FREEFORMER

Additive manufacturing – a free approach

ARBURG

SHIFT WORKER

Plastic freeforming. Building functional parts from tiny droplets. Using standard granulates.

More freedom all-round! The industrial additive manufacture of technical functional parts is highly demanding: this involves a wide range of original materials. Flexible material and colour combinations. And, above all, reproducible part quality. Individually optimisable. This is precisely what we provide. After all, in the ARBURG Plastic Freeforming (APF), we have developed a completely new process for you. Our open freeformer system allows you to get the best out of all applications. Experience plastic freeforming!

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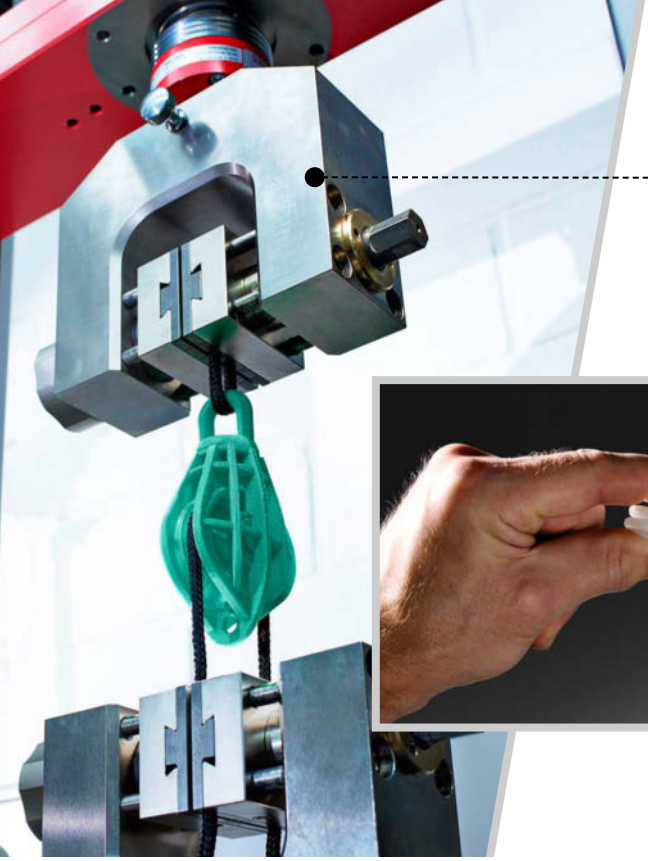


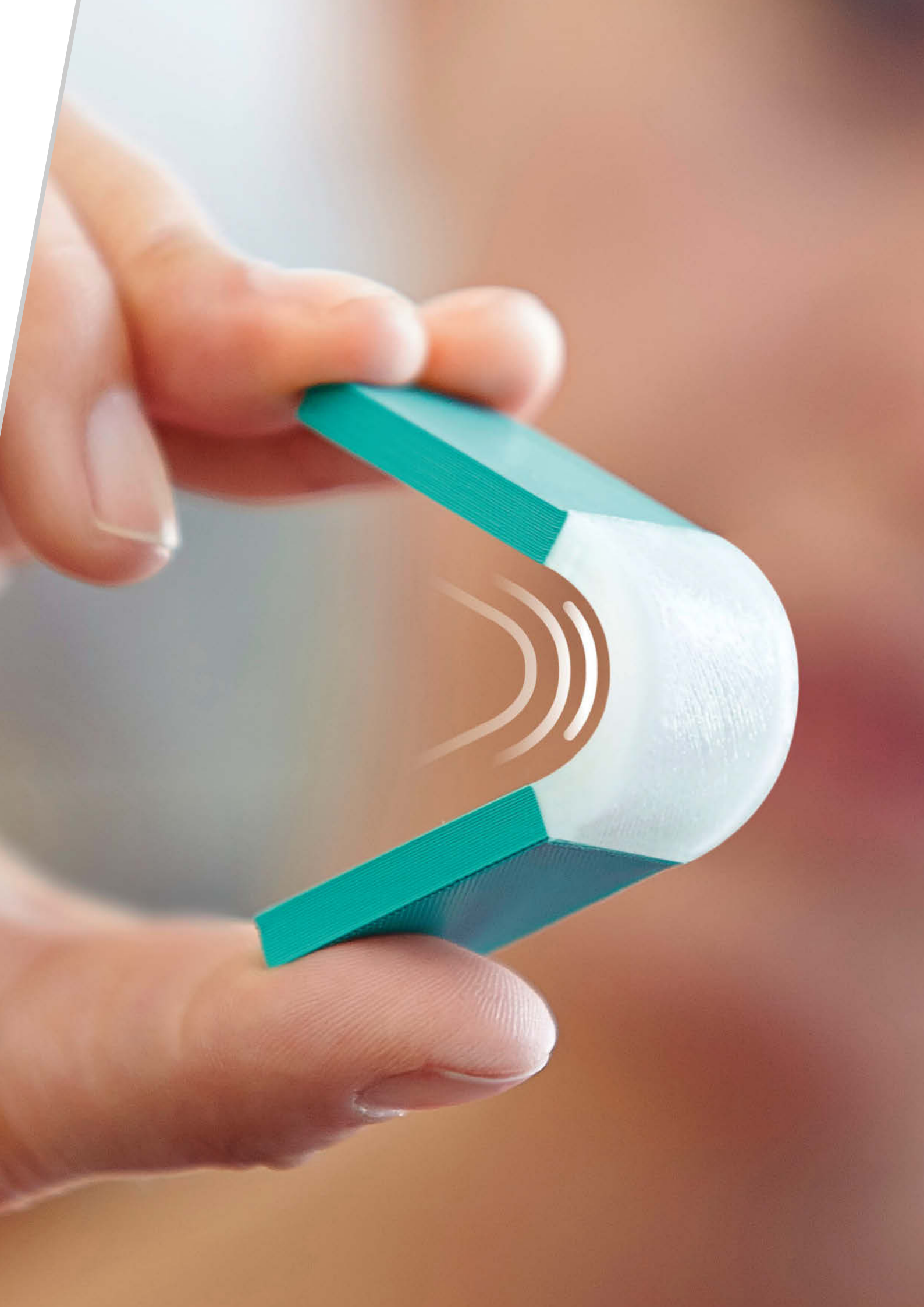
Strong, reversible, resilient, high-density: the additive manufacture of technical functional parts is our speciality.

AT A GLANCE

// We are completely redefining plastics processing with our patented process for industrial additive manufacturing, known as ARBURG Plastic Freeforming (APF). The freeformer, our open system for the additive manufacturing of functional parts, produces efficiently and flexibly. Parts created directly from 3D CAD data. Using qualified standard granulates.
Layer-by-layer application of tiny plastic droplets. Get started with a technology that offers brand new opportunities to produce one-off parts and small-volume batches. \\

freeformer – more than just 3D printing

- Additive manufacturing with standard granulates
- Individual process settings and material qualification
- High part quality
- Technical functional parts – also as hard/soft combinations



GREAT FREEDOM FOR YOU!

Material diversity

The freeformer can be used to process standard granulates in a flexible way. It does not require any prefabricated materials such as resins, powders or filaments. This means that a wide range of low-cost materials and dyes are available to choose from. However, reproducible additive manufacturing requires the materials used to be qualified in a standardised process. This results in pre-defined process settings, which we make available to you for reference materials. We are continuously expanding this database. In addition to the familiar additive standard materials, you can also process special original materials using our freeformer. These include, for example, TPEs with various Shore hardnesses, semi-crystalline PP, biopolymers, flame-proof materials and medical-grade polylactide.

Open system

The freeformer is designed as an open system. Slice and process parameters are freely programmable and can thus be individually adapted at any time. Based on our data sets for reference materials, your modified original materials are quickly available for use, as was the case with a PC approved for aerospace applications or an FDA-compliant medical-grade TPE.

Multi-component technology

The freeformer is equipped with several discharge units as standard. You can use these to produce parts in various material and colour combinations – also as resilient hard/soft combinations. In the case of complex part geometries, you can alternatively use one component to construct support structures.

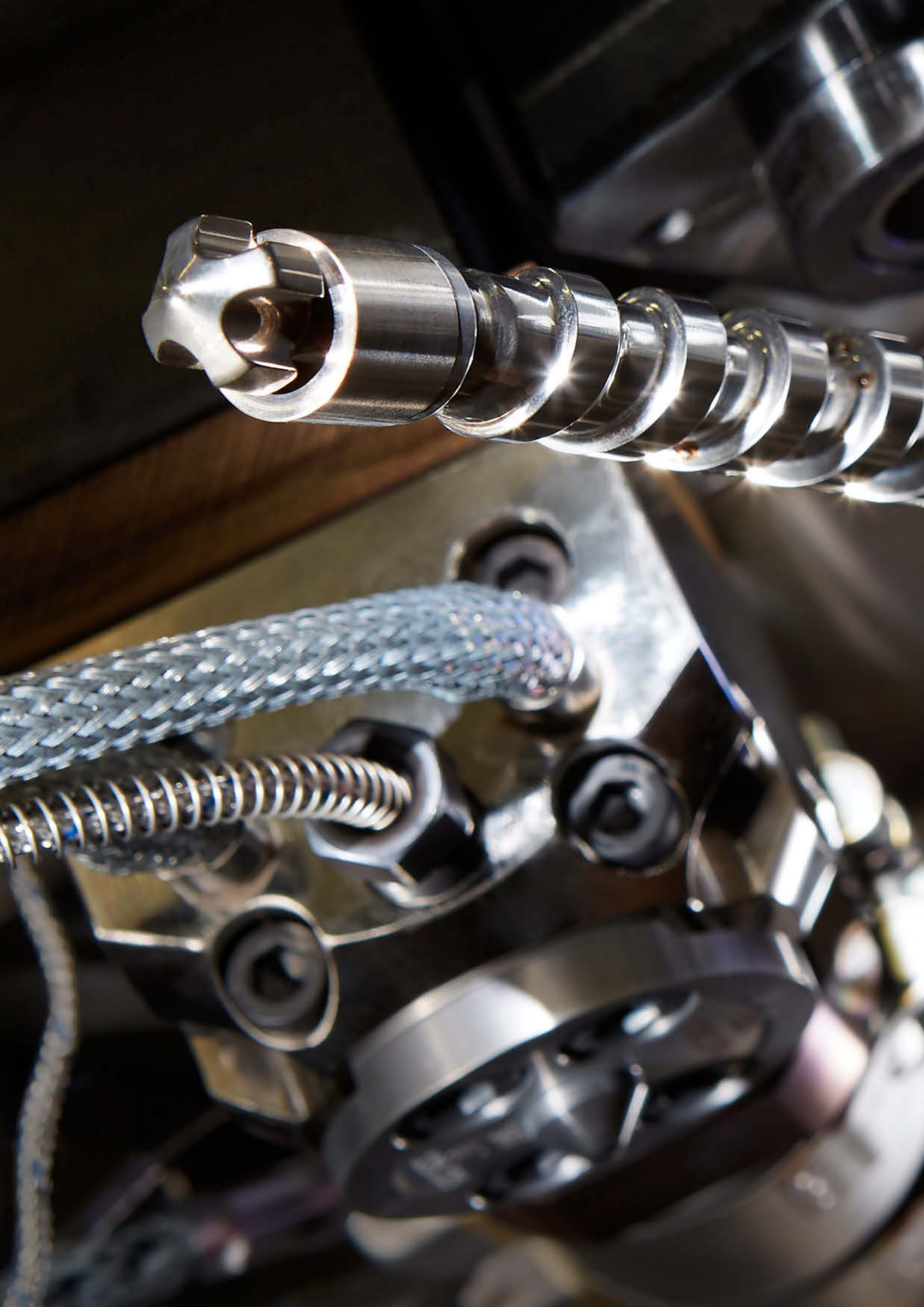
DROPLET BY DROPLET
into
functional parts

Free for more flexibility:
optimise parts.

Free for greater diversity:
process standard granulates.

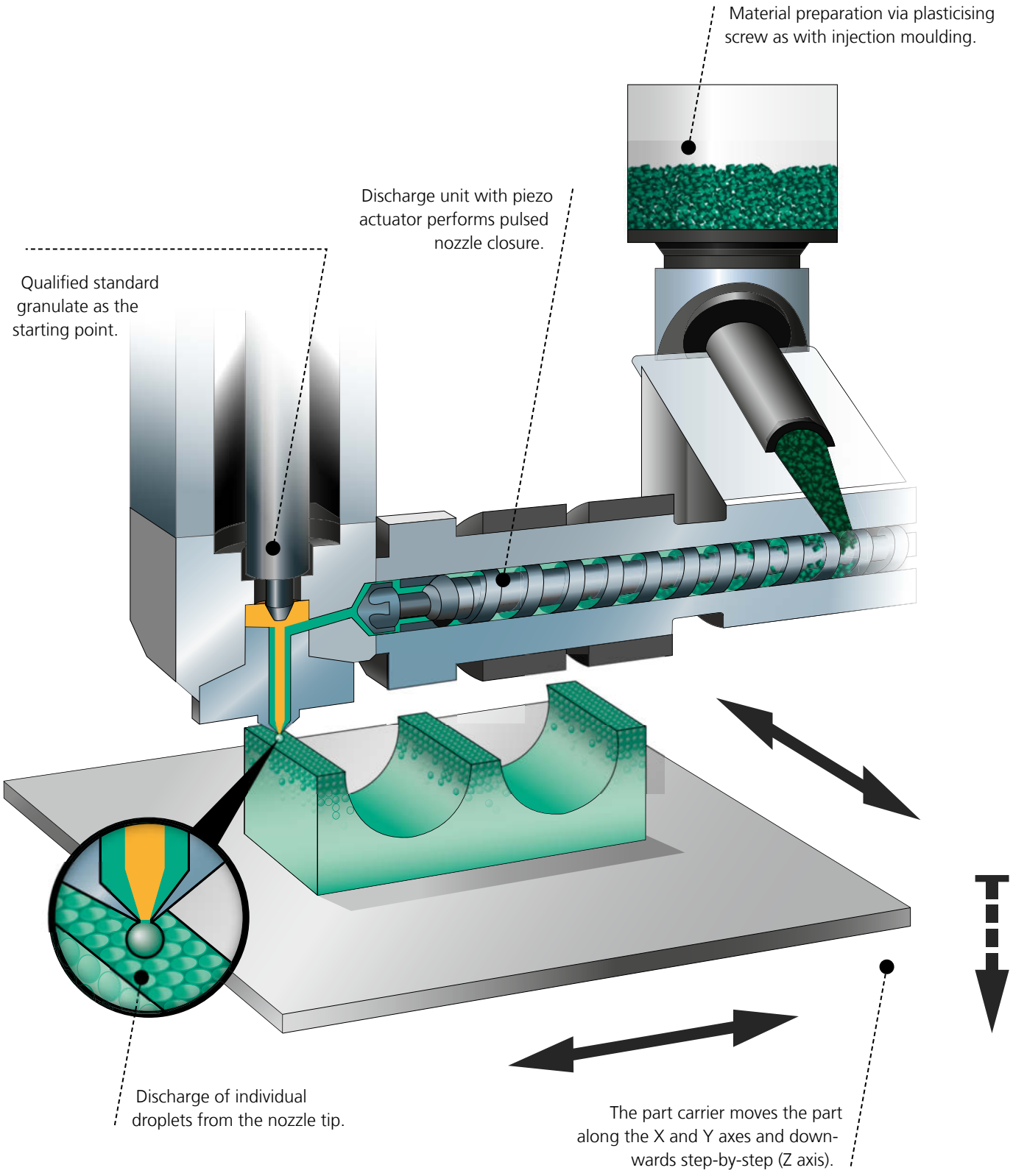
Free for more functionality:
combine several materials.

Free for more opportunities:
additive manufacturing with
original materials.



PROCESSES AND TECHNOLOGY: UNIQUE

// Injection moulding is our world. That's why we designed our additive manufacturing technology from an industrial plastic processing perspective. With a completely new approach that is entirely our own: ARBURG Plastic Freeforming (APF) with the open freeformer system. An integrated material preparation unit melts standard granulates as with injection moulding. And as you know, this is one of our core areas of expertise. The special discharge unit marks a new era in industrial processing: the generation of tiny plastic droplets and their application layer-by-layer to produce three-dimensional parts. This technology will also inspire you. \\



Process principle
Watch our video!

SINGLE-UNIT BATCHES: NO PROBLEM.

Our process

We use a special plasticising screw to melt standard granulates in the same way as in injection moulding. This is followed by freeforming without the use of a mould: a high frequency, high precision pulsed nozzle closure discharges tiny plastic droplets, which are applied very precisely by means of a moving part carrier. No special processes or material additives are required in order to harden the plastic in the temperature-controlled build chamber; instead, the tiny droplets fuse with the surrounding material as they cool. This enables us to build up your high-strength three-dimensional plastic parts layer-by-layer. The droplet size, layer thickness and process control can be influenced "freely" in a targeted manner.

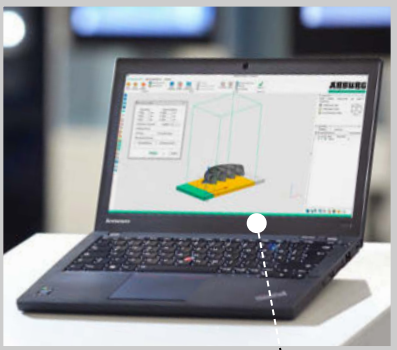
Potential

- Material variety – no prefabricated materials, no manufacturer-dependent procurement
- Use of original materials e.g. to ensure resistance to ageing or for FDA compliance
- Processing of specific material compounds
- Combination of materials and colours - even as a durable hard/soft combination
- Process without emissions or residues – no active extraction required, efficient use of materials
- High part quality – part optimisation based on the tiniest droplets

MATERIALS AND PROPERTIES: KNOWN

// Our freeformer enables you to work the way you always wanted to: completely independently! This begins with the materials used. You can use your familiar standard granulates. In other words, the same materials used for conventional injection moulding. The only requirement: the required material must be qualified, in other words key processing parameters need to be determined – which you can do for yourself at any time thanks to our open system. This also facilitates individual part optimisation. \\

Open technology: high level individuality, e.g. through self-dyeing in master batches.



Open system: slice and process parameters are freely programmable.

A matter of adjustment

Tiny plastic droplets provide the basis for flexible adjustment options. This is why we designed our freeformer as an open system. Everything is freely programmable, starting from the layered geometrical slicing and automatic processing of the 3D CAD data for an NC program to material preparation and the discharge of the droplets. This is the ideal basis for industrial practice.

Material qualification

A reproducible process requires the predefined process settings to be determined that take into account all material- and quality-dependent criteria. Our material database documents qualified reference materials such as ABS (Terluran GP 35), PA10 (Grilamid TR XE 4010), PC (Makrolon 2805), TPE-U (Elastollan C78 A15) and PP (Braskem CP 393). Further examples include special plastics for specific applications such as medical PLLA (Purasorb PL18, Resomer LR 708) and a PC (Lexan 940) approved for aerospace use.

Parts quality

The part quality achievable with the APF process displays a particularly even structure - in every direction. The density, material properties and surface structure can be influenced in a targeted manner by varying the droplet size and process control. The more densely the droplets are positioned in relation to one another, i.e., the more tightly the parts are "packed", the higher the mechanical properties. Studies have shown that, depending on the material, the same tensile strengths can be achieved in the layers as is the case with injection moulding.

Homogeneous, densely structured layers: tests such as computer tomography provide evidence of the quality of the parts.

ADVICE AND SUPPORT: EXPERTISE

// Do you want to use certain additives or process your own material compounds? ARBURG Plastic Freeforming (APF) is ideal for this purpose. In principle, any material that can be thermoplastically processed is suitable. The objective, however, is to produce good quality parts from the preferred material. As with injection moulding, this requires detailed knowledge of plastics processing. Our expert technical advice will help you with relevant information every step of the way. \\

Prototyping Center

We carefully check in advance whether our freeformer really is suitable for the desired material and part. We offer top-class service in this context: at our headquarters in Lossburg, Germany we use several freeformers to manufacture sample parts with various qualified materials in an additive manufacturing process practically around the clock. This means that we can now respond immediately to your inquiries.

ARBURG Prototyping Center:
Rapid production of prototypes.

freeformer
200-3X
reddot award 2014
winner
freeformer
200-3X
freeformer
300-3X

SYSTEMS AND OPPORTUNITIES: CUSTOMISED

// Depending on the requirements at hand, our freeformer is available in different sizes with two or three discharge units: You want to produce complex geometries using support structures? The freeformer 200-3X offers you all the options. You need more space or are seeking to achieve even greater functionality in your parts? If so, then the freeformer 300-3X is just what you're looking for. Always the same: our high-quality technology and a design that unites functional and aesthetic aspects to produce a seamless system. These are efficient solutions for industrial practice that are only available from one source: ARBURG. \\


freeformer 200-3X: our standard system with two discharge units.
freeformer 300-3X: our variant with a 50 percent larger build chamber and up to three discharge units.
ARBURG
freeformer 200-3X
ARBURG
freeformer 300-3X

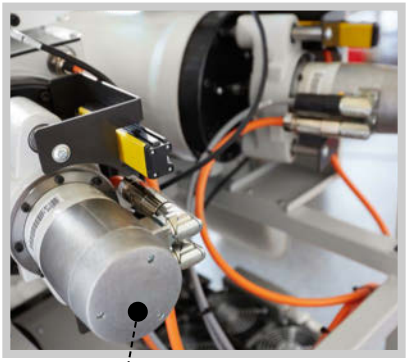
High industrial standard

Our freeformer offers you uncompromising high-end technology: robust industrial PC with multi-touch screen as a modern operating panel. Powerful servo motors for homogeneous material preparation. High-frequency nozzle actuators for the finely dosed discharge of droplets. Precise linear axes for the micrometre-precise positioning of the part carrier. Complex ventilation technology for uniform temperature control in the build chamber. This is the only way to obtain truly professional and reproducible results.

Flexible process technology

Our decades of experience in injection moulding have helped us recognise the flexibility of the freeformer as the measure of all things. What does this mean for you? An open system that lets you process multiple materials or colours as standard. In particular, our larger freeformer 300-3X offers important additional features in terms of process technology. Thanks to its three discharge units, complex and resilient functional parts can be produced in hard/soft combinations with a support material. This is the only system of its kind in the world to date.

Great flexibility: we can help you to combine up to three components in a single part.



Great quality: as machine manufacturers, we always use high-performance components such as servo motors.

Automation and more

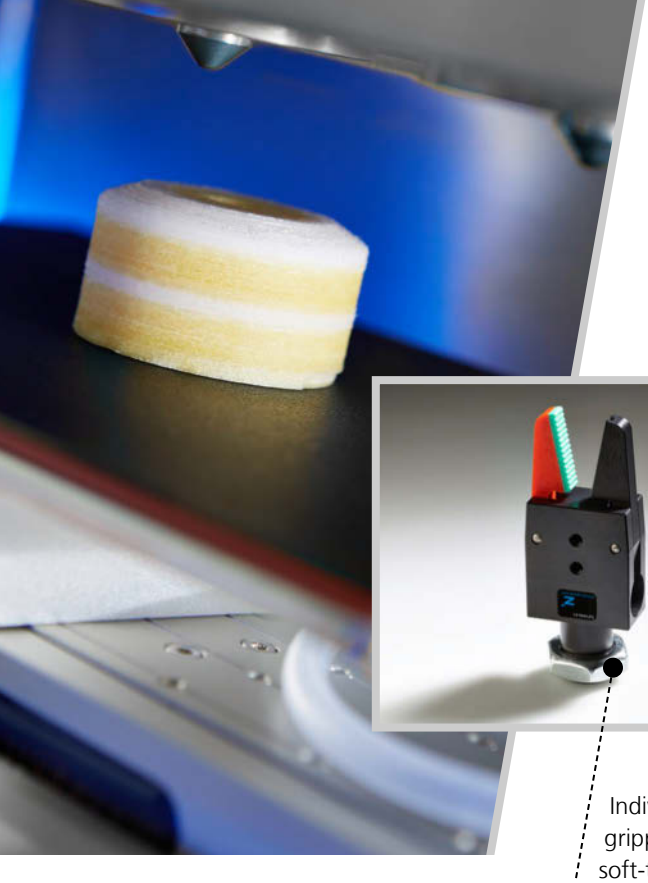
With the high-quality technology of our freeformer you can manufacture your products with ease in any environment, free from emissions and without active extraction. The larger freeformer 300-3X also offers you more opportunities for industrial applications. For example, the automatic opening and closing of the build chamber door forms the basis for an automated additive manufacturing process. The closed cooling system can also be expanded with a cooling water connection.

FREEFORMER 200-3X

Discharge units:	**2**
Build area:	**200 cm²**
Part carrier:	**3-axis**

FREEFORMER 300-3X

Discharge units:	**2-3**
Build area:	**300 cm²**
Part carrier:	**3-axis**



Small-volume batch for aerospace applications: geometrically precise air duct made from flame-resistant PC.

Individual part for automation: gripper with product-specific soft-touch surface.

APPLICATION RANGE AND PARTS: MULTI-FACETED

// Design freedom meets material diversity: industrial additive manufacturing of individual medical implants or functional assemblies for automation technology are just two of many areas for which ARBURG Plastic Freeforming (APF) is the ideal choice. No matter what industry you come from, the freeformer offers you a wide range of new options. Quality at affordable unit costs – it's in our blood!. We believe this holds a great deal of potential for the future – particularly for you! \\

Highlights

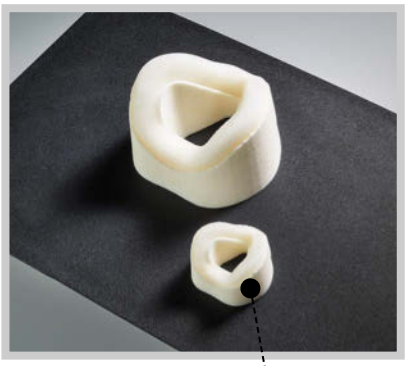
- One-off parts and small-volume batches in original material
- Functional integration with a click effect
- Complex, resilient hard/soft parts
- Mass customisation in 3D

Online examples

What is possible with our freeformer open system?
Be inspired by some more examples.

Mass customisation in 3D: individualisation of high-volume injection-moulded parts in original material.

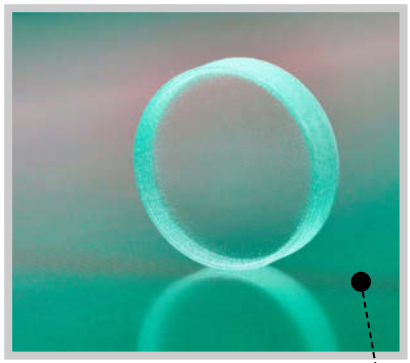
Process-reliable integration of inserts: roller as hard/soft combination.

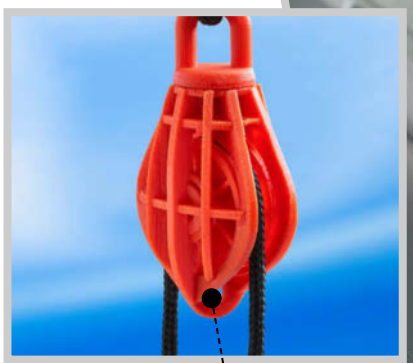


Reversible, tear-resistant and impermeable: miniature nose mask made from medically approved TPE.

Medical implants: cranial implant made from resorbable polylactide (PLLA).

Conductive material compound (ABS with carbon nano tubes): direct contacting of a manually inserted LED.





Transparency despite additive manufacturing: extremely tightly packed Perspex (PMMA) part.

Kinetic and robust: rope pulley assembly produced from bio-polyamide in a single step.

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