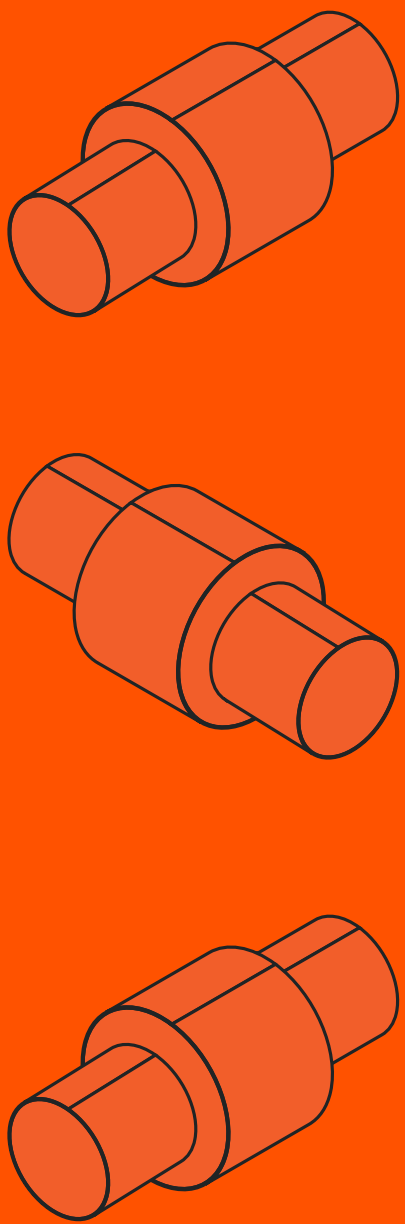
Technology Applied™

Industrial 3D Printing Services



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TÜV NORD
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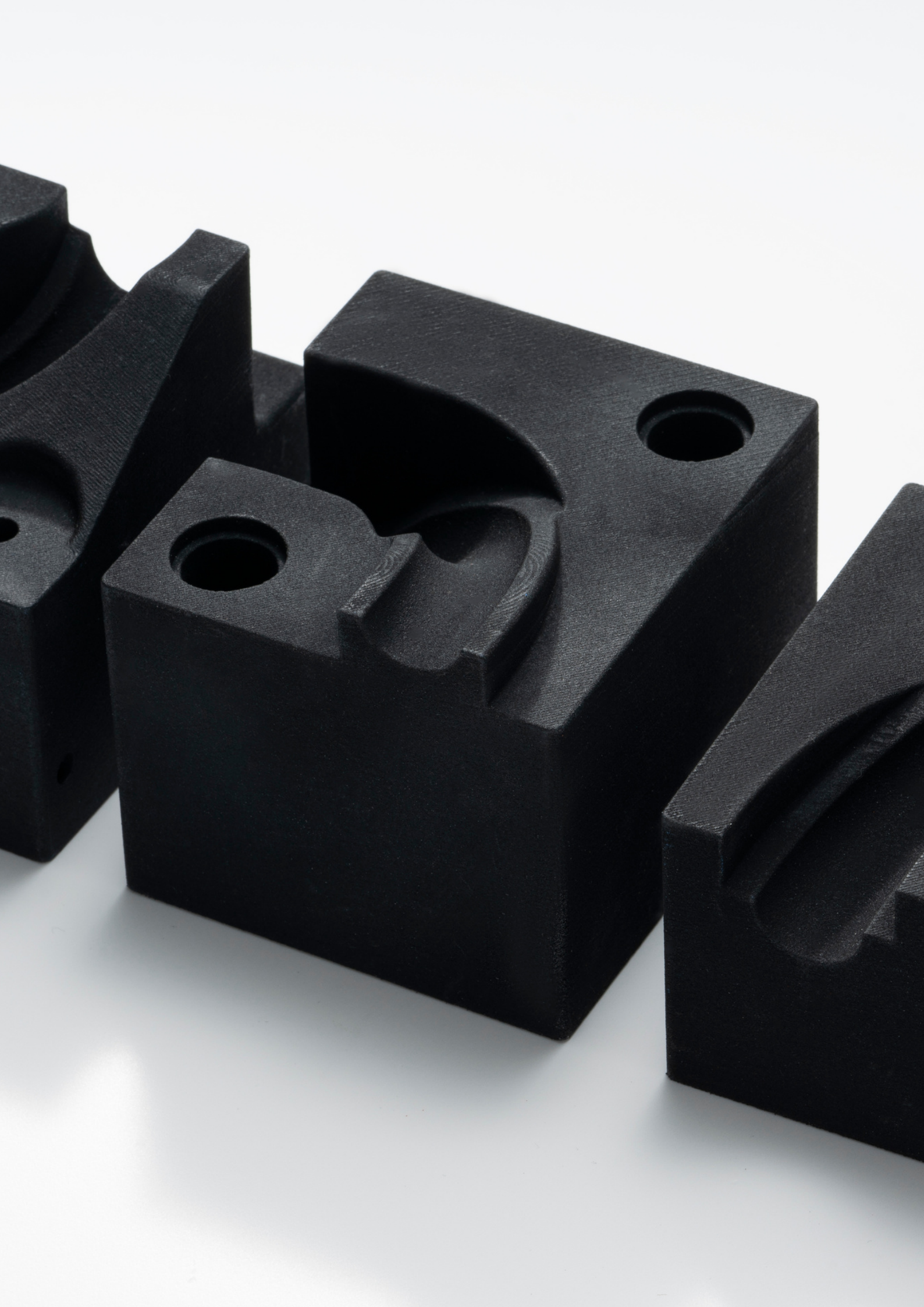
PN-EN ISO 9001



About Us

Technology Applied Sp. z o. o. is a company that responds to the needs of its customers with passion and professionalism, providing a number of functional elements for machines, devices and production lines. Our portfolio includes both prototype models as well as small and medium production series. Thanks to the experience and availability of advanced industrial technologies, we are able to offer high-quality, repeatable and durable prints.

Our competitiveness results from short lead times, attractive starting cost and direct contact with the client, which makes Technology Applied the preferred supplier of plastic parts even for the largest companies. We attach great importance to quality, which is why we use only industrial printing devices in our work and we have certified processes in accordance with ISO 9001:2015

Our offer does not end with 3D printing. We also offer various methods of post-processing, thanks to which we are able to meet the needs of the most demanding customers. We have our own machine park and a team of qualified specialists with many years of experience, which enables the implementation of even the most complex projects.

Contact details:

info@ta.parts

+48 85 733 9000

www.ta.parts

Location:

Technology Applied
ul. Wiejska 42/3
15-509 Sobolewo

Registration data:

Technology Applied sp. z o.o.
ul. Transportowa 2D/45
15-399 Białystok
VAT: PL542 324 49 53

Contents

Technologies

SLS

DESCRIPTION

SLS technology, i.e. Selective Laser Sintering, is an advanced 3D printing method that uses a laser to sinter powdered plastics, layer by layer. In this process, the laser precisely scans the surface of the powder, sintering the particles only in places defined by the digital model. This makes it possible to create intricate structures inside the object without the need for additional support structures, as the unsintered powder particles act as a natural support.

Using SLS technology offers a number of benefits. First, it allows the production of parts with a high degree of complexity and precision that are difficult to achieve with other 3D printing methods. In addition, with no support required, the post-printing process is simplified and the finished object often requires less post-processes. SLS is also appreciated for producing components with uniform mechanical strength in different directions, which makes it ideal for many industrial applications.

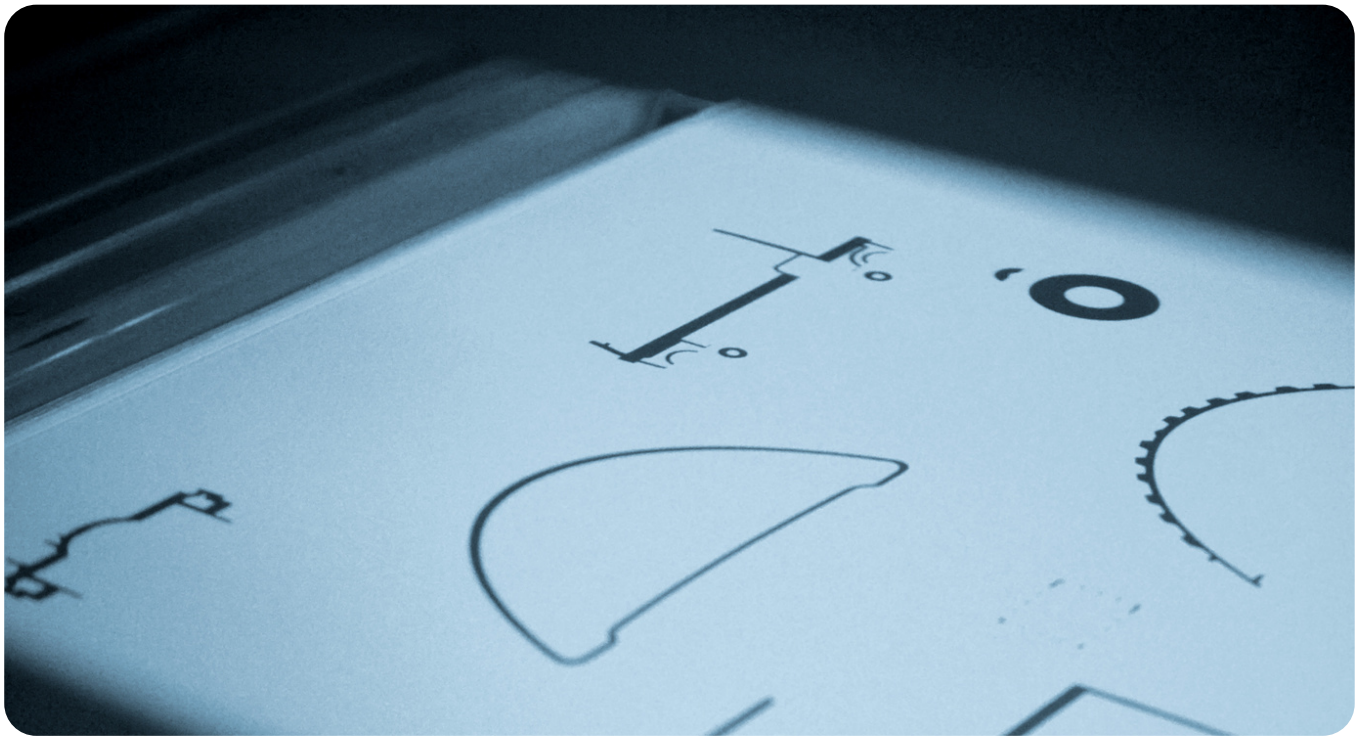
PRINT PARAMETERS:

- Building platform 340mm x 340mm x 600mm
- Maximum part size 320mm x 320mm x 590mm
- Layer height 0.1mm - 0.12mm
- Min. wall thickness 0.8mm

AVAILABLE MATERIALS:

- PA12
- PA12GF
- PA2210FR UL 94 V-0
- PA2241FR
- Alumide
- TPU1301

MJF



DESCRIPTION

MJF technology, i.e. Multi Jet Fusion, developed by HP, is a modern 3D printing method involving the simultaneous use of materials in powder form and binding particles, which are applied with nozzles to each layer of powder. The process differs from other 3D printing techniques in that the areas to be bonded are defined with bonding particles and then cured by the simultaneous application of heat. This two-step process allows you to create more uniform and durable objects in less time compared to other techniques.

Using MJF technology brings many benefits. Thanks to its unique approach to 3D printing, it is possible to create complex geometries that would be difficult to achieve in non-industrial technologies. In addition, MJF produces components with a high surface quality, which reduces the need for post-processing. It is also one of the fastest 3D printing technologies available, which makes it attractive for industrial series production.

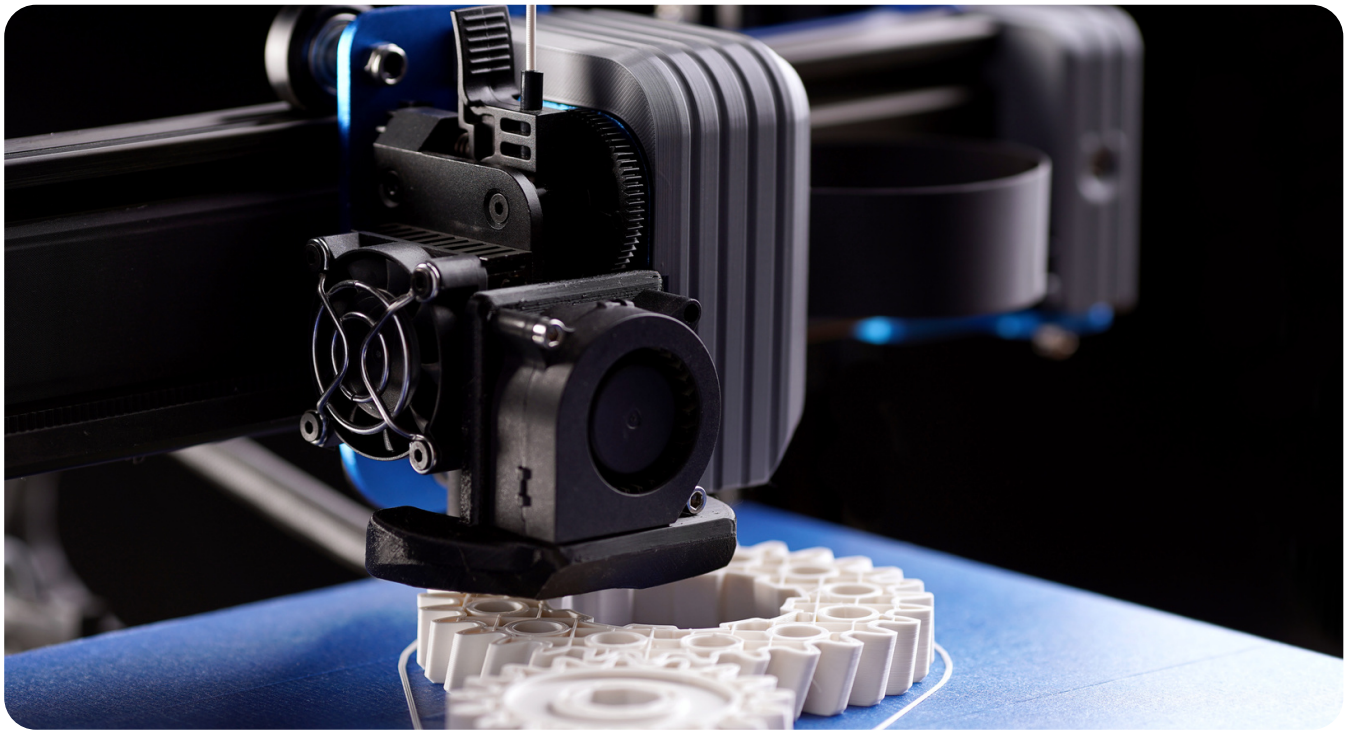
PRINT PARAMETERS:

- Building platform 380mm x 284mm x 380mm
- Maximum part size 380mm x 284mm x 380mm
- Layer height 0.08mm
- Min. wall thickness 0.8mm

AVAILABLE MATERIALS:

- PA12 HP
- PA11 HP

FDM



DESCRIPTION

FDM technology, i.e. Fused Deposition Modeling, is one of the most popular 3D printing methods. In this process, the thermoplastic material is heated to a liquid state and extruded through a precisely controlled nozzle, forming the object layer by layer. As the material cools and solidifies, successive layers are combined until a complete structure is built.

Despite many advantages, FDM technology has some limitations. Due to the way the layers are applied, objects printed with this method may show visible layer lines and have limited precision compared to some other 3D printing technologies. However, for many applications, especially those that do not require ultra-high precision or perfectly smooth surfaces, FDM remains the best choice due to its simplicity, low cost and wide range of materials.

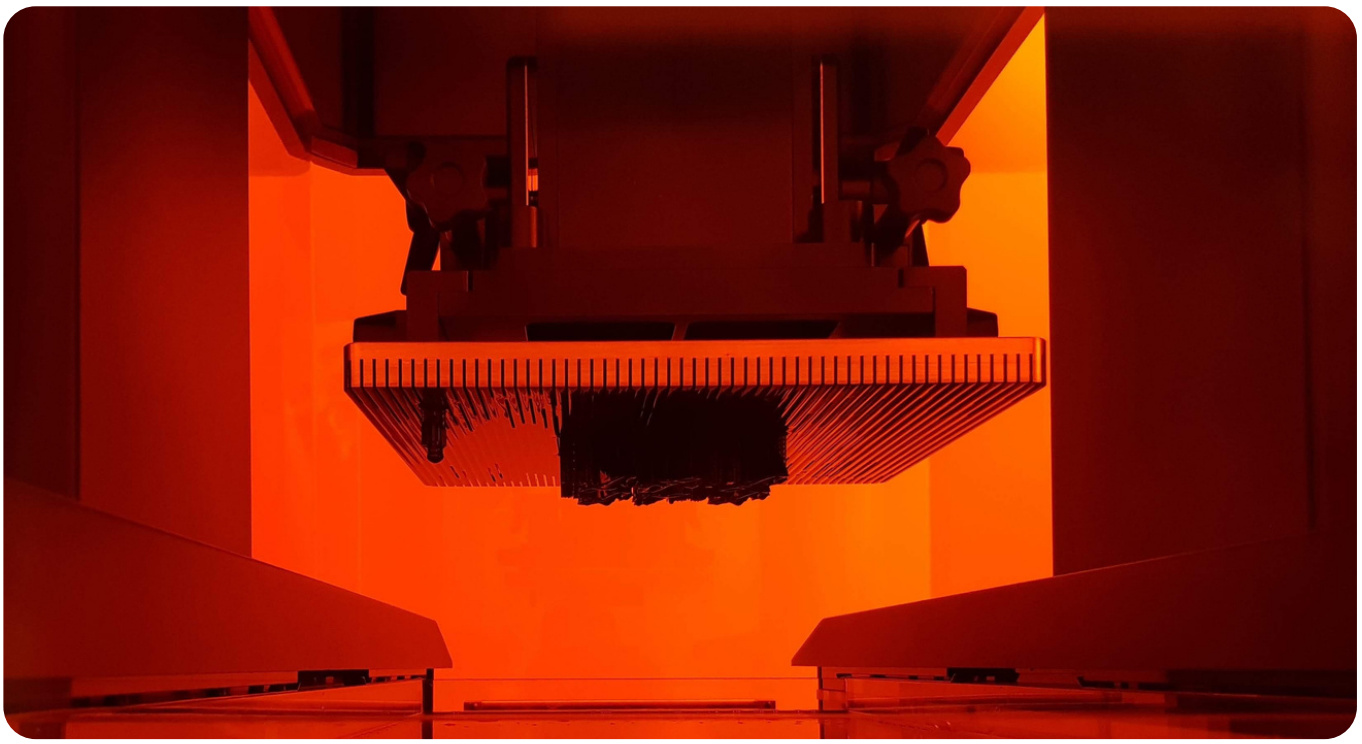
PRINT PARAMETERS:

- Building platform 250mm x 210mm x 210mm
- Maximum part size 250mm x 210mm x 210mm
- Layer height 0.1mm - 0.2mm

AVAILABLE MATERIALS:

- PLA
- ASA
- PET-G
- PET-G UL 94 V-0
- TPU
- ABS

DLP



DESCRIPTION

DLP technology, short for "Digital Light Processing", is a 3D printing method based on digital light processing. In this process, UV light is directed at the photosensitive resin, causing it to harden in the places that are irradiated. Thanks to the use of a DLP projector, it is possible to simultaneously cure the entire resin layer in one step, which makes the printing process faster compared to other technologies based on photopolymerization.

There are many benefits to using DLP technology. One of its main strengths is its ability to create objects with exceptionally high surface quality, making this technique often used in industries that require detailed and injection-like details. This makes it one of the best technologies for prototyping elements.

PRINT PARAMETERS:

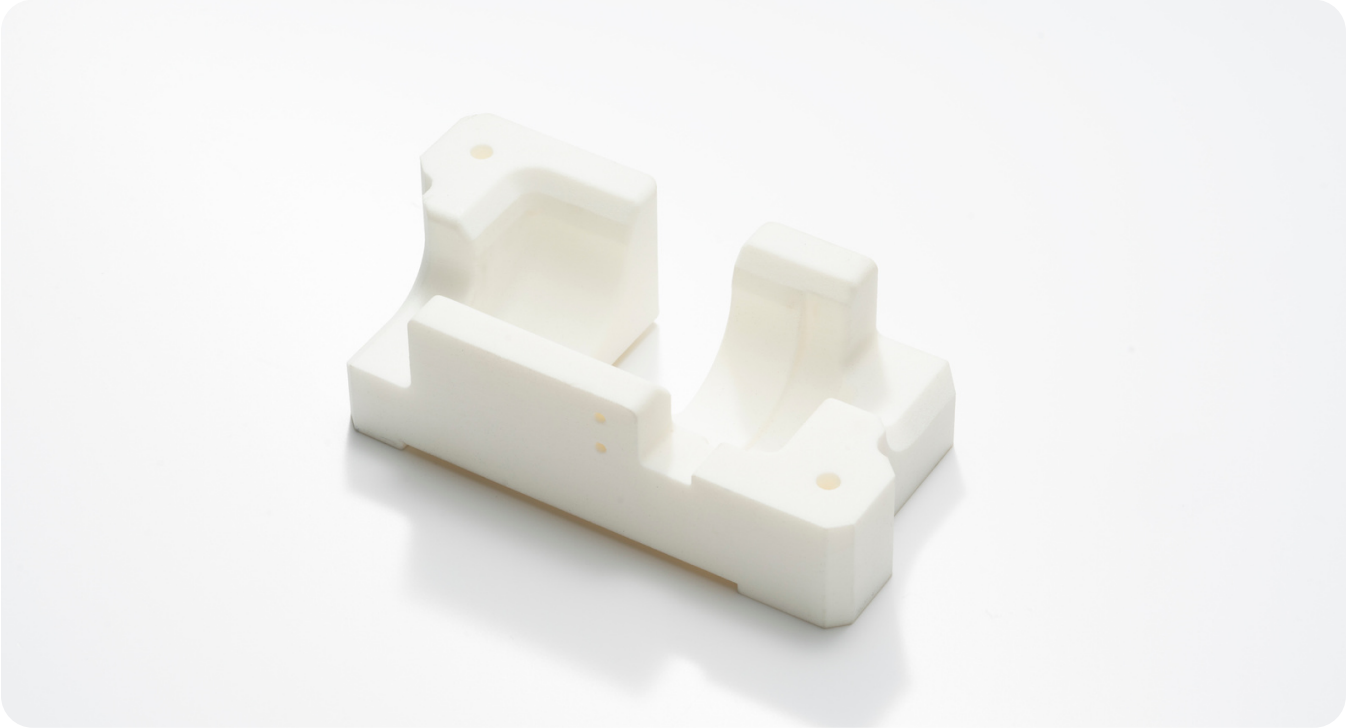
- Building platform 330mm x 185mm x 400 mm
- Maximum part size 330mm x 185mm x 400 mm
- Layer height 0.01mm - 0.1mm

AVAILABLE MATERIALS:

- ABS-Like
- Hi-Temp
- Rubber Like
- Transparent

Materials

PA12 SLS



DESCRIPTION

PA12 is a durable polyamide, widely used in industry, both for the production of utility parts and substitutes for injection molded plastics. In addition, it is characterized by high durability and accuracy. It also has certificates of biocompatibility and approval for contact with food.

MATERIAL PROPERTIES

- chemical resistance
- high impact strength
- possibility of further processing
- ideal for the food and medical industries

CERTIFICATES

- biocompatibility in accordance with EN ISO 10993 and FDA skin contact & biocompatibility
- approved for contact with food by FDA

POST-PROCESSING

The raw print is characterized by a slight roughness, which results from the production technology. Additional processing methods allow to improve its technical and visual properties.

Finishing methods available:

- polishing
- DeepDye coloring
- spray painting
- insertion of threaded inserts
- VaporFuse Surfacing

PA12GF SLS

DESCRIPTION

PA12GF is a thermoplastic polyamide with high mechanical strength, stiffness and impact resistance. Thanks to the addition of glass fibers, this material has excellent abrasion resistance and long-term dimensional stability over a wide temperature range, making it a suitable choice for engineering applications, especially where high strength, stiffness and abrasion resistance are required.

MATERIAL PROPERTIES

- thermal resistance
- good mechanical properties
- high stiffness
- wear and abrasion resistance

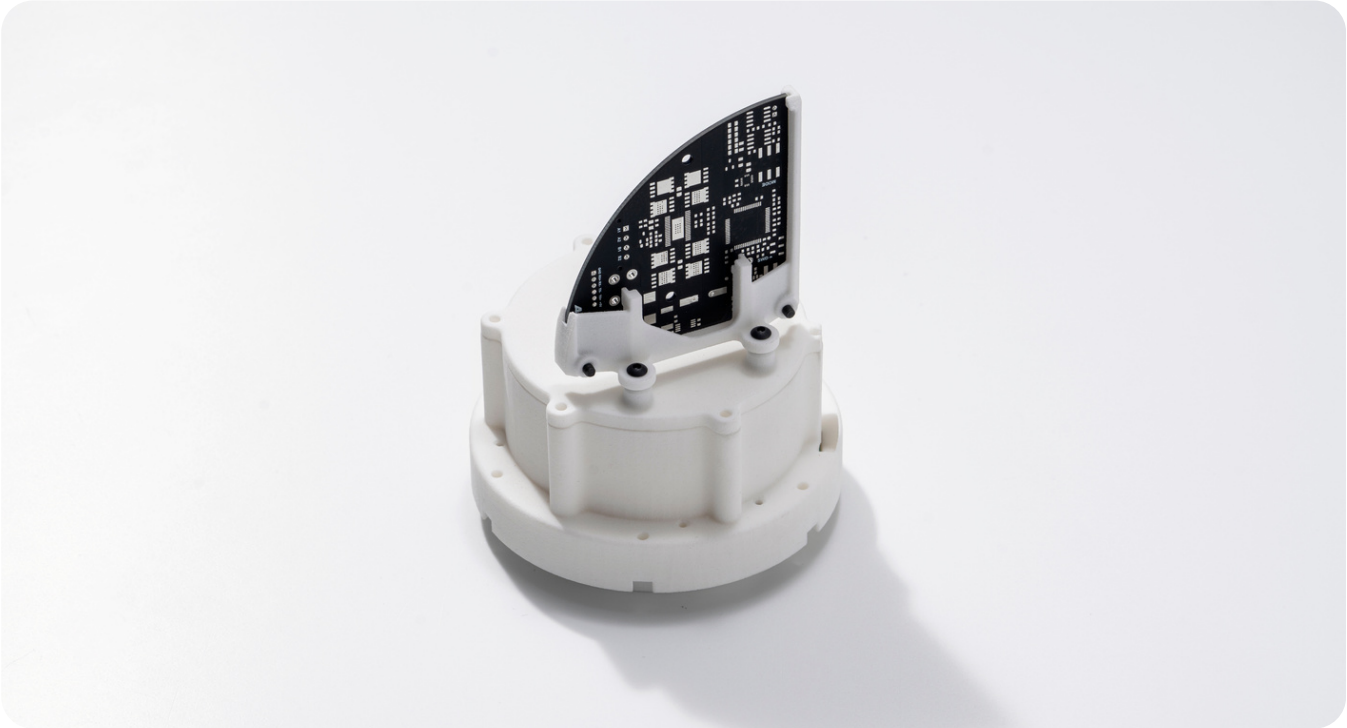
POST-PROCESSING

The raw print is characterized by a slight roughness, which results from the production technology. Additional processing methods allow to improve its technical and visual properties.

Finishing methods available:

- polishing
- DeepDye coloring
- spray painting
- insertion of threaded inserts
- vaporfuse surfacing

PA2210FR UL94 V0 SLS



DESCRIPTION

PA2210FR is a thermoplastic polyamide characterized by the ability to self-extinguish. It is a material with low volatile content and low smoke emission during combustion, which makes it suitable for applications where fire safety is a key element. PA2210FR also has good mechanical strength, flexibility and dimensional stability.

MATERIAL PROPERTIES

- high chemical resistance
- high thermal resistance
- good mechanical properties
- limited flammability

CERTIFICATES

- complies with FAR 25.853 - flame resistance
- UL 94 V0 compliant

POST-PROCESSING

The raw print is characterized by a slight roughness, which results from the production technology. Additional processing methods allow to improve its technical and visual properties.

Finishing methods available:

- polishing
- DeepDye coloring
- spray painting
- insertion of threaded inserts
- vaporfuse surfacing

PA2241FR SLS

DESCRIPTION

PA2241FR is a thermoplastic polyamide with the addition of special ingredients to improve fire resistance. Thanks to these modifications, this material is self-extinguishing and produces low smoke and toxic gas emissions in the event of a fire. PA2241FR also retains the beneficial characteristics typical of polyamides, such as mechanical strength, flexibility and dimensional stability. This material is more attractive in price than PA2210FR due to better refreshing parameters and the lack of the UL94 V0 standard.

MATERIAL PROPERTIES

- high chemical resistance
- high thermal resistance
- good mechanical properties
- limited flammability

CERTIFICATES

- complies with FAR 25.853 - flame resistance

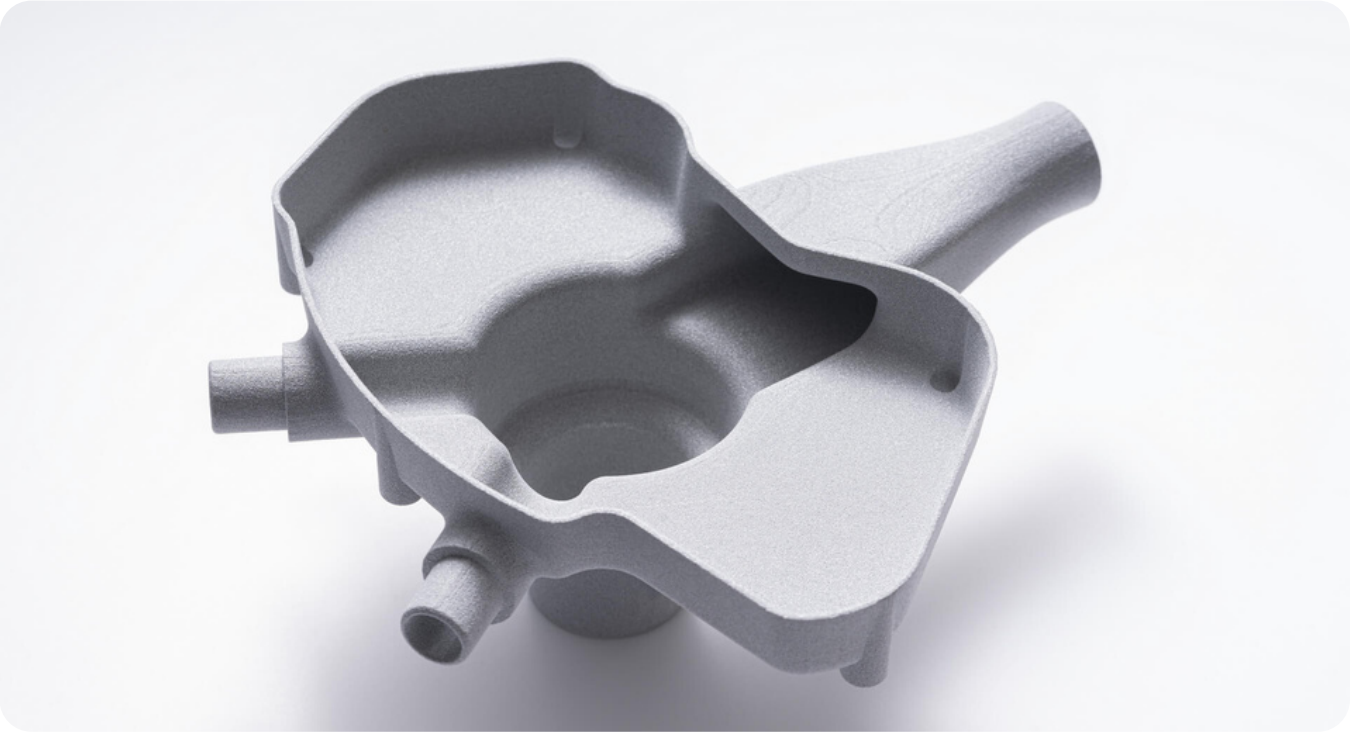
POST-PROCESSING

The raw print is characterized by a slight roughness, which results from the production technology. Additional processing methods allow to improve its technical and visual properties.

Finishing methods available:

- polishing
- DeepDye coloring
- spray painting
- insertion of threaded inserts
- vaporfuse surfacing

Alumide SLS



DESCRIPTION

Alumide is an innovative composite material used in 3D printing, which is a combination of AlSi10Mg aluminum and PA12 polyamide. It is characterized by a unique set of properties such as stiffness, thermo-dimensional stability and ease of mechanical processing. These features make Alumide an attractive choice for creating precise, functional prototypes and structural components.

MATERIAL PROPERTIES

- increased thermal conductivity compared to pure PA12
- easy finishing, good machinability
- temperature stability

POST-PROCESSING

The raw print is characterized by a slight roughness, which results from the production technology.

Finishing methods available:

- polishing
- DeepDye coloring
- spray painting
- insertion of threaded inserts

TPU1301 SLS

DESCRIPTION

TPU1301 is highly flexible, which makes it widely used for functional prototypes, shock absorbers, gaskets, footwear, bands and other products that require flexibility and strength. It is used wherever very high impact strength and energy absorption are required.

MATERIAL PROPERTIES

- high flexibility
- excellent elasticity after deformation
- good resistance to hydrolysis
- high UV stability

POST-PROCESSING

The raw print is characterized by a slight roughness, which results from the production technology. Additional processing methods allow to improve its technical and visual properties.

Finishing methods available:

- polishing
- DeepDye coloring
- spray painting
- insertion of threaded inserts
- vaporfuse surfacing

PA12 HP MJF

DESCRIPTION

PA12 HP is an advanced material based on polyamide 12. It is distinguished by mechanical strength, flexibility and impact resistance, which makes it an ideal choice for the creation of engineering prototypes, functional components and final products. This material is also characterized by chemical resistance. The method of processing MJF of the PA12 material also affects its increased density, and thus - improved hygroscopicity of the material in relation to other competing applications technologies.

MATERIAL PROPERTIES

- chemical resistance
- high impact strength
- possibility of further processing
- abrasion resistance

CERTIFICATES

- biocompatibility in accordance with EN ISO 10993 and FDA skin contact & biocompatibility
- approved for contact with food by FDA

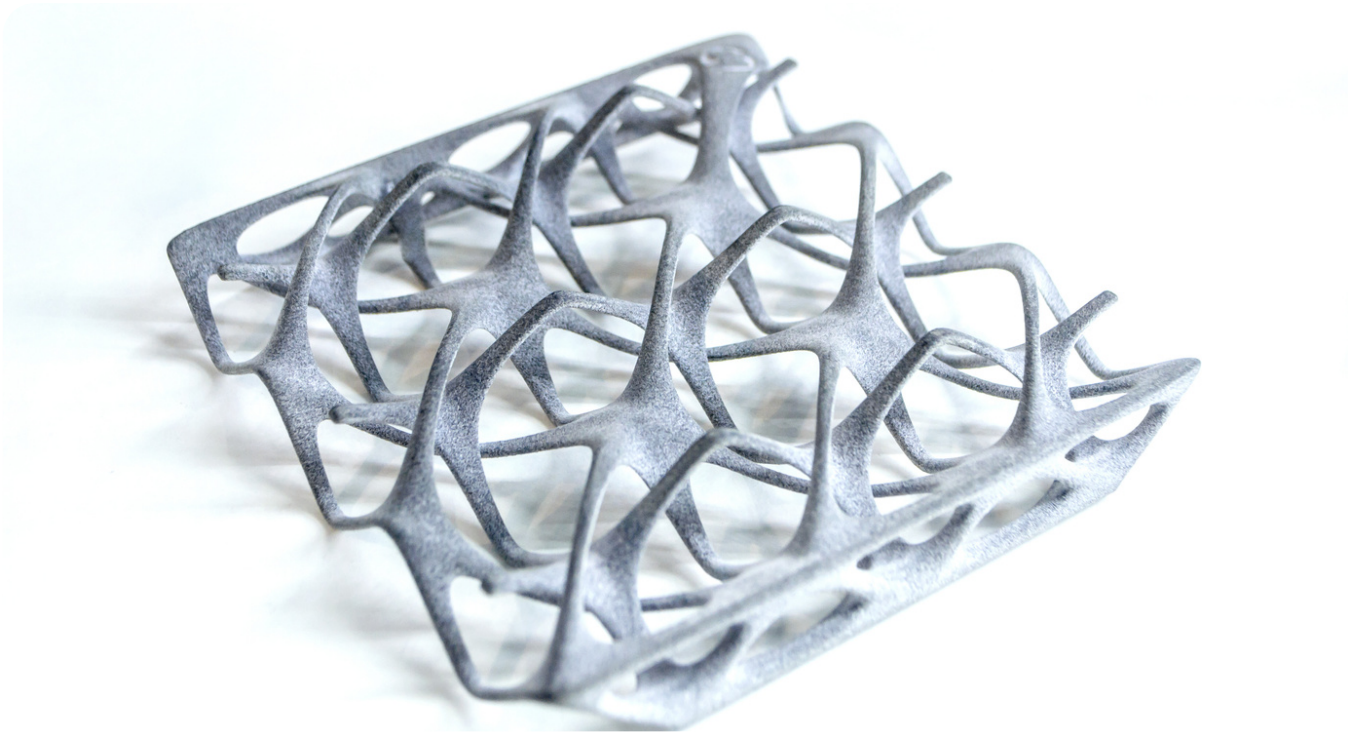
POST-PROCESSING

The raw print is characterized by a slight roughness, which results from the production technology. Additional processing methods allow to improve its technical and visual properties.

Finishing methods available:

- polishing
- DeepDye coloring
- spray painting
- insertion of threaded inserts
- vaporfuse surfacing

PA11 HP MJF



DESCRIPTION

PA11 HP is an advanced material based on biopolyamide (nylon 11) and used in printing processes in MJF technology. It is characterized by excellent mechanical strength and resistance to external conditions, such as humidity or UV radiation. In addition, it has better impact strength than PA12. The material is flexible, making it suitable for components that require a certain degree of flexibility while maintaining strength and durability.

MATERIAL PROPERTIES

- excellent chemical resistance
- high elongation at break
- high impact strength
- high plasticity

CERTIFICATES

- biocompatibility in accordance with EN ISO 10993 and FDA skin contact & biocompatibility
- approved for contact with food by FDA

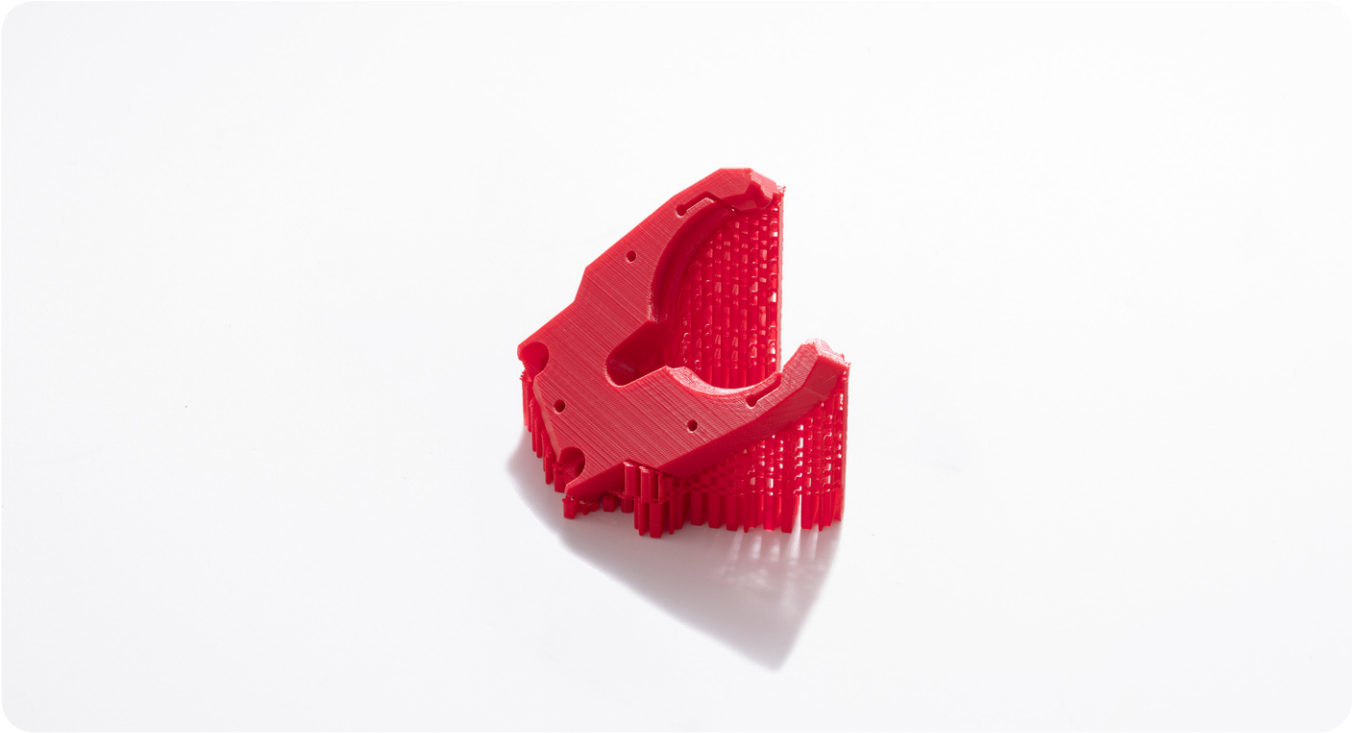
POST-PROCESSING

The raw print is characterized by a slight roughness, which results from the production technology. Additional processing methods allow to improve its technical and visual properties.

Finishing methods available:

- polishing
- DeepDye coloring
- spray painting
- insertion of threaded inserts
- vaporfuse surfacing

PLA FDM



DESCRIPTION

PLA (polylactic acid) material is a biodegradable and ecological plant-derived polymer that provides quality prints with minimal environmental impact. Thanks to its ease of printing and low shrinkage, PLA is ideal for creating low-cost prototypes, conceptual models and decorative elements.

MATERIAL PROPERTIES

- Eco-friendly and biodegradable material
- high hardness
- high tensile strength
- good dimensional accuracy resulting from the lack of shrinkage during the process

POST-PROCESSING

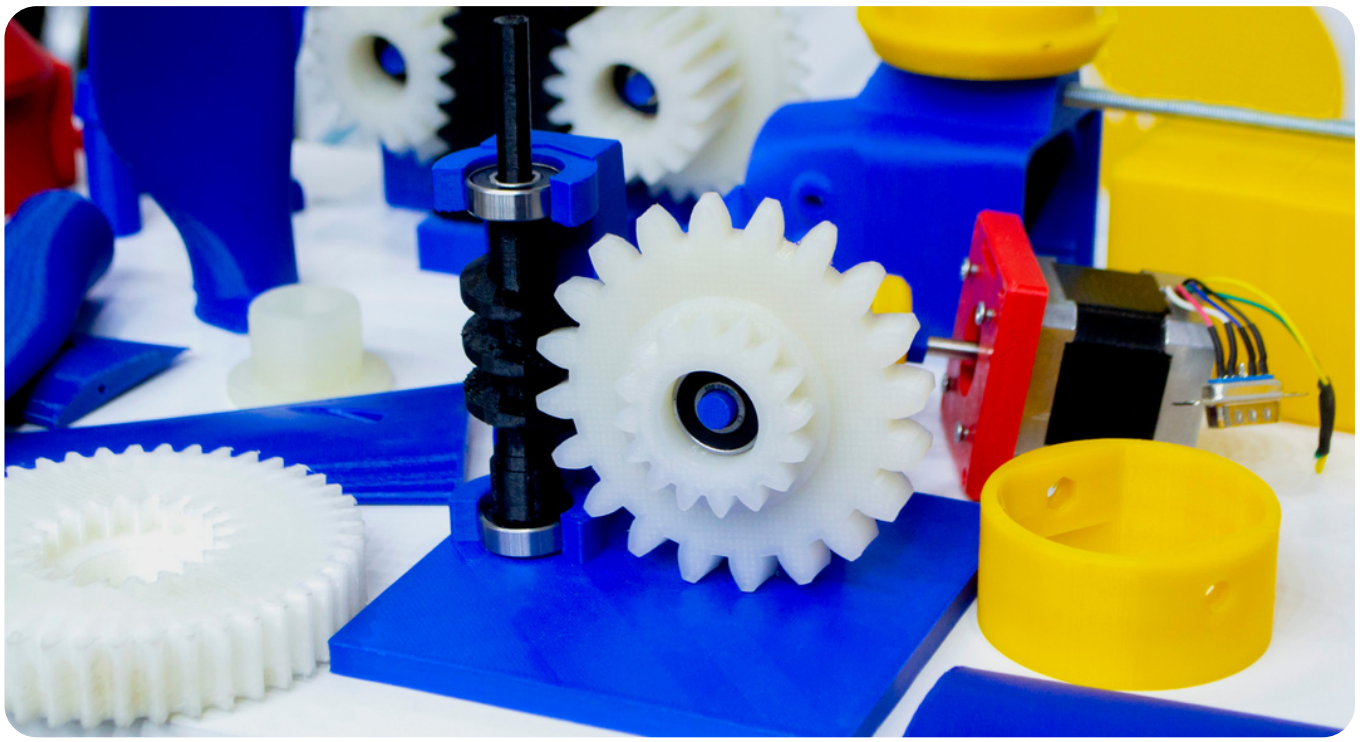
FDM printouts are characterized by a visible layers. Raw prints are cleaned of support material. The material is not subject to any dyeing technology.

Finishing methods available:

- insertion of threaded inserts

MATERIAL COLORS

ASA FDM



DESCRIPTION

ASA is a thermoplastic polymer characterized by excellent resistance to weather conditions, UV radiation and temperature changes, which makes it an ideal choice for creating durable external components, such as housings, covers and elements exposed to weather conditions. Compared to ABS, ASA has less shrinkage during printing, which makes it easier to achieve accurate dimensions.

MATERIAL PROPERTIES

- excellent resistance to external exposure
- resistance to UV radiation
- good dimensional accuracy resulting from the lack of shrinkage during the process

POST-PROCESSING

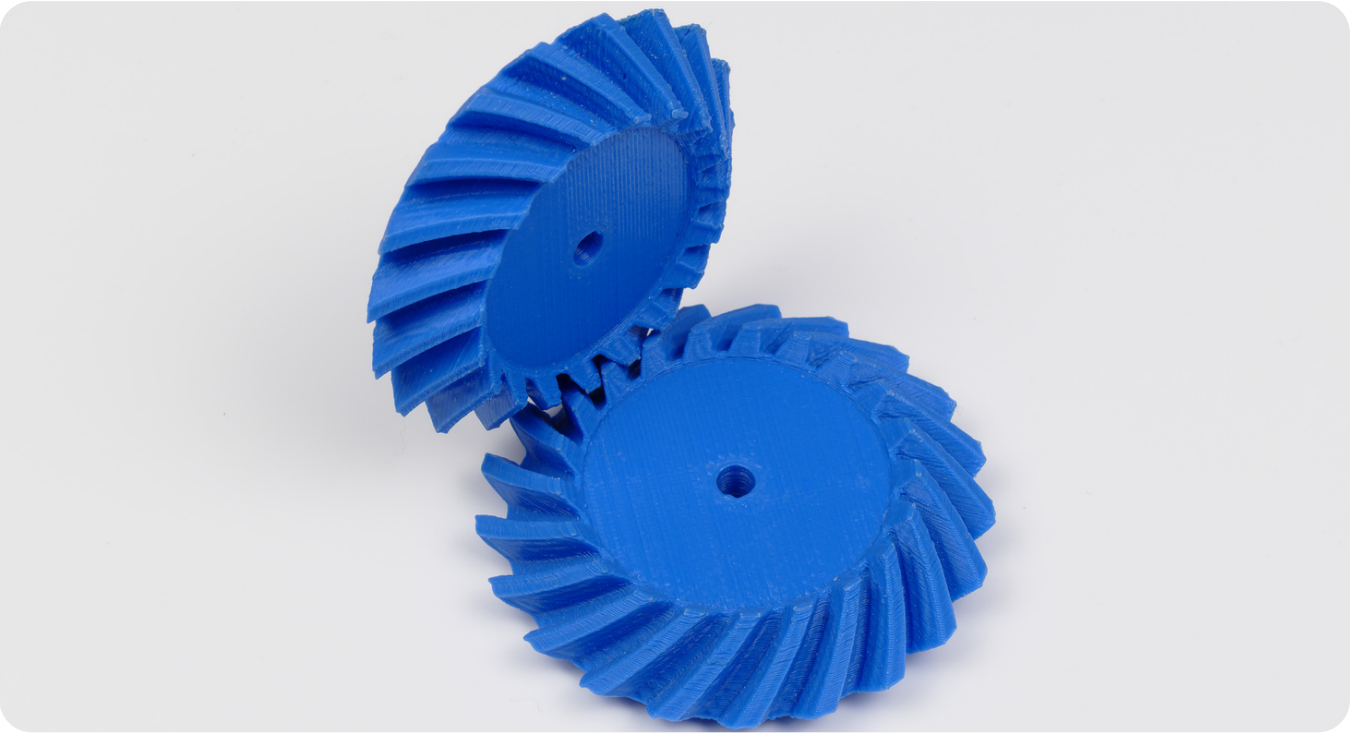
FDM printouts are characterized by a visible layers. Raw prints are cleaned of support material. The material is not subject to any dyeing technology.

Finishing methods available:

- insertion of threaded inserts

MATERIAL COLORS

PET-G FDM



DESCRIPTION

PETG is a material that is characterized by very good mechanical properties in terms of stiffness, hardness and impact resistance. PETG is resistant to chemicals, which makes it an ideal material for creating functional prototypes, models and components that require durability. Its mechanical properties, ease of printing and availability in a wide range of colors make PETG one of the popular choices in the world of 3D printing.

MATERIAL PROPERTIES

- chemical resistance
- high dimensional accuracy of printed elements
- high impact strength
- base material approved for contact with food

POST-PROCESSING

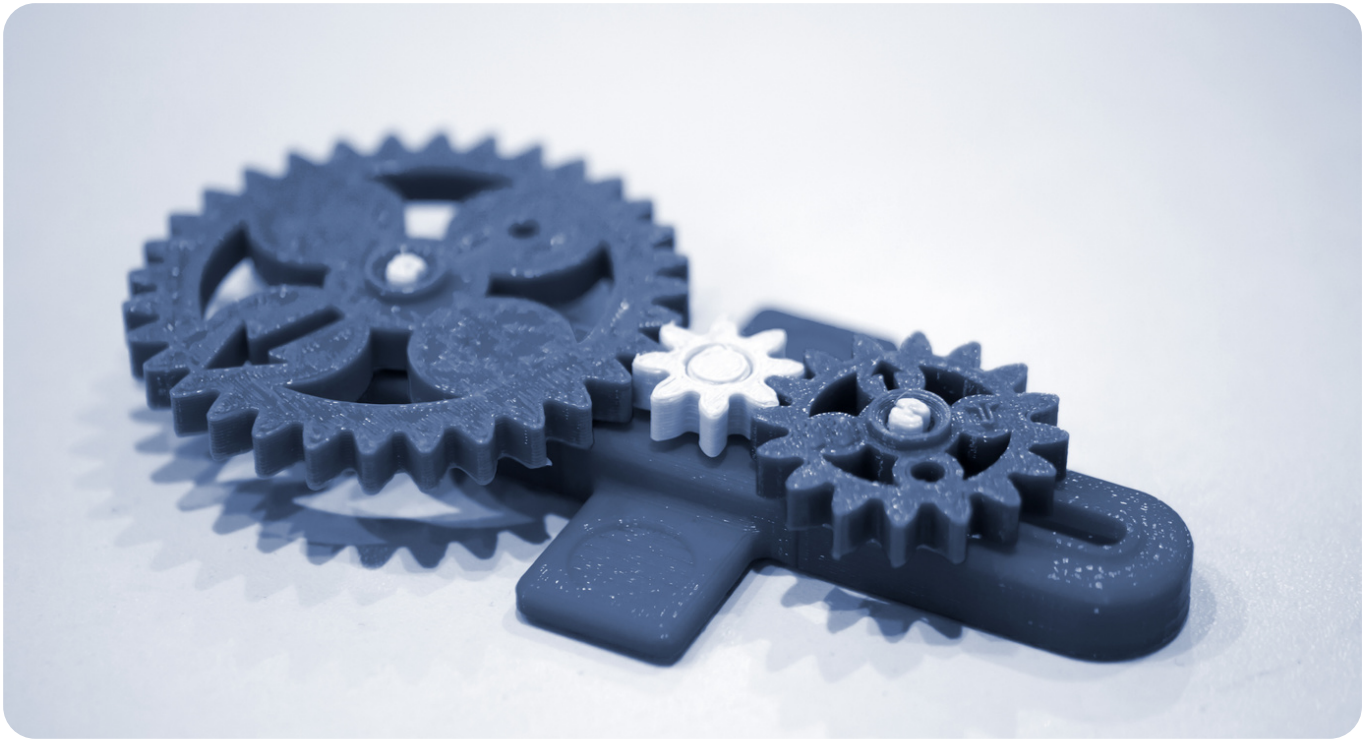
FDM printouts are characterized by a visible layers. Raw prints are cleaned of support material. The material is not subject to any dyeing technology.

Finishing methods available:

- insertion of threaded inserts

MATERIAL COLORS

PET-G UL94 V0 FDM



DESCRIPTION

PETG FR V0 is a halogen-free, flame retardant filament that has been designed in accordance with the requirements of the UL 94 V0 flammability classification. Used in coatings or covers protecting electrical circuits where there is a risk of fire.

MATERIAL PROPERTIES

- halogen-free
- excellent dimensional stability
- designed to meet UL 94 V0 standards*

CERTIFICATES

- The material is designed so that after processing in FDM technology, the finished products meet the UL 94 V0 standard

POST-PROCESSING

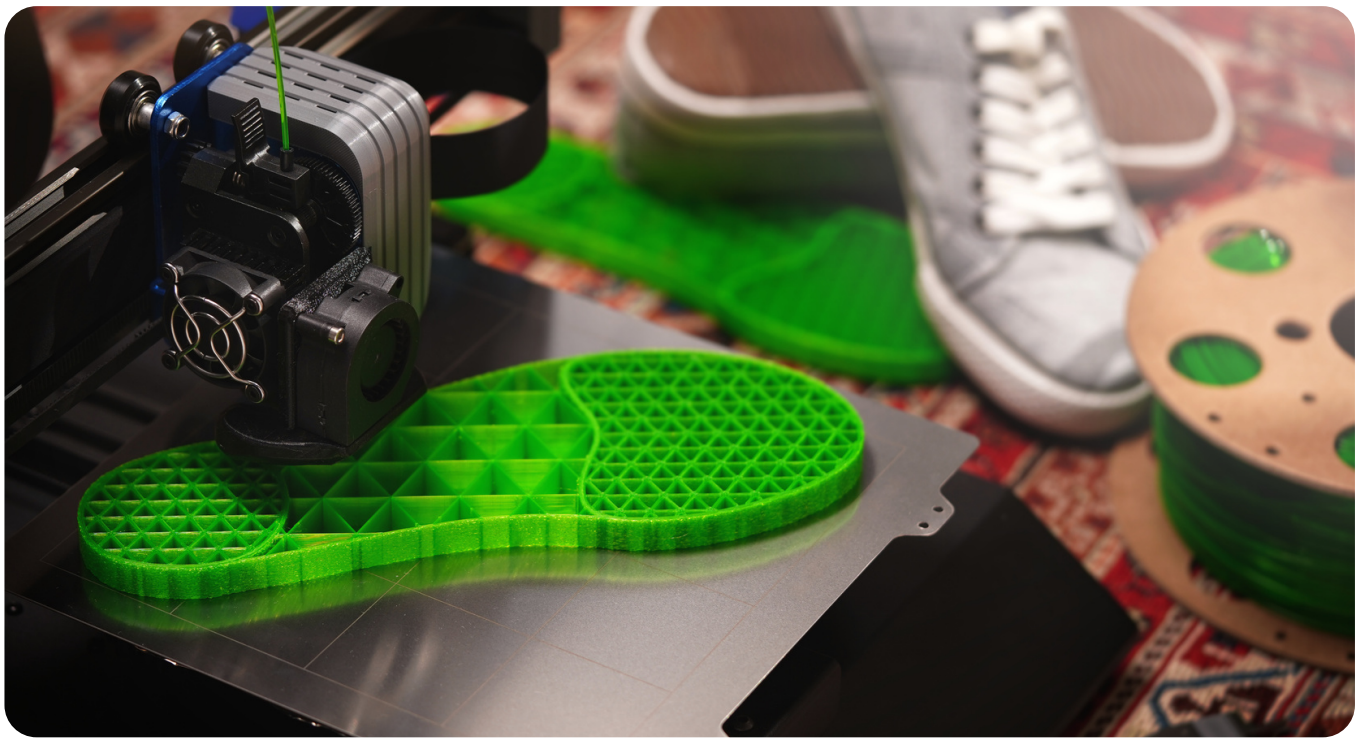
FDM printouts are characterized by a visible layers. Raw prints are cleaned of support material. The material is not subject to any dyeing technology.

Finishing methods available:

- insertion of threaded inserts

MATERIAL COLORS

TPU FDM



DESCRIPTION

TPU90A is a material designed for the production of flexible prints. It has a high ageing resistance and is resistant to weak and dilute acids and bases. It is used to produce seals with high chemical resistance and elements acting as energy absorbers.

MATERIAL PROPERTIES

- good resistance to UV radiation
- good abrasion and wear resistance
- high surface quality
- high tensile strength

POST-PROCESSING

FDM printouts are characterized by a visible layers. Raw prints are cleaned of support material. The material is not subject to any dyeing technology.

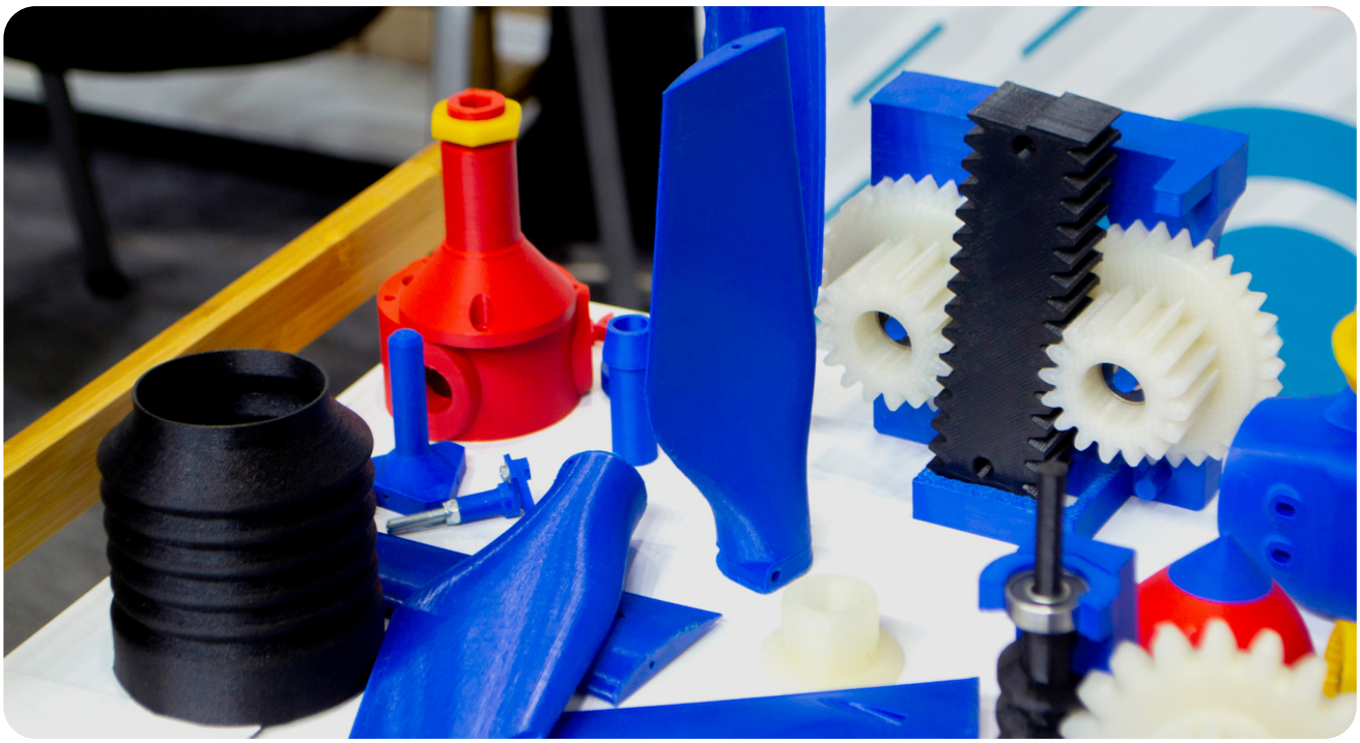
Finishing methods available:

- insertion of threaded inserts

MATERIAL COLORS

MATERIALS

ABS FDM



DESCRIPTION

ABS is a material characterized by exceptional mechanical strength and chemical resistance. ABS exhibits good impact and low temperature resistance, making it an ideal choice for functional prototypes, machine parts and components that will be subjected to heavy use. Unfortunately, due to the high shrinkage during cooling, the dimensional accuracy of the product has a low accuracy class. For applications requiring a higher accuracy class, we suggest the use of ASA material.

MATERIAL PROPERTIES

- high impact strength
- high mechanical strength
- low water absorption
- high stiffness

POST-PROCESSING

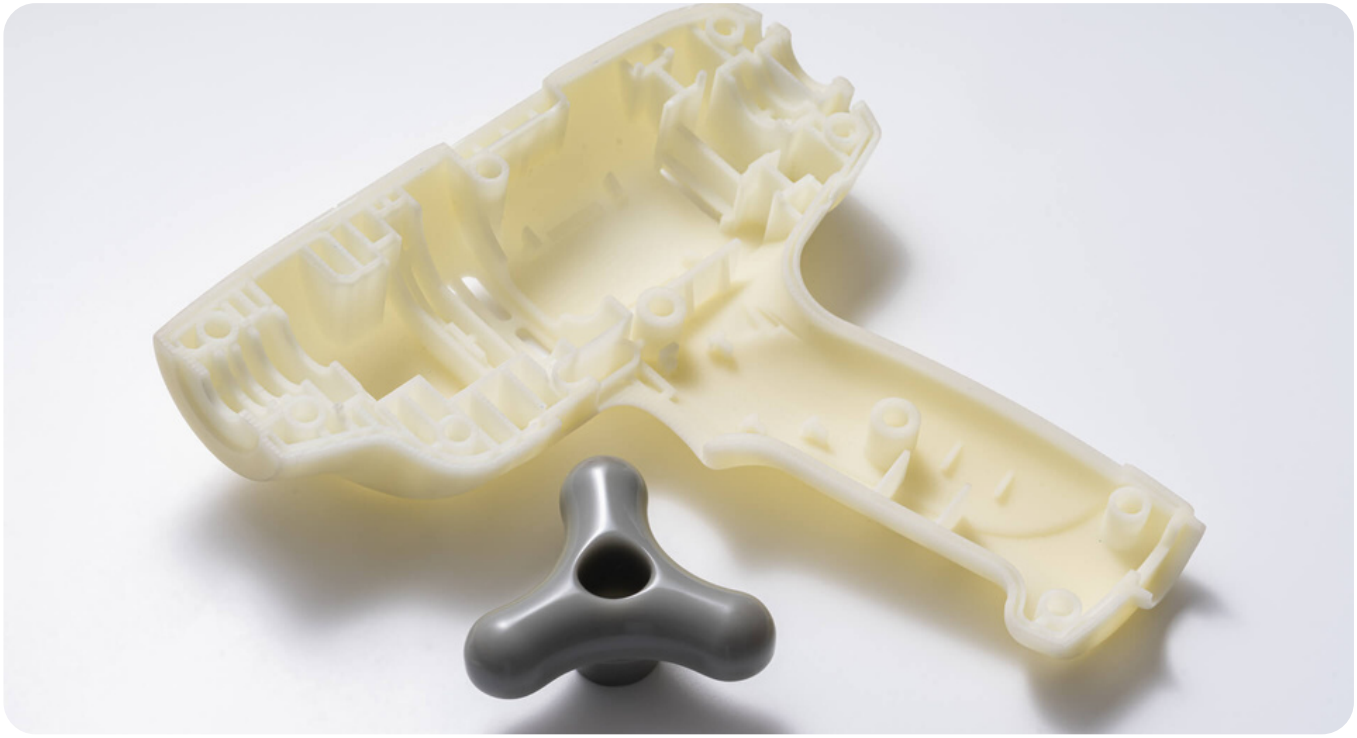
FDM printouts are characterized by a visible layers. Raw prints are cleaned of support material. The material is not subject to any dyeing technology.

Finishing methods available:

- insertion of threaded inserts

MATERIAL COLORS

ABS-Like DLP



DESCRIPTION

ABS-Like is a light-curing resin used primarily for prototyping purposes. High surface smoothness imitating injection and good dimensional accuracy parameters make it an excellent material for the production of concept parts of high visual quality.

MATERIAL PROPERTIES

- high surface quality
- good repeatability
- slight shrinkage during printing
- high stiffness

POST-PROCESSING

Printouts from DLP technology are characterized by low impact strength. Raw prints are cleaned of support material.

Finishing methods available:

- insertion of threaded inserts
- polishing

MATERIAL COLORS

Hi-Temp DLP

DESCRIPTION

Hi-Temp 3D printing resin is characterized by high thermal resistance, high mechanical strength, high density and stiffness. The deformation at 160°C make products made of this resin ideal for applications requiring temperature resistance and for the production of short-run injection moulds.

MATERIAL PROPERTIES

- high surface quality
- good repeatability
- high stiffness
- excellent temperature resistance

POST-PROCESSING

Printouts from DLP technology are characterized by low impact strength. Raw prints are cleaned of support material.

Finishing methods available:

- insertion of threaded inserts
- polishing

Rubber-Like DLP

DESCRIPTION

Rubber-like resin has unique properties that allow the creation of flexible, rubber-like parts. Thanks to its elasticity and rubber-likeness, this type of resin is perfect for prototypes that require flexibility.

MATERIAL PROPERTIES

- high resilience and flexibility
- high bending resistance

POST-PROCESSING

Raw prints are cleaned of support material.

Transparent DLP

DESCRIPTION

The transparent resin is characterized by a high level of light transmission and the achievable effect of transparency. It is a perfect solution for all applications that require light transmission, such as vision sensor covers, transparent covers or transparent prototypes.

MATERIAL PROPERTIES

- high surface quality
- high light transmittance
- possible transparency effect
- high stiffness

POST-PROCESSING

Printouts from DLP technology are characterized by low impact strength. Raw prints are cleaned of support material.

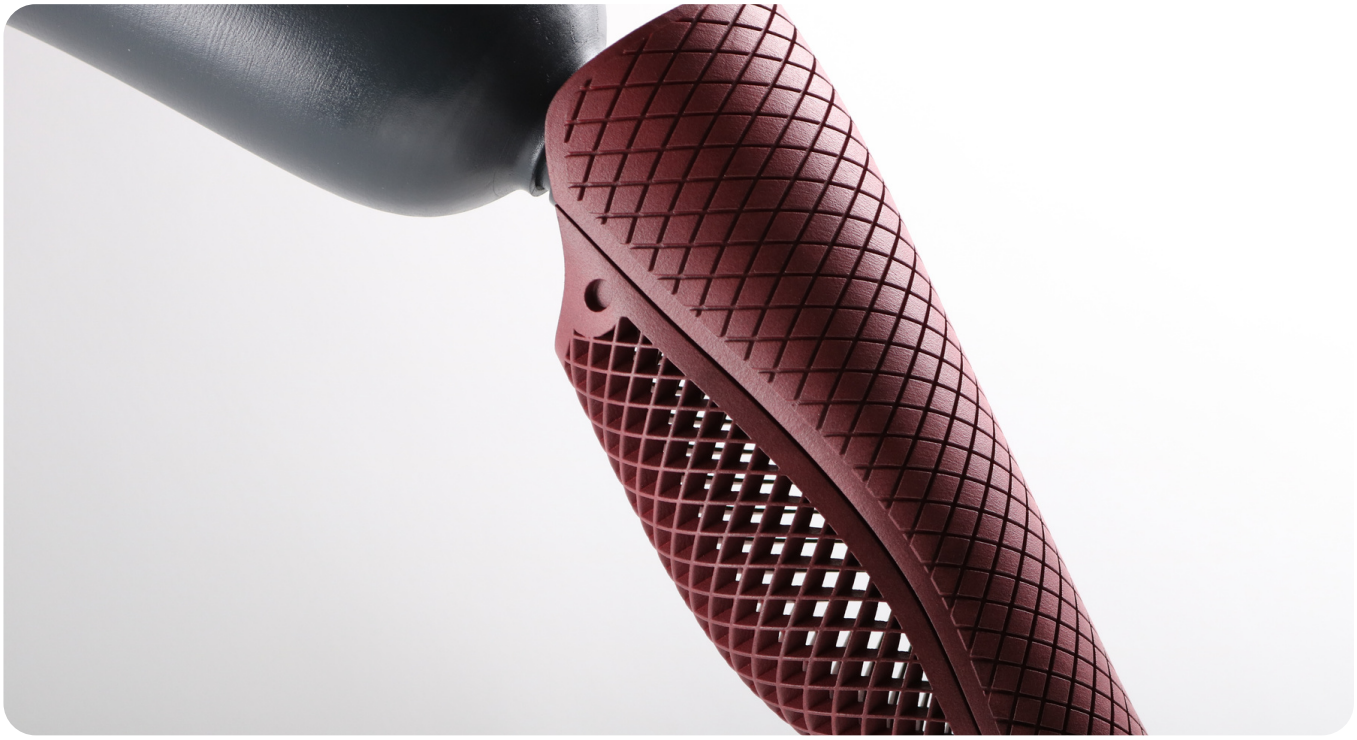
Finishing methods available:

- insertion of threaded inserts
- polishing
- colorless varnishing for transparency.

*the effect of transparency is possible only in the case of detail geometry that allows post-production methods to access all surfaces

Finishing Technologies

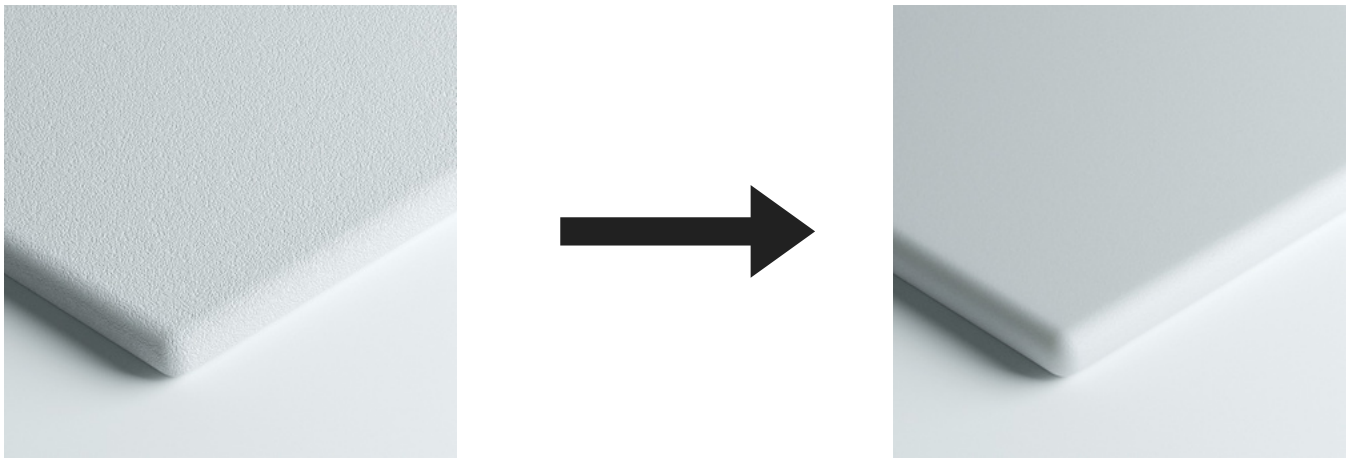
Polishing with PSS technology



DESCRIPTION

PolyShot Surfacing (PSS) from DyeMansion is the most effective surface finishing technology used to achieve finished usable parts. It is characterized by not using abrasion processes during smoothing. The principle of its operation is to apply the same material from which the detail was made, using compressed air. The particles of the material are shot through a nozzle under high pressure to smooth out the surface elevations and depressions, achieving a more uniform part quality. The advantage of the non-abrasive polishing method is also the lack of a significant impact on the dimensional accuracy of details. What's more, this technology, as it does not use any additional medium, does not negate any of the certificates held by the material - primarily certificates of contact with food and biocompatibility.

PPS polishing is completely free in Technology Applied and it is subjected to every part not exceeding the dimensions of 300mm x 300m x 300mm.



DeepDye coloring

DESCRIPTION

The DyeMansion DM60 deepdye coloring technology is an innovative solution that enables permanent and high-quality dyeing of the surface of details. It uses advanced pigments that penetrate the structure of the material, creating an even and durable layer of color resistant to abrasion. Elements are immersed under pressure in dyes that penetrate into the microscopic pores and structures of the part, regardless of its geometric complexity. Thanks to this, deep and uniform colors of the surface are obtained, which are not subject to flaking or fading under the influence of external factors. The dyeing process is controlled, which allows you to adjust the color intensity and achieve the desired visual effect.

OFFER

The Technology Applied tinting offer includes the following colors:

SLS		MJF
	Black - no reserve price	
	Standard colors minimum price 44€	
	Dedicated RAL on request minimum price 60€	

Spray painting

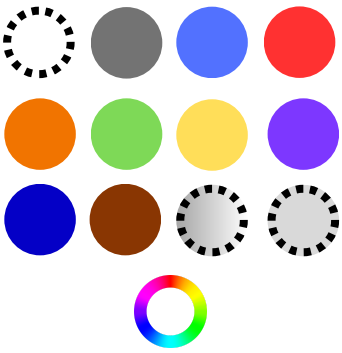
DESCRIPTION

Spray dyeing of plastics is a process that enables durable and aesthetic covering of the surface of printed elements with a layer of paint. In this process, the paint is applied to the surface through a spray gun, resulting in a quick and even coating. Spray painting allows for cheap and effective colouring of details without the need to run other processes. The low minimum price and the benefit of dyeing in colors from the full palette of colors make this method perfect for single parts and prototypes. This method is also used in applications requiring the use of metallic dyes or colorless varnishes.

OFFER

The Technology Applied tinting offer includes the following colors:

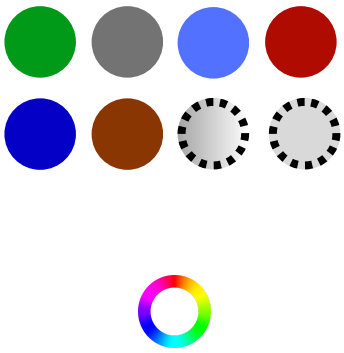
SLS



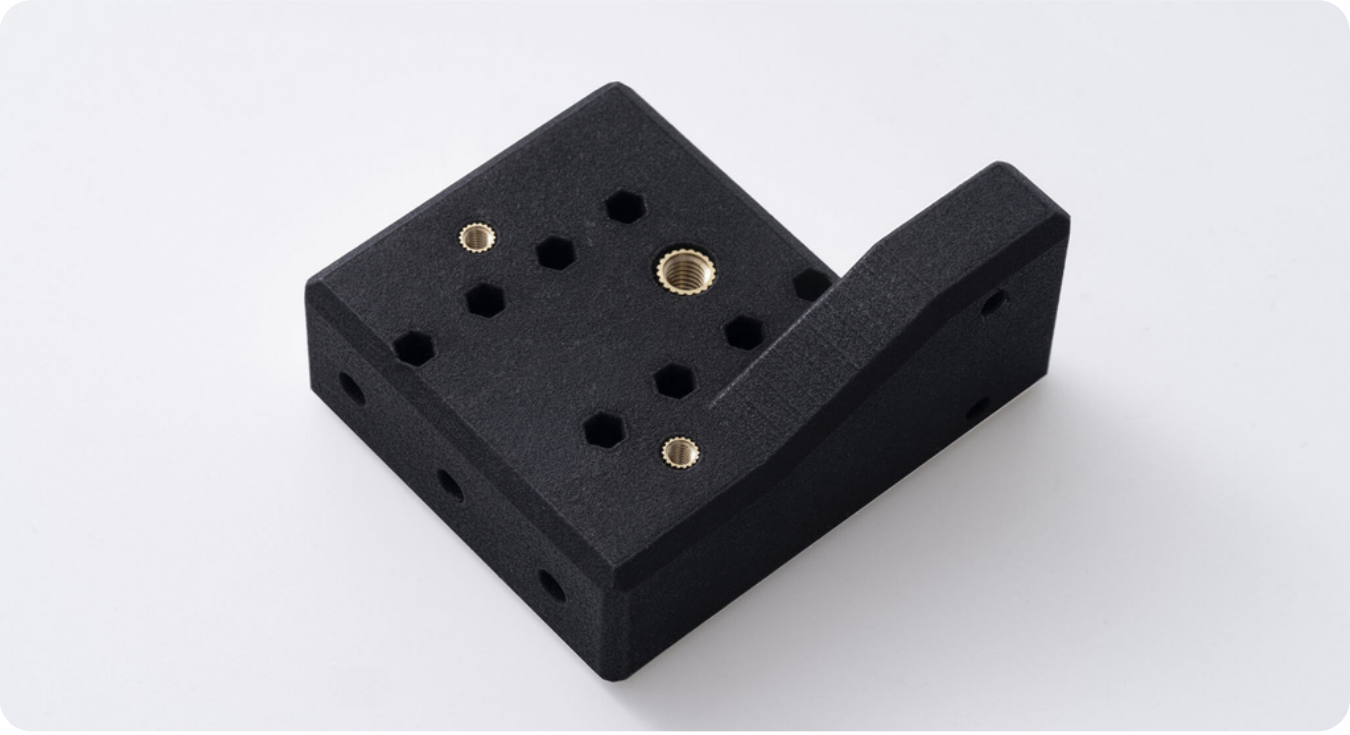
Standard colors with no reserve price

Dedicated RAL on request minimum price 15€

MJF



Insertion of threaded inserts



DESCRIPTION

Embedding threaded inserts is a technological process consisting of placing metal inserts with threads in previously made holes in plastics. This allows for a durable and solid threaded connection between metal and plastic.
The general process for embedding threaded inserts is as follows:

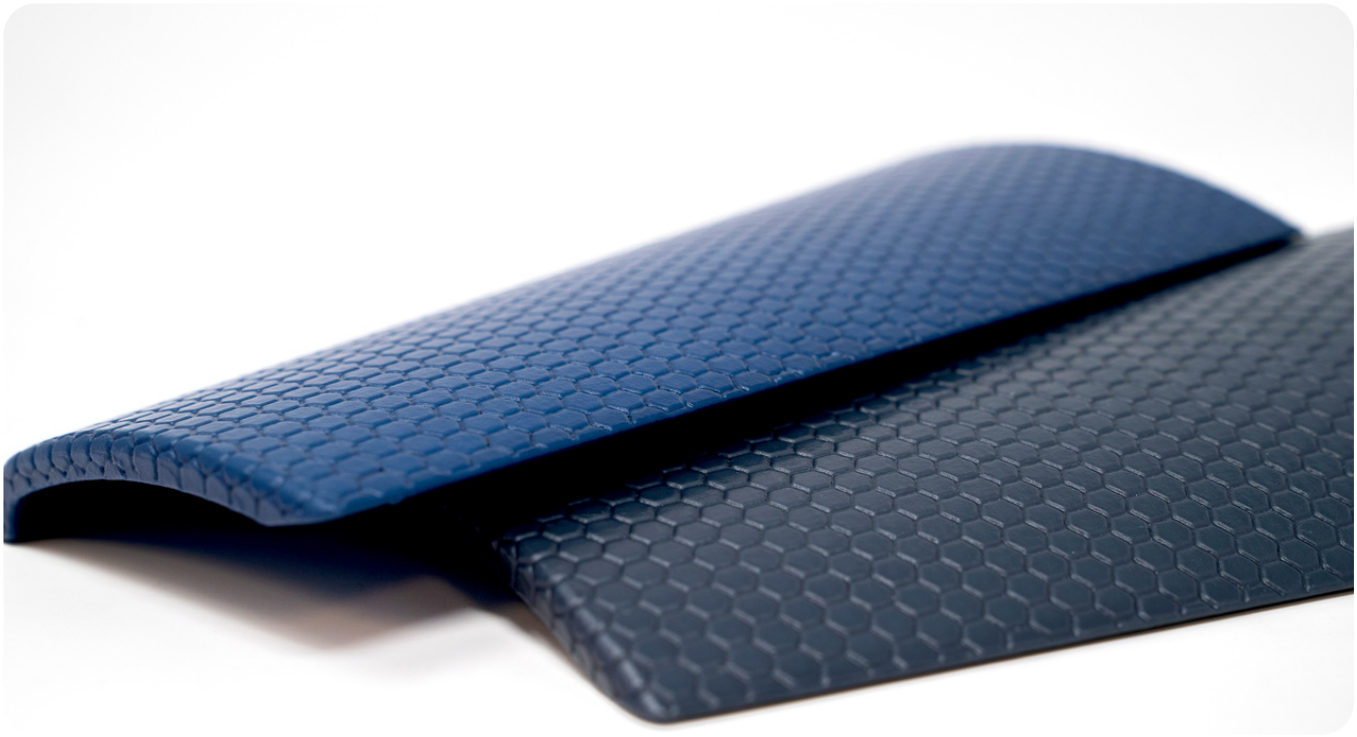
- Hole preparation: The detail is printed with a special hole created in accordance with the specification of a specific insert. We send the specifications of the hole to the design department of the customer if we use our inserts. It is also possible to install a customer's insert.
- Insert heating: The threaded metal insert is heated to allow it to interact with the plastic.
- Feathering of the insert: The heated insert is gently inserted into the hole in the plastic. During fusion, under the influence of heat, the softening material surrounds and adheres to the insert and penetrates its external thread, creating a solid connection.
- Cooling and curing: After the insert is placed, the whole thing is cooled. The plastic will harden around the insert, creating a durable and strong thread connection.

OFFER

Technology Applied offers inserts in sizes from M2 to M8 and imperial inserts. It is possible to order and install inserts other than those indicated above.

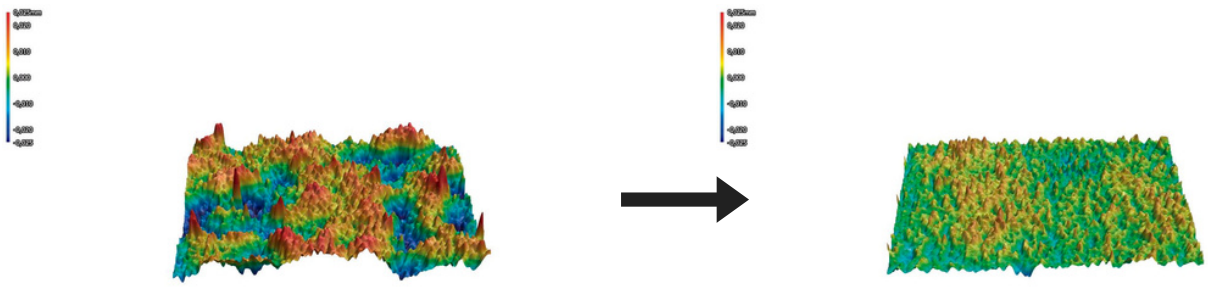
The price for the insert and installation of 1 piece of insert from the Technology Applied range is 1€.
The price for the cylinder and assembly of 1 piece of cylinder on a special order or a non-standard cylinder is determined individually, depending on whether the cylinder is delivered by the customer or by Technology Applied.

VaporFuse Surfacing



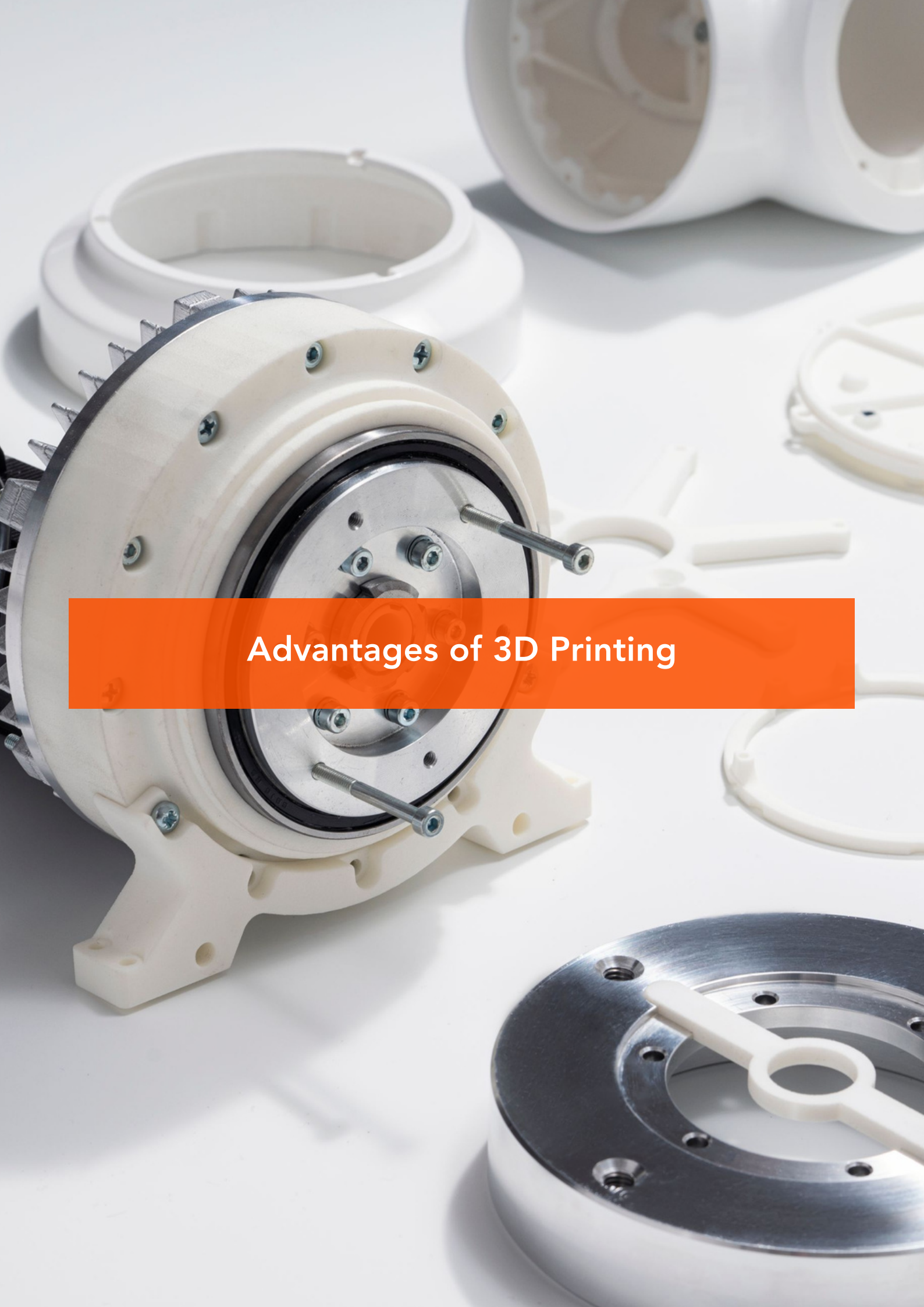
DESCRIPTION

VaporFuse Surfacing is an advanced finishing technology that allows to improve the appearance and surface properties of 3D printed details. In this process, printed parts are placed in a special chamber where they are exposed to chemical vapor. This vapor acts on the surface of the elements, dissolving their outer layer, which leads to a smooth and uniform surface. This technology allows for the elimination of 3D printing layers that are typical for additive technologies. Thanks to this, an aesthetic and smooth finish is obtained. VFS not only improves aesthetics but can also affect mechanical properties. Closing the outer porosity of the part significantly increases its tightness to both liquids and gases. VFS technology affects the entire part, regardless of the complexity of its geometry. External surfaces and internal channels are smoothed out. VFS technology does not leave any toxins or media, which allows you to maintain material certificates such as food contact, skin contact, biocompatibility, non-flammability and others.



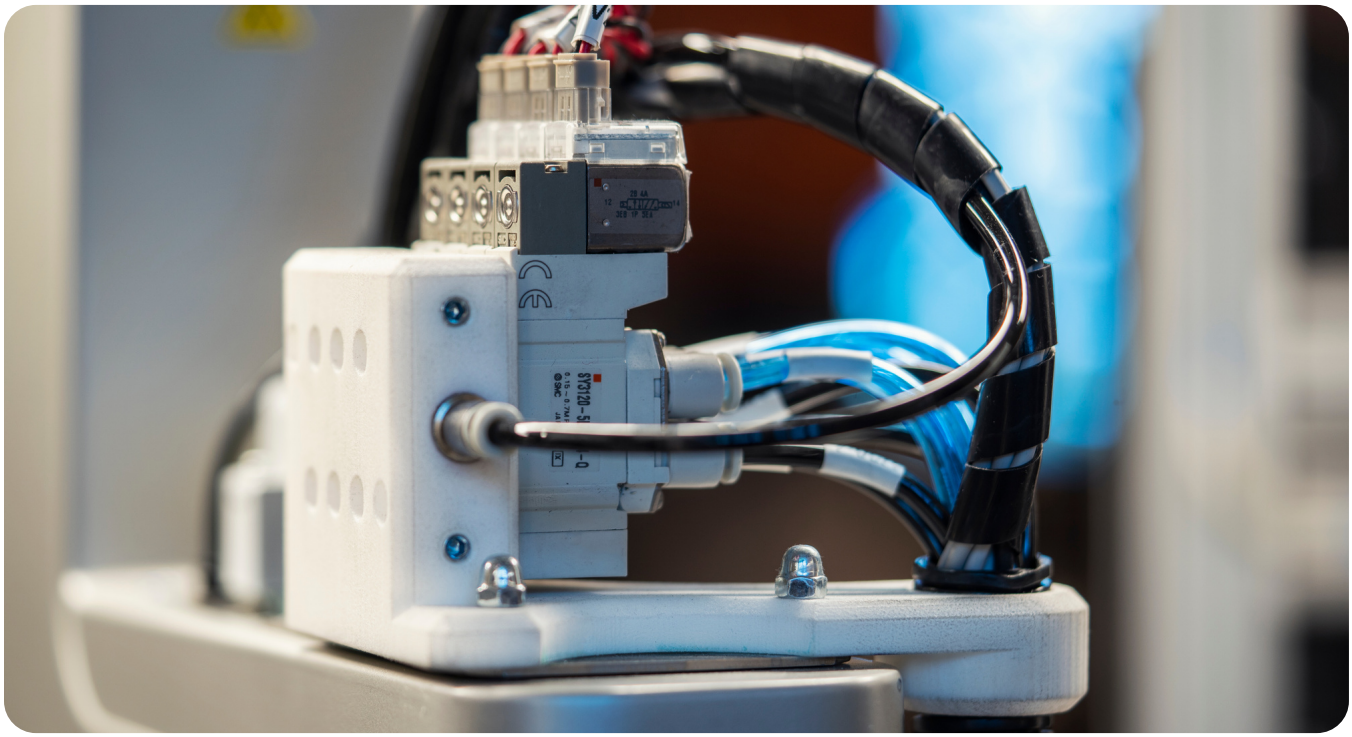
Post-processing table

	Technology	DeepDye coloring DM60	Spray painting or clear varnishing	Insertion of threaded inserts	VaporFuse Surfacing	PSS polishing or normal polishing
PA12	SLS	✓	✓	✓	✓	✓
PA12GF	SLS	✓	✓	✓	✓	✓
PA2210FR UL 94 V0	SLS	✓	✓	✓	✓	✓
PA2241FR	SLS	✓	✓	✓	✓	✓
Alumide	SLS	✓	✓	✓	✗	✓
TPU1301	SLS	✓	✓	✓	✓	✓
PA12 HP	MJF	✓	✓	✓	✓	✓
PA11 HP	MJF	✓	✓	✓	✓	✓
PLA	FDM	✗	✗	✓	✗	✗
ASA	FDM	✗	✗	✓	✗	✗
PET-G	FDM	✗	✗	✓	✗	✗
PET-G UL 94 V-0	FDM	✗	✗	✓	✗	✗
TPU	FDM	✗	✗	✓	✗	✗
ABS	FDM	✗	✗	✓	✗	✗
ABS-Like	DLP	✗	✗	✓	✗	✓
Hi-Temp	DLP	✗	✗	✓	✗	✓
Rubber-Like	DLP	✗	✗	✗	✗	✗
Transparent	DLP	✗	✓	✓	✗	✓



Advantages of 3D Printing

Customization



One of the significant advantages of 3D printing is the ability to personalize details at an unprecedented level. Traditional production methods often involve the mass production of standardized components that do not necessarily correspond to the individual needs or preferences of users. 3D printing turns this model upside down, enabling the creation of unique, personalized products, which has its applications both in relation to final products, as well as tooling and parts for devices produced in one piece or in small quantities.

The 3D printing process allows flexibility in design, allowing the shape, size and topology of the element to be adapted to specific requirements. Whether it's customized medical prostheses, ergonomically designed tools or custom ornaments, additive manufacturing allows you to create items that are perfectly matched to the anatomical, functional and aesthetic needs of the recipient.

The advantage of personalizing 3D printing is particularly evident in fields such as medicine, where customized implants, prostheses and orthopedic appliances can significantly improve the quality of life of patients. Also in the field of design, it enables the creation of prototypes tailored to a specific target group, taking into account their preferences and needs.

3D printing makes it possible to meet individual needs in a way that would be difficult to achieve using traditional production methods. This is mainly due to the lack of start-up costs of 3D printing and the great flexibility mainly related to the lack of the need to retool devices and produce tools to produce new shapes.

Consolidation

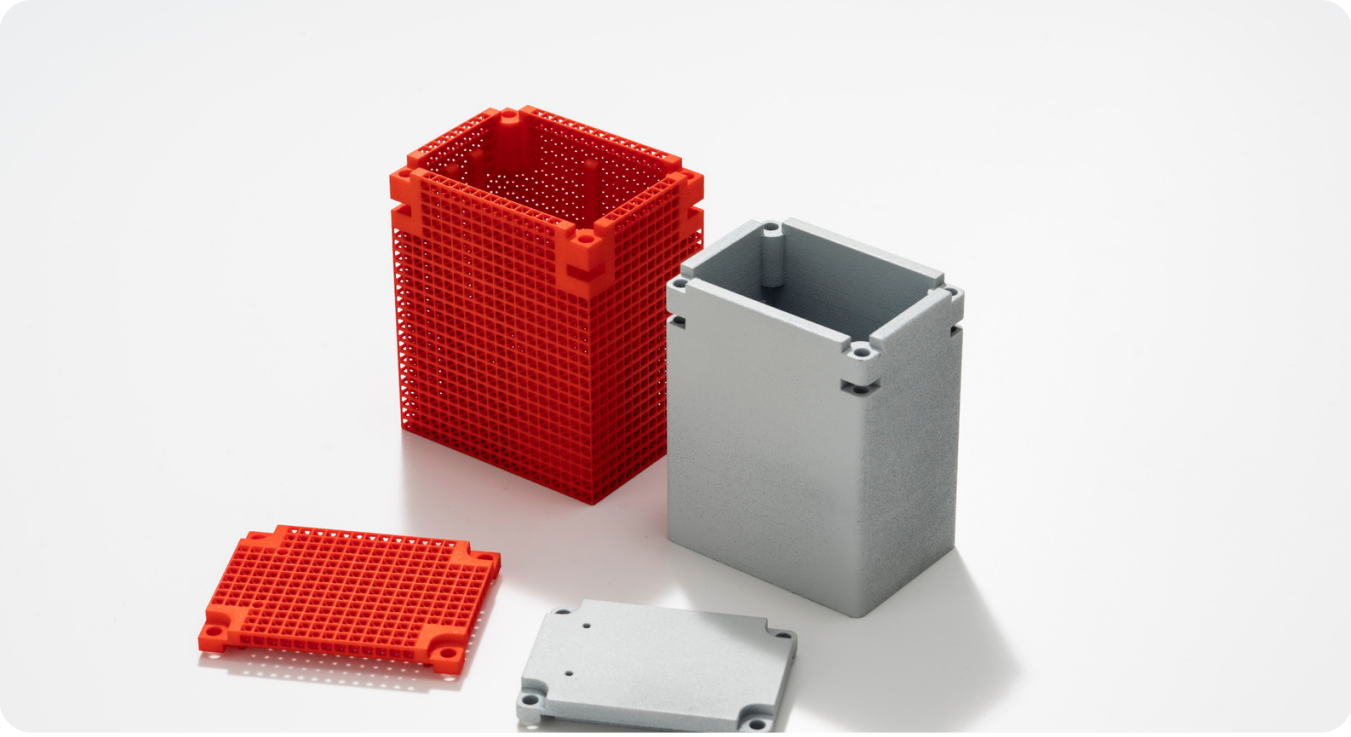
Consolidation, i.e. the ability to combine different components in one 3D print, is an important and unique advantage of this technology. Traditional manufacturing methods often require separate processes, assembly and bonding of individual components, which is time consuming and generates additional costs. 3D printing technologies enable the creation of complete and complex objects in one process - this procedure is called consolidation.

The consolidation process in 3D printing allows you to combine different parts, components or functions in one coherent printout. This creates new design possibilities, where instead of creating and combining individual elements, you can achieve all the necessary detail parameters in one process. Examples include fabricating mechanical assemblies that would previously require assembly, or creating items with built-in spaces or channels that might be difficult to achieve in the traditional way.

Consolidation in 3D printing not only increases production efficiency by eliminating the need for assembly, but also can improve the quality and durability of printed elements. The entire assembly becomes an integral part of one object, which has a positive effect on the price, time and durability of the consolidated object.

The ability of 3D printing to consolidate objects is transforming the way we design and build, eliminating the need for assembly and enabling more complex and efficient products to be created in a single process.

Complex topology



The ability to design complex topologies in 3D printing is a significant advantage that allows you to optimize the structure and performance of printed elements. Traditional manufacturing methods are often limited by standard forms and geometries, which can lead to material waste and poor mechanical properties. Topology in 3D printing introduces a revolutionary approach to design where structure and material are tailored to specific loads and applications.

Topology in 3D printing consists of analyzing the loads to which a given element will be subjected, and then optimizing its geometry to make the most of the material and minimize unnecessary loads. This allows designers to create unique shapes that are optimized for a specific function. For example, if a component needs to be strong in some places and light in others, the topology allows fine adjustments in thickness and shape, leading to material savings and improved mechanical properties.

The advantage of topology in 3D printing is particularly evident in industries such as aerospace, automotive and tool manufacturing, where minimizing weight while maintaining strength is a key factor. 3D printing combined with topology allows you to create components that are optimal in terms of performance and efficiency, which contributes to achieving better results with less material consumption.

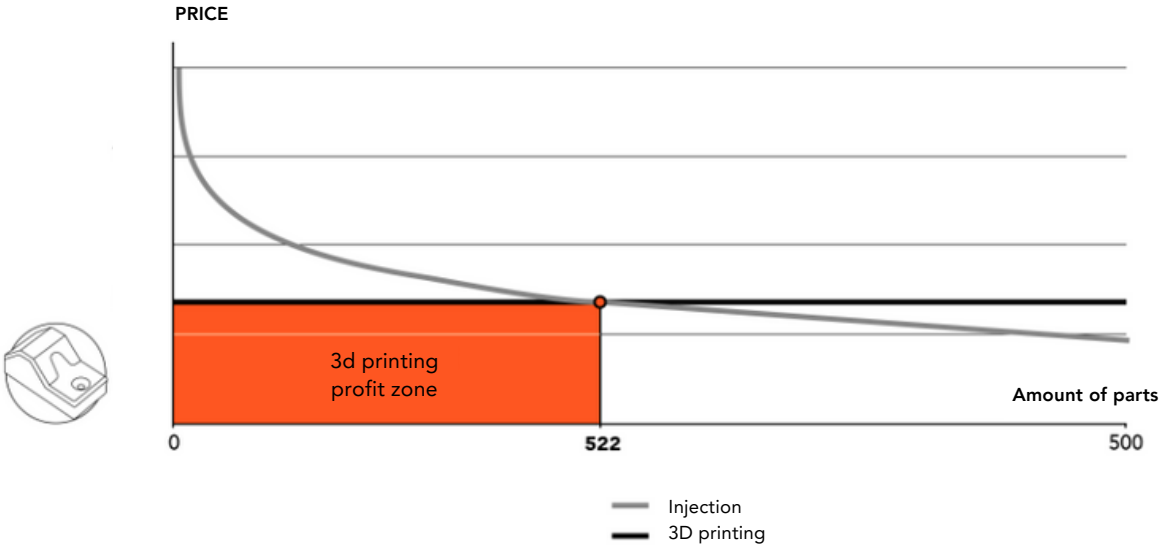
In conclusion, the use of topology in 3D printing is an important tool that transforms the way we design and manufacture, leading to more efficient, optimized and functional printed parts.

Prototyping

Prototyping is the process of creating early, often experimental, iterations of products, objects, or solutions to test their appearance, function, performance, or user response. The main purpose of prototyping is to obtain a physical representation of the design that will allow various aspects to be tested, verified and evaluated before moving to full production or implementation. 3D printing plays an important role in the prototyping process due to the lack of start-up costs, flexibility, lack of costs associated with changing the concept and speed in the manufacturing process. 3D printing is at the forefront of technologies used to validate products in the construction process. Making prototypes has a number of advantages, such as:

- **Creating visual models:** 3D printing allows you to create realistic visual models that can help you better understand the project, both internally within the project team and in communication with clients or stakeholders.
- **Reducing development time:** With 3D printing, the time it takes to develop a project and bring a product to market can be significantly reduced, which can bring a competitive advantage.
- **Concept testing:** Prototyping in 3D printing allows you to verify and test different concepts before going into production. This allows you to identify any errors, imperfections or aspects that need improvement.
- **Functionality:** 3D prototypes can be created from a variety of materials, which makes it possible to test their functionality in conditions close to reality.
- **Verification of ergonomics and use:** 3D prototypes allow you to test the ergonomics and comfort of using objects, which is especially important in projects related to consumer products.

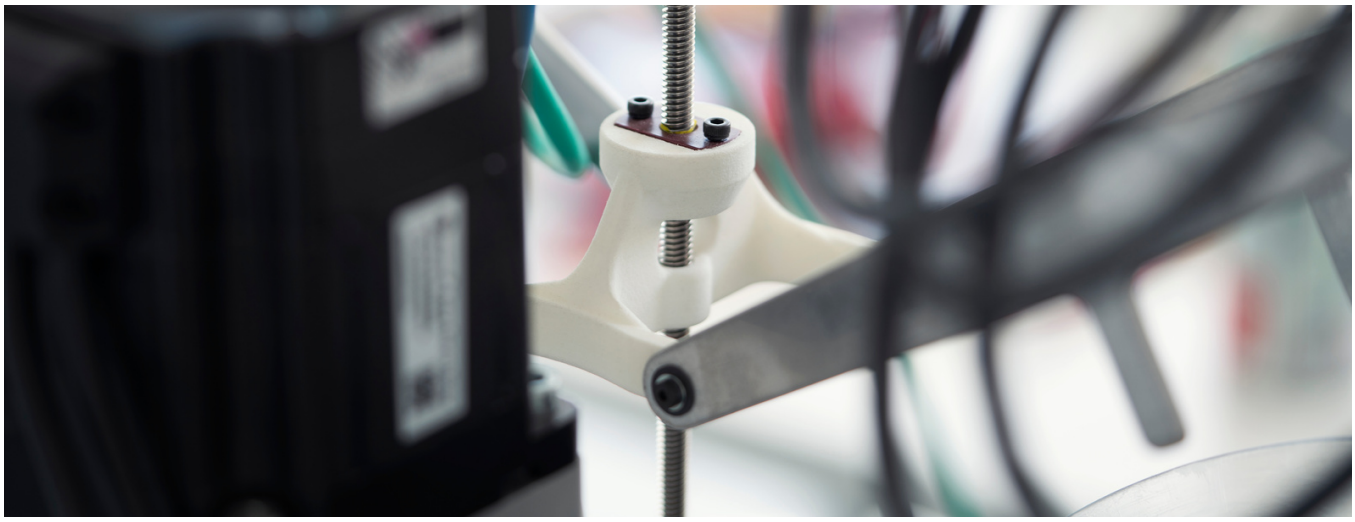
Price & time



3D printing, due to zero starting costs, no need to produce a tool, no need to store inventory and flexibility in changing the product concept, has become a preferred technology in the initial phase of product development or as the main production technology for applications that do not require mass quantities of parts. Although the price of a part produced in 3D printing is usually higher than the unit price of a part produced by injection, the lack of the need to produce an expensive tool makes it worth using this solution anyway. This is perfectly visible on the chart. The 3D printing profitability zone is a place where the number of produced details does not exceed the profitability of the tool. This fact means that, despite the higher nominal price per detail, the price of the entire project is lower and less exposed to risk. This makes 3D printing a very attractive solution in the context of single, short and medium series production. What's more, the development of 3D printing technology makes it more and more often, mainly in the case of small-sized details, cheaper than injection, even in mass production.

The situation is similar in terms of production time. Despite the fact that 3D printing has developed significantly recently, which directly translated into its acceleration, it is still a slower technology than injection. The time advantage of 3D printing lies primarily in the reaction time, which in the case of additive technologies is almost instantaneous. The 3D printing speed zone, like the profitability zone, finds its place from the moment it is necessary to create a tool to its actual implementation into production.

Sample implementations



Technology Applied sp. z o.o.
ul. Wiejska 42/3
15-509 Sobolewo
www.ta.parts
info@ta.parts
+48 85 733 9000