# Materials for FDM-printers

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# Filament

- Filament diameter was originally 2.85 mm
- Nowadays mostly 1.75 mm
- Flexible
- Durable
- Conductive
- Anti-bacterial
- Sculptable
- Metal
- Glow-in-the-dark
- Industrial




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# PLA

- PLA - Polylactide
- Made out of cornstarch or sugarcane
- Used in biodegradable plastic products
- Most common 3D-printing material

- Printing temperature 190ºC - 210ºC
- Heatbed temperature 0ºC – 60ºC



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# PLA

Pros
- Easy printability
- Doesn’t require heat bed
- Accuracy
- Post-processing
- Non-toxic when printing
- Colors
- High tensile strength

Cons
- Temperature resistance
- Impact strength
- Doesn’t stretch
- Chemical resistance
- UV-light resistance



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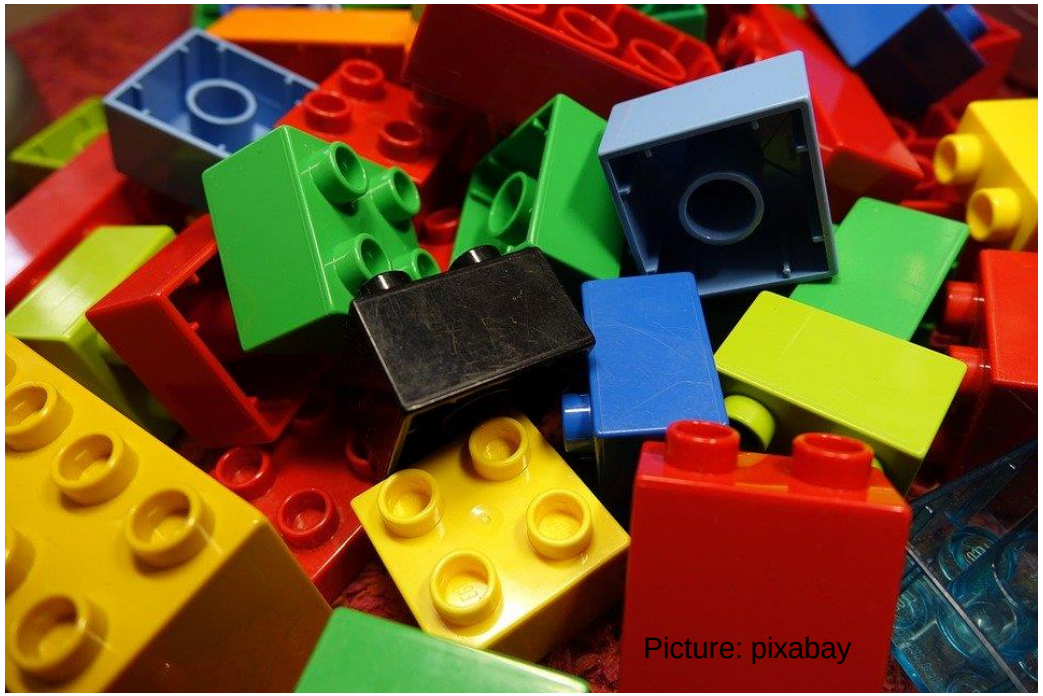
# ABS

- ABS - Acrylonitrile butadiene styrene
- Plastic which is completely made out of chemicals
- Used widely in everyday items in a common household
- One of the most common 3D Printing materials

- Printing temperature 230ºC - 245ºC
- Heat bed temperature 70ºC – 95ºC


Picture: pixabay



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# ABS

Pros
- Impact Strength
- Temperature resistance
- Chemical resistance
- Post processing ‘easy’

Cons
- Not an easy material to print
- Toxic when printing
- Easily warps
- UV-light

Picture: 3dhubs.com



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# PET and PETG

- PET - Polyethylene terephthalate
- PETG is the same, but glycol is added
- Widely used in everyday plastic items
- Also one of the most common 3D printing materials
- Excellent replacement for ABS – because of fumes

- Printing temperature 225ºC - 240ºC
- Heat bed temperature 70ºC – 90ºC

Picture: mymyinifactory.com



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# PET and PETG

Pros
- Temperature resistance
- FDA approved
- Chemical resistance
- Impact resistance
- Easy to post process
- Stiff
- Odorless

Cons
- “Hard” to print
- Bad bridging abilities unless optimal cooling
- Can string easily
- Can destroy bed




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# ASA

- ASA - Acrylonitrile styrene acrylate
- Similar to ABS
- UV-resistance
- Used in automotive industry

- Printing temperature 225ºC - 245ºC
- Heat bed temperature 85ºC – 105ºC



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# ASA

Pros
- Impact strength
- Temperature resistance
- Chemical resistance
- Post processing ‘easy’
- UV-resistance

Cons
- “Hard” to print
- Toxic fumes when printing
- Can easily warp



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# Support materials

- HIPS, PVA and Breakaway
- Used when good bottom surface quality is needed on surfaces which float in air
- HIPS dissolves into limonene - ABS
- PVA dissolves into water – PLA
- Breakaway easily comes off – PLA, ABS, Nylon, CPE

- Printing temperature 210ºC - 240ºC
- Heat bed temperature 60ºC – 110ºC



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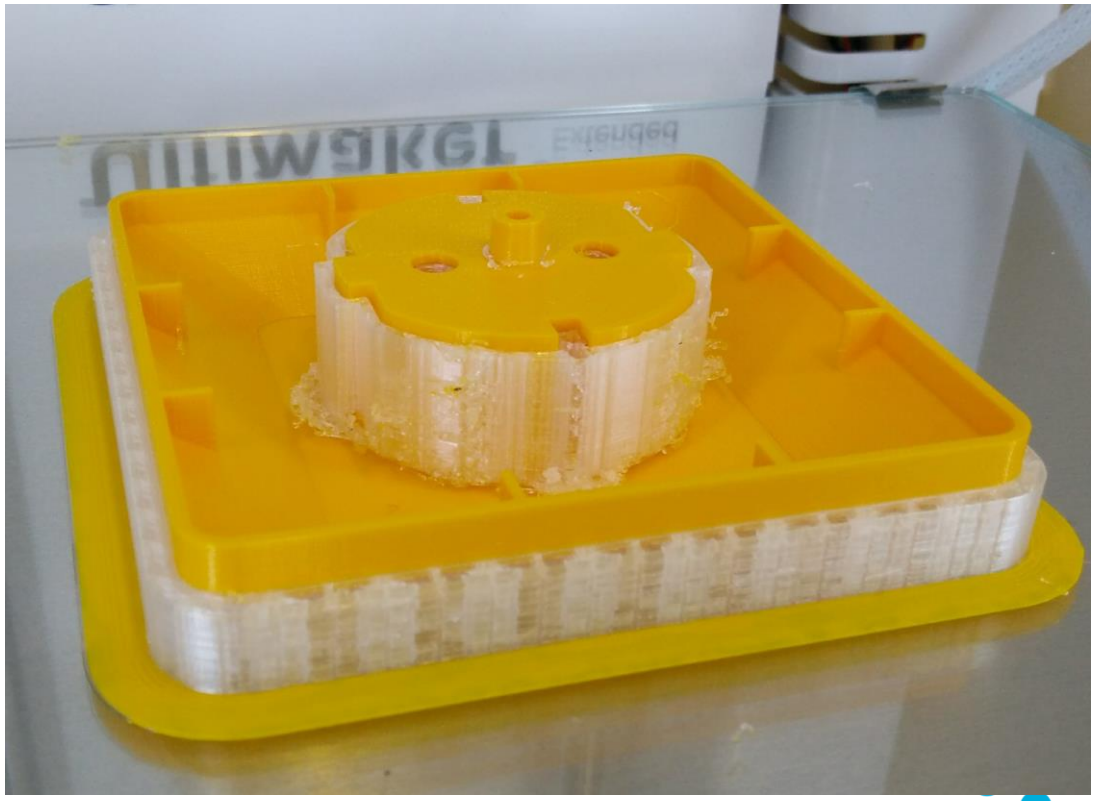
# Support materials

Pros
- Bottom surfaces are pretty
- HIPS could be used as main material also

Cons
- Heated bed required
- High temperature printing
- Chemicals are required
- Hygroscopy materials





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# Nylon

- Nylon - polyamide
- Widely used material in different sectors
- Durable and flexible
- Several different variations of this material

- Printing temperature 220ºC - 255ºC
- Heat bed temperature 70ºC – 90ºC



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# Nylon

Pros
- Impact strength
- Temperature resistance
- Chemical resistance
- Stiff
- Odorless when printing
- Wear resistance

Cons
- Tricky to print
- Starts to warp easily
- Hygroscopic
- Not for moist environments



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# Polycarbonate

- Polycarbonate - PC
- Widely used plastic in the industry
- Impact resistance
- Heat resistance
- Bends a bit

- Printing temperature 250ºC - 310ºC
- Heat bed temperature 80ºC – 120ºC



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# Polycarbonate

Pros
- Thermal resistance (150ºC)
- Excellent impact strength
- Bends without breaking

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- “Hard” printability
- Easily warps
- Requires a lot of heat for prints to succeed
- Highly hygroscopic
- Doesn’t fit to environments which are moist



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# Other types of filaments

- Glow in the dark – Abrasive
- Wood – Abrasive
- Metal powder infused – Abrasive
- Carbon infused – Abrasive
- Flexible – Semiflex – Ninjaflex
- Inductive

# Manufacturers?