ASTON University

3D Printer Capability

Zortrax m200

make, name & model:

200 x 200 x 180mm
BUILD VOLUME

“Basically reliable 3D printer”

https://zortrax.com/3d-printers/m200-/

FFF 3D Printing

process type = FFF (Fused Filament Fabrication)

Technical details:

- Single nozzle extrusion
- 0.4mm nozzle typical
- 90-390 micron resolution
- Tolerance +/- 0.2%
- Support material is same as model and must be mechanically removed
- Minimal wall thickness: 400 microns (for 0.4 mm nozzle)
- Typical layer thickness 0.19mm, but 0.09, 0.14, 0.29 and 0.39 available.
- 0.3mm and 0.6mm nozzles available
- Max. print temp 290° C
- Max. platform temp 105° C
- Generic filament possible, though previous success advised.
- Tough & practical, where robustness is more important than finish.

Filament Reel

This printer takes 1.75mm filament from 800g spools

Materials often used & suitability:

- Z-ULTRAT, Unique ABS plastic blend for durability and excellent surface quality
- Z-PETG, Improved durability and tensile strength is resistant to oils and greases.
- Z-PLA Pro, Biodegradable, chalk gives unique mat finish and gypsum-like texture to details
- Z-Glass, Semi-transparent, light-transmitting resilient thermoplastic
- Z-ABS, Low-cost but versatile, cheap but tough enough for basic functional testing
- Z-HIPS, For printing large models for functional testing no post-processing needed
- Z-PCABS, Highly durable blend of polycarbonate & ABS impact, UV and temp resistant
- Z-Flex: thermoplastic polyester elastomer that is elastic, & can bend without breaking

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V 2.0 27-05-2022

Zortrax m300 / Plus

make, name & model:

300 x 300 x 300mm
BUILD VOLUME

“Print big models in one go”

https://www.3djake.uk/zortrax/hepa-cover

FFF 3D Printing

process type = FFF (Fused Filament Fabrication)

Technical details:

- Single nozzle extrusion
- 0.4mm nozzle typical
- 90-290 micron resolution
- Tolerance +/- 0.2%
- Support material is same as model and must be mechanically removed
- Minimal wall thickness: 450 microns (for 0.4 mm nozzle)
- Typical layer thickness 0.19mm, but 0.09, 0.14, 0.29 and 0.39 available.
- 0.3mm and 0.6mm nozzles available
- Max. print temp 290° C
- Max. platform temp 105° C
- Generic filament possible, recommended settings given during slice.
- Tough & practical, where robustness or speed is more important than finish.

Filament Reel

This printer takes 1.75mm filament on 2Kg spools

Materials often used & suitability:

- See m200 list on previous sheet, in addition the following materials can be used:
- Z-ESD, Gives models electrostatic discharge protection. Surface resistivity ranges from 10^6 to 10^9 Ω/sq, eliminating risk of damage to sensitive devices
- Z-ASA Pro, Stable thermoplastic designed to withstand adverse environments extending the life span. Highly resistant to changing weather conditions and UV light, therefore ideal for external uses.
- Z-Nylon. Strong filament resistant to high temperatures & chemicals. Can be post-processed with metal machining tools. Hard to break, can be coloured with commonly used, acid-based clothing dyes.
- Z-Semiflex. Flexible material meant for industrial applications. Resistant to greases, light acids, and alkalis and temps up to 130˚ C

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3DGence P255 Double

make, name & model:

190mm x 255mm x 195mm
BUILD VOLUME

"Designed to create accurate parts in great detail"

https://www.3djake.uk/zortrax/hepa-cover

FFF 3D Printing

Process Type = Fused Filament Fabrication

Technical details:

- Min. layer height: 20 µm
- Dual Print Heads
- Print Head temp 270°C
- Nozzle Diameter 0.4/0.4mm
- Filament Diameter 1.75mm
- Build Surface: heated ceramic plate
- Build Plate Temperature:160°C
- Working temperature: 15-32°C

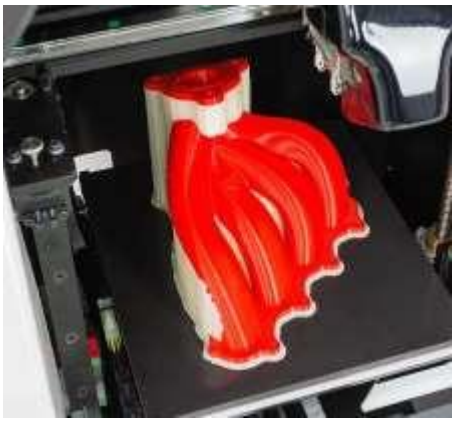
Available Materials

This printer uses two, side-loading filament reels

Filament Reels Available Include:

- ABS
- PP
- PLA
- This machine is able to Work with all the primary materials used in FDM
- It will 3D print with all filaments available on the market, the user is not restricted to a specific brand of filament.
- 3DGence also enables 3D printing from water-soluble material BVOH, which allows supports to be removed without problems.

Power Requirements: 230v AC;	Slicing Software:- '3DGence SLICER 4.0	Files type preferred: .STL,
Output needs: Largely non-recyclable (micro) plastic waste without specialist reclamation. Otherwise landfill.	Space needed:- 550mm x 460cmm x 640cm Connectivity:- USB Drive, SD Card	



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Ultimaker S5

make, name & model:

330 x 240 x 300mm
BUILD VOLUME

"Reliable 3D printing – at scale"

https://www.3dprima.com/3d-printers/ultimaker-s5-air-manager/a-24319

FFF 3D Printing

process type = FFF (Fused Filament Fabrication)

Technical details:

- Dual nozzle extrusion
- 0.4mm nozzle typical
- 20-200 micron resolution @ 0.4
- Tolerance XYZ: 6.9, 6.9, 2.5 microns
- Dual extruders allow for support material to be printed separately. Use soluble PVA for complex shapes
- Typical layer thickness 0.15mm, but 0.06, 0.1, 0.2, 0.3 and 0.4 available.
- 0.25 mm, 0.6 mm, 0.8 mm nozzles also available
- Max. print temp 290° C
- Max. platform temp 105° C
- Generic filament possible, recommended settings given during slice.
- Smooth, accurate finish - longer print time.

Filament Reel

This printer takes 2.85mm filament on 750g spools

Materials often used & suitability:

- PLA: highly versatile, easy to print, and available in 11 colours. Reliable with high dimensional accuracy and a surface finish
- PVA: water-soluble support offers freedom to complex model geometries where removal of breakaway would be otherwise impossible.
- Breakaway: support is easy & quick to re-move, leaving a smoother finish than others, with no further post-processing needed.
- PC: tough, strong, and retain dimensional stability when subjected to temperatures as high as 110 ºC.
- PETG: properties include good printability, toughness, chemical resistance, wear re-sistance, and temperature resistance
- Nylon: polyamide grade based on PA6/66. Reduced humidity absorption, withstands significant mechanical stress so use for tools, functional prototypes, and end-use parts.

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V 2.0 27-05-2022

Ultimaker 3

make, name & model:

223 x 223 x 205 mm
BUILD VOLUME

"Reliable 3D printing – at scale"

https://www.3dprima.com/3d-printers/ultimaker-s5-air-manager/a-24319

FFF 3D Printing

process type = FFF (Fused Filament Fabrication)

Technical details:

- Sinle nozzle extrusion
- 0.4mm nozzle typical
- 20-200 micron resolution @ 0.4
- Tolerance XYZ: 6.9, 6.9, 2.5 microns
- Typical layer thickness 0.15mm, but 0.06, 0.1, 0.2, and 0.4 available.
- 0.25 mm, 0.6 mm, 0.8 mm nozzles also available
- Max. print temp 260° C
- Max. platform temp 100° C
- Generic filament possible, recommended settings given during slice.

Filament Reel

This printer takes 2.85mm filament on 750g spools

Materials available include:

- PLA
- ABS
- CPE
- CPE+
- PC
- PETG
- Nylon
- PP
- TPU 95A

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V 2.0 27-05-2022

Ultimaker 2+

make, name & model:

223 x 223 x 205 mm
BUILD VOLUME

"Reliable 3D printing – at scale"

https://www.conrad.com/p/ultimaker-2-3d-printer-1417150

FFF 3D Printing

process type = FFF (Fused Filament Fabrication)

Technical details:

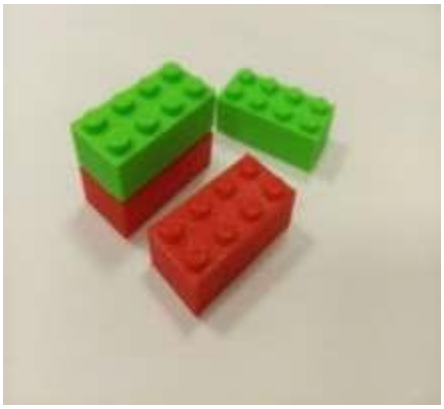
- Sinle nozzle extrusion
- 0.4mm nozzle typical
- 20-200 micron resolution @ 0.4
- Tolerance XYZ: 6.9, 6.9, 2.5 microns
- Typical layer thickness 0.15mm, but 0.06, 0.1, 0.2, and 0.4 available.
- 0.25 mm, 0.6 mm, 0.8 mm nozzles also available
- Max. print temp 260° C
- Max. platform temp 100° C
- Generic filament possible, recommended settings given during slice.

Filament Reel

This printer takes 2.85mm filament on 750g spools

Materials available include:

- PLA
- ABS
- CPE
- CPE+
- PC
- PETG
- Nylon
- PP
- TPU 95A



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3DP 200 Workbench

make, name & model:

1000 x 1000 x 500mm
BUILD VOLUME

"The Complete Industrial-Strength Large-Format 3D Printer "

https://www.3dplatform.com/3D-Printers

FFF 3D Printing

process type = FFF (Fused Filament Fabrication)

Technical details:

- Dual nozzle extrusion
- 0.6mm nozzle typical
- 50 micron resolution
- 0.4, 0.8, 1.0 & 1.2mm nozzle options
- Tolerance +/- 0.01mm
- Layer height 50 microns (0.05mm +)
- Support material is different to model but must still be mechanically removed.
- Generic filaments generally, recommended settings given by product & slicer.
- Use for very large projects. Expect to have to fill and sand in post-processing if smooth finish required.
- Max bed temp 145°C, max nozzle temp 295°C

Filament Reel

This printer takes 2.85mm filament on 2.3Kg spools

Materials often used & suitability:

Similar to Ultimaker, most polymers including, but not limited to the following;

- 3DP ABSX
- 3DP HIPS
- 3DP M-ABS
- 3DP PETG
- 3DP TCP-FLEX 65
- 3DP Wood Filled
- 3DP PA12 Nylon
- 3DP Carbon-P
- 3DP PC-ABS

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Kodak Portrait

make, name & model:

200 x 200 x 235 mm
BUILD VOLUME

"Reliable, Accurate, Easy to use, Safe"

https://3dprintingindustry.com/news/review-the-kodak-portrait-3d-printer-a-reliable-dual-extrusion-machine-169090/

FFF 3D Printing

process type = FFF (Fused Filament Fabrication)

Technical details:

- Dual nozzle extrusion
- 0.4mm nozzle typical
- 20-250 micron resolution @ 0.4
- Tolerance XYZ: 12.5, 12.5, 2.5 microns
- Dual extruders allow for support material to be printed separately. Use soluble PVA for complex shapes
- Typical layer thickness 0.15mm, but 0.06, 0.1, 0.2, 0.3 and 0.4 available.
- 0.25 mm, 0.30mm, 0.35mm, 0.50mm, 0.6 mm, 0.8 mm nozzles also available
- Max. print temp 295° C
- Max. platform temp 105° C
- Generic filament possible, recommended settings given during slice.

Filament Reel

This printer takes 1.75mm filament on 750g spools

Materials available include:

- KODAK PLA+
- PLA Tough
- ABS
- Nylon 6
- Nylon 12
- Nylon 6/6.6/12
- PETG
- PVA
- Flex98
- HIPS
- Acrylic
- And third-party materials

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Raise 3D Pro 2

make, name & model:

300mm x 220mm x 180mm
BUILD VOLUME

"Fast Fused Filament Fabrication With Desk Top Printing"

https://www.3djake.uk/zortrax/hepa-cover

FFF 3D Printing

process type = FFF (Fused Filament Fabrication)

Technical details:

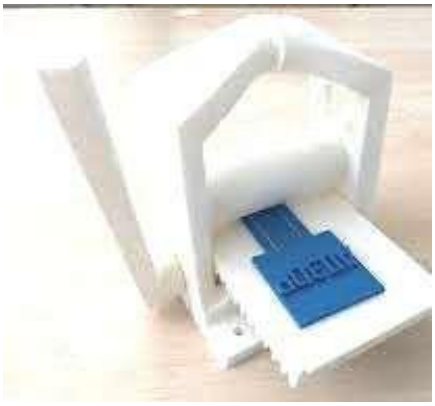
- Dual nozzle extrusion
- Nozzle Diameters:- 0.2/0.4/0.6/0.8/1.0mm
- 0.01 mm layer thickness
- Max Nozzle Temp:- 300°c
- Build Plate:- Aluminium with adhered magnetic hold-down
- Max Build Plate Temperature 110°c
- Heated Bed Material:-Silicone
- Build Plate Levelling available
- Support material:
- Memory 1GB
- Ports USB 2, Ethernet*1

Available Materials

This printer takes 1.75mm filament on 750g spools

Materials available include:

- Carbon fibre reinforced
- Glass fibre reinforced.
- PA (Polyamide, Nylon)
- PC (Polycarbonate)
- PP (Polypropylene)
- TPU (Thermoplastic polyurethane
- ABS (Acrylonitrile butadiene styrene)
- ASA (Acrylic styrene-acrylonitrile)
- PETG
- PLA
- PVA (Polyvinyl alcohol)
- Flame Retardant (FR) Filament
- A FULL LIST OF AVAILABLE MATERIALS CAN BE FOUND AT raised3d.com
- Ceramic filaments: White Zirconia, Black Zirconia and Alumina.
- Stainless steel filament (316L) and H13 Tool Steel.



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Hyrel 3D System 30M

FDM 3D Printer

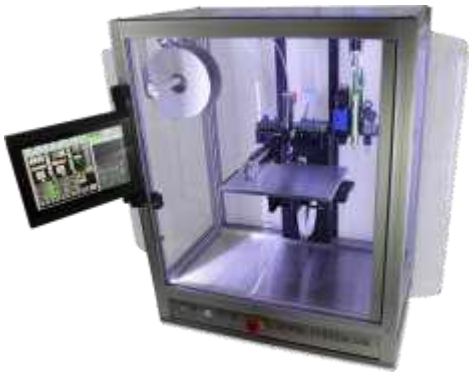
Process Type = FDM 'Fused Deposition Modelling'

Available Materials

This printer uses filament reels

225mm x 200mm x 200mm
BUILD VOLUME

"works with numerous materials, including store-bought orhome-made filaments, clays, pastes, hydrogels, photo-initiators, and cementitious materials"



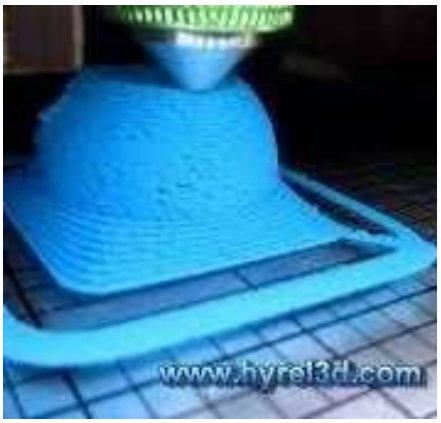
https://www.hyrel3d.com/portfolio/system-30m/

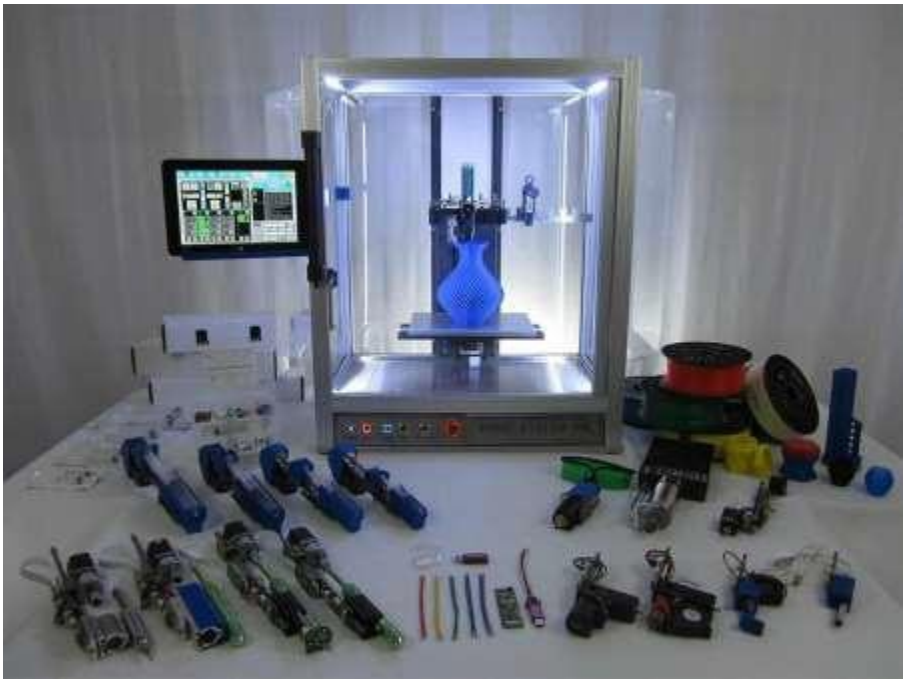
Technical details:

- Bed temperature 80°C
- x/y Printing Speed Up to 30 mm/sec
- Enclosure temperature 55°
- Includes interchangeable mounting system
- Plug-and-play modular heads
- Ready for upgrade/expansion options
- Compatible with large volume extruders
- State-of-the-art 150+ MHz 32-bit ARM processor
- Modular, micro-stepping motor-drivers
- Integrated, Dual CAN-bus architecture
- "Smooth Move" motion control technology firmware
- Integrated web camera for build area monitoring

Materials available include:

- ABS (Acrylonitrile Butadiene Styrene)
- BendLay
- Clay
- LayBrick
- LayWood
- Metal Clay
- Ninjaflex
- PET (PolyEthylene Terephthalate)
- PETG (PolyEthylene Terephthalate Glycol-modified)
- PLA (Poly(Lactic Acid))
- Plasticine
- PlastInk Rubber
- Play-Doh
- PC (PolyCarbonate)
- More materials www.hyrel3d.com/portfolio/system-30m





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V 2.0 27-05-2022

FormLabs Form 2

make, name & model:

145mm x 145mm x 175mm
BUILD VOLUME

"Affordable Desk-Top SLA"

https://formlabs.com/3d-printers/form-2/

SLA 3D Printer

Process Type = Stereolithography (SLA)

Technical details:

- Violet laser cures resin onto platen suspended in tank of liquid resin
- Tank is automatically re-filled and heated as required
- Resin tank has limited life
- Built model must have excess liquid resin washed off using isopropanol.
- Layer thickness: 50 & 100 microns
- Laser spot size 140 microns
- Supports are auto generated but can be added manually if required
- Support material is same as model and must be mechanically removed

Proprietary Resins

This printer uses a 1Ltr plug-in cartridge

Materials often used & suitability:

There are at least 30 products generally available for our Form 2's, some of the most common follow:

- White resin is best for display models where a smooth consistent finish is required.
- Clear Resin is preferable for it's light transmittance, post-process polishing required for finish.
- Black Resin as white, multiple primer coats
- Rigid 10K 75 MPa, twice that of base resins. Has very smooth, matte, chalky surface finish
- High Temp Resin 120°C / 238 °C post-cure performance/ with additional thermal cure.
- Flexible 80A 3.4 MPa only, but 60% elongation
- Grey Pro designed for high precision, moderate elongation, low creep and repeated use.
- Tough 2000 Resin Impact properties: 33 J/m
- Elastic 50A 1.6 MPa only, but can achieved 100% elongation before breaking.

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FormLabs Form 3BL

make, name & model:

335mm x 200mm x 300mm
BUILD VOLUME

"large format dental 3D printer that raises the bar for dependable high-production dental 3D printing"

https://formlabs.com/3d-printers/form-3l/

SLA 3D Printer

Process Type = Stereolithography (SLA)

Technical details:

- Violet laser cures resin onto platen suspended in tank of liquid resin
- Tank is automatically re-filled and heated as required
- Resin tank has limited life
- Built model must have excess liquid resin washed off using isopropanol.
- Layer thickness: 50 & 100 microns
- Laser spot size 140 microns
- Two 250 mW lasers
- Supports are auto generated but can be added manually if required
- Support material is same as model and must be mechanically removed

Proprietary Resins

This printer uses two 1 Ltr plug-in cartridge

Materials often used & suitability:

The Form 3BL is compatible with all the Form 2 resins (listed before) and many more including biocompatible. some Form 3BL resins listed below

- Castable Wax Resin, A highly accurate material for casting and pressing crowns, bridges, and RPDs
- Castable Wax 40 Resin, An easy-to-cast jewelry resin capable of printing smooth, highly detailed designs.
- Permanent Crown Resin, A tooth-colored, ceramic-filled resin for 3D printing permanent single crowns, inlays, onlays, and veneers.
- Surgical Guide Resin, A next generation 3D printing material for premium-quality surgical implant guides
- BioMed Clear, BioMed Clear Resin is a hard, strong material for biocompatible applications requiring long-term skin or mucosal membrane contact. This USP Class VI certified material is suitable for applications that require wear resistance and low water absorption over time.

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FormLabs Fuse 1	SLS 3D Printing	Available Materials
make, name & model:	Process Type = Selective Laser Sintering	This printer uses powder-based materials
165mm x 165mm x 300mm BUILD VOLUME	Technical details:	Powders Available Include:
"High Performance Selective Laser Sintering, Finally Within Reach"	• Layer Thickness 110 µm • Material Refresh Rate 30% – 50% • Laser Spot Size (FWHM) 200 µm • Hopper Capacity 8.5 kg Nylon 12 • Startup Time 60 minutes • Air Handling Pressure-controlled two-stage filtration (Replaceable HEPA and carbon mediums) • No supports needed	• Nylon 12a Powder • Nylon 11a Powder
 https://3dprinting.co.uk/sls-3d-printers/formlabs-fuse-1/		

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V 2.0 27-05-2022

Markforged Mark 2

make, name & model:

300mm x 220mm x 180mm
BUILD VOLUME

"The only way to make aluminium-strength parts on your desktop"

https://www.lboro.ac.uk/research/amrg/amrg-group/facilities/equipment/markforgedmarktwo

CFR 3D Printer

process type = CFR (Continuous Fibre Reinforcement)

Technical details:

- Dual nozzle extrusion
- 0.4mm nozzle typical
- 100-200 micron resolution
- Tolerance: +/-0.05 mm
- Layer height: 100 µm default, 200 µm maximum
- Support material is same as model and must be mechanically removed
- Simple, accurate printer, complexity is in design and infill parameters.
- See Eiger slicing software for more information on inserting composite layers, patterns and density.

2x Filament Reels

1mm and 2.85mm filament on 50 and 750g spools

Materials & suitability:

- Printer inserts layers of fibre reinforcement into your plastic model to your design.
- Choice of two plastics:
  Onyx: a micro carbon fibre filled nylon. High strength, toughness & chemical resistance, can be reinforced with continuous fibres to yield aluminium-strength.
  Nylon: Unfilled thermoplastic, non-abrasive for ergonomic surfaces and pieces that are easily marred. It can be painted or dyed
- Choice of four fibres:
  Carbon Fibre: For ultra-high strength parts, costly at scale or volume
  Fibreglass: provides strength 10x of ABS when used with Onyx. Relatively cheap.
  Kevlar: High-impact resistance, extremely impact-resistant, nearly immune to fracture,
  HSHT Fibreglass: High Strength High Temperature: high strength (nearly equal to 6061-T6 Aluminium) at high temperatures.

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V 2.0 27-05-2022

Markforged X7

make, name & model:

330mm x 250mm x 200mm
BUILD VOLUME

"The turnkey industrial carbon fibre 3D printer for every type of functional part "

www.mark3d.com/en/product/markforged-3d-printers/x-series-markforged-3d-printer/markforged-x7-onyx-3d-printer/

CFR 3D Printer

process type = CFR (Continuous Fibre Reinforcement)

Technical details:

- Dual nozzle extrusion
- 0.4mm nozzle typical
- 100-200 micron resolution
- Tolerance: +/-0.05 mm
- Layer height: 50 µm default, 250 µm maximum
- Support material is same as model and must be mechanically removed
- Simple, accurate printer, complexity is in design and infill parameters.
- See Eiger slicing software for more information on inserting composite layers, patterns and density.

2x Filament Reels

1mm and 2.85mm filament on 50 and 750g spools

Materials & suitability:

- Printer inserts layers of fibre reinforcement into your plastic model to your design.
- Choice of five plastics:
  Onyx & Nylon as listed for the Mark 2 on a previous sheet plus:
- Onyx ESD stronger, stiffer and more resistant to electro-static discharge than regular Onyx
- Onyx FR is flame resistant and considered self extinguishing at thicknesses above 3mm
- Precise PLA highly versatile, easy to print, and available in 8 colours. Reliable with high dimensional accuracy and a surface finish
- Choice of four fibres:
  Carbon Fibre: For ultra-high strength parts, costly at scale or volume
  Fibreglass: provides strength 10x of ABS when used with Onyx. Relatively cheap.
  Kevlar: High-impact resistance, extremely impact-resistant, nearly immune to fracture,
  HSHT Fibreglass: High Strength High Temperature: high strength (nearly equal to 6061-T6 Aluminium) at high temperatures.

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V 2.0 27-05-2022

Markforged Metal -X

make, name & model:

300mm x 220mm x 180mm
BUILD VOLUME

"Affordable Desk-Top Metal Printing"

https://www.aniwaa.com/product/3d-printers/markforged-metal-x

Metal 3D Printer

Process Type = Atomic Diffusion

Technical details:

- Dual nozzle extrusion
- 0.4mm nozzle typical
- Additive Manufacturing (ADAM)
- Print Chamber: Heated
- Dual Nozzle
- Metal Material and Support Release
- Max Part Size: 250 x 183 x 150 mm
- Max Part Weight: 10kg
- Resolution: 50 micron – 200 micron

Filament Reel

This printer uses 200cc filament reels

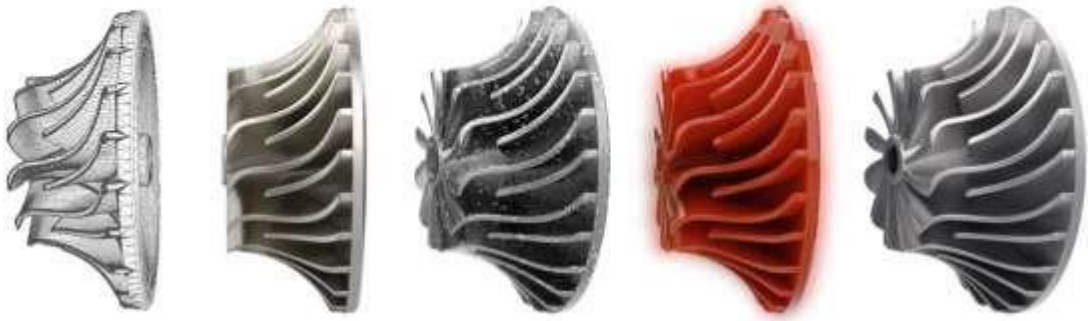
Materials List:

- 17-4 PH Stainless Steel
- A2 & D2 Tool Steel
- Inconel (IN) 625
- Copper
- H13 Tool Steel

Image courtesy Markforged.

Image courtesy Markforged.

Image courtesy Markforged.



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V 2.0 27-05-2022

Stratasys PolyJet J835

PolyJet 3D Printer

Proprietary Resins

make, name & model:

Process Type = Jetted resin layers, cured in situ

This printer uses 4Kg plug in cartridges

350mm x 350mm x 200mm
BUILD VOLUME

"Realistic, final-product standard models in one go."

https://3dprinting.co.uk/polyjet-3d-printers/stratasys-j850

Technical details:

- Full colour resin printer
- Support material is soft and can be removed with a jet washer
- Layer Thickness 14-16 microns

Build modes:

- High quality, 14-micron resolution
- High Mix , 27-micron resolution
- Highspeed 27-micron resolution
- Super high speed

Resins used include:

- Explanation of unique materials is available here.
- Pantone, CYMK
- Flexible, rubber over-moulds available using the Agilus series of materials
- Digital ABS Series
- High saturation colours and Vero ultra clear
- SUP706B, soluble in sodium hydroxide solution

APF
ADVANCED PROTOTYPING FACILITY

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For printing and other enquiries please e-mail apf@aston.ac.uk

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HP Jet Fusion 580

Jet fusion 3D Printer

Available Materials

make, name & model:

Process Type = HP Jet Fusion

This printer uses a 1Ltr plug in cartridge

332mm x 190mm x 248mm
BUILD VOLUME

"Design, Create, Test & Iterate"

www.mark3d.com/en/product/markforged-3d-printers/x-series-markforged-3d-printer/markforged-x7-onyx-3d-printer/

Technical details:

- Machine uses HP Multi Jet Fusion Technology
- Build Speed 1,817cm^3/hr(111 in^3)
- Layer Thickness 0.008mm,(0.003i
- Printhead resolution 1200dpi
- Operating temp 20 - 30° C (68 - 86°F)
- Models are Tough & practical
- Power consumption 7200w
- NA (US & Canada): IEC 61010-1 compliant,
- NRTL certified
- EU: Machinery Directive, EN 61010-1,
- EN 60204-1, EN ISO 12100 and ENISO 13849-1 compliant

Required Consumables

- Original HP 3D High Reusable 3D Printing Materials
- V1R30A
- HP 3D HR CB PA 12 10L (4 kg)
- HP Original Agents
- V1Q80A HP 3D400 500-ml Detailing Agent
- V1Q70A HP 3D450 250-ml Black Agent
  V1Q71A HP 3D400 500-ml Fusing Agent
  V1Q81A HP 3D400 250-ml Bright Fusing Agent
- V1Q73A HP 3D450 250-ml Yellow Agent
- V1Q74A HP 3D450 250-ml Magenta Agent
- V1Q75A HP 3D450 250-ml Cyan Agent
- Original HP printheads
- V1Q67A HP 3D400 Printhead Kit
  V1Q76A HP 3D450 Colour Printhead Kit

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