FREEFORMER

Efficiently and flexibly to additively manufactured components

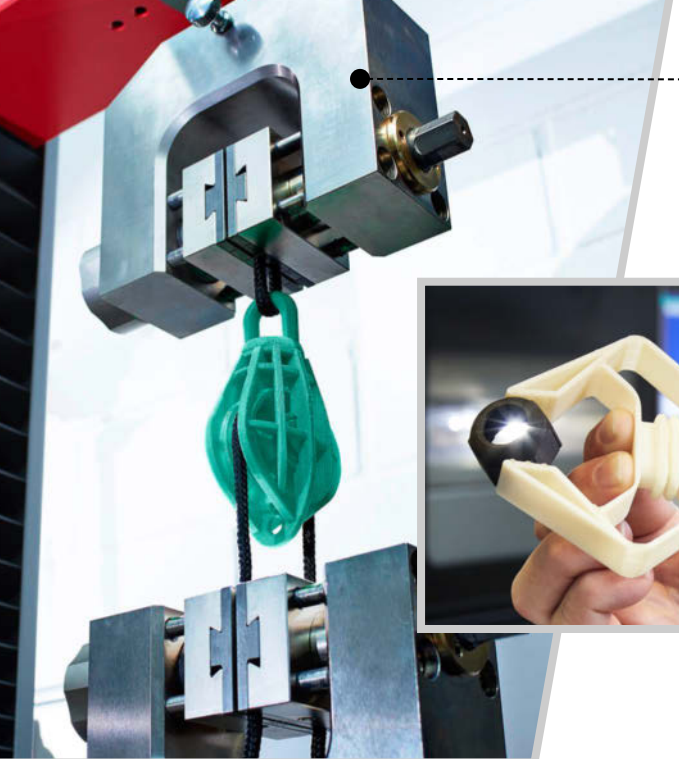
ARBURG

LAYER BY LAYER

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 color combinations. And, above all, reproducible part quality. Individually optimizable. This is precisely what we provide. After all, in 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!

WIR SIND DA.



Strong, resilient, dense:
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). Our open system for the additive manufacturing of functional components, produced efficiently and flexibly directly from 3D CAD data. With qualified standard granulates and by applying the smallest plastic droplets in layers. 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

freeformer systems process standard granulates. They do 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 standardized 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, flameproof materials, and medical-grade polylactide.

Open system

The ARBURG Plastic Freeforming (APF) process has been designed to act 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-material technology

freeformer systems are equipped with several discharge units as standard. You can use these to produce parts in various materials and color combinations – also as durable 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

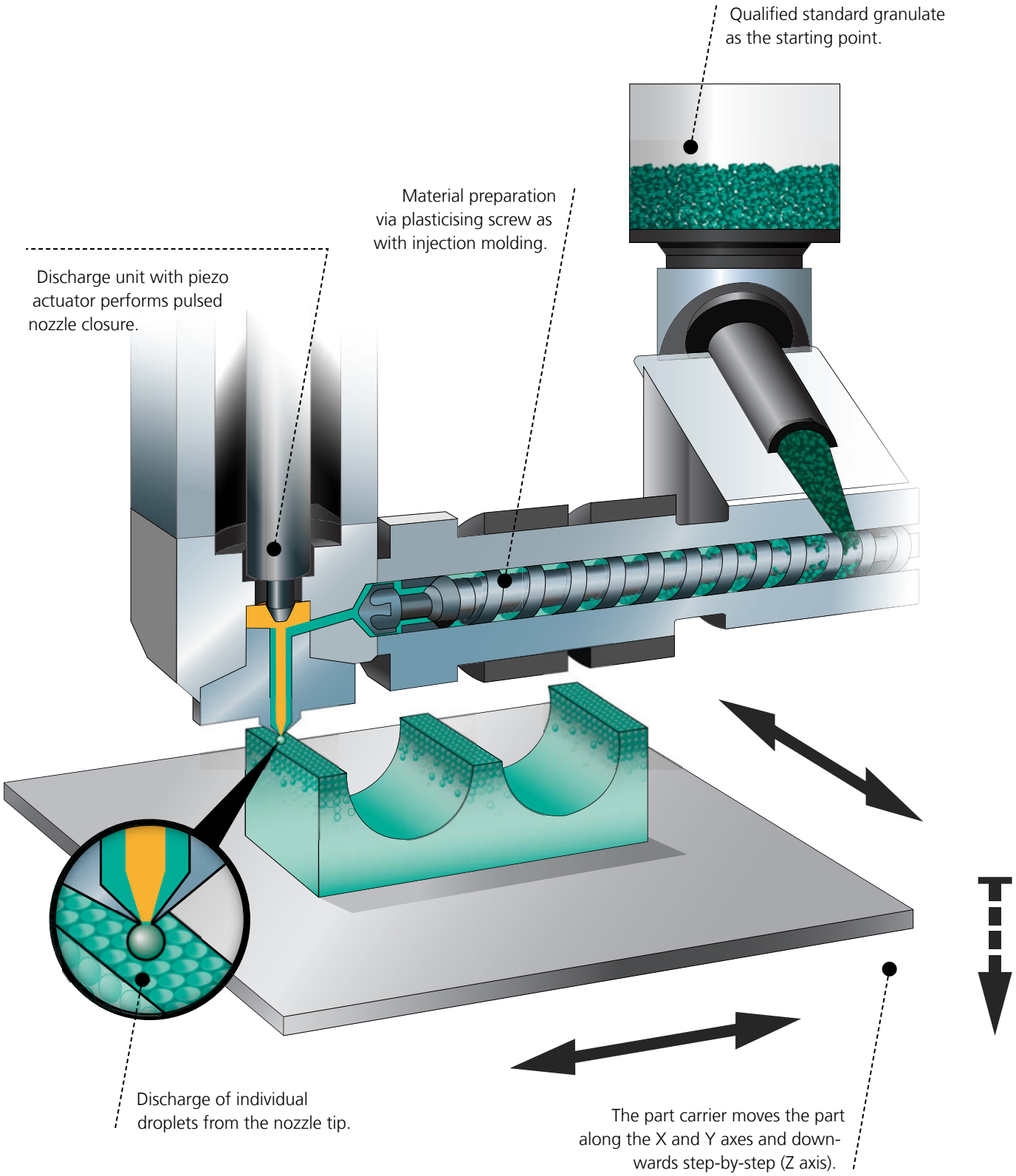
More options:
Large build chamber, precise temperature control for reliable printing

Functionally integrated:
Up to 3 discharge units and precise, piezo-controlled regulation of component density

Multi-material printing:
Combine hard and soft materials as standard granulate

PROCESSES AND TECHNOLOGY: UNIQUE

// Injection molding 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 molding. 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 plasticizing screw to melt standard granulates in the same way as in injection molding. This is followed by freeforming without the use of a mold: 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.

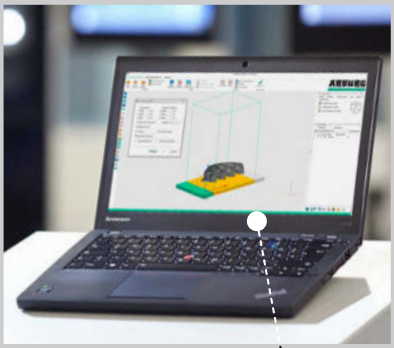
Potential

- 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 colors - even as a durable hard/soft combination
- Process without emissions or residues – no active extraction required, efficient use of materials
- High part quality – part optimization 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 molding. 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 optimization. \\

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. 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 molding.

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 molding, 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 component. We offer you top service for this: 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.

Contact our additive manufacturing experts directly and explain your requirements.

ARBURG Prototyping Center:
Rapid production of prototypes.

SYSTEMS AND OPPORTUNITIES: CUSTOMISED

// We offer our freeformers with two or three discharge units to suit every requirement. In addition, variants are available that can process high-temperature granulates. Always the same: our high-quality technology and a sophisticated design that combines function with aesthetics to create a perfect industrial production system. \\

freeformer
750-3X
freeformer
750-3X

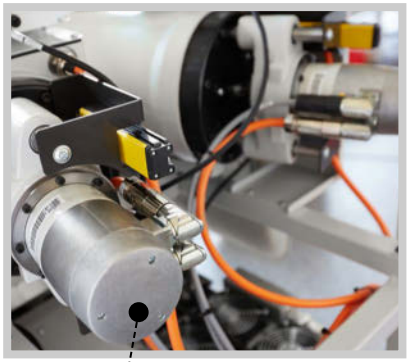
High industrial standard

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 micrometer-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 molding have helped us recognize the flexibility of the freeformer as the measure of all things. So what does this mean for you? An open system that lets you process multiple materials or colors 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

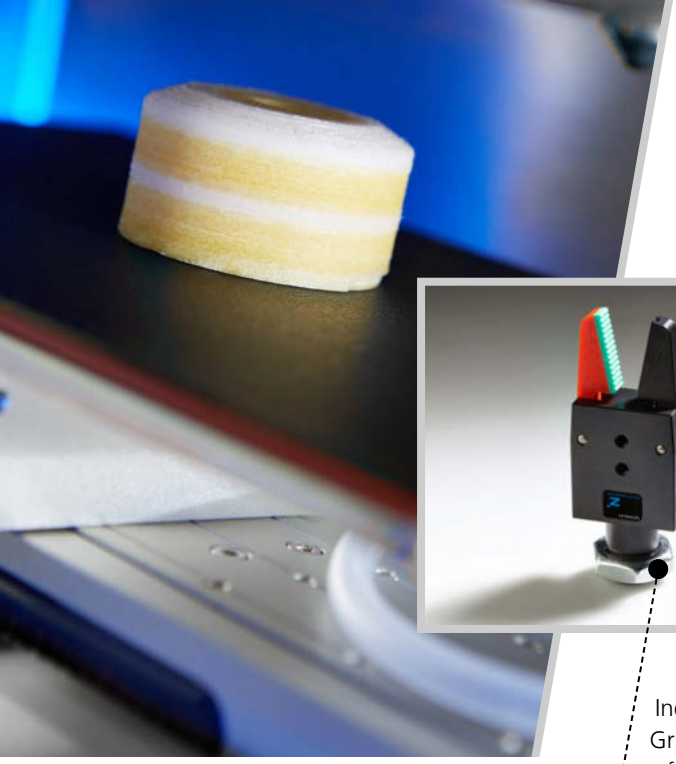
With the high-quality technology of our freeformer, you can manufacture in any environment without any problems – emission-free and without active extraction. The closed cooling system can be expanded with a cooling water connection. Our freeformer 750-3X also offers all the options for an automated additive production process.

FREEFORMER 750-3X

Discharge units:	**3**
Build area:	**750 cm²**
Part carrier:	**3-axis**
Build chamber temperature:	**max. 120°C**

FREEFORMER 750-3X HT

Discharge units:	**3**
Build area:	**750 cm²**
Part carrier:	**3-axis**
Build chamber temperature:	**max. 200°C**



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

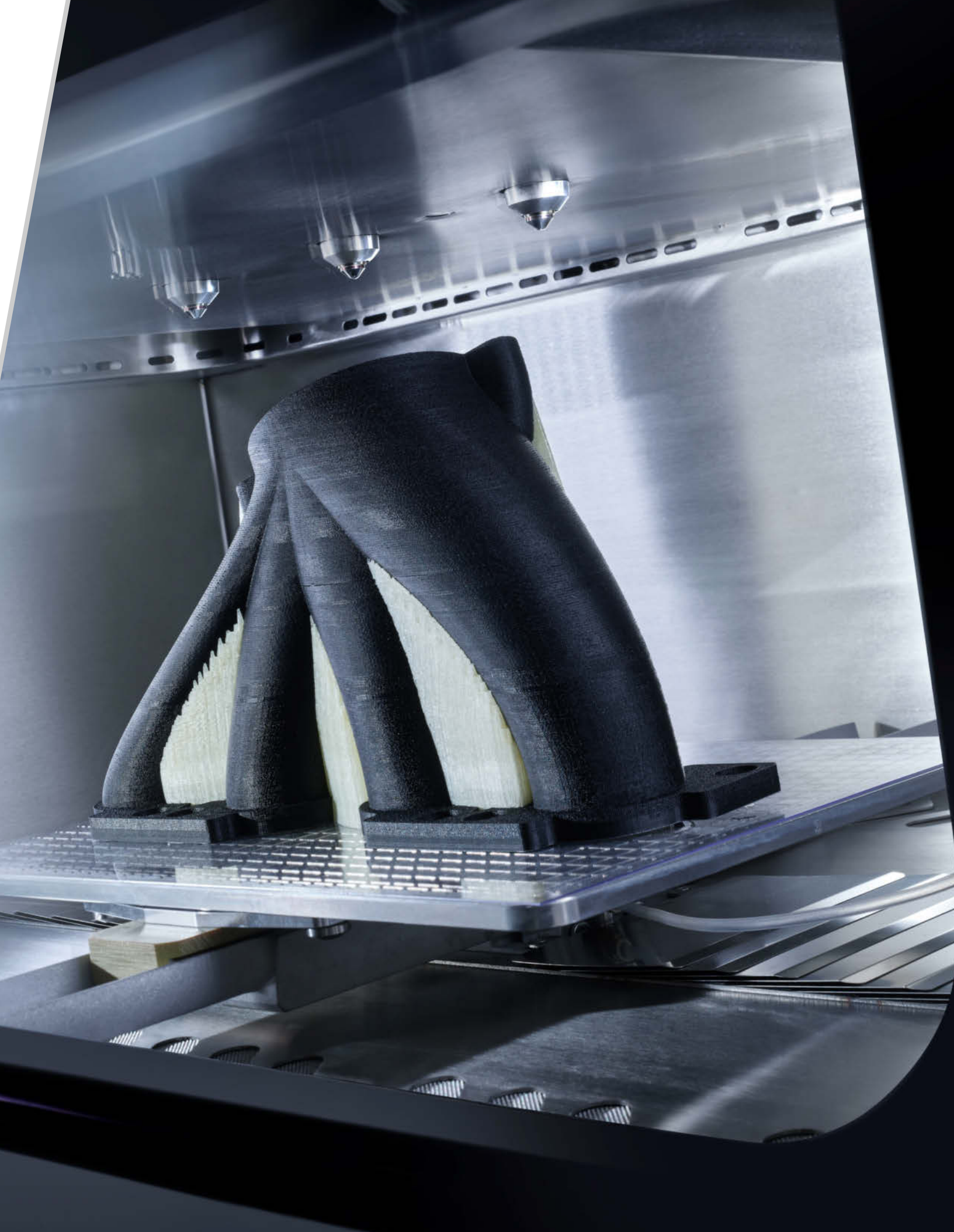
Small-volume batch for aerospace applications: Precise air duct made from flame-resistant PC.

APPLICATION RANGE AND PARTS: MULTI-FACETED

// Freedom of design meets material diversity: industrial additive manufacturing of individual medical implants or functional assemblies like grippers for automation technology are just two of many areas for which ARBURG Plastic Freeforming (APF) is the ideal choice. No matter what industry you work in: freeformers offer comprehensive new possibilities and quality at economical unit costs. \\

Highlights

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

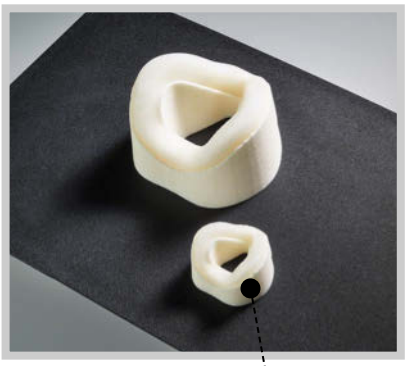


Online examples

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

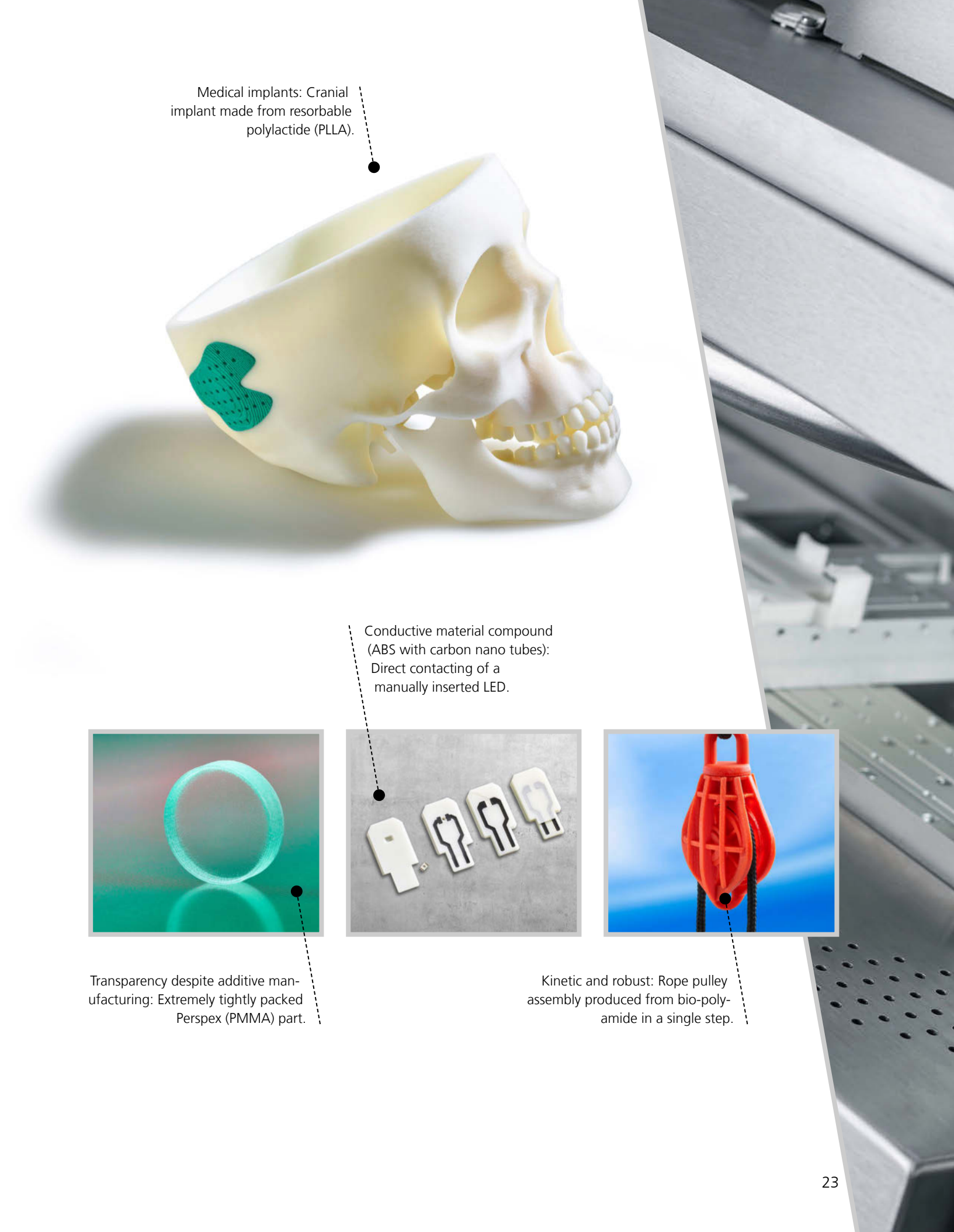
Mass customization in 3D: Individualization of high-volume injection-molded parts in original material.

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



Resilient, 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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