3D PRINTERS

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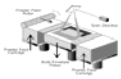
EXTRUSION

TECHNOLOGY	MATERIALS
Fused deposition modeling (FDM) or Fused Filament Fabrication (FFF)	Thermoplastics, eutectic metals, edible materials, Rubbers, Modeling clay, Plasticine, Metal clay (including Precious Metal Clay)
Robocasting or Direct Ink Writing (DIW)	Ceramic materials, Metal alloy, cermet, metal matrix composite, ceramic matrix composite

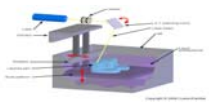
POWER BED



TECHNOLOGY	MATERIALS
Power bed and inkjet head 3-D printing	Metal alloy,powdered polymers,plaster
Electron beam melting	Metal alloys including titanium alloys
Selective laser melting	Titanium alloys , Cobalt Chrome alloys,stainless steel,aluminium.
Selective heat sintering	Thermoplastic powder
Selective laser sintering	Thermoplastics, metal powders, ceramic powders
Direct metal laser sintering (DMLS)	Metal alloy

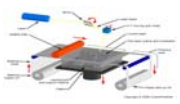
LIGHT POLYMERISED AND WIRE

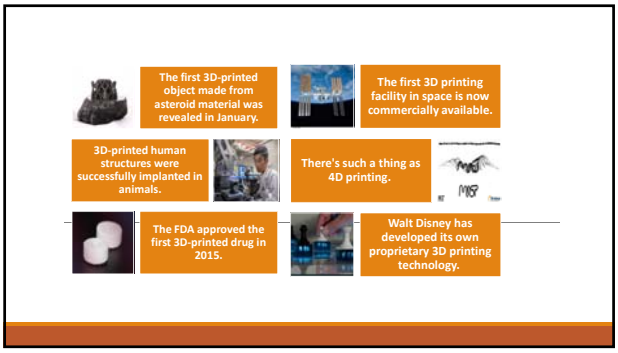
TECHNOLOGY	MATERIALS
Stereolithography	Photopolymer
Digital light processing	Photopolymer
Electron beam freeform fabrication (EBF3)	Metal alloy



LAMINATED AND POWER FED

TECHNOLOGY	MATERIALS
Laminated object manufacturing	Paper, metal foil, plastic film
Direct energy deposition	Metal alloy




The first 3D-printed object made from asteroid material was revealed in January.
The first 3D printing facility in space is now commercially available.
3D-printed human structures were successfully implanted in animals.
There's such a thing as 4D printing.
The FDA approved the first 3D-printed drug in 2015.
Walt Disney has developed its own proprietary 3D printing technology.


HobbKno
Shower Head

THANK YOU

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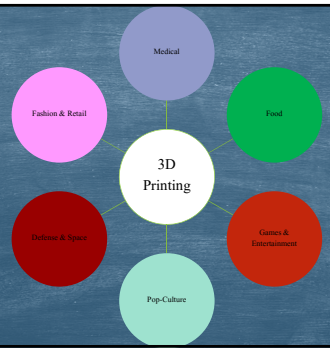
Materials For 3D Printing

Materials used for various 3D printing processes



Defense and Space

Eyes On YOU

Defense and Space

New technologies using Unmanned Aircraft Vehicles (UAV) could create a new, cost-effective and reliable monitoring service. Researchers at University of Southampton, UK have created a new 3D printed drone, called 2Seas, that could soon be used by maritime security organizations.

3D Printing of 2Seas

Defense and Space

The team had to build and test the UAV in less than two years. This pointed at the use of rapid manufacturing techniques and off the shelf components. Carbon fibre tubes have been used for the wing spars, empennage spars and tail booms.

The parts that required a higher level of detail and geometrical complexity (i.e. the central wing box, fuel tank and engine mountings) were instead produced using a selective laser sintered polymer.

Selective Laser Sintering

Defense and Space

The Selective Laser Sintering is an additive manufacturing technique in which a powder of raw material is sintered together by a laser beam.
It is available in a number of variants that use different materials including metals, polymers, and combinations of the two.
In Present work, we are using Nylon.

Nylon's Properties:

- Pleats and creases can be heat-set at higher temperatures.
- More compact molecular structure
- Better weathering properties; better sunlight resistance.
- High melting point (256 °C/492.8 °F)
- Excellent abrasion resistance.

Also it is advantageous because of its versatility in terms of geometry, the maximum size achievable and it's relatively low cost.

Defense and Space

Drone it Yourself

Jasper van Loenen, an independent designer working in the field of interaction design and art, wanted to make the design simpler so anyone could make their own robots. Van Loenen created a custom DIY (Drone It Yourself) v1.0 kit that turns any object into an unmanned aerial vehicle, simply by attaching four motors and a control unit.

The plastic parts have been 3D printed in ABS in Fused Deposition Modelling process.

Defense and Space

Liberator

Defense Distributed successfully test fired the world's first 3D-printed handgun named Liberator.

All 16 parts of the gun are made from a tough, heat-resistant plastic used in products such as musical instruments, kitchen appliances and vehicle bumper bars. Fifteen of those are made with a 3D printer while one is a non-functional metal part which can be picked up by metal detectors, making it legal under U.S. law. The firing pin is also not made of plastic, though it is easily crafted from a metal nail.

Why ABS?

- Light Weight
- Ability to be injection molded and extruded
- Impact resistance and toughness
- High heat resistance
- Resistant to aqueous acids, alkalis, concentrated hydrochloric and phosphoric acids.

These properties make it quite useful for Fused Deposition Modelling.

3D Printed Metal Gun

Fashion and Retail
Food

3D printing in Fashion & Retails

People started with soft PLA, but it's a hard and breakable material because the material is inflexible , which is the key property of a "real" textile.

After then they introduced with "Filaflex"- is the original elastic filament for 3d printers, this new revolutionary material is a TPE (thermoplastic elastomer) with a polyurethane base & some additives

Conti…

Not only clothes in fashion world we can print our footwear watchs accessories and many more things. Material used in these things are ABS , laywood -place , polyamide , Wax.

Design your own cloths

Designed by Joshua Harris, an industrial engineer, for an Electrolux design competition in 2010, the concept printer would not only print out clothing, but would recycle used clothing as well.

Joshua envisions this printer in homes by 2050!!

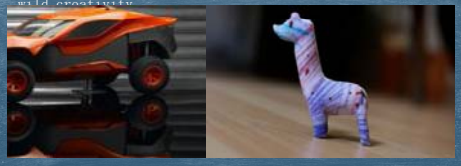
3D printing in Food & Cooking

- There is amazing way that 3-D printed food can change the way we eat :
  - **Food that's easy to swallow, also looks good.**
  - **Customized nutrition**
  - **Sustainable foods**
- NASA seeks inspiration from the concept of the Food Replicator from the movie Star Trek. So the space agency has funded research for a 3D printer that creates entrees or desserts at the touch of a button.

Pop Culture and Games and Entertainment

Just Toying

- Crayon Creatures is a service to turn children's drawings into figurines—nice-looking designer objects to decorate the home and office with a colorful touch of wild creativity.



Animated Characters

- Sony pictures was the first to embrace the concept of 3D printing to create characters for the movie *Pirates – A Band of Misfits*.

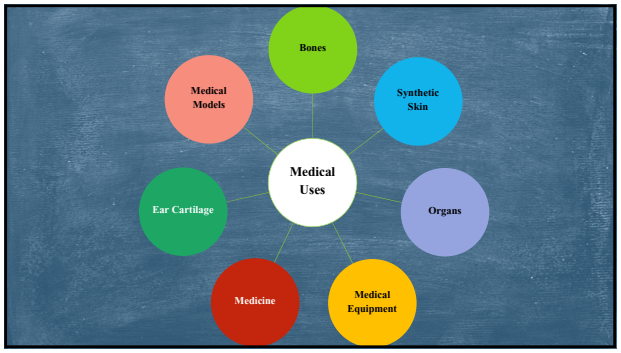
3D Printing on TV

- Popular sitcom *The Big Bang Theory* shows how a 3D printer can be used for a hobby; in this case creating their own miniature figures.

Skyfall's Aston Martin

- Skyfall filmmakers 3D-printed this rare Aston Martin so they wouldn't have to damage the original for the film sequence. The effects crew model makers called on a company called Voxeljet, which used a massive 3D printer with a capacity of 283 cubic feet to reproduce three 1:3

Medical Applications



3-D Printing of Prosthetic parts

- Material used in making
  - **PLA- Poly Lactic acid** → They are biodegradable aliphatic polyster, rich in starch such as corn and wheat
- Benefits
  - Low cost
  - Versatility
  - Less time in manufacturing
  - Comfort

3-D Printing of Bones

- Typical ancient method
  - Metals are used as substitute which are supported by nuts
- In 3-D printing
  - Material Used
    - Calcium Phosphate
    - Titanium Powder
  - More complex and stable design are achieved
  - integrate with surrounding bones and encourage formation of bones

3-D Printing of ear cartilage

- **Live Ink** are used **(PLA)**
  - Ink which can regenerate
  - Living tissues are printed along with dissolvable material
- Biodegradable plastic like polymer material are used to form tissue shape and a water based gel delivers the cell to the structure

THANK YOU