

Mechanical Engineering Student Access Machine Shop

Fused Deposition Modeling

(Commonly known as FDM, 3D printers or rapid prototyping)

OVERVIEW:

FDM or 3D printing is a form of additive manufacturing technology where a three dimensional object is created by laying down successive layers of material. Additive manufacturing (AM) is defined by ASTM as the "process of joining materials to make objects from 3D model data, usually layer upon layer.

FDM begins with a software process, which processes an STL file (stereo lithography file format) mathematically slicing and orienting the model for the build process. If required, support structures are automatically generated. The machine dispenses two materials – one for the model and one for a disposable support structure.

QUICK CHECK LIST:

EMAIL job requests instructions for the Dimensions PRINTERS ONLY!

Please include in your request the following items:

- **FILE FORMAT: *.STL**
- ***.PDF FILE WITH PART DIMENSIONS**
- **HOW MANY PARTS NEEDED**
- **TYPE of BUILD: Dimension SST1200es-Low, High or Solid Density**
- **Please email your files to MESHOPS-ME@BERKELEY.EDU.**
- **We will send an email back with a quote on cost of materials; you will need arrange payment via credit/debit card or check made out to "UC REGENTS" or IOC (inter department charge) prior to us starting your work.**

DIMENSION SST 1200es

Materials Used:

Model: The acrylonitrile butadiene styrene (ABS) polymer is liquefied and deposited by an extrusion head, which follows a tool-path defined by the CAD file. The materials are deposited in layers as fine as 0.25 mm (0.010") thick and the part is built from the bottom up – one layer at a time.

Support: Support material is used for making temporary supports while manufacturing is in progress. The soluble support material is dissolved with specialized mechanical agitation equipment utilizing a precisely heated sodium hydroxide solution.

DIMENSION SST 1200es

Dimension Printers #4,#5,#6 and #7 SST 1200ES soluble support material, ABS+ model material, build size 10" x 10" x 12" (254mm x 254mm x 305mm) with print density selections of low, high or solid.

(Unless specified, we will assume solid selection)

NOTES on Dimension printers:

- Resolution of the Dimension FDMs is @ 0.25mm (0.010").
- While designing your parts, we have found that a **minimum part thickness** of 1 to 1.5mm or 0.040 to 0.060", any thinner will not be successful.
- Consider using fillets in the corners to add strength.
 - Due to limited resolution, circular parts will not be perfectly round. If you plan on having mating pieces, there needs to be @ 0.18mm (0.007") clearance between the two parts.
- Outer diameters will be larger,
- Inner diameters will be smaller.

MARKFORGED X 7

Currently we are not accepting EMAIL requests for the MARKFORGED print work due to the complexity and opinions available in the design and build process. You will need to schedule an in person one on one consultation with one of our 3D print technicians.

MARKFORGED X7

Materials Used:

Model: The ONYX is a proprietary combination of nylon and chopped carbon fiber that is liquefied and deposited by an extrusion head, which follows a tool-path defined by the CAD file. The material is deposited in layers as fine as 50um (0.002") thick and the part is built from the bottom up – one layer at a time.

Support: Support material (also oynx) is used for making temporary supports while manufacturing is in progress. The support material is manually removed by hand at the completion of the build.

MarkForged X7

MarkForged X7 printer #1, OYNX model and support material,
Build size 12.992" x 10.630" x 7.874" (330mm x 270mm x 200mm)

NOTES on MarkForged printers:

NO SECONDARY MACHINING ALLOWED!

Due to the presence of carbon fiber in the OYNX material, we do not allow or recommend any type secondary machining.

Resolution of the MarkForged FDMs is @ 50um or 0.002"

Current charges:

- **\$5.00 per cubic inch for the Dimension SST 1200ES**
- **\$0.50 per cubic centimeter for MarkForged X7 ONYX build material**
- **\$3.00 per cubic centimeter for MarkForged X7 Fiberglass additive**
- **\$4.00 per cubic centimeter for MarkForged X7 Kevlar additive**
- **\$4.00 per cubic centimeter for MarkForged X7 HSHT Fiberglass
(high strength, high temperature)**
- **\$6.00 per cubic centimeter for MarkForged X7 Carbon Fiber additive**

