

# 3D Printing Basics

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In 1986, Charles "Chuck" Hull was granted a patent for this system, and his company, 3D Systems Corporation was formed and it released the first commercial 3D printer, the SLA-1, later in **1987 or 1988**.

**Inventor:** Chuck Hull

Stereolithography 3D printer



SLA-1

# History of 3D Printing

The concept of 3D printing has been imagined back in the 1970's, but the first experiments are dated from 1981.

The first 3D printing attempts are granted to Dr Kodama for his development of a rapid prototyping technique. He was the first to describe a layer by layer approach for manufacturing, creating an ancestor for SLA (or Stereolithography): a photosensitive resin was polymerized by an UV light. Unfortunately, he did not file the patent requirement before the deadline.

A few years later, a French team of engineers, Alain Le Méhauté, Olivier de Witte and Jean-Claude André, was interested by the stereolithography but abandoned due to a lack of business perspective. This 3D printing attempt was also using a stereolithography process.

Charles Hull was interested in the technology and submitted a first patent for stereolithography (SLA) in 1986. He founded the 3D Systems Corporation and in 1988, released the SLA-1, their first commercial product.

If SLA was the first 3D printing technology developed, what about SLS (Selective Laser Sintering) and FDM (Fused Deposition Modeling) back then?

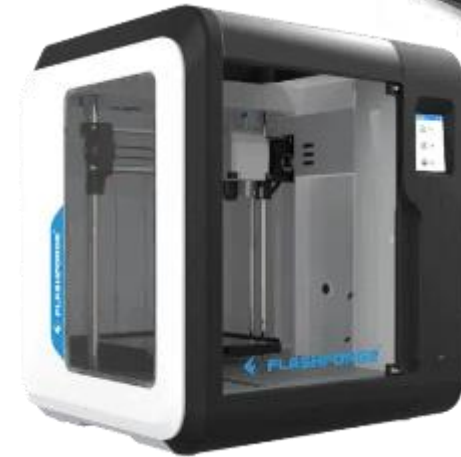
In 1988, at the University of Texas, Carl Deckard brought a patent for the SLS technology, another 3D printing technique in which powder grains are fused together locally by a laser.

In the meantime, Scott Crump, a co-founder of Stratasys Inc. filed a patent for Fused Deposition Modelling (FDM). In less than ten years, the three main technologies of 3D printing were patented and 3D printing was born

# Types of Printers

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- Open
- Closed
- Closed with Filters
- Resin / SLA printers
- Any cubic resin / SLA printer



# Tools required for ABS and PLA printers

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50mm Scraper

Alen keys

Paint brush

Box Knife



# Types of Materials

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ABS - Acrylonitrile Butadiene Styrene – 1.75mm dia

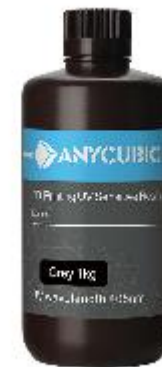
PLA - Polylactic acid – Corn starch – 1.75mm dia

TPU - Thermoplastic Polyurethane – 1.75mm dia

SLA - Resin UAV plastic - photosensitive resin

All come in various colours.

LOOKING AFTER THE FILAMENT



# Brands of Materials / Filament—

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Cheap Filament prints cheap and bad

- UP3d / Teirtime materials – Up fila - PLA and ABS
- E Sun – PLA and ABS
- Flashforge -
  
- All filament either comes in 500gram roll or 1kg roll
- SLA Resin comes in 1kg bottles

# Safety of materials

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[SLA resin materials - https://www.youtube.com/watch?v=7kHcsTG9QsM](https://www.youtube.com/watch?v=7kHcsTG9QsM)

**ABS Plastic** – heats to 270deg

- Heat for heating elements – Extruder and heat bed.
- Micro particles from fumes- best to have filter to filter out fumes

**PLA Plastic**

- PLA is made from natural materials like maize and sugarcane.
- Heat for heating elements – Extruder and heat bed.
- Extruder heats to 210 deg

TPU – 240 to 260 deg

# File types

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## .STL file

What is an STL file?

- STL is a file format commonly used for 3D printing and computer-aided design (CAD).
- The name STL is an acronym that stands for stereolithography

## .DXF File

What is a DXF File?

- DXF is short for Drawing Interchange Format or Drawing Exchange Format.
- Commonly known as AutoCAD DXF format, is a CAD data file format.

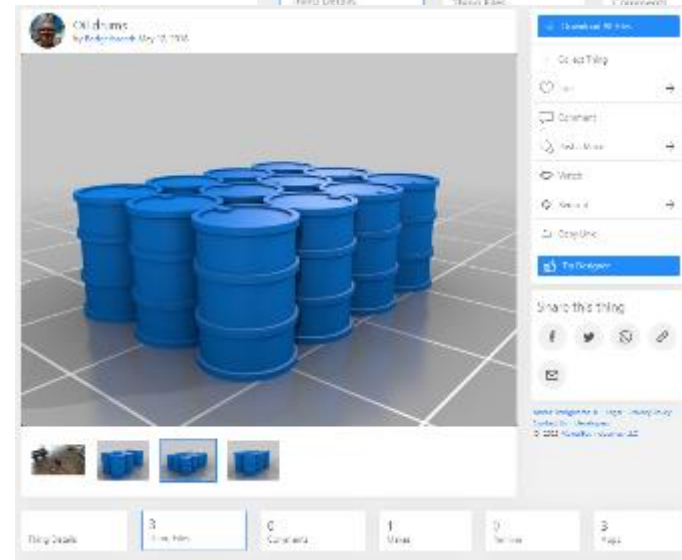
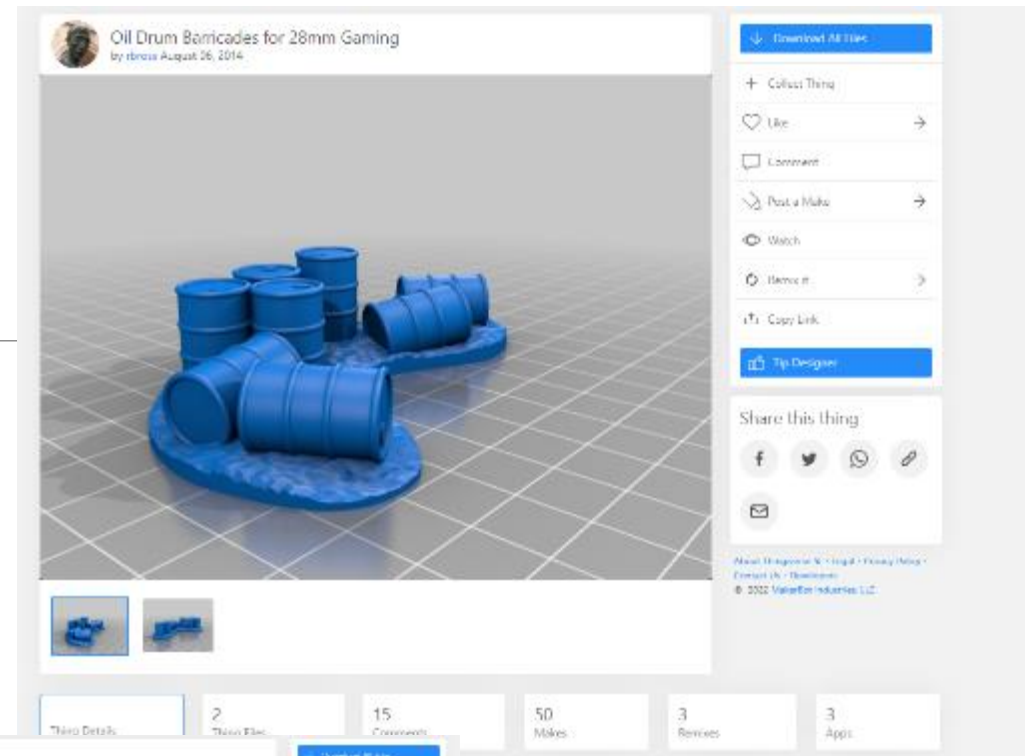


# Web Sites

<https://www.thingiverse.com/>

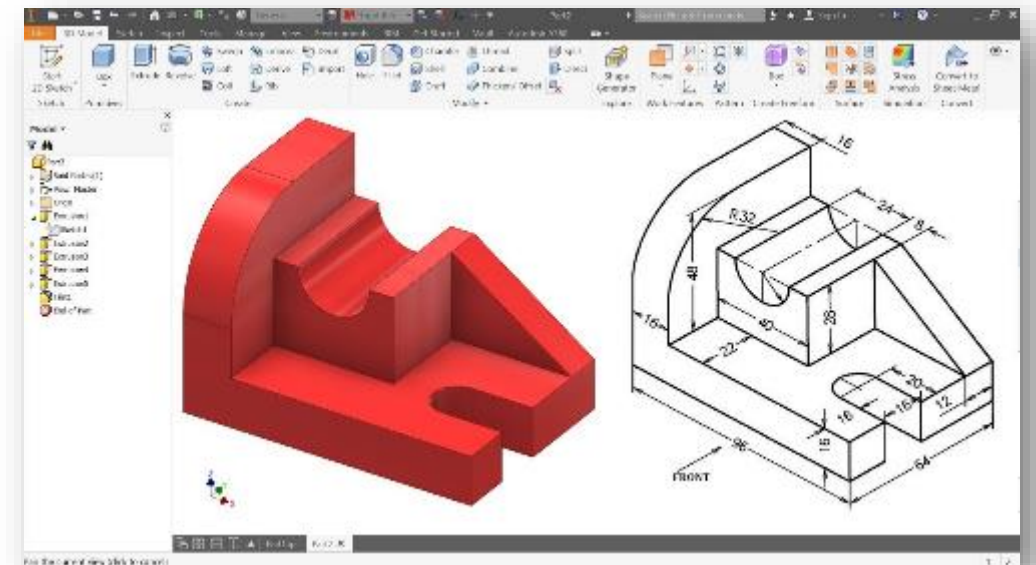
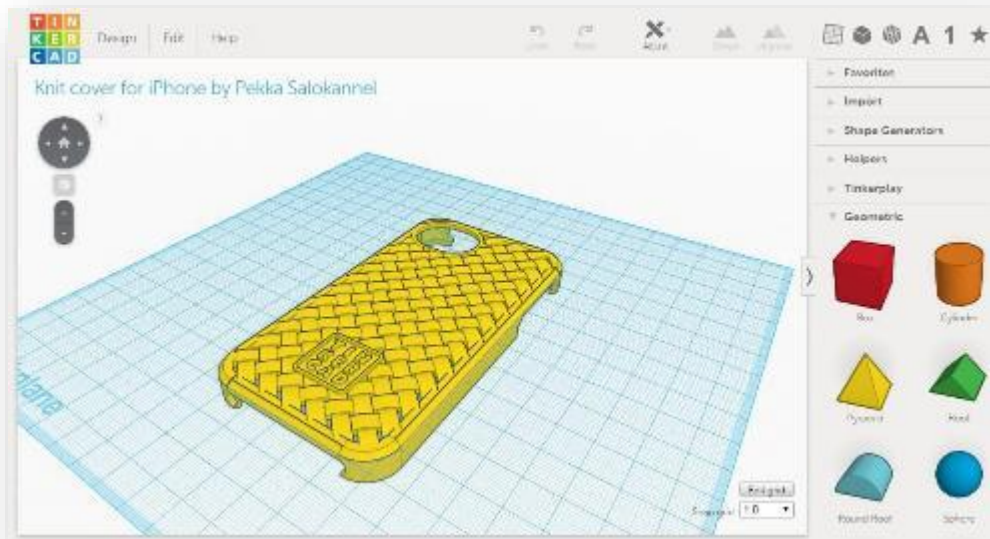
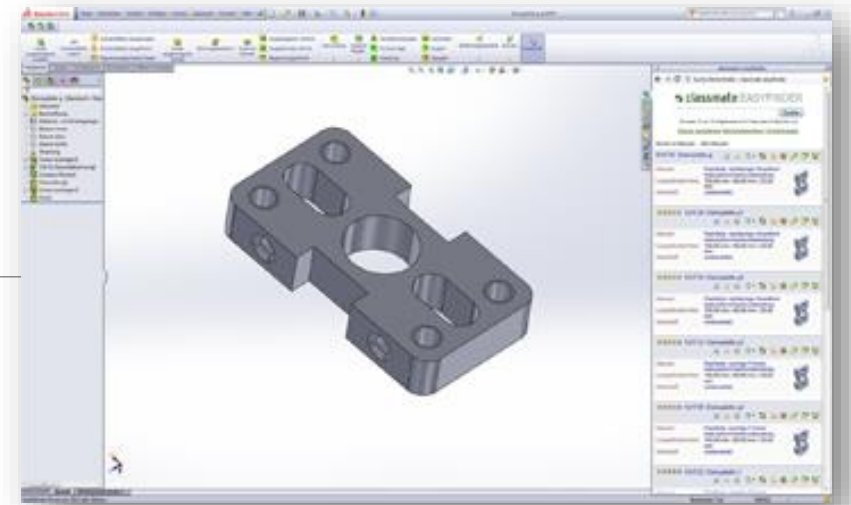
<https://thangs.com/>

<https://www.yeggi.com/>



# CAD Programs

- Solid Works – Student license cost \$150 a year
- AutoCAD inventor – Student license available to everyone
- Fusion 360 – student license available to everyone
- Tinker CAD – Free to download



# Operation of the Machines

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