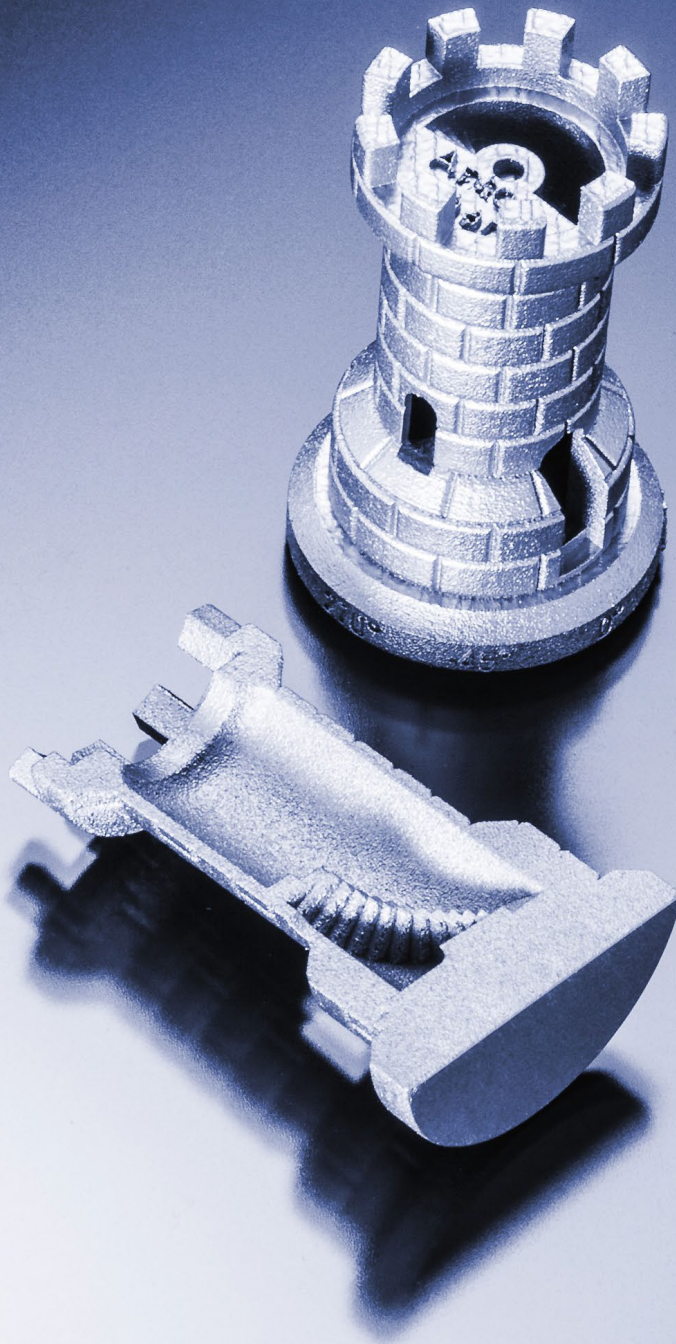


Solutions for Additive Manufacturing



Analytical methods for additive manufacturing

Anton Paar has the know-how for:

Particle characterization ● ●

The better you know your particles, the better you can predict your material's behavior during manufacturing. The Litesizer and PSA series of particle size analyzers, the density analyzers UltraPyc and AutoTap, the gas adsorption analyzers NOVAtouch and the autosorb series, give you access to a great variety of results. All in all, Anton Paar offers the broadest particle characterization portfolio available from one single provider worldwide.

Parameters:

Particle size distribution (measured dry or wet) | Pore size | Pore distribution | Zeta potential | Molecular mass | Surface area | Density | And more



Powder rheology ●

Advanced true powder rheology, based on the MCR Evolution rheometers, brings the full array of traditional and rheological methods, and decades of experience into the field of granular media. The versatile and powerful MCR powder rheometer offers high reproducibility, fully automated measurement modes, and multiple measurement modes for quality control as well as scientific purposes.

Parameters:

Powder flow | Cohesion strength | Flowability | Compressibility | Bulk density | Permeability | Deaeration time | Pressure drop | Wall friction angle

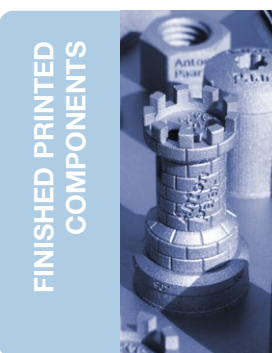


Surface characterization ● ●

Anton Paar offers measuring solutions for indentation testing, scratch testing, tribological tests, surface charge analysis, and atomic force microscopy. This variety allows the measurement of a wide range of properties. All instruments deliver highly accurate results and offer operation and software to support instrument operators.

Parameters:

Hardness | Elastic modulus | Deformation | Adhesion | Scratch resistance | Friction | Wear | Roughness | Surface topography | Surface charge



CHALLENGE

The granulate agglomerates and blocks the supply line of the printer.

The granulate shows different melting properties from batch to batch.

The melted polymer polycarbonate is too viscous/fluid which has a negative influence on the final component – its surface is uneven.

The flowability of the powder is not good enough and the product is inhomogeneous.

The sintered product is too fragile or porous.

The metal powder flow through the sinter nozzle is very inconsistent.

You want to reuse the excess metal powder from past productions and want to know if it is still usable.

You want to find out how resistant the final printed component is.

You want to know how a component behaves when in contact with other surfaces – without conducting extensive tests.

SOLUTION

Measure the **surface charge** of your granulate with a **SurPASS 3 zeta potential analyzer** to optimize the inline flow.

Establish quality control of incoming raw materials: measure the **skeletal density** by helium pycnometry with instruments of the **UltraPyc** series and determine the **porosity** by gas adsorption with instruments of the **NOVAtouch**, **Quadrasorb**, and **autosorb iQ** series.

Find out about the **molecular weight** of your granulate with an **MCR Evolution rheometer**.

Use a **PSA particle size analyzer** to define the **distribution and the mean size of the particles**. The size distribution is an important parameter which influences the performance of the raw material and therefore the quality of the final product.

Use a **PSA particle size analyzer** to measure the **particle size distribution** – and therefore the **packing density** – of your raw powder or suspensions.

Determine rheological properties such as **powder flow** with an **MCR powder rheometer**.

Measure the **cohesion strength** with an **MCR powder rheometer** to find out the **flowability** of the recycled powder.

Measure the **critical load**, **adhesion**, **scratch resistance**, **roughness**, and **viscoelastic behavior** with a **NST³ nano scratch tester** or a **NHT³ nanoindenter**.

Find out about the **friction and wear** of your component with a **TRB³ pin-on-disk tribometer**.

YOUR BENEFITS

At just the touch of a button, you can investigate your sample – non-destructive and suitable for a variety of sample geometries. According to the results, you can then take measures to improve the material properties and avoid clogging of the lines in the future.

Simple and fast analysis of density, specific surface area, and pore volume provides ideal parameters for quality control and materials' optimization with respect to process parameters.

With the results of your measurements you are able to predict the melting behavior of the granulate depending on the temperature so you can adjust the settings of your sinter accordingly.

The size distribution gives insights into the homogeneity of the surface of the powder. It depends on the final product which size distribution is needed – with PSA you can ensure that your powder always has the grade of homogeneity you need.

The performance and homogeneity of a product depends on the packing density of the particles: The broader the size distribution, the better the packing of the particles and the more stable the sintered product.

Knowledge about the rheological properties of a powder enables you to find the optimal flow speed and thus select the ideal nozzle design. This has a positive influence on the final component's quality.

Knowing the flowability, you can calculate how much new powder you have to add to make the powder usable for high-quality end products.

Compliance with ISO 20502 and ASTM C 1624 ensures that your product always satisfies your customers.

The pin-on-disk method is a fast and accurate method that will give you results in a very short time – ideal for efficient quality control of final products.



“

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

”

All new instruments* include repair for 3 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 3-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 3-year warranty.



THE SHORTEST RESPONSE TIMES

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 are located, there is always an Anton Paar service engineer nearby.

