Introduction of our 3D polymer printing technologies

PLASTIC-FORM

Where, who and what they are used for

Generally we can say that 3D printing shows up in more and more areas of our everyday life. It can be found in a wide variety of industrial sectors almost without exceptions. It is becoming more and more common for home and hobby usage.

Application Areas

- ***Manufacturing***
- ***Jigs and fixtures***
- ***Part manufacturing***
- ***Rapid prototyping***
- ***Realistic representations***
- ***Composite tooling***

Industries

- ***Aerospace***
- ***Automotive***
- ***Consumer products***
- ***Dental***
- ***Medical***
- ***Education***
- ***Railway***
- ***Fashion and arts***

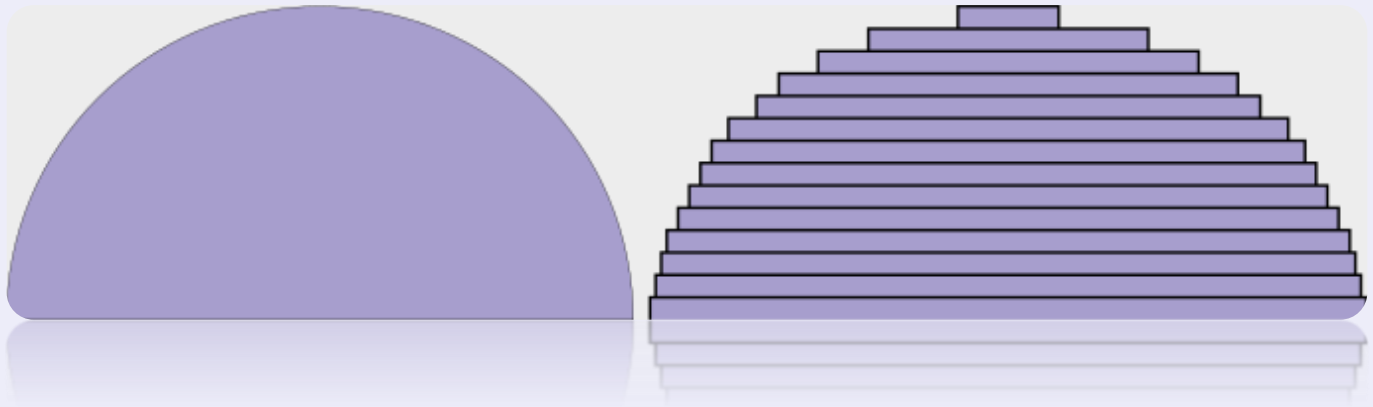
PLASTIC-FORM

What is 3D printing?

The 3D printer is a device capable of creating objects from digital models.

3D printing is such an additive technology, where our object is been built up layers by layers, as opposed to subtracting manufacture, where our object is carved out of a given volume. The latter is also commonly referred to as a subtractive procedure.

During printing process the machine reads data of the model and forms overlapping layers over each other, therefore building gradually up the model from sections. These layers are bonded together or automatically adhered to each other.

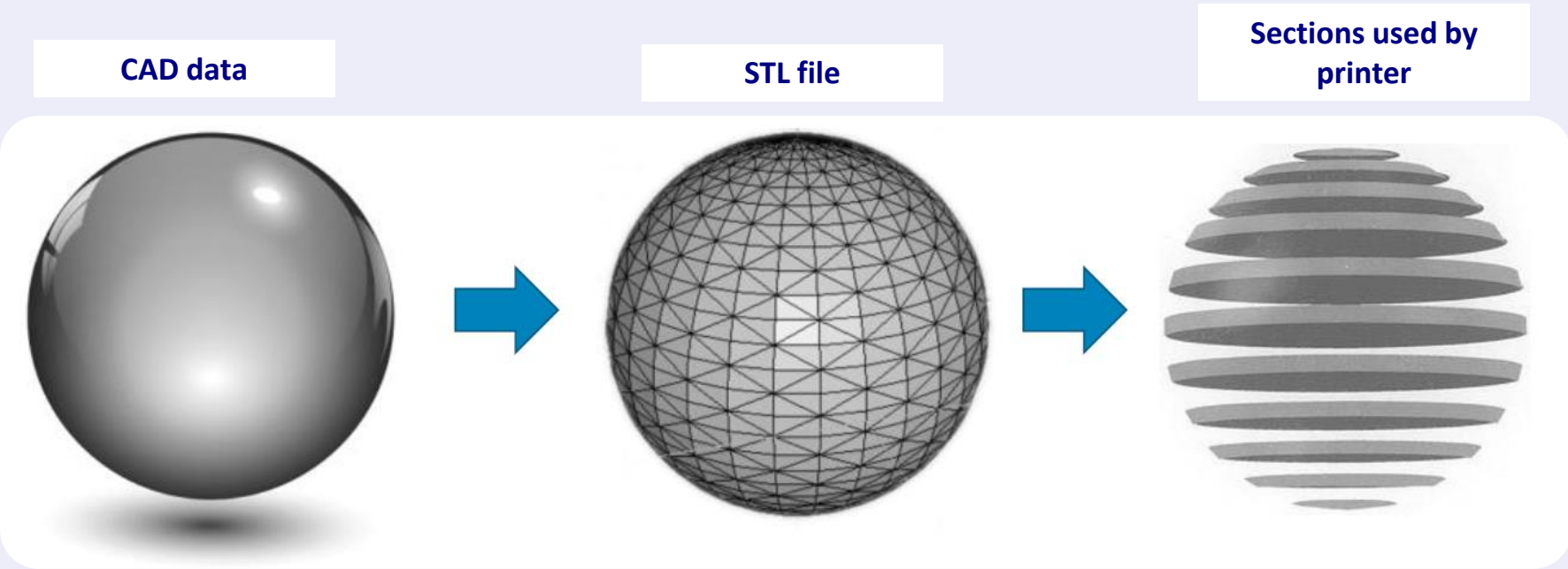


3D modell szeletelése

PLASTIC-FORM

Softwares, data

The additive manufacturing process is preceded by the creation of a digital model. This can be done either by using a computer-aided design (CAD) or a 3D modeling software. Digital model also can be created of an existing body by using a 3D scanner. The most common data format between CAD software and a 3D printer is the STL (Standard Tessellation Language / STereoLithography) file, which stores the surface of the three-dimensional body divided into tiny approximating triangles. The smaller the triangles, the more accurate the approximation is. Our competencies include converting 3D models to other extensions as well.



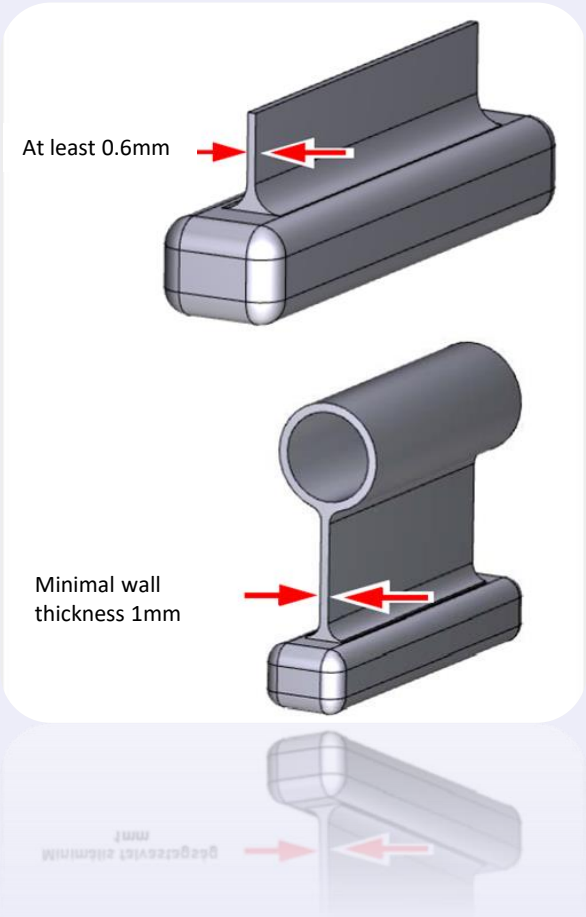
PLASTIC-FORM

Key to the expected final results

Without claiming completeness, just to mention some of the most importants

General design aspects:

- **Minimal wall thickness:** 0.6 mm
- **Minimal load bearing wall thickness:** 1 mm
  - Even more if it’s possible.



PLASTIC-FORM

Key to the expected final results

Without claiming completeness, just to mention some of the most importants

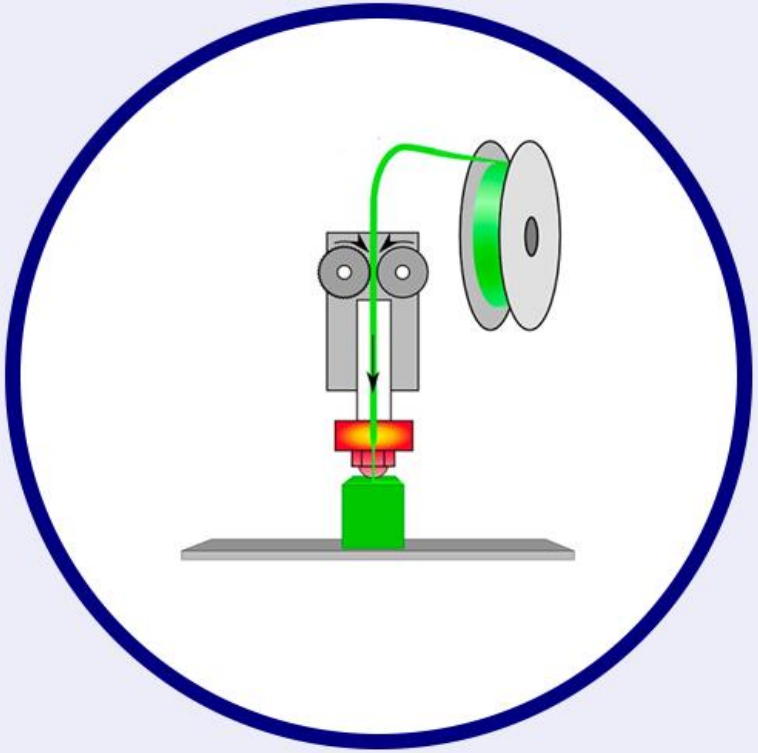
Orientation

- Orientation can basically define the quality, geometric stability, and dimensions of our object.
- The tensile strength of extruded plastics is strongest along the x-y plane.
- When creating undercuts the usage of support is needed.

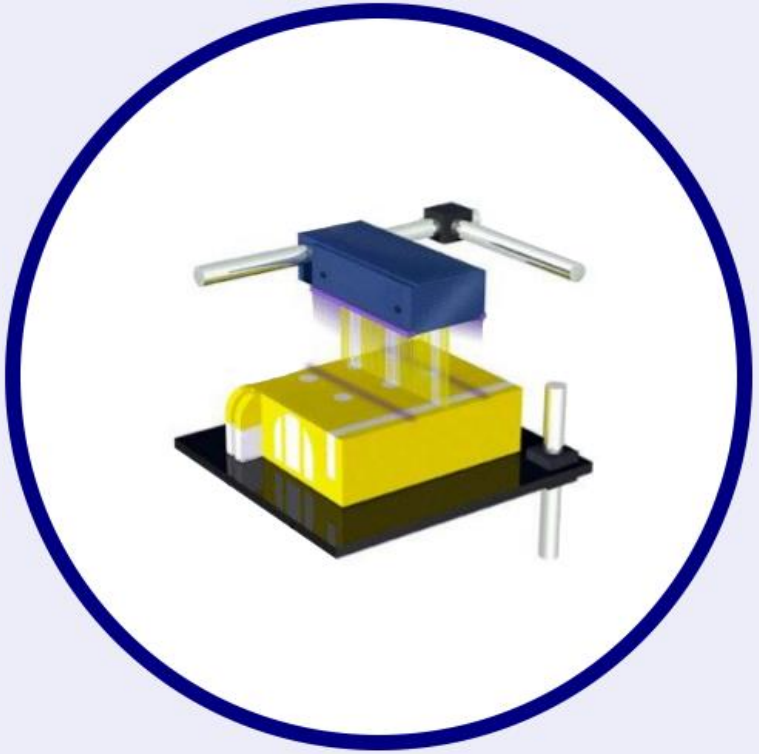
PLASTIC-FORM

Our printing technologies

FDM technology



Polyjet technology

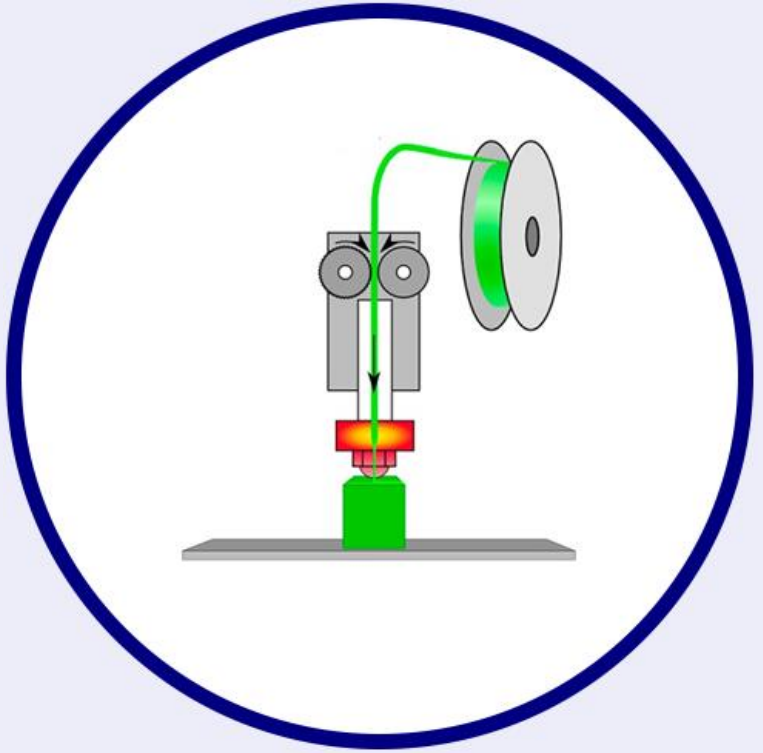


PLASTIC-FORM

Our printing technologies

Short introduction of FDM technology

FDM (that is Fused Deposition Modelling) and FFF (Fused Filament Fabrication) are one of the most commonly known printing procedures. Thermoplastic polymer fiber (filament) gets into the machine during fiber drawing technology, that gets melt, therefore model can be created layer by layer.



Advantages

- The most cost effective printing technology
- Unique mechanical, thermal and chemical resistance
- Usage of real thermoplastic polymers

Disadvantages

- Longer printing time
- Different mechanical properties of layers regarding of perpendicular and parallel orientation
- Design limitations

PLASTIC-FORM

FDM printers of ours

Stratasys F370

- **Reliable, precise, affordable, efficient**
- **Printable dimensions:** 356 x 254 x 356mm
- **Achievable layer thickness:** 0.12 - 0.33mm
- **Precision:** +/- 0.2mm
- **Number of extruders:** 1db modell, 1db támasztó
- **Available materials**
  - **ABS**
  - **ASA**
  - **Diran**
  - **PLA**
  - **FDM TPU 92A**
  - **PC-ABS**
  - **ABS+CF10**

PLASTIC-FORM

FDM printers of ours

SUNLU S8 FDM 3D printer

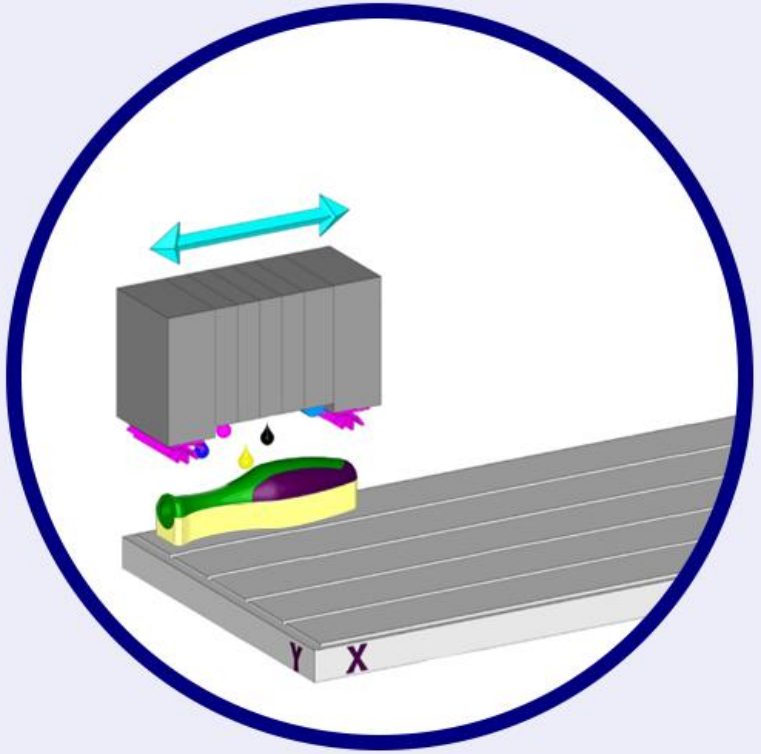
- **Best prices**
- **Printable dimensions:** 310 x 310 x 400mm
- **Number of extruders:** 1 piece
- **Achievable layer thickness:** 0.1 – 0.3mm
- **Precision:** +/- 0.2mm
- **Available materials**
    - **PLA** (Polytic acid)
    - **PETG** (Polyethylene terephthalate glycol)
    - **ABS** (Acrylonitrile-butadiene-styrenel)
    - **TPU** (Thermoplastic polyurethane)

PLASTIC-FORM

Our printing technologies

Short introduction of Polyjet technology and its benefits

Polyjet is a 3-dimensional printing process using UV-light for curing acrylic-based epoxy resin (photopolymer). It is similar to the SLA procedure, but here, instead of laser, the raw material solidification takes place by means of a light source radiating in UV range.



PLASTIC-FORM

Our printing technologies

Short introduction of Polyjet technology and its benefits

- **High accuracy**
- **Rich in details**
- **High construction speed**
- **Smooth surfaces**
- **High resolution**
- **Minimal post-production**

PLASTIC-FORM

Our printing technologies

Polyjet technológia rövid ismertetése, előnyei

- **Thinnest layer thickness on the market (0.015-0.03mm)**
- **Thinnest vertical wall thickness (0.6mm)**
- **Hard, flexible, digital materials**
- **More than a hundred type of material combinations**
- **Multi-component products**
- **Guaranteed dimensional precision for the entire workspace**
  +/- 0.2mm

PLASTIC-FORM

Polyjet printers of ours

Stratasys Objet30 Prime V

- **Printable dimensions:** 294 x 192 x 148.6mm
- **Layer thickness:** 0.015-0.036mm
- **Available model raw materials**

Prototyping materials

- Rigid effect : *VeroWhitePlus™, VeroBlackPlus™, VeroBlue™, VeroGrey™, DraftGrey™, FullCure720 ™*
- Transparent: *VeroClear™*

Functional materials

- Polypropylene simulation: *Rigur™, Durus™*
- High temperature resistant: *RGD525™*
- Rubber-like: *Agilus30Black™*, *Agilus30Clear™ TangoGray™, TangoBlack™*

Biocompatible material

- rigid, transparent: MED610 ™

PLASTIC-FORM

Polyjet printers of ours

Stratasys Objet500 Connex3

- **Industrial, even for small series printing**
- **Printable dimensions:** 490 x 390 x 200mm
- **Layer thickness:** 0.017-0.03mm
- **8 printing head:** 6 model + 2 support
- **Combination and simultaneous printing of even 3 material types (3-component product)**
- **More favorable specific product prices and production time can be achieved when printing more products**
- **Huge workspace**

PLASTIC-FORM

Polyjet printers of ours

Stratasys Objet500 Connex3

Available model raw materials

Prototyping materials

- Rigid effect : *VeroWhitePlus™, VeroBlackPlus™, VeroBlue™, VeroGrey™, DraftGrey™, FullCure720 ™, VeroMagenta ™, VeroYellow ™, VeroCyan ™*
- Átlátszó: *VeroClear™*

Functional

- ABS simulation: *digital ABS*
- Polypropylene simulation: *Rigur™, Durus™, digital PP*
- High temperature resistant material: *RGD525™*
- Rubber-like (Shore A 30-95): *Agilus30Black™, Agilus30Clear™ TangoGray™, TangoBlack™*

Biocompatible

- rigid, transparent: MED610 ™

PLASTIC-FORM

Short overview of FDM raw materials

- **PLA**: one of the lowest melting temperature of plastics, low shrinkage. It is very easy to print and also nature friendly as it is made from natural materials.
- **ABS**: harder to handle, melts at a higher temperature than PLA, requires a heated tray to print. Very light and strong material, also ideal for printing smaller objects. ABS is the cheapest plastic on the market.
- **ASA**: amorphous thermoplastic. Developed as an alternative to ABS, it has better chemical resistance and also wheaterproof. Good mechanical properties, easy to print and UV resistant.
- **PA-Nylon:** Extremely durable, resistant and hard to break, flexible. High resistance to heat, alcohol and chemicals. Can be painted easily after sanding. Sensible for ambient humidity, requires high nozzle and bed temperature. The most resistant filament in extreme conditions. It also tolerates constant loads well. Requires suitable printer to print.
- **PET/PET-G**: It's similar to PLA in terms of printing capabilities, but has similar wear resistance features like ABS. Pure PET is rarely used in printing, G stands for the glycol modification. Due to this modification the filament gets more cleaner, less fragile and easier to use. A good alternative between PLA and ABS.
- **TPU/TPE**: Flexible, elastic filament. It has excellent chemical resistancy. Compared to general TPE, TPU is slightly more rigid - making printing easier. Little bit more durable than the other, keeps its flexibility better in the cold.
- **PC-ABS:** it has better mechanical strength than PLA or ABS parts. After finishing, a glass-like surface can be achieved, featuring a high degree of transparency. Non-toxic, environmentally friendly. High distortion temperature and high thermal stability (up to 110 ° C). It is characterized by low flammability, good formability and easy printing.

PLASTIC-FORM

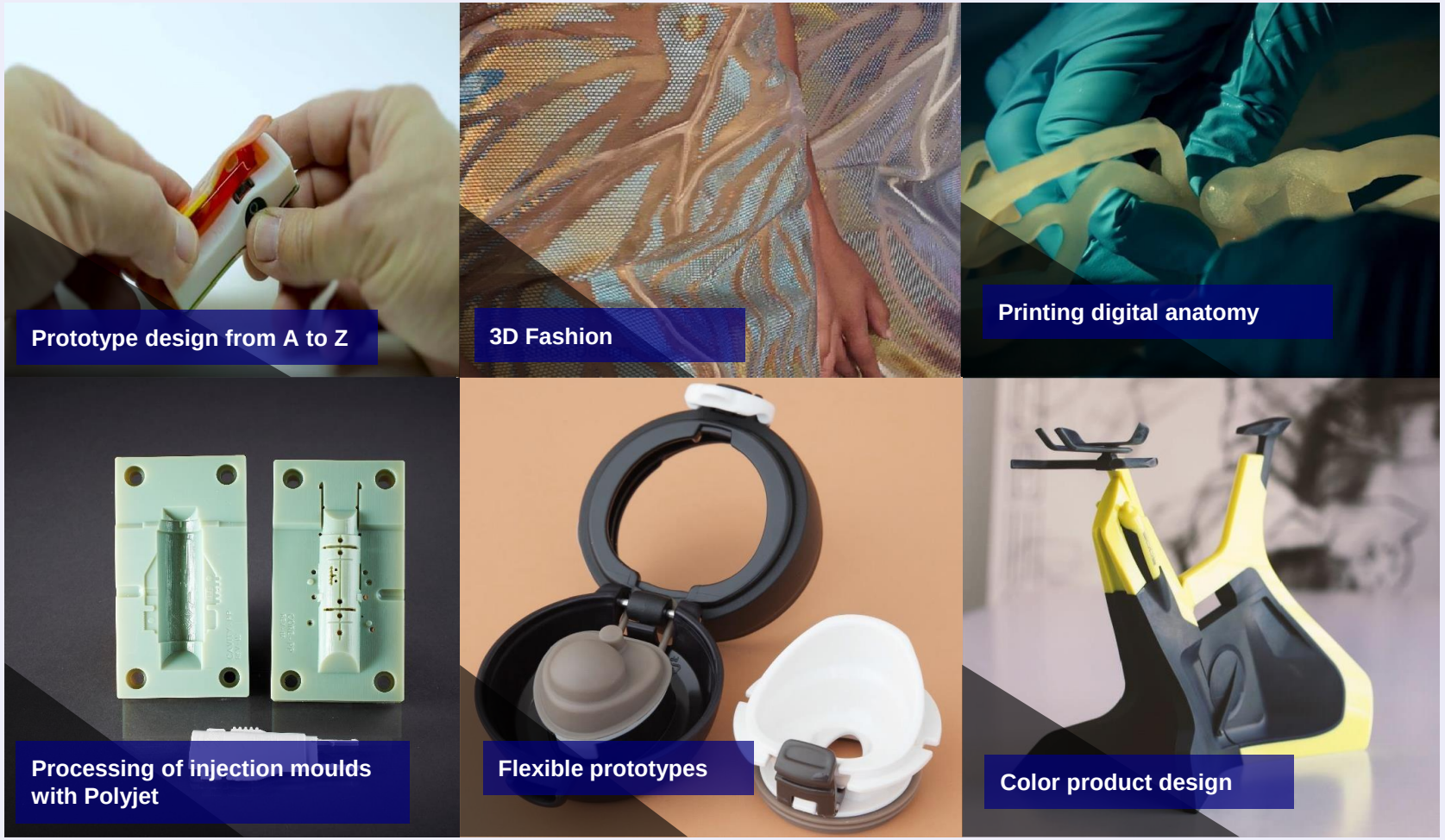
Short overview of Polyjet raw materials

Raw materials by application areas:

- **Prototype, design**: Highly accurate presentation models, fine details can be displayed. Good dimensional stability, good transparency. Complex, small parts. Prototypes and parts of electronic housings, medical devices. Suitable for a wide range of different industries and applications. It is described by durability and rigidity. Single and multicolor prototype design. Glass and clear acrylic effect simulation. Affordable pricing.
- **Functional purpose**: High heat resistance, up to 82-90 °C after heat treatment. Good elongation at break. Rubberish feel and look. It is characterized by excellent impact resistance and vibration absorption. Excellent, smooth, glossy surfaces. High-strength materials for heavy-duty applications. For snap-in parts, moving hinges. For contact surfaces such as knives, scissors. For moving parts and complete assemblies. For assembling electronic components. Simulation of polypropylene. For packaging products. For sports products and accessories.
- **Biocompatible material:** Rigid, medical prototyping material with various biocompatibility approvals. It is characterized by high dimensional stability as well as colorlessness and transparency. Ideal for applications that require prolonged skin or mucosal contact. For medical and dental applications. The materials are suitable for continuous skin contact for more than 30 days and for up to 24 hours mucosal contact.

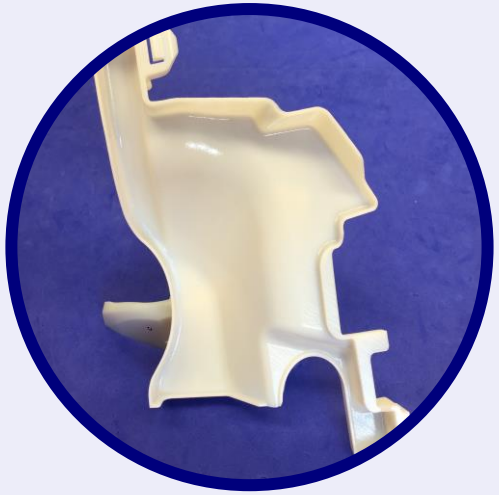
PLASTIC-FORM

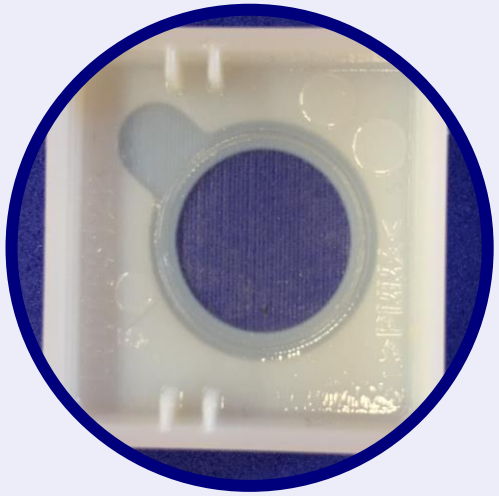
Application areas



PLASTIC-FORM

Our sample products

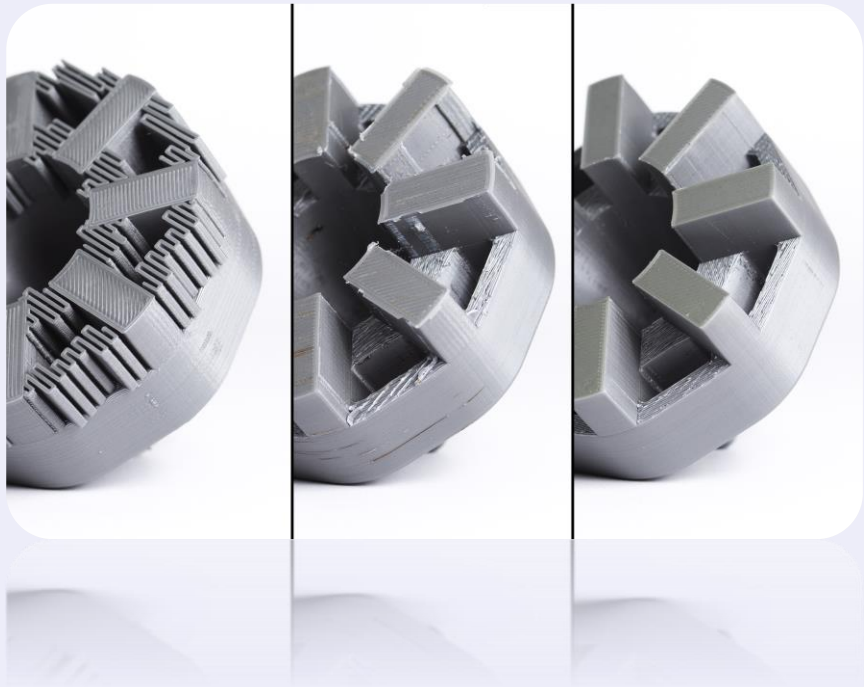




PLASTIC-FORM

Post-processing

- Additive manufacturing gradually shifting from prototype manufacturing towards final product manufacturing.
- The touch, look and feel of the printed parts are becoming more and more important.
- Usually, printed parts require a certain degree of post-processing.
- Post-processing is an important step the of 3D printing process.
- We call post-production any process, tasks or tecniques that further emphasizes our object.
- The finishing, refining step of 3D printing.



PLASTIC-FORM

Post-production

- Remove of support (water jet, solvent)
- Surface finishing with sandpaper
- Welding
- Adhere
- Priming and painting
- Smoothing
- Polishing
- Fluid dipping
- Resin coating

- Heat-treating
- Photo whitening
- Filling in the gaps
- Plating
- Inserting

PLASTIC-FORM

Professional support

When and how can we help, why is it worth to choose us

1. **Design:** if we can negotiate during the design process, we can draw your attention to important aspects that can affect both the price and the quality of the final product. *For instance:* in reducing material requirements. Entrust us with the design of the part and you don't have to worry about the quality of the end result.

2. **Choosing raw material:** Both fiber drawing and liquid technology offer wide variety of raw materials that can highly affect the appearance, feel and function of the product. It is difficult to navigate among various polymers, s and in the absence of experience it seems an impossible task. Tell us your requirements and expectations, and we will suggest raw material.

3. **When choosing technology**: It is not just our best interest to reduce printing time. We can recommend machine and technology to meet your expectations, thus reducing both printing time and price. It is everyone's interest to choose the optimal procedure.

PLASTIC-FORM

Our prices

Request a custom quote at the email address below: nagyadam@plasticform.hu,

or call the following number: **+3670 604 1309**

	Sunlu S8	**F370**	**Objet 30**	**Objet 500****
Machine hourly fee	1 €	4 €	6 €	11 €
Raw material cost*	15-45€ / kg	190-480€ / kg	290-500€ / kg	266 - 450 € / kg
Designer's fee 25€/hour				
Post-processing 18€/hour				
*Weight of the support must also be calculated over the weight of printed part				
**In case of small-and medium series production, specific decrease in the unit price can be calculated.				

PLASTIC-FORM