Anton Paar

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**

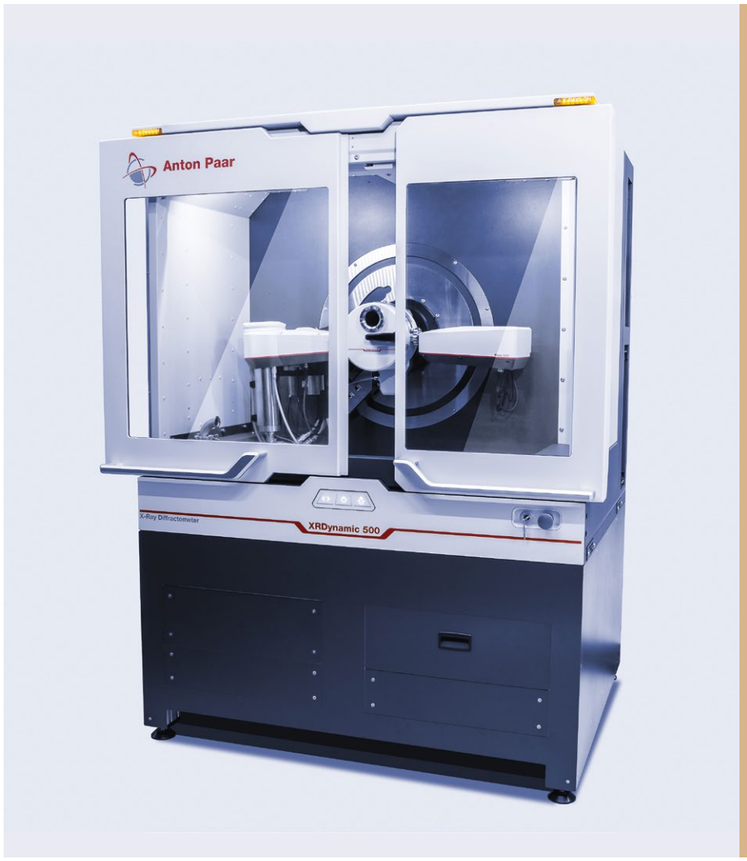
What does that mean for your process?

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

X-ray diffraction (XRD) can be used throughout additive manufacturing processes and all other areas where metal powders are used. From determining the phase purity of raw materials, which allows the detection of even minor impurities, to crystallite size analysis of metal powders used in sintering processes, and even analysis of finished products in order to determine residual stresses that can cause fatigue, XRD does it all. In fact, XRD allows optimization of every step throughout the complete life cycle of metal powders, to ensure finished products are of the highest quality.

XRDynamic 500 powder X-ray diffractometer

Measure **crystal structure, phase purity,** and **crysallite size**

In one fast XRD measurement, you can analyze the phase purity and crystallite size of metal powders. You can also perform residual stress analysis of components printed from metal powders, to further optimize all processes – from raw materials to finished products.

XRDynamic 500

- Right out of the box: Best-in-class resolution / signal-to-noise ratio
- TruBeam™ concept: Larger goniometer radius and evacuated beam path
- Full automation: X-ray optics and beam geometry change
- Self-alignment: Instrument and sample, for maximum convenience

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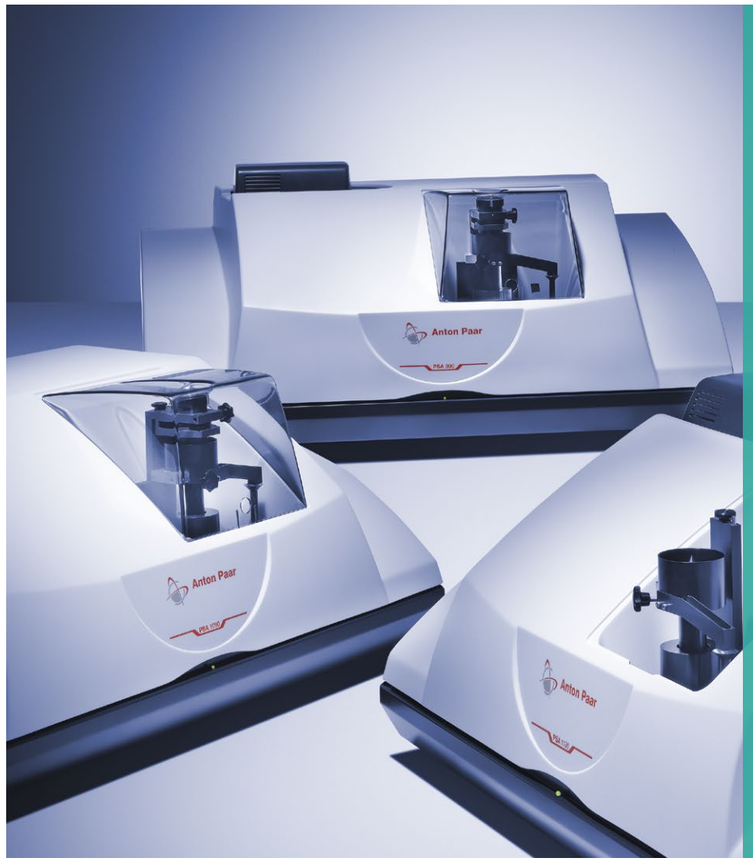

PRACTICAL
IMPACT

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**

What does that mean for your process?

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.

Main features

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 Nova 600/800.

Autotap | Ultrapyc | Nova 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 ±0.05 °C
- PowderProtect mode for safely measuring fine powders

Nova series

- Measures up to four samples simultaneously, and in parallel prepares up to four more samples
- Proprietary small cold-zone technology for improved sensitivity
- Integrated touchscreen displays real-time data and simplifies user experience
- Conforms to the requirements of ASTM B922

All your applications covered

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, XRDynamic 500, the PSA series, Autotap, Ultrapyc, and the Nova series, you can you can understand and improve your materials, as well as optimize your processes, in:

METHODS

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

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

ALLOYS

ALUMINUM

BRASS

BRONZE

COBALT

COPPER

FLAKES

GRAPHITE

IRON

MOLYBDENUM

NICKEL

STAINLESS STEEL

THERMAL SPRAY POWDERS

TIN

TITANIUM

ZINC

Anton Paar
Certified Service

We’re confident in the high quality of our instruments. That’s why we provide **a full warranty for three years.**

All new instruments* include repair for three years. You avoid unforeseen costs and can always rely on your instrument. Alongside the warranty, we offer a wide range of additional services and maintenance options.

*Due to the technology they use, some instruments require maintenance according to a maintenance schedule. Complying with the maintenance schedule is a prerequisite for the three-year warranty.

Service and support directly from the manufacturer
Our comprehensive service provides you with the best individual coverage for your investment so that maximum uptime is ensured.

Safeguarding your investment
Regardless of how intensively you use your instrument, we help you keep your device in good shape and safeguard your investment – including a three-year warranty.

The shortest response time
We know that sometimes it’s urgent. That’s why we provide a response to your inquiry within 24 hours. We give you straightforward help from real people, not from bots.

Certified service engineers
The seamless and thorough training of our technical experts is the foundation of our excellent service provision. Training and certification are carried out at our own facilities.

Our service is global
Our large service network for customers spans 86 locations with a total of 350 certified service engineers. Wherever you’re located, there’s always an Anton Paar service engineer nearby.

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