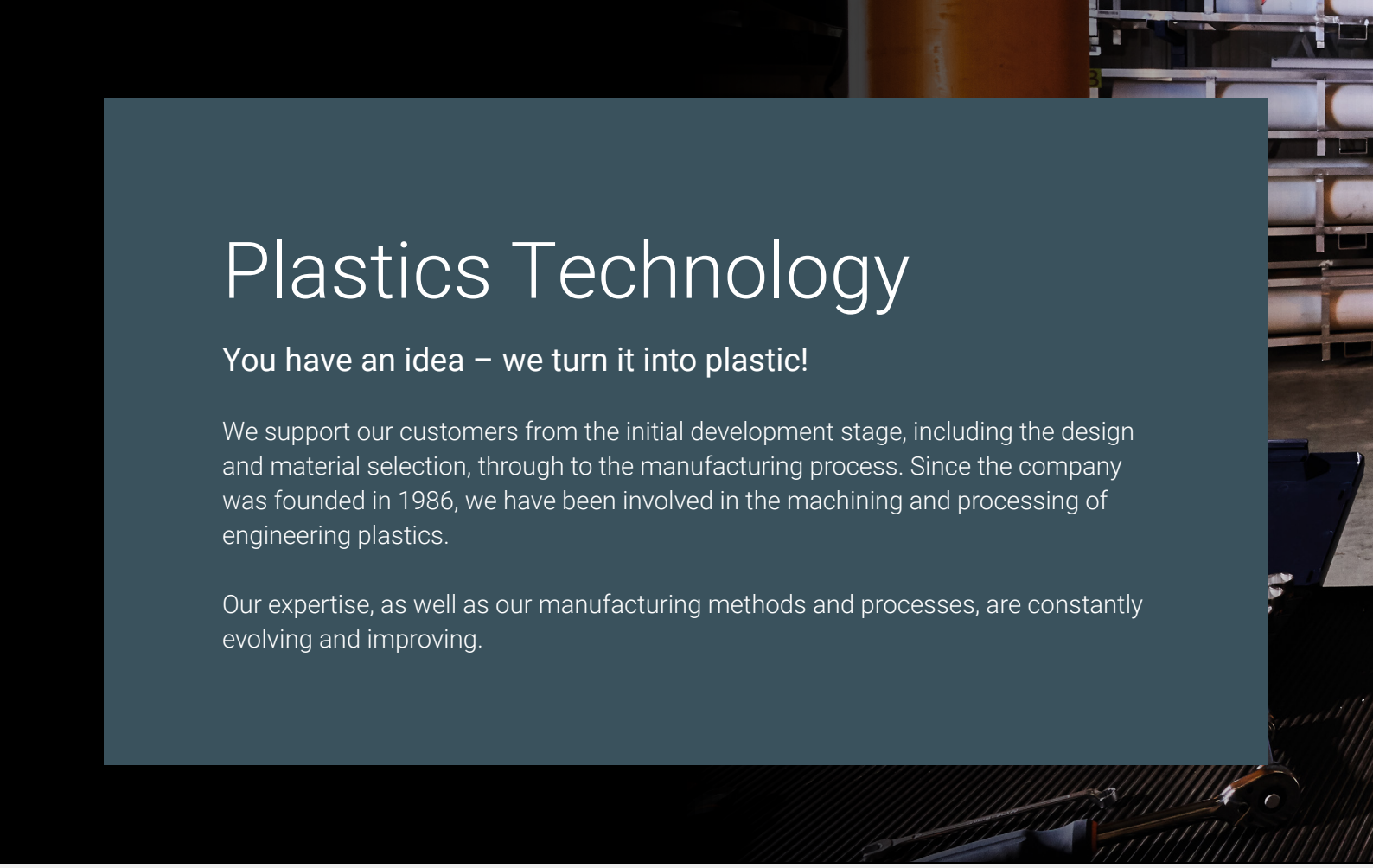
# Plastics Technology

Machining, additive manufacturing and molded parts – all from a single source

HÄNSSLER
Kunststoff- und Dichtungstechnik



# Plastics Technology

## You have an idea – we turn it into plastic!

We support our customers from the initial development stage, including the design and material selection, through to the manufacturing process. Since the company was founded in 1986, we have been involved in the machining and processing of engineering plastics.

Our expertise, as well as our manufacturing methods and processes, are constantly evolving and improving.

We work with customers from nearly every industry and specialize in the production of advanced plastic components – always guided by our principle: “We never want to be the biggest, but always the best!”

Our manufacturing capabilities range from CNC-turned and milled parts on state-of-the-art machining centers to additive manufacturing and hybrid processes combining additive and subtractive methods. Molded parts are produced on our injection molding machines or using the vacuum casting process. Depending on material, geometry, quantity and cost requirements, we select the optimal manufacturing process for our customers.

### Our core competencies

- Development and optimization of plastic parts
- Selection optimal manufacturing processes and materials
- Production of customer-specific plastic parts from a quantity of 1
- Flexible production and delivery in a short time
- Networked processes, fully traceable and transparent

### Our strengths

- Personal contacts in sales and technology
- Quality from in-house production - everything from a single source
- Latest, state-of-the-art technology in production, quality assurance and order processing
- Availability due to large stock of semi-finished technical plastics
- Short and precise delivery times
- Certified according to DIN EN ISO 9001 (quality), 50001 (energy) and 14001 (environment)
- Responsible production (short delivery routes, energy-efficient, from renewable energy)

You can find more information at:
dicht.de/en/plastics-technology

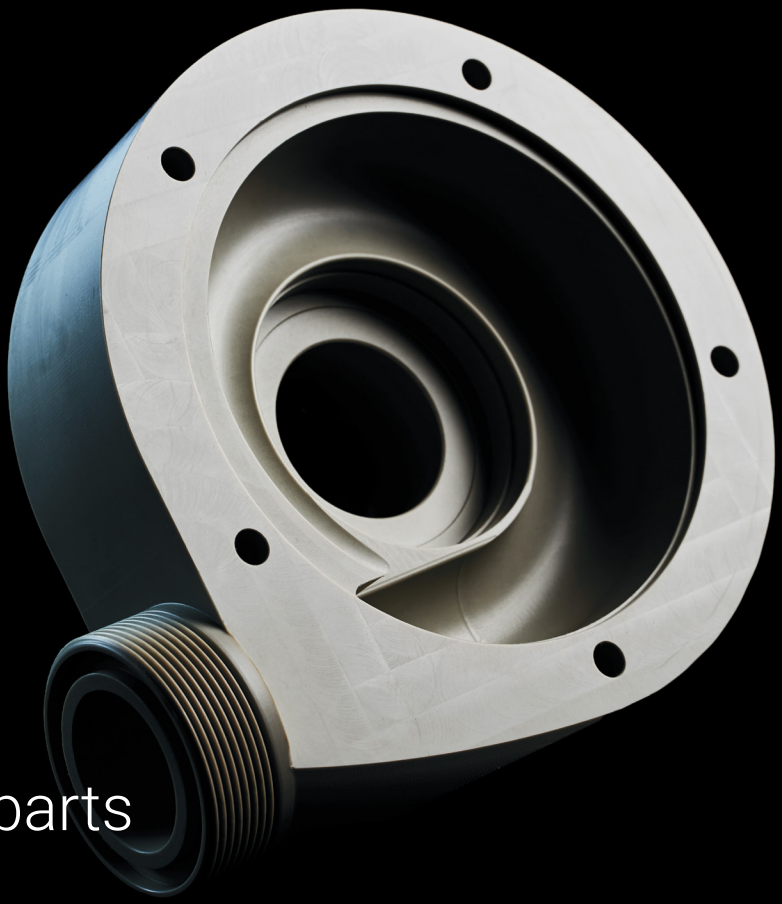

## Plastics technology



## Professional journal article



## Our services at a glance



# Turned and milled parts

Pump housing made of PP | Application: conveying special media

## Plastic machining

In addition to the production of sealing elements, the manufacture of customer-specific plastic parts from a variety of materials is one of our core competencies. Our machining production is exclusively optimized for plastics processing. There are three main areas within our production:

### Plastic turned parts

Plastic turned parts are manufactured on CNC lathes that have been specially modified for plastics processing. This enables us to achieve tight tolerances, high repeatability, and excellent surface quality. In this production area, we manufacture the smallest components from a few millimetres up to turned parts with a diameter of several meters from a quantity of 1 up to large series. Flexible production planning and a comprehensive inventory of semi-finished products enable us to achieve short delivery times.

### Milled plastic parts

In this area, we process plastic sheets on three-axis portal milling machines up to 2 x 2 meters or manufacture the most complex milled parts from sheets, tubes and solid rods on simultaneous 5-axis machining centers.

When manufacturing milled plastic parts, it is particularly important that the components are clamped without force in order to guarantee dimensional accuracy. Thanks to our uncompromising specialization in plastics processing, we have also adapted our milling machines perfectly to the conditions and modified them accordingly.

### Turned and milled plastic parts

Here we combine all available technologies and manufacture every conceivable geometry on multi-function machining centers. By combining the various work steps, we avoid additional setuops of the component, thereby reducing costs and increasing accuracy. Thanks to large, automated tool magazines, we reduce set-up times and achieve an optimal repeat accuracy.

More information can be found at
dicht.de/en/plastics-technology/turned-and-milled-parts

Deflection gearbox made of PEEK | Application: reducing weight in a Formula Student racing car

# Range of services

## Development

The price, quality and process reliability of a plastic component have the greatest impact right from the development stage. Our development department can support you in designing and constructing the optimum component for your application.

Benefit from our many years of experience and specialized expertise. Whether it's the choice of material, the manufacturing process or material-specific tolerances, we will support you.

## Production

We have specialized in processing only plastics on our machining centers. This strategy allows us to optimize our manufacturing capabilities and means we do not have to make any compromises.

We use special tools, clamping devices and fixtures that have been developed exclusively for plastics processing, mainly by us. Our optimal equipment guarantees quick response times, top quality, and cost efficiency.

## Quality assurance

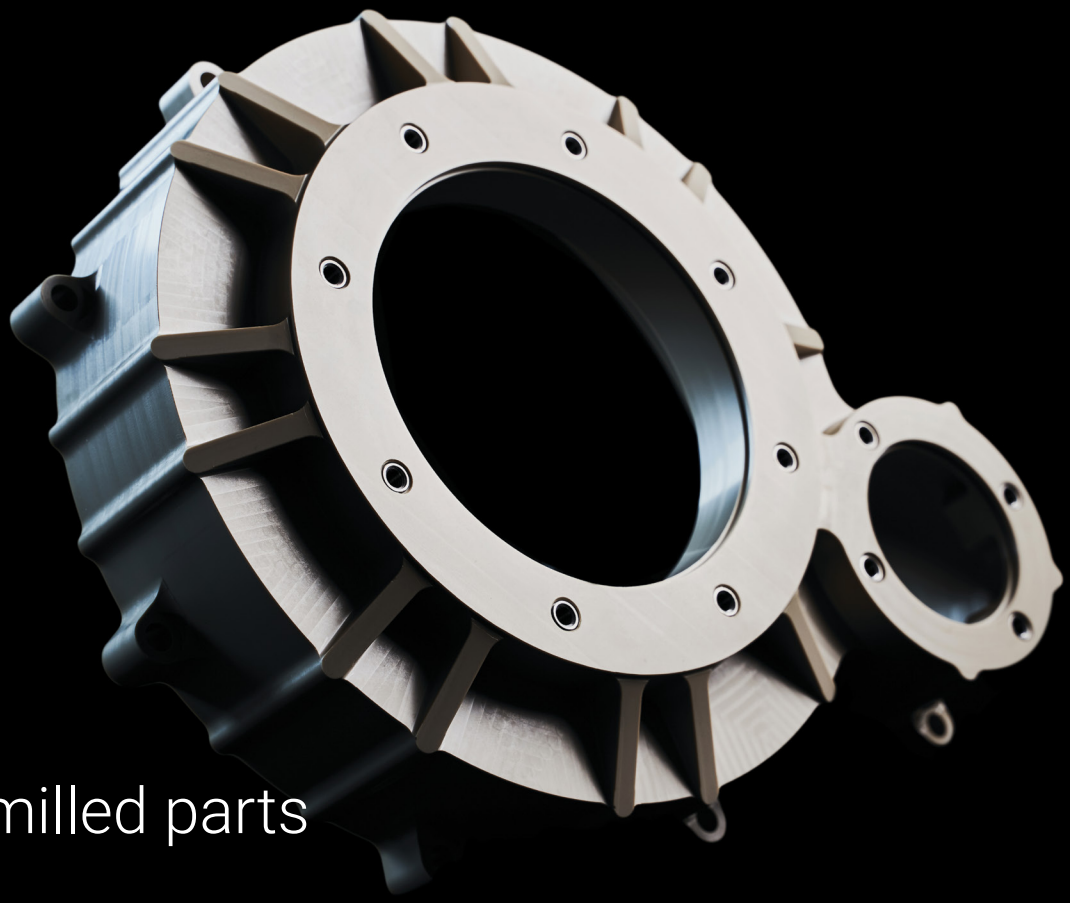
We carry out quality assurance during production and through final inspections of each order. When it comes to customer-specific requirements for the inspection and documentation of certain criteria, we are optimally equipped and can respond to our customers' wishes.

We also work in this area with state-of-the-art testing equipment in air-conditioned rooms and measure tactilely or optically with automated test programs.

## Logistics and shipping

In logistics, we focus on full traceability by fully digitizing all processes. Every delivery that leaves our premises is 100% traceable and we can identify the batch delivered with the date of manufacture at any time.

Each item is scanned upon removal and dispatch and automatically provided with a label on which all information is made available. Customized labels are also possible so that our customers no longer need to repackage their products.



# Turned and milled parts

Gear housing made of PEEK | Application: reducing weight in a Formula Student racing car

## Materials

We process over 160 different plastics, regularly adding new materials sourced from selected suppliers in Europe. Thanks to our large stock of semi-finished products, we guarantee short delivery times from high-quality materials. We meet approval and compliance requirements for many industries, and our compliance officer supports our customers with questions in this area.

In our materials overview you will find the most common materials with the most important properties and application recommendations. However, we can also draw on many other materials. Together with our customers, we are happy to take on the complex selection of materials, taking into account the general conditions.

### Engineering plastics

Thermoplastics such as POM, PA, PC, PET, PEEK, PSU, PEI, PPS, PE, PP, PVDF and many more are processed for most engineering applications.

All base materials can be combined with various additives, such as glass or carbon fiber reinforcement, or additives to optimize friction, electrical conductivity, or flame retardancy. Laminated materials based on epoxy, phenolic resin or PI are a special group in this area.

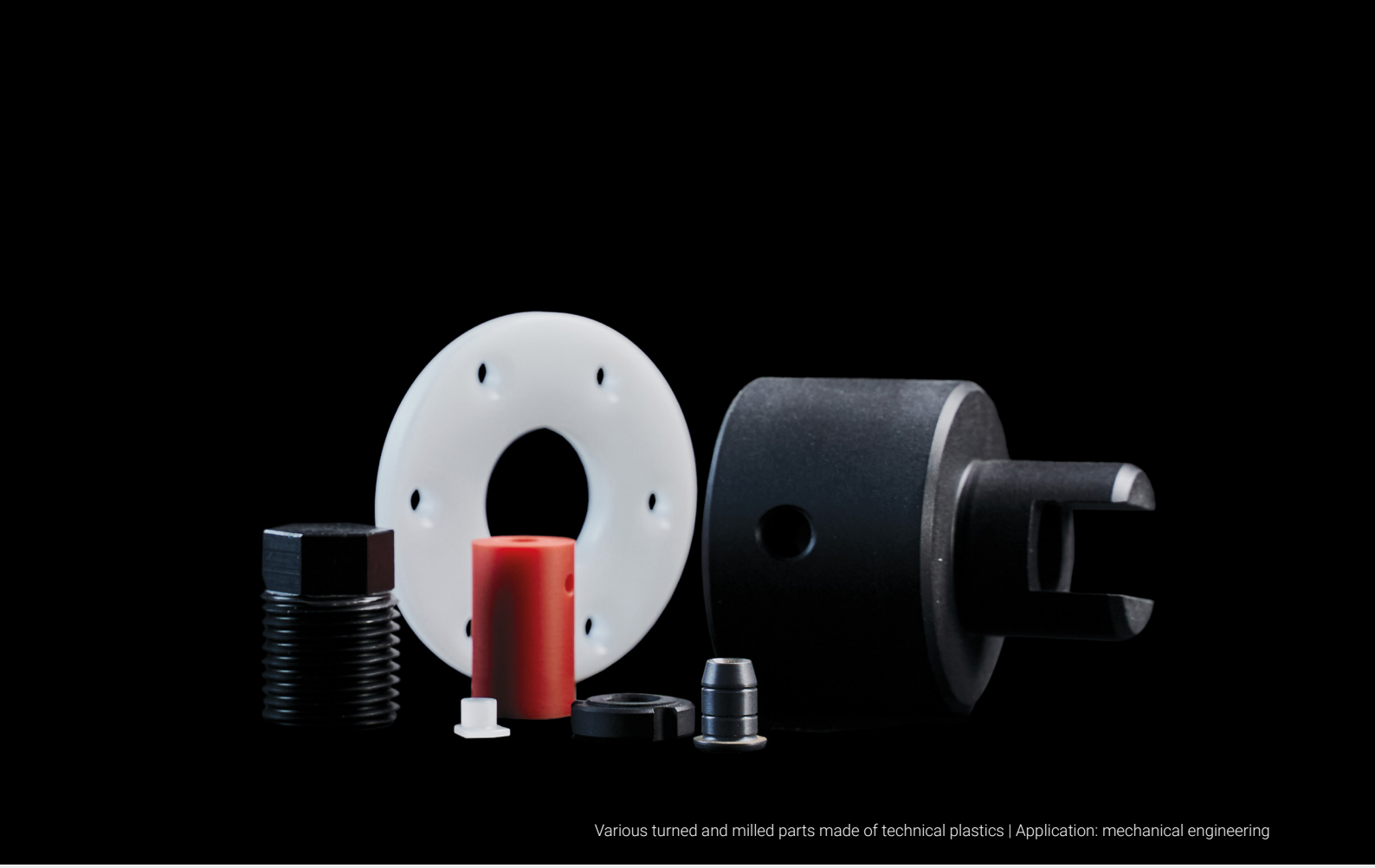
### Fluoroplastics

Fluoroplastics such as PTFE are often used in sealing technology. PTFE and PTFE compounds are also used in applications involving low friction, high temperatures or chemical applications.

PTFE can be combined with a variety of additives to improve its properties in terms of friction, wear, compressive strength or heat resistance. We have many semi-finished products made from a wide variety of compounds in stock, allowing us to guarantee short delivery times.

### Elastic materials

One of our special features is the ability to machine elastic materials and therefore avoid expensive molding costs. We machine elastomers with a hardness starting at 70 Shore A and produce complex profiles in unbeatable time and without long-term investment, even in small quantities. Common elastomers include NBR, H-NBR, PU, FPM, EPDM and silicone.



Various turned and milled parts made of technical plastics | Application: mechanical engineering

# Applications

## Lightweight construction

Engineering plastics are increasingly being used to replace metallic materials in order to save weight. Certain high-performance plastics with reinforcing additives can withstand high mechanical and thermal loads while weighing significantly less. For example, our components made from the high-performance plastic PEEK and PEEK compounds are used in sectors such as motor racing, medical technology and the food industry.

## Mechanically resilient and insulating

Many plastic parts prove their worth, particularly in applications where the component has to withstand mechanical loads and at the same time fulfill electrically insulating properties.

We have extensive experience in the electrical industry, wind power and automation technology, where our solutions are used. Components that were previously made from aluminum and had to be elaborately insulated are now made entirely from engineering plastics.

## Chemical applications

In applications in the chemical industry, metallic materials often reach their limits because they are not suitable for contact with the process media. Plastics such as PP, PTFE and PPS are the solution. We use these materials, for example, to manufacture pump housings for pumping aggressive media. The components made from plastics are also very easy to clean.

More information can be found at
dicht.de/en/plastics technology/turned-and-milled-parts

# Bushes / Bearings

Guide bushings made of fabric laminate and POM | Application: mechanical engineering

## Technical guide bushes / sliding bearings made of plastic or fabric laminate

We manufacture guide bushes and plain bearings from various materials as well as slotted or drilled on request.

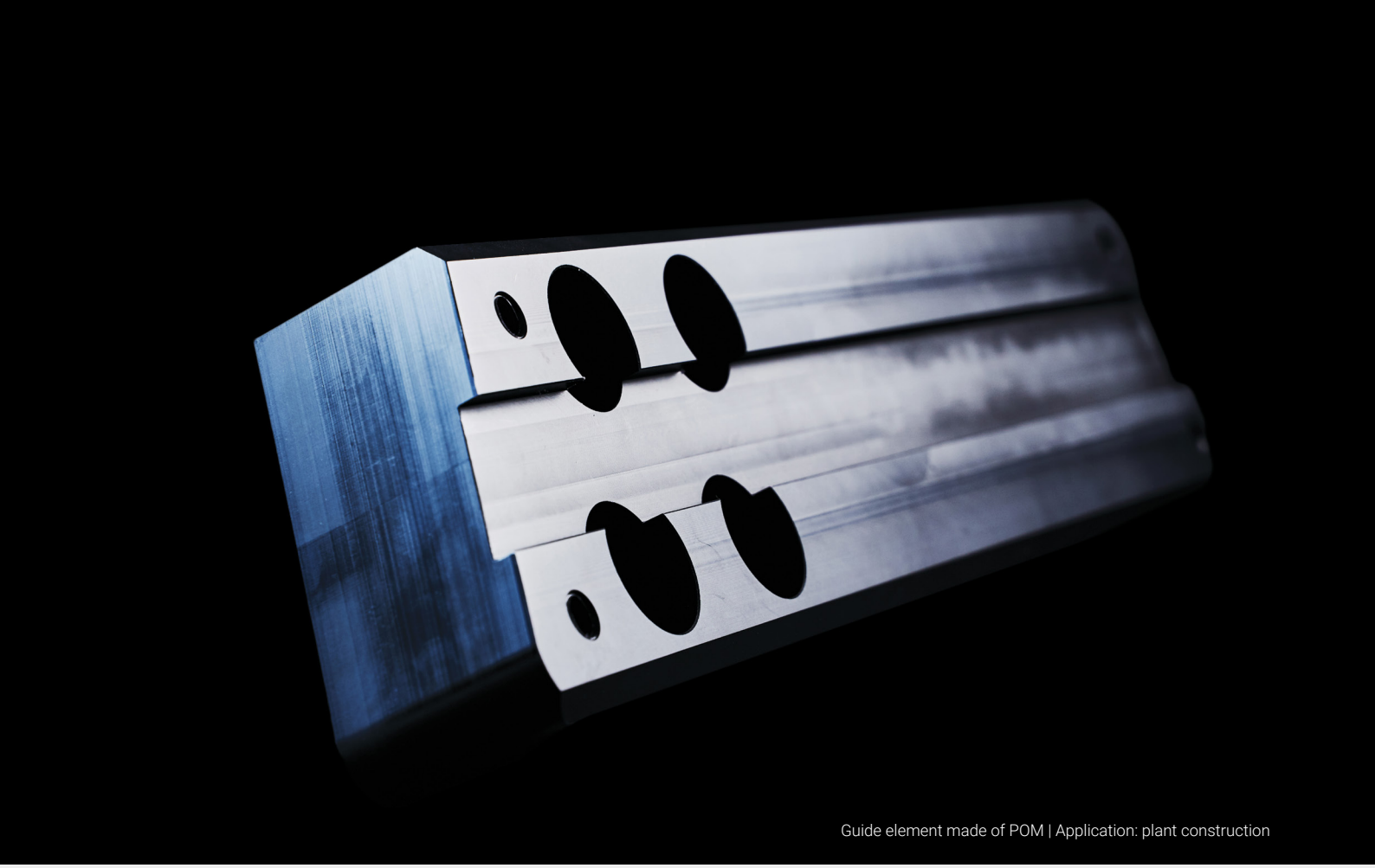
Manufactured from hard fabric or high-performance plastics, guide bushes are particularly impressive because they are maintenance-free and wear-resistant. Low friction values and low weights combined with high corrosion and chemical resistance make them particularly popular. They are mainly used where subsequent lubrication is not possible.

We manufacture guide bushes entirely according to your individual specifications without minimum quantities. We are happy to implement special requests such as the use of materials with certain conformities, engravings also with consecutive numbers, a slot for easier installation or the insertion of lubrication holes for you.

## Advantages of plastic guide bushes / slide bearings

- cost-effective
- favorable strength-to-weight ratio
- maintenance-free dry running
- high mechanical damping
- corrosion resistant
- chemical resistant
- low coefficient of friction
- wear-resistant

For more information please refer to our **„sealing technology“ brochure, section „Guide rings“.**



Guide element made of POM | Application: plant construction

## Guide elements made of high-performance plastics

Wear occurs wherever threre is friction. Especially where metallic materials are used. Regular lubrication is unavoidable here in order to avoid “seizure” in guideways.

With our high-precision guide elements made of high-performance plastics, we offer a cost-effective alternative. By selecting the right material, we offer the optimal conditions for use as a guide or sliding element, e.g. in conveyor systems or automation solutions. Materials with a sliding additive completely eliminate the need for oil lubrication.

On request, we can manufacture guides made of food-approved materials (FDA, EU) for the meat processing industry or bottling plants. Detectable plastics are also possible.

## Advantages of the guide elements made of high-performance plastics

- Excellent sliding properties
- High wear resistance
- Self-lubricating (depending on material)
- Noise reduction
- Avoidance of stick-slip effect
- No corrosion
- High chemical resistance
- Better weight/performance ratio

## Typical areas of application

- Conveyor systems
- Automation
- Linear technology
- Filling systems
- Waste systems

More information can be found at
dicht.de/en/plastics-technology/bushes-or-bearings

# Moulded parts

Guide rings made of POM | Application: cylinder construction

## From prototype to series

One of our core competences is the support of our customers from the first prototypes to the serial part. If a moulded part is the best option for economic or manufacturing reasons, we have various options for developing the optimal solution.

For moulded parts in large quantities, we draw on the expertise of our qualified partners. Together with our customers, we develop the optimal moulded part, take over the initial sampling and qualify the perfect series part.

For medium quantities, we develop cost-effective tools made of high-strength aluminum in our own toolmaking shop using a modular system. Due to our flexible production, we have the possibility to produce moulded parts in a very short time on our own injection moulding machines.

For small quantities, vacuum casting is a very good alternative. Especially for components made of elastomers, where machining is no longer possible due to insufficient shore hardness or geometric complexity, it can be used to produce usable components made of polyurethane.

## Modular system for cost-effective tools

If the expected number of pieces does not reach the usual size for a moulded part, there is an intermediate solution. Moulds are CNC machined from a high-strength aluminum alloy and positioned in a standard mould frame. By recycling most of the components, the cost of the mould is significantly reduced and can be realized within a very short time.

The production of several thousand components is possible with these unhardened tools in high component quality and is especially advantageous in the product development phase. These tool inserts can be changed relatively easily in a short time, and different variants can be tested in parallel.

Standard products produced in this way are, for example, guide rings made of POM for hydraulic cylinders. Here, a mould contains several dimensions, and a positioning insert is used to release the sprue for the respective guide element. This solution is therefore very cost-effective and allows these moulded parts to be produced economically even in manageable quantities.

More information can be found at
dicht.de/en/plastics-technology/moulded-parts

Various vacuum cast parts made of PU | Application: pilot series in plant construction

## Vacuum casting for usable molded parts

The vacuum casting process is suitable for moulded parts in small quantities. Here, the master model is produced using additive manufacturing, from which a silicone mold is created. The finished component is then produced in this silicone mould under vacuum using polyurethane vacuum casting resin. The silicone mould can be used to produce up to 20 components before it has to be replaced.

If larger quantities are required, the mould can also be CNC machined from aluminum if the complexity of the component allows. The polyurethane vacuum casting resin allows a Shore A hardness between 35 and 95. In addition, components can also be made from liquid silicone with a Shore A hardness between 30 and 59.

The vacuum casting components are not only suitable for prototypes before a series tool is created, but can actually be used for various applications.

## Applications for vacuum casting components

### Complex housing seals

Some complex geometries are necessary for the sealing of cases, which can only be produced by means of moulding manufacturing processes. However, if the planned quantities are small, the production of a conventional mould is not economical.

In addition, more complex geometries are possible using vacuum casting, since the positive can be produced using additive manufacturing.

### Seals for test stands

Essential for leakage tests of die-cast or injection-moulded parts, complex sealing geometries are required onto which the component to be tested is pressed.

The seals produced by vacuum casting can be derived and manufactured from the 3D CAD data with little effort and in a very short time.

### Spare parts in case of loss of the series tool

When inspecting older equipment, the procurement of spare parts made of elastomers is often a problem because the series tool is no longer available.

Wiper components or seals can be produced very cost-effectively using the vacuum casting process based on the samples.

### Development parts

In the development phase, development times and costs can be significantly reduced by using components in the vacuum casting process for testing. Even if the exact series material is not available, most functions can still be fulfilled.

# Additive manufacturing / 3D printing

## You have an idea – we print it in plastic.

For many technical challenges, additive manufacturing offers great potential. We specialise in producing usable and durable plastic parts additively.

In terms of lightweight construction, geometric complexity and material selection, these manufacturing processes open up completely new approaches.

It is important to take these new degrees of freedom into account during the development phase. Design and procurement processes must also be aligned with this. In keeping with the motto “3D printing not just for the desktop”, we support you in making the most of these manufacturing methods:

- higher geometric complexity (undercuts, free form surfaces, channels, bionic design)
- lightweight construction through hollow components
- no tooling costs
- easy design changes without additional costs
- good availability of suitable semifinished products (especially for high tech plastics)
- resource savings (no chip waste, lower material consumption)
- low set up costs
- cost advantages for complex components

### Our core competences

- development and optimisation of additively manufactured plastic parts
- selection of the best additive manufacturing process
- processing of high tech plastics
- finishing and optimisation of additively manufactured components

### Our strengths

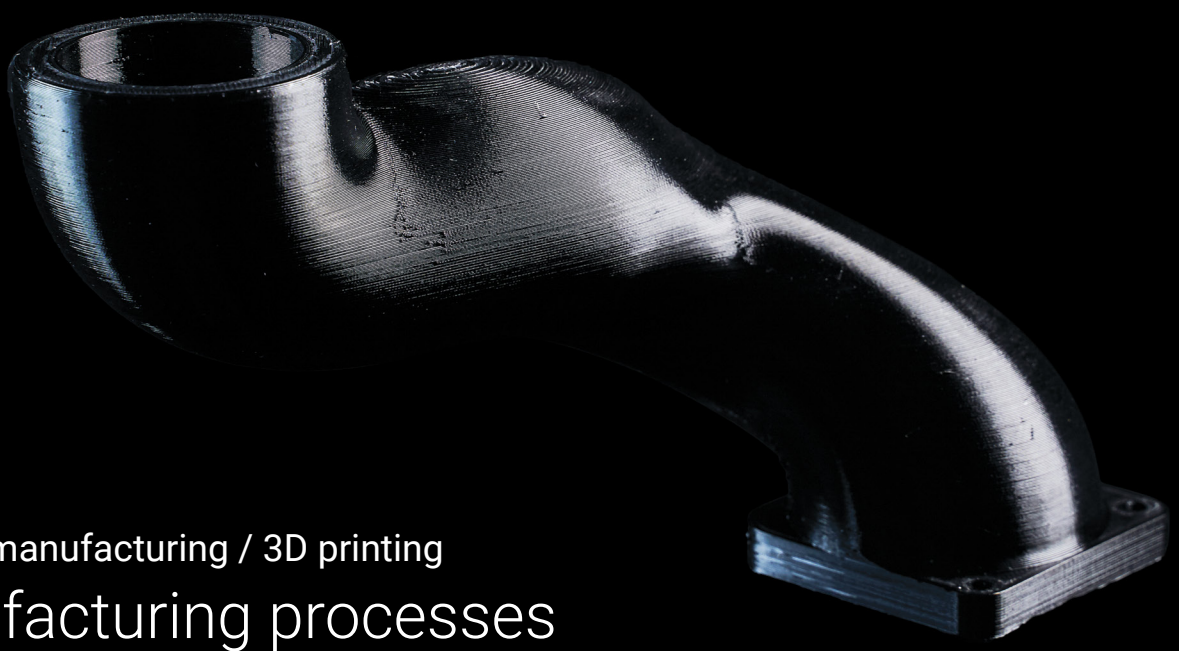
- additive and subtractive manufacturing from a single source
- high availability of technical plastics thanks to a large stock of raw materials
- short and precise delivery times
- state of the art technology in manufacturing, quality assurance and order processing
- certified in accordance with DIN EN ISO 9001 (quality), 50001 (energy) and 14001 (environment)
- responsible, energy efficient production (short delivery routes, use of renewable energy)

Suitable materials can be found at
dicht.de/en/additive-manufacturing

## Additive manufacturing / 3D printing



Suitable materials can be found at
dicht.de/en/additive-manufacturing/materials



Extraction pipe made of PET | FFF process | Application: automation

## Additive manufacturing / 3D printing

# Manufacturing processes

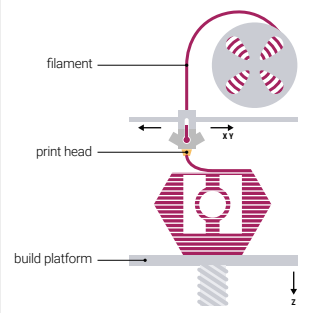
The term “additive manufacturing” covers a wide range of manufacturing processes. Depending on requirements – such as the material, the precision or the batch size – we select the best possible process for the specific application.

Knowing the intended use of the component helps us tremendously when determining the optimum process. Useful parameters include:

- operating temperature
- mechanical load
- required precision
- media exposure
- required weight

In vielen Fällen haben wir die Möglichkeit, den identischen Werkstoff zu verarbeiten, der in weiteren Entwicklungsschritten oder in der Serie verwendet werden soll.

## Overview of the most important manufacturing processes



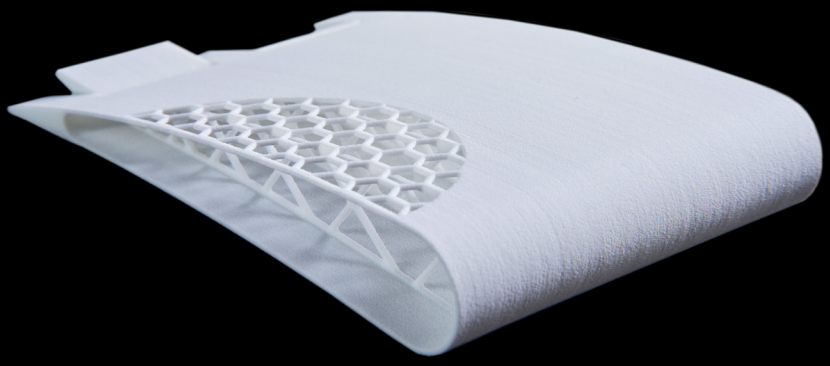

### FFF (Fused Filament Fabrication)

The FFF process, also known as the FDM process, is probably the best known 3D printing process. A plastic filament is fed into a heated print head. A nozzle melts the filament and applies it to the build platform layer by layer.

FFF is considered one of the most cost effective 3D printing processes while offering a very wide range of materials. We specialise in using this process to handle high tech materials for high mechanical and thermal loads.

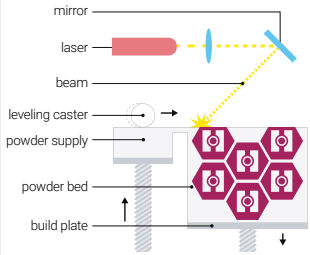
+ large variety of materials
+ possible to produce hollow and therefore very light components
+ cost effective for small and medium batch sizes
+ minimal material consumption, particularly interesting for high grade high tech materials
+ suitable for producing robust components

– medium precision that can be improved by mechanical reworking
– layer oriented surface structure
– different mechanical strength in the x, y and z directions



Test component made of PA | SLS process

Compact compressed air distributor made of Resin Clear | SLA process | Application: automation



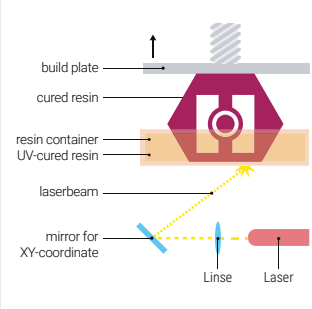

## SLS (selective laser sintering)

A laser melts the required powder material layer by layer, joining the individual layers together. The range of materials is somewhat restricted.

For the production of larger quantities, however, this process can be an economical alternative.

+ suitable for producing load bearing components
+ no support structures required
+ cost effective series production
+ high precision

– inefficient for small quantities
– slightly textured surface
– no hollow, closed components possible
– limited material choice




## SLA (stereolithography)

SLA is the oldest patented additive manufacturing process. Here a liquid photopolymer is cured layer by layer by means of a laser. Different materials with special properties can also be processed with this method.

Components with high demands on accuracy and appearance can be manufactured in this way.

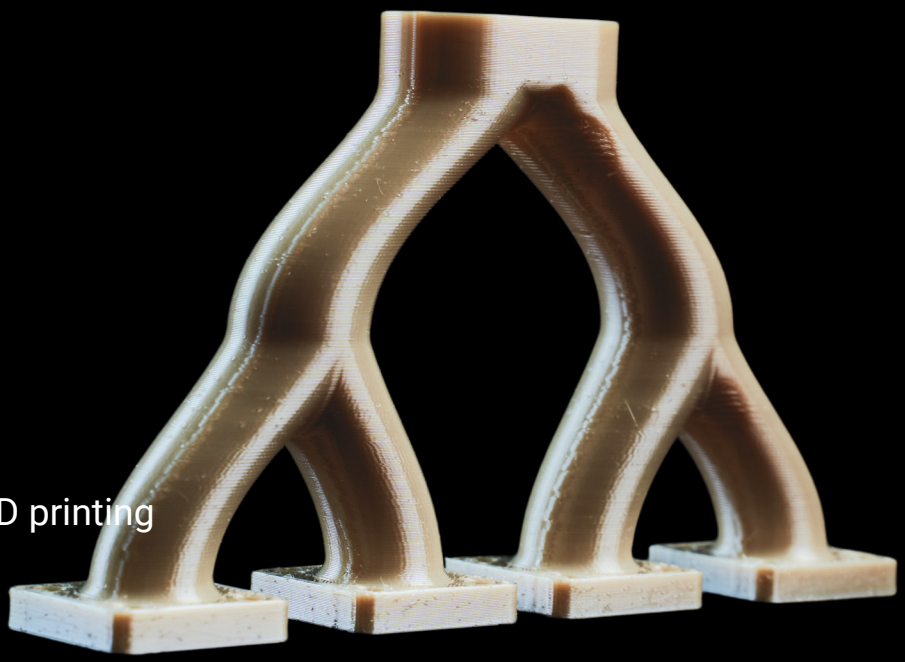
+ very high precision
+ very high surface quality
+ wide range of materials
+ filligree geometries

– laborious post processing
– end products are not permanently UV stable
– no hollow, closed components possible
– materials not available in other manufacturing processes

More information can be found at dicht.de/en/additive-manufactu-ring/manufacturing-processes

Additive manufacturing / 3D printing

# Applications



Exhaust manifold made of ULTEM™ 9085 | FFF process | Application: plant engineering

Additive manufacturing opens up new degrees of freedom. These can be used in the development of series parts and have a major influence on the design of the component itself. Development processes can be significantly shortened through quickly available and inexpensive prototypes, or components can be developed that are no longer manufacturable using other conventional processes. This results in countless applications that offer enormous advantages in many areas.

## Development

### Initial samples (without mechanical or thermal load)

The best known application is the production of design prototypes that are not subjected to mechanical or thermal loads. At the start of a development, these prototypes are used to check the required part for ergonomics, appearance and ease of assembly or to visualise and compare different ideas.

3D printed design prototypes can be produced quickly and inexpensively from simple materials, which drastically shortens the development process.

### Functional prototypes (mechanically and thermally loaded)

Thanks to the wide range of available materials, functional prototypes can be produced that are very close to the series part.

In many cases it is possible to process exactly the same material that will later be used in the series as a moulded or machined part.

These additively manufactured functional prototypes are therefore mechanically and thermally resilient and can be used in pilot series to carry out tests quickly and cost effectively.

### Test parts for research and development

Additive manufacturing can be used to produce parts to verify processes and run simulations. Designs that would not be feasible with other manufacturing methods open up new avenues for research and development.

One example is parts with internal channels of different cross sections that can even be produced transparently to make functions and processes visible.

Extraction device made of PET | FFF process | Application: automation

# Production and quality assurance

### Production equipment

Additively manufactured devices are ideal for optimizing production steps, avoiding errors, improving quality, and increasing efficiency.

Clamping devices, drilling templates, extraction devices, positioning devices for laser marking or manual work steps, and grippers for robots can be manufactured easily and independently of their complexity.

No production facilities need to be used to create these tools. The design of these tools is also very simple, as they can usually be derived directly from the 3D model without a manually created manufacturing program, for example on a CNC machine.

### Assembly tools

There is enormous potential in the area of assembly stations in the form of additively manufactured holders for components and tools or positioning for manual assembly steps and assembly tools. These aids can be precisely adapted to requirements and designed specifically for each component. Small quantities, rapid change intervals, and complexity are irrelevant in the world of additive manufacturing.

### Test equipment

In quality assurance in particular, it is important to position the component to be measured securely and without tension. Using 3D printing, fixtures with the exact counter-contour of the component can be produced very easily. By using printed plastic fixtures in coordinate measuring machines, the component is not damaged and can be positioned freely in space.

More information can be found at
dicht.de/en/additive-manufacturing/
potential-for-your-company/

Additive manufacturing / 3D printing

# Applications

Seal made of TPU | FFF process | Application: mechanical engineering

## Finished product

We specialize in the production of additively manufactured components that can be used in industrial applications. Our reliable processes, using high-quality materials, are designed to produce mechanically and thermally resilient series parts.

If the additional degrees of freedom offered by additive manufacturing are exploited as early as the development phase, completely new products and solutions can be developed that can no longer be manufactured using conventional methods.

In terms of lightweight construction, geometric complexity and material availability, completely new solutions are emerging that can generate decisive competitive advantages.

As a development partner, we support our customers and advise them from the very first idea.

### Series plastic parts

Complex housings for electronics, load-bearing components made from high-tech materials, hollow components for lightweight applications, complex pipelines and even functional seals - the possible applications are extremely diverse. Where conventional manufacturing methods reach their limits, additively manufactured components offer a whole new spectrum.

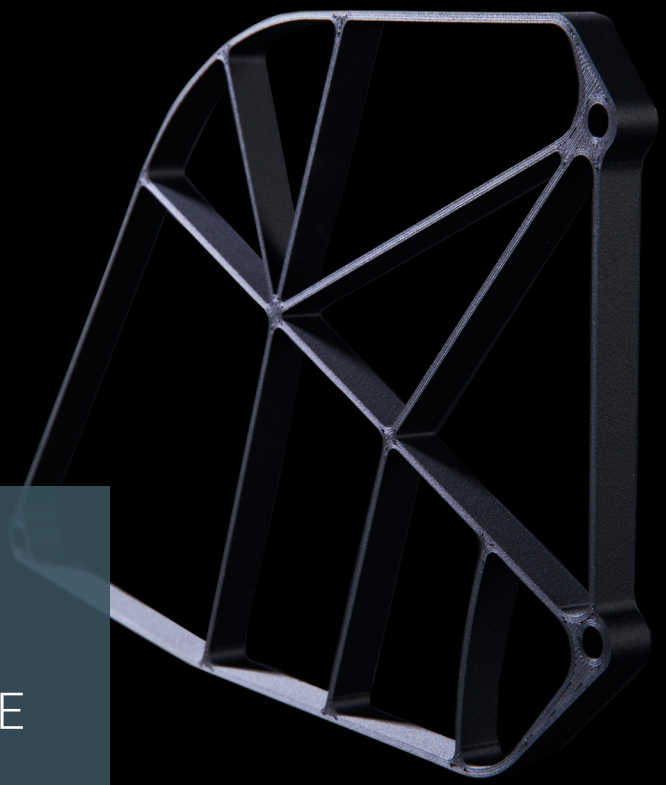
### Spare parts

If tool molds are no longer available or are defective, spare parts can usually be reproduced in the series material using our 3D printing process. All that is required is the 3D CAD file.

More information can be found at
dicht.de/en/additive-manufacturing/potential-for-your-company/

TECHNICAL ARTICLE

# FIBER-REINFORCED MATERIALS IN ADDITIVE MANUFACTURING



Carrier made of PEEK CF | FFF process | Application: research and development

Both glass and carbon fiber composites expand the range of applications for additively manufactured components enormously. Fiber-reinforced materials are an optimal solution, especially when it comes to high loads, high dimensional stability and weight reduction.

Fiber composites can be processed with all our additive manufacturing processes (FFF, SLA, SLS), but the FFF process in particular offers the greatest variety of materials and the greatest advantages.

We are currently achieving the best results with PA and PEEK, which are filled with either glass or carbon fibers in varying percentages and processed on our FFF systems. We have compared the two fibers in the table as a direct comparison.

New materials are regularly added that we can process with our additive manufacturing processes, and we are continuously improving our processes. Tell us about your application and we will work with you to select the optimum material and manufacturing process.

| Requirement | More efficient |
|---|---|
| Tensile strength | Carbon fiber |
| Stiffness | Carbon fiber |
| Flexibility | Glass fiber |
| Low weight | Carbon fiber |
| Heat resistance | Equally increased |
| Durability | Carbon fiber |
| UV resistance | Carbon fiber |
| ESD-safe | Carbon fiber |
| Electrical conductivity | Carbon fiber |
| Radio wave permeability (Bluetooth etc.) | Glass fiber |
| Price | Glass fiber |
| Dimensional stability | Equally increased |

Housing made of PA CF | FFF process | Application: automation

Additive manufacturing / 3D printing

# Post-processing of printed parts

In principle, additively manufactured components can be used without further processing steps. However, printed components can be optimized for certain applications. Various processes are available for this and certain advantages of conventional and additive manufacturing methods can be combined.

## Machining post-processing

Machining steps such as drilling, milling, turning or thread milling allow tolerances and surface qualities to be achieved that are in no way inferior to conventionally manufactured components.

Additional machining steps are often recommended, especially for additively manufactured components for actual use, in order to be able to realize fits or sealing surfaces, for example.

## Vibratory grinding

Certain materials can be vibratory ground with ceramic or plastic grinding media, which significantly improves the surface finish.

Depending on the duration of the process, the usual surface structure of additively manufactured components can therefore be almost completely eliminated. Vibratory finishing also breaks edges and straightens small defects caused by the additive manufacturing process.

## Deburring

To deburr, clean and improve the surface quality of additively manufactured components, the components can be post-processed in a blast cabinet.

Different results are achieved depending on the material and blasting medium. In this way, surface compaction and thus an increase in strength is possible.

More information can be found at
dicht.de/en/additive-manufacturing/potential-for-your-company/

Housing made of ABS with EMI shielding coating* | FFF process | Application: electrical industry

## Tempering

Due to the additive manufacturing process, residual stresses can be introduced by the thermal process, which can lead to deformation of the component.

Depending on the material being processed, we temper the components after completion to reduce distortion.

Various temperature curves with specific time intervals are run in a tempering oven directly after the printing process.

## Chemical-thermal smoothing

This special process can be used to improve the surface of certain materials after the printing process without adding any additional material. In special applications, this post-processing can even increase the tightness.

## Assembly

Like conventionally manufactured components, additive-manufactured components can be fitted with threaded inserts, for example, or screwed or glued to other components.
We are happy to carry out these operations on request and deliver the finished assembly to you.

## Coatings

For special applications, coatings can be the solution for achieving certain requirements.

For example, there are coatings to meet optical requirements or to ensure a high level of tightness. An EMC coating* can provide shielding against electromagnetic interference.

* EMC = Electromagnetic compatibility refers to the ability of a technical device not to disturb other devices through unwanted electrical or electromagnetic effects, or to be disturbed by other devices.


Connection unit made of PPS | FFF process | Application: plant construction

Additive manufacturing / 3D printing

# Applications for post-processed printed parts

## Pipe connections in plant engineering

The advantages of additive manufacturing are particularly evident in the development of complex pipe connections in plant engineering. Complex geometries can be produced from materials that can withstand high temperatures and are also suitable for medium contact without any molding costs.

These components can be optimized for actual series or test use by post-processing the flange surfaces, attaching sealing seats and threads or by machining operations.

High-precision functional surfaces are thus created on the pipe connections, which are suitable for mounting sensors, hoses or other connecting elements, for example.

## Coated housings for electronics

More and more electronic components need to be housed in a space-saving manner and often under critical weight specifications. These housings can be additively manufactured cost-effectively and customized.

The right choice of material with properties such as fire-retardant and antistatic is crucial here. It is also possible to apply an EMC coating* to 3D-printed components. This protects the integrated electronics from electromagnetic interference.

* EMC = Electromagnetic compatibility refers to the ability of a technical device not to disturb other devices through unwanted electrical or electromagnetic effects, or to be disturbed by other devices.

Drive unit made of ULTEM™ 1010 and iglidur® I180 PF | FFF process | Application: plant construction

## Lightweight shaft

The FFF process can be used to produce hollow components with an internal lattice structure. Depending on the application, this structure can be modified in terms of its density and structure, which allows the strength and, above all, the weight to be adjusted.

One particular application is lightweight drive shafts with machined fits for the bearings. The basic body of the shaft is printed with an internal grid structure and is therefore unbeatably light in order to reduce the shaft's moment of inertia as much as possible. The bearing seats are turned with high precision in a further work step to achieve the necessary concentricity.

## Assemblies

In order to be able to use additively manufactured components in assemblies, threaded inserts are mounted, for example. These ensure the necessary strength of the screw connection. Functional surfaces can be milled over so that other components can be mounted to them with the specified accuracy.

## Mechanical components made from high-tech plastics

For machining, the blank must have at least the external dimensions of the component. These blanks are usually sawn from sheet material or solid rods, then machined and the excess material removed by turning or milling. This results in costly waste in the form of chips, particularly in the case of expensive high-tech plastics.

In addition, semi-finished products made from special plastics are not always available in the required dimensions. With additive manufacturing, it is possible to produce a plastic blank in the desired size with very little waste, which is then mechanically post-processed for functional surfaces.

More information can be found at
dicht.de/en/additive-manufacturing/
potential-for-your-company/

Additive manufacturing / 3D printing

# Materials

Gear wheel made of ULTEM™ 1010, ULTEM™ 9085 and PA 12 | FFF process | Application: research and development

All available additive manufacturing processes can be combined with a wide range of materials. We specialize in producing components that are ready for use, can withstand mechanical and thermal loads and offer additional functional properties for special applications.

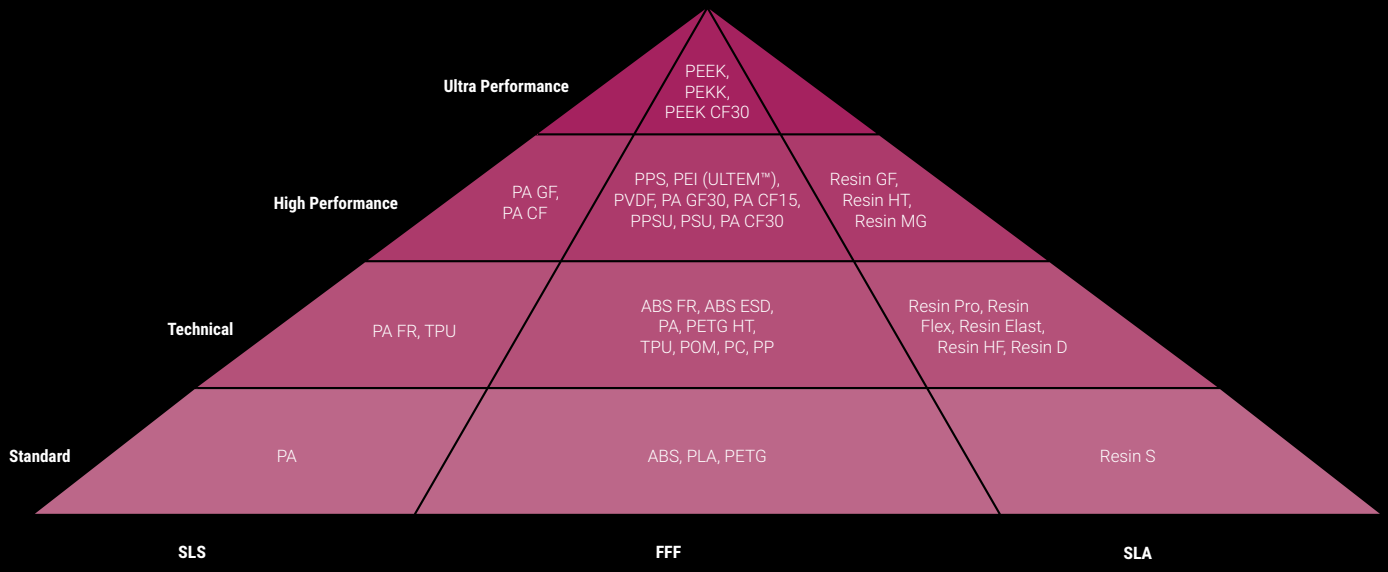
Material development in additive manufacturing is rapid, and new materials are constantly being added, the processing possibilities and process parameters of which are being researched in-house.

Selecting the right material is crucial and can be done optimally if we know the application criteria. Important parameters are e.g:

- mechanical load
- thermal load
- possible media contact
- optical requirements
- accuracy requirements
- aterial-specific properties
  (conformity, conductivity, fire behavior, UV resistance)

We have divided the materials into 4 categories, classified the most important material groups according to performance and presented them in our competence pyramid.

Suitable materials can be found at
dicht.de/en/additive-manufacturing/materials




## Standard category

We assign materials to this category that are inexpensive and easy to process. They are suitable for prototypes, devices, fixtures and illustrative samples.

The materials in this category have a limited mechanical and thermal load-bearing capacity, but are still a good choice for most applications.

## Technical category

This category includes materials that can withstand higher mechanical and thermal loads and are also antistatic and flame-retardant. The costs are somewhat higher, but high-quality, additively manufactured technical components can be realized.

Some materials in this category can be processed together, making 2K components possible. We also include elastic materials for seals in this category.

## High Performance category

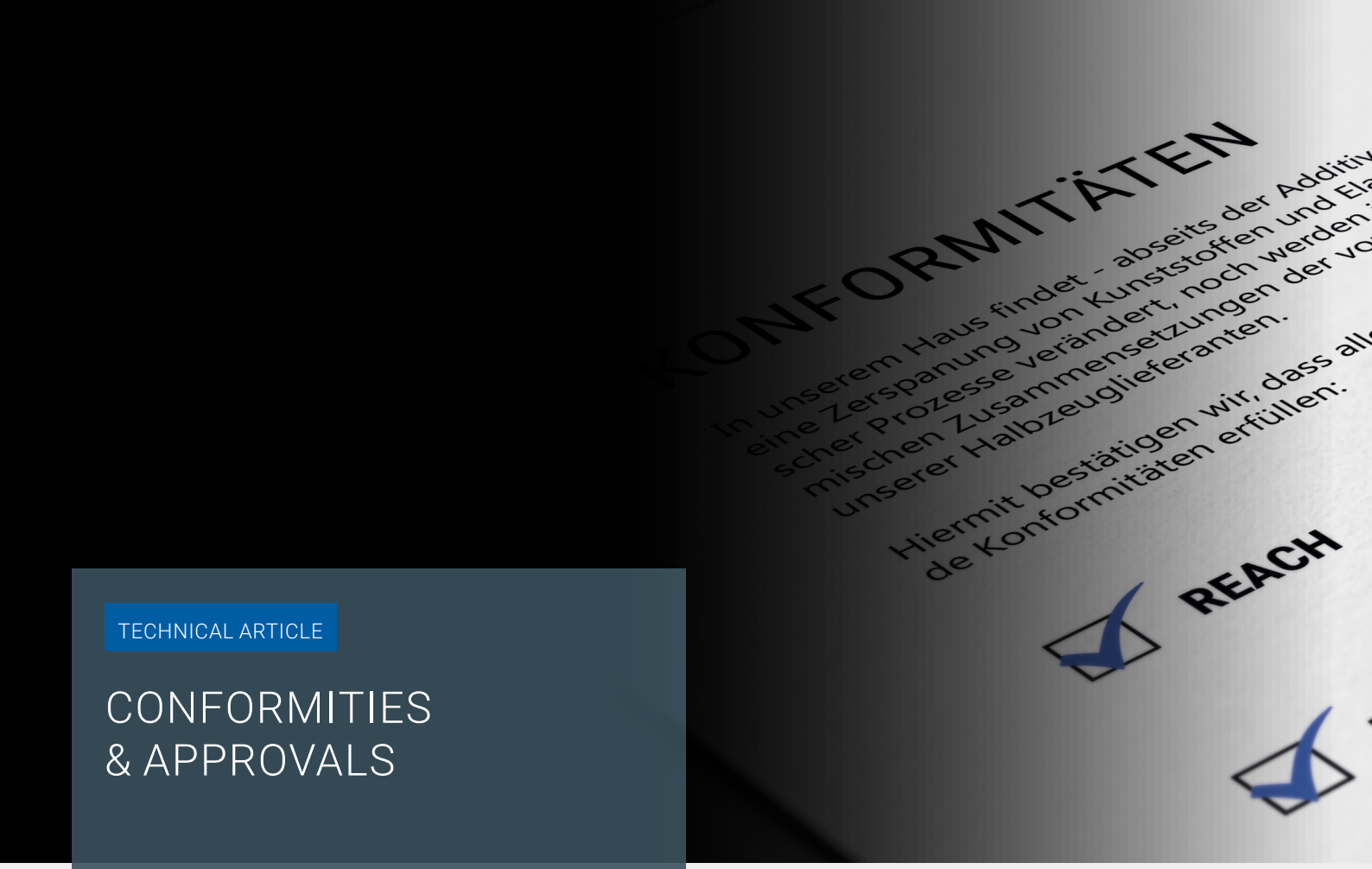
We include special materials with glass or carbon fiber reinforcement and high-temperature properties in this category. Processing is more complex, costs are higher and additional post processes are sometimes necessary.

These materials are suitable for technically demanding applications with high mechanical and thermal loads. When designing components from this high-performance category, it is particularly important to know the boundary conditions so that we can optimally adapt the design and processing parameters.

## Ultra Performance category

Additive manufacturing approaches its limits with these materials, but thanks to our many years of experience and a large machine park, we also have these materials under control.

The optimum design of the components to be manufactured is crucial here, and cooperation is highly recommended right from the start of development.




TECHNICAL ARTICLE

# CONFORMITIES & APPROVALS

In addition to classic properties such as dimensional accuracy, material, temperature, pressure or media resistance, certificates and accompanying documents are playing an increasingly important role.

The number of national and international regulations is constantly growing. New standards are being established in every industry and new regulations are regularly issued in the various trading zones that need to be implemented. If a product does not meet the specified guidelines or the associated documents are not available, it is not eligible for sale.

At Hänssler, we are committed to keeping pace with this development and providing our customers with comprehensive information and support.

Internally, we have trained a compliance officer, and we use software solutions to ensure a seamless flow of information and precise traceability of all products.

## Material compliance

Regulations such as REACH and RoHS, the elimination of conflict minerals under the Dodd Frank Act or compliance with California Proposition 65 are required for countless products across all industries and materials. Safety along the supply chain is the be-all and end-all, regardless of whether you want to resell merchandise to demanding customers or need components for your own production.

We work exclusively with reputable, long-standing suppliers. They provide the certificates that our material compliance experts need to be able to issue your required certificates reliably and promptly.


## Application-related approvals

These often relate to material properties, compositions, test methods or manufacturing processes. In addition, the requirements are often industry-specific. For example, FDA approvals and products in accordance with EU 10/2011 or EC 1935/2004 are particularly in demand in the food sector. For drinking water applications, W270 and the KTW regulation are mandatory. Medical grade materials with USP approvals are required in medical and pharmaceutical technology, while NORSOK has established itself as the standard in the petroleum industry. Benefit from our extensive wealth of experience and let us advise you.

## Foreign trade law documents

In a broader sense, conformity is also often required here. Once the products have been manufactured, they often have to be exported to third countries with the correct new customs tariff numbers.

This is where our export team can support you. In addition to customs clearance and the organization of overseas shipments, we can also take care of checking dual-use regulations or preparing technical documentation for exports to the country of your choice, for example.

## Conformities without wasting time

It is advisable to check the requirements carefully, especially if items are intended for resale. If possible, let us know at the time of your inquiry which conformities or certificates must be provided. In this way, your Hänssler customer advisor, in cooperation with the purchasing department, can find compliant finished products and semi-finished products for further processing. Delivery times for special materials can be taken into account when preparing your quotation.

The required documents are then available to you before or at the latest on delivery. This enables you to resell your products quickly and smoothly. Occasionally, certain conformities are only required for items with a particularly wide range of applications when they are resold. Our experts will be happy to support you in the after-sale with the subsequent procurement of documents.

# Quality

We are committed to maintaining and continuously improve quality at the highest level in every area of our company. Of course, we are certified in accordance with DIN EN ISO 9001:2015, but our own standards go far beyond this.

## Quality in production

We manufacture on state-of-the-art machining centers at our Mannheim site in order to meet the constantly growing demands placed on our customers' components. The machining centers have all been modified and optimized by us for plastics processing.

We always adapt tools, clamping devices, fixtures and equipment to the latest technical possibilities and rely on automation to make the processes as error-free as possible.

## Quality assurance

The production-related quality assurance department is equipped with state-of-the-art equipment and guarantees the best possible quality standards. Every manufactured part goes through the final inspection once again or is additionally checked in accordance with our customers' defined inspection specifications.

We take tactile and optical measurements according to specified test programs under constant climatic conditions.

## Traceability

Every process at our company is digitally networked to support employees in their tasks, but also to ensure seamless traceability.

We can track every batch of produced items and every delivery is marked with all the important information on the label.

## Quality in design

Quality assurance from the first step of the process chain guarantees the best quality for every component. We use PLM software* to manage all information over the entire life cycle of a design part, from brainstorming to design and production.

When changes are made, the warehouse stock is automatically checked and measures are taken at all relevant points to ensure that the changes are safely incorporated into the process.

Errors can be avoided as early as the design stage of plastic parts if special manufacturing features are taken into account at an early stage.

The more intensively we are involved in the development process in an advisory capacity, the faster and more reliably a product is created in the desired quality with optimum cost-effectiveness.

## Partnerships with suppliers

When procuring semi-finished products and molded parts, we rely on reputable suppliers and only maintain long-term partnerships.

When selecting suppliers, we also focus on uncompromising quality and reliability and only work with the best.

* PLM = Product Lifecycle Management is a concept for the seamless integration of all information generated during the lifecycle of a product. The concept is based on coordinated methods, processes and organizational structures and usually uses IT systems to record and manage the data.

# Environment

We check the impact of each of our activities on the environment. By adopting a holistic approach, we keep the impact on our environment as low as possible. We are certified in accordance with DIN EN ISO 14001:2015 (environment) and DIN EN ISO 50001:2018 (energy). We therefore constantly put our processes to the test in order to incorporate the latest findings.

However, we also want to set an example with our behavior and encourage our employees and business partners to act in an environmentally conscious manner in all situations.

## 100 % green electricity

We only use certified green electricity, thereby significantly reducing our CO2 footprint.

We also produce our own solar power using photovoltaic systems on the roofs and façades of our buildings.

## Drinking water

With us, disposable and reusable bottles are taboo and no employee has to transport water to work. Tap water is treated by modern water dispensers, cooled and carbonated as required.

This simple measure alone saves thousands of plastic bottles and their transportation every year.

## Occupational health and safety

Our workstations are ergonomically designed with the latest technical equipment, and occupational safety is a top priority.

The work areas are constantly reviewed and improved in order to optimize working conditions.

Employees receive regular training and have a direct influence on occupational health and safety in all areas.

## Packaging

We deliberately avoid using printed packaging so that it can be reused at any time. We also send our goods in used packaging where possible.

## Energy

Our main consumers are equipped with sensors so that energy consumption can be analyzed at any time. This measure enables us to detect deviations at an early stage and thus react promptly.

The effects of savings measures are verifiable with continuous data collection and motivate further improvements.

## Recycling

Our largest amount of waste comes in the form of plastic shavings, which we reduce as much as possible by selecting the optimum semi-finished products.

A large proportion of the chips are collected by special extraction devices in the machining centers, allowing them to be recycled.

New manufacturing technologies such as additive manufacturing also contribute to low-waste production. This offers enormous savings potential, especially for high-quality high-tech plastics.

# Development partner

## for plastic parts and seals – our range of services

We prefer to be involved in development right from the start. Together with our customers, we design the optimum plastic or sealing element. Our many years of expertise in the processing of plastics are incorporated into every step of the process. Thus, the function, quality and price-performance ratio of the product to be developed is optimized right from the start. This is reflected in every area, and every process is optimized with the ultimate goal of customer satisfaction in mind.

### Order processing

Every customer is looked after by a dedicated sales employee who is responsible for all customer communication, quotations and order processing. This approach guarantees short response times, optimum communication and a long-term, binding business relationship. Supported by state-of-the-art IT solutions, every step is comprehensively documented. This enables us to achieve maximum flexibility and quality in all areas.

### Development of new solutions

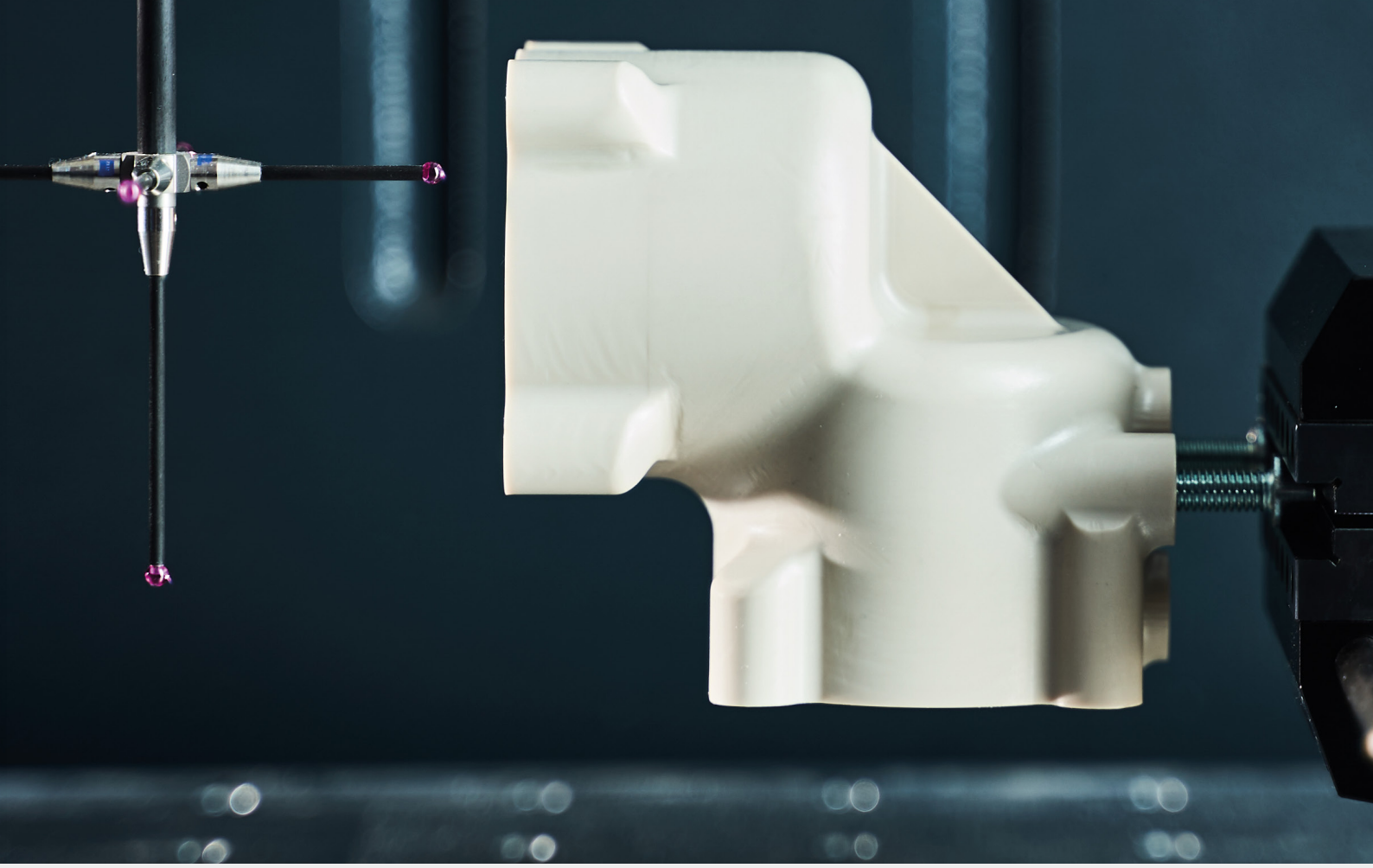
Our broad range of experience allows us to provide comprehensive advice. The design and tolerance of plastic and elastomer parts in particular require special expertise in order to optimize the manufacturing process, ensure process reliability and reduce costs. We work with state-of-the-art design and development tools. We can support you as a development partner in the planning and development of your product. Our development team will work with you to find solutions for your tasks and will provide help to significantly shorten development processes.

### Prototype construction

We have the technical facilities to produce cost-effective prototypes in short delivery times. The short path to the first finished part is used for rapid functional testing and, if necessary, rapid further development. For prototype production, we use our machining centers, program our 3D printers or use our vacuum casting capabilities.

### Single item or small quantities

Apart from mass production, we specialize in designing niche products and technically sophisticated special components, which we manufacture in small to medium series. For some time now, additive manufacturing has been offering completely new ways of doing this. With our constantly expanding machinery and further training in this area, we can reproduce almost any manufacturing process in-house. This means that we can accompany you all the way and you do not need to change suppliers between development and series production.



## Series production

We have specialized in processing only plastics on our machines. This strategy allows us to optimize our manufacturing capabilities and means we do not have to make any compromises. We use special tools, clamping devices and fixtures that have been developed exclusively for plastics processing, mainly by us. Thanks to the optimal equipment, we guarantee short reaction times in the highest quality at low costs. State-of-the-art automation and IT solutions help us to produce competitively at the highest level in Mannheim.

## Quality assurance

„We never want to be the biggest, but always the best!“ This motto is of course particularly important in the area of quality assurance. We achieve our high quality standards with lean, networked and clearly defined processes. Just like our products, we also critically review all processes time and again in order to identify errors before they occur. We are not only ISO 9001 (quality) certified, but also design our processes in accordance with ISO 14001 (environment) and ISO 50001 (energy).

## Logistics and shipping

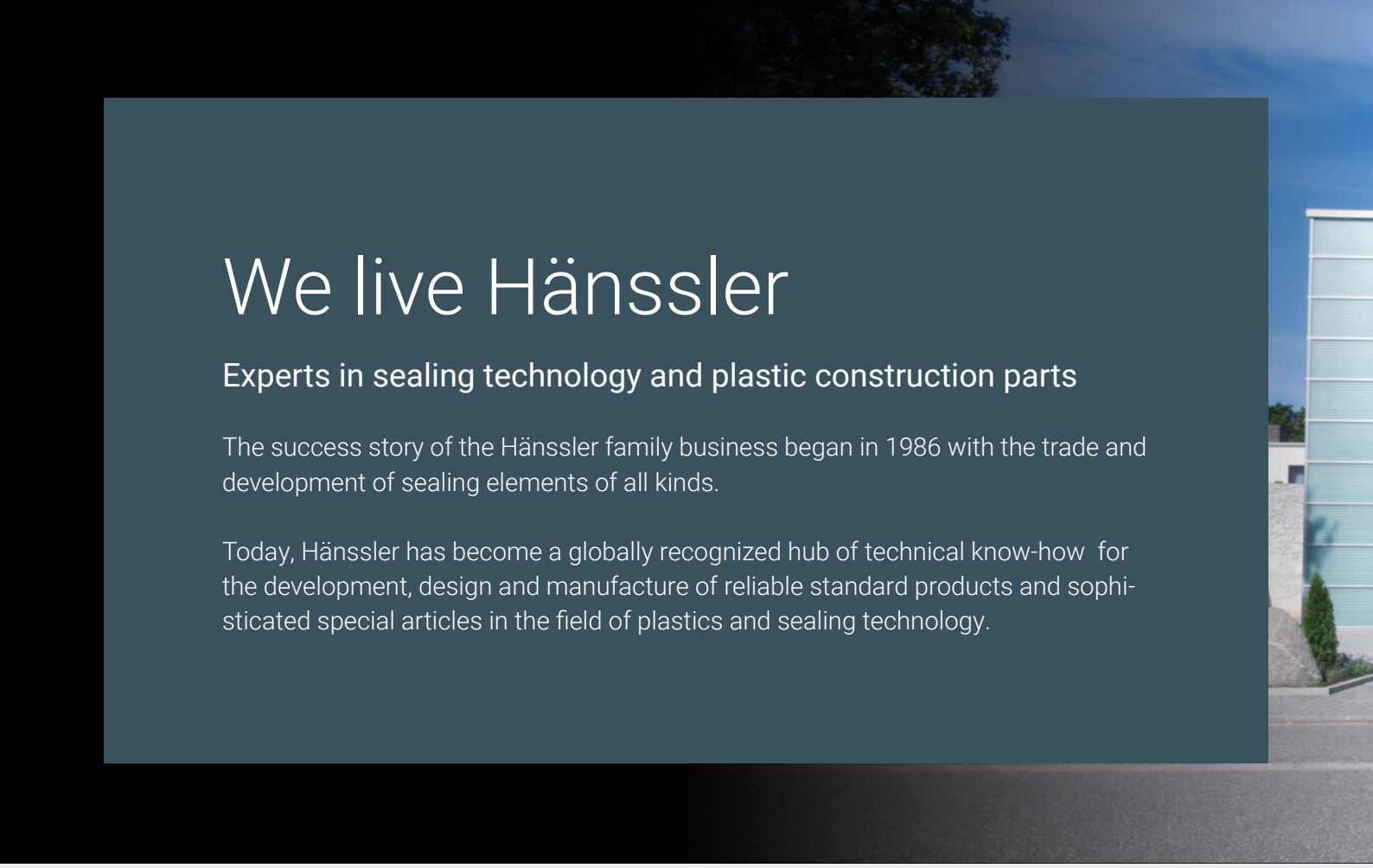
In the logistics area, we focus on traceability by completely digitizing the processes. Every delivery that leaves our company is 100% traceable and we can identify the batch delivered with the date of manufacture at any time. Each item is scanned upon removal and dispatch and is automatically provided with a label on which all information is made available. Customized labels are also possible so that our customers no longer need to repackage their products.

DIN EN ISO 9001 ZERTIFIKAT

DIN EN ISO 14001 ZERTIFIKAT

DIN EN ISO 50001 ZERTIFIKAT

More information can be found at
dicht.de/en/development-partner/quality-assurance/



# We live Hänssler

## Experts in sealing technology and plastic construction parts

The success story of the Hänssler family business began in 1986 with the trade and development of sealing elements of all kinds.

Today, Hänssler has become a globally recognized hub of technical know-how for the development, design and manufacture of reliable standard products and sophisticated special articles in the field of plastics and sealing technology.

Almost all manufacturing options can now be realized in-house or together with our reliable partners: from turning/milling to injection molding and additive manufacturing.

### Working together is important to us

We are a solid, independent family business with flat hierarchies and a familiar corporate culture. Our employees reward this with great loyalty to the company.

Information, further education and training are important building blocks in our corporate development.

### Our guiding principles

At Hänssler, the satisfaction of customers, suppliers and employees takes center stage. Our values form the basis of our corporate culture and are uncompromisingly taken into account in every decision we make.

- We shape our business processes with enthusiasm and respectful commitment.
- We never want to be the biggest, but always the best!
- We always act to safeguard our entrepreneurial freedom.
- Our actions are based on a spirit of mutual commitment, friendliness and sincerity.
- Our relationships with customers and business partners are based on mutual long-term benefit.
- Quality is practiced uncompromisingly in all areas.
- It is the responsibility of each individual to avoid endangering people and the environment.

### Become a part of our community!

Apply via **bindabei@dicht.de** – also speculatively for permanent positions, internships or for a thesis as part of your studies.


## Materials overview brochure

With the “Materials overview” brochure, we have created a compendium of more than 160 materialsto help you quickly find the most suitable plastic for your application.

Here you will find information on hardness, temperature and pressure ranges, resistance and other properties of our materials. We supplement and update the contents of our printed brochure on our website.


## Sealing technology brochure

The “Sealing technology” brochure contains a summary of all the sealing elements that we produce and supply on a daily basis. As we are not bound to any catalog, the variety of profiles can hardly be covered in a standard print.

The number of special profiles - within over 30 years of manufacturing sealing elements for almost all industries - has also increased enormously.

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