

**Metal Powder**



# The unbeatable team for metal powder characterization



## PRACTICAL IMPACT

The final product quality depends strongly on the properties of the raw materials as well as the processing parameters. You can measure the cohesion strength with an MCR Evolution rheometer for powder rheology to find out the flowability of the powder. Employing this methodology, you will know whether excess metal powder from past production is still viable or requires the adaption of processing parameters. In this way you can calculate how much new powder you have to add to make the powder usable for high-quality end products.

### MCR powder rheology

Measure powder flow properties

#### What does that mean for your process?

Knowing and controlling the powder properties that count is essential for smooth processing at maximum efficiency along with high-quality output. The powder cells from Anton Paar give you the necessary tools to understand your powder during all application stages.

#### Main features

##### MCR Evolution rheometer with a powder flow cell and a powder shear cell

- The highest sensitivity and absolute results in the shortest amount of time
- Easy, safe, and clean sample handling and preparation
- Precise temperature and humidity control
- Modular rheometer concept for fluidized and consolidated powders as well as suspensions and solids (with other MCR accessories)



## PRACTICAL IMPACT

If the sintered product is too fragile or porous, particle size analysis will help you to understand the problem: the particle size distribution of metal powders affects both the sintering kinetics as well as the physical properties of the final product. On the one hand, the width of the size distribution plays a crucial role in densification of the final product. On the other hand, the mechanical properties of the final product are affected by the grain growth rate which is strongly influenced by the average particle size of the metal powder.

### PSA particle size analyzers

Measure particle size

The performance of the final product depends on the packing density of the particles, which strongly depends on the width of the particle size distribution. Besides optimizing the final product, by altering the average particle size of the metal powder, also the sintering conditions can be optimized towards a more efficient process.

##### PSA series

- Multiple-laser technology for a wide range of particle sizes
- Measures metal powders in dry form or dispersed in any suitable liquid – both with just one setup
- Accurate and repeatable size distribution of powder particles
- Stability for a lifetime – permanent alignment and no glass elements in dry dispersion



## PRACTICAL IMPACT

If the powder shows different melting, flow, or packing properties from batch to batch, a rigorous quality control process for incoming materials will help. An appropriate quality control process includes: measuring the tap density with Autotap, determining the skeletal density with the Ultrapyc series, and discovering the pore size and surface area by gas adsorption with NOVAtouch.

### Autotap | Ultrapyc | NOVAtouch series

Measure tap density, true density, surface area, and pore size distribution

Quality control for metal powders involves characterizing specific surface area and density properties. In fact, numerous international standard committees have issued methods for the characterization of the surface area, the tapped density, and the skeletal density of metal powders. These properties help determine the powders' consistency from batch to batch to ensure that the downstream processes run smoothly.

##### Autotap

- Easy to use, incorporating a high degree of automation
- Compliant with most internationally recognized standard methods
- User-selectable, lockable number of taps provides reproducible test method parameters

##### Ultrapyc

- TruPyc technology for accurate results over the widest available sample range
- TruLock lid delivers unmatched repeatability
- Peltier temperature control provides stability of better than  $\pm 0.05$  °C
- PowderProtect mode for safely measuring fine powders

##### NOVAtouch series

- High-sensitivity gas sorption analyzer measures up to 4 samples simultaneously
- Proprietary small cold-zone technology for improved sensitivity
- Integrated touchscreen displays real-time data and simplifies user experience

# All your applications covered

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No matter which method of metal working you employ, what you manufacture, or which type of powder you process: Anton Paar has got you covered. With MCR powder rheology, the PSA series, Autotap, Ultrapyc, and the NOVAtouch series, you can understand and improve your materials, as well as optimize your processes, in:

## METHODS

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ADDITIVE MANUFACTURING  
CASTING  
ELECTRIC-CURRENT-ASSISTED  
SINTERING  
FLAME SPRAYING  
HOT ISOSTATIC PRESSING  
LASER CLADDING  
MELTING  
METAL INJECTION MOLDING  
PLASMA SPRAYING  
PRESSING  
PTA WELDING  
POWDER FORGING  
POWDER WELDING  
SINTERING

## APPLICATIONS

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ARCHITECTURAL MATERIALS  
AND PAINTS  
CARBON BRUSHES  
COATINGS  
COMPONENTS FOR THE  
AUTOMOTIVE INDUSTRY  
CONDUCTIVE MATERIALS AND  
THERMAL MANAGEMENT  
CONSUMER GOODS  
DIAMOND TOOLS AND  
ABRASIVES  
ELECTRONICS  
FILTERS  
MEDICAL TECHNOLOGY  
PRINTING AND SCREEN  
PRINTING  
PRESSED AND SINTERED  
COMPONENTS  
BEARINGS  
THERMAL SURFACING

## TYPES OF POWDERS

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ALLOYS  
ALUMINUM  
BRASS  
BRONZE  
COBALT  
COPPER  
FLAKES  
GRAPHITE  
IRON  
MOLYBDENUM  
NICKEL  
STAINLESS STEEL  
THERMAL SPRAY POWDERS  
TIN  
TITANIUM  
ZINC

