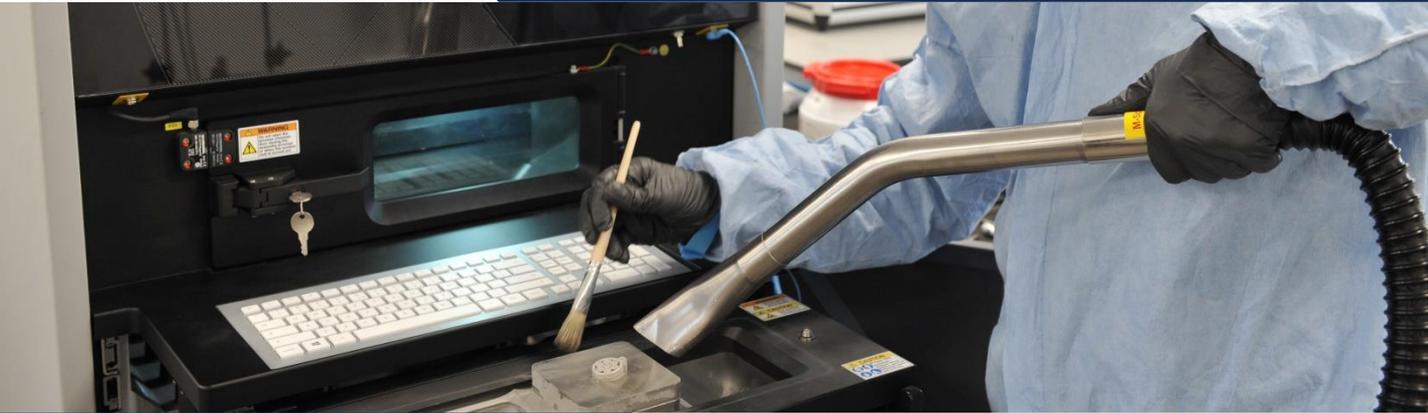
Heat treat 3D printed components to relieve residual stresses and improve microstructure.

### **Mechanical testing of additive manufacturing parts**

Evaluate mechanical properties of additive manufactured parts to validate for end use.

### **Density and porosity measurement of additive manufacturing samples**

Determine the density of printed parts and locate porosity to ensure they meet quality standards (fully dense or specified porosity).



## Powder Processing

### **Mechanical milling (ball milling) of powders**

Grind and mechanically alloy powders to refine particle size or create alloy powders from elemental blends (mechanical alloying).

### **Sieving and powder classification service**

Separate a bulk powder into specified size fractions to meet different process requirements or remove oversized/undersized particles.

### **Recycling and reconditioning of used powder**

Take powder that has been used in additive manufacturing (exposed to heat) and test/treat it so it can be reused (remove fines, restore flow).

# Full Services Portfolio

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## Advanced Metals & Green Steelmaking

- Green Steel
- Product Development
- Process Improvement
- Extra

## Advanced Materials Development

- Custom Alloy Development
- New Steel
- Supporting R&D
- Additive Manufacturing & Powder Metallurgy
- Additional Services

## Characterisation and Analysis

- Characterisation and Analysis

## Critical Raw Materials

- By-product Valorisation
- End of Life Process Development
- Mine Tailing Valorisation
- Piloting /Testbed Hosting
- Process Scale-up
- Process Optimisation

## Sustainable Cement and Concrete

- Product Development
- Process Improvement

## Powder Analysis and Additive Manufacturing

- Powder Analysis
- Additive Manufacturing
- Powder Processing

## Energy and Process Decarbonisation

- Feasibility Studies
- Energy and Emission Optimisation
- Process Optimisation
- Leveraging Facilities

## Facilities and Equipment

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# Full Services Portfolio

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## Training

### Processes

- Ironmaking
- Desulphurisation of Iron
- Steel Plant Raw Material
- Primary Steelmaking
- Secondary Steelmaking
- Ladles
- Practical Steelmaking
- Stainless Steelmaking
- Electric Arc Furnace (EAF) Steelmaking
- Continuous Casting
- General

### Supplementary

- Engineering
- Metallurgy
- Environmental Protection
- Management
- Research

### Applications

- Circular Economy
- Digital Technology
- Analytical Techniques

### Products

- Finished Goods

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