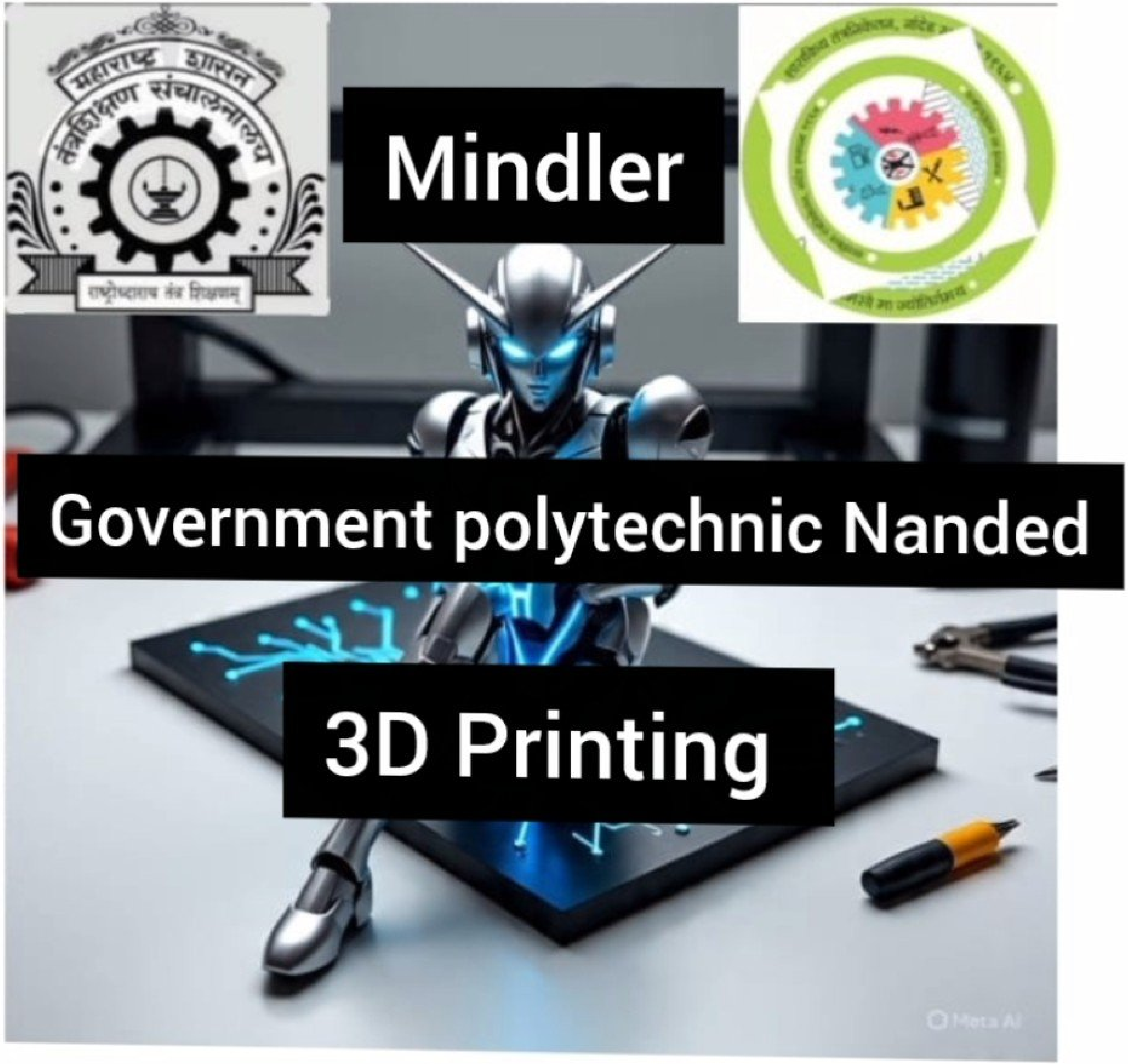
Mindler
Government polytechnic Nanded
3D Printing

GOVERNMENT POLYTECHNIC, NANDED

DEPARTMENT OF INFORMATION TECHNOLOGY

VISION

Become premier centre in the Information Technology with value based education that will prepare students for ever changing technological challenges of 21st century.

MISSION

M1: To train the students in the latest technologies.

M2: Provide an environment that inculcates ethics and effective soft-skills.

M3: Develop the skill sets among students that will benefit employer and society.

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DEPARTMENT OF INFORMATION TECHNOLOGY

Program Educational Objectives (PEOs)

PEO1
Become competent Information technology engineers to work as a programmer or an administrator in a team or as a individual.

PEO2
Pursue higher studies in relevant field of engineering with a desire for lifelong Learning

PEO3
Become a successful professional with ethical and societal responsibilities

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Program Outcomes (pos)

(what s/he will be able to do at the entry point of industry soon after the diploma program)

1.Basic and discipline specific knowledge :
apply knowledge of basic mathematics, science and engineering fundamentals and engineering specialization to solve the engineering problems

2.Problem analysis :
identify and analyse well-defined engineering problems using codified standard methods

3.Design/ development of solutions :
design solutions for well-defined technical problems and assist with the design of systems components or processes to meet specified needs

4.Engineering tools, experimentation and testing :
apply modern engineering tools and appropriate technique to conduct standard tests and measurements

5.Engineering practices for society, sustainability and environment :
apply appropriate technology in context of society, sustainability, environment and ethical practices

6.Project management :
use engineering management principles individually, as a team member or a leader to manage projects and effectively communicate about well-defined engineering activities

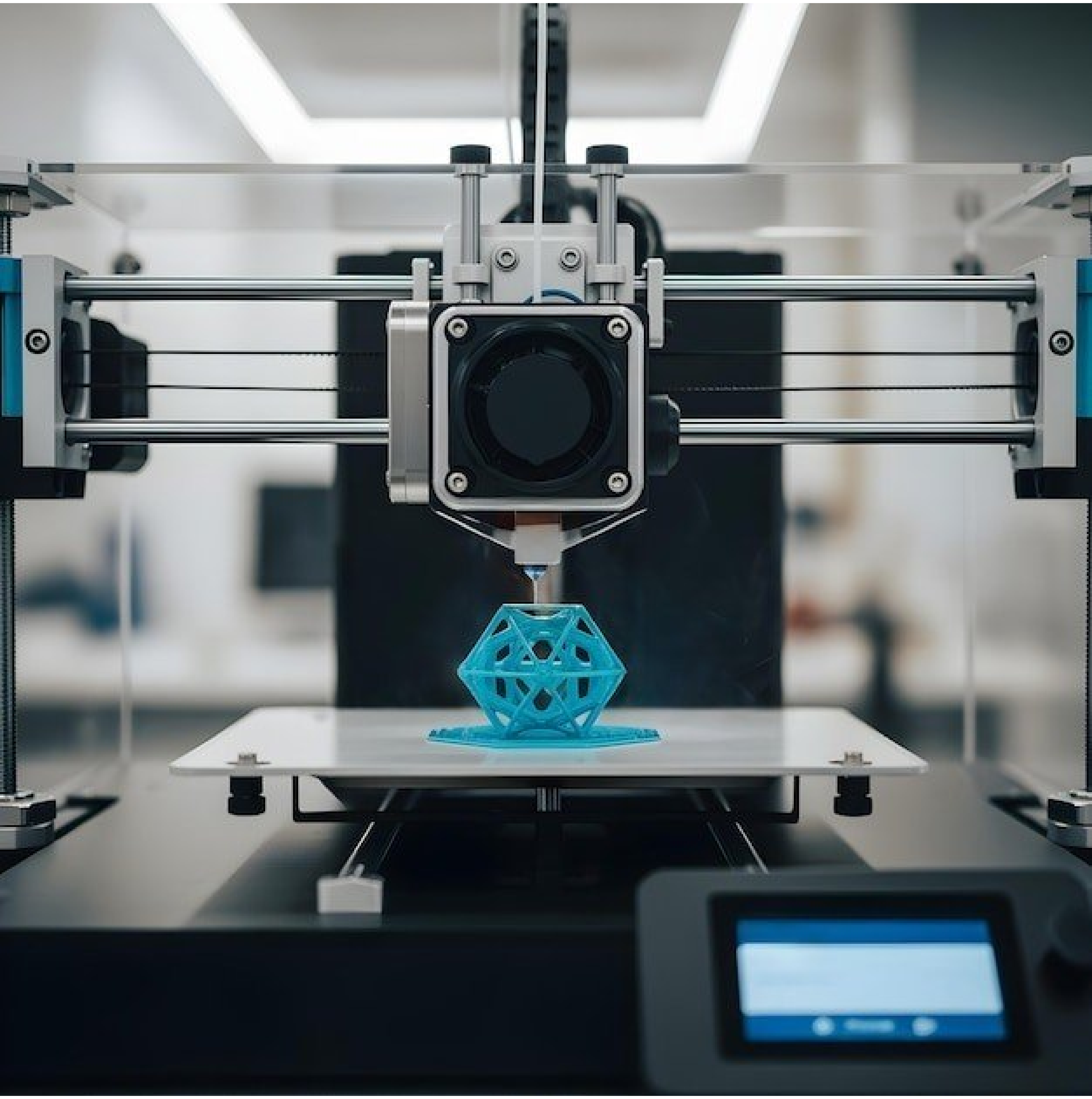
7.Life-long learning :
ability to analyse individual needs and engage in updating in the context of technological changes

Program Specific Outcomes (psos)

(what s/he will be able to do in the information technology specific industry soon after the diploma program)

1.Modern information technology:
use latest technologies for operation and application of information.

2.Information technology process:
maintain the information processes using modern information and communication technologies



CONTENTS

INTRODUCTION

- 3D printing is a form of additive manufacturing technology where a three dimensional object is created by laying down successive layers of material
- It is also known as rapid prototyping, is a mechanized method whereby 3D objects are quickly made on a reasonably sized machine connected to a computer containing blueprints for the object.
- The 3D printing concept of custom manufacturing is exciting to nearly everyone.
- This revolutionary method for creating 3D models with the use of inkjet technology saves time and cost by eliminating the need to design; print and glue together separate model parts.

HISTORY

- ***1984 - 86 -*** Charles Hull invents 3D printing and coins the term "Stereo Lithography"
- ***1992 -*** First 3D printer built by 3D Systems
- ***1999 -*** First application of 3D printing in the medical field - creating the human bladder
- ***2000 -*** Miniature human kidney created through 3D printing
- ***2006*** - The Selective Laser Sintering machine – printing multiple materia & fields
- ***2009*** - First usable prosthetic leg – this opens the door for customized products using 3D printing
- ***2011*** - 3D printers start offering 14k gold as printable material

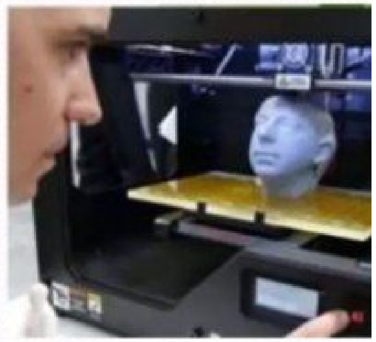
HOW DOES IT WORK?

- A person creates a 3D image of an item using a computer-aided design (CAD) software program. The CAD information is sent to the printer.
- The printer forms the item by depositing the material in layers—starting from the bottom layer—onto a platform.
- In some cases light or lasers are used to harden the material.

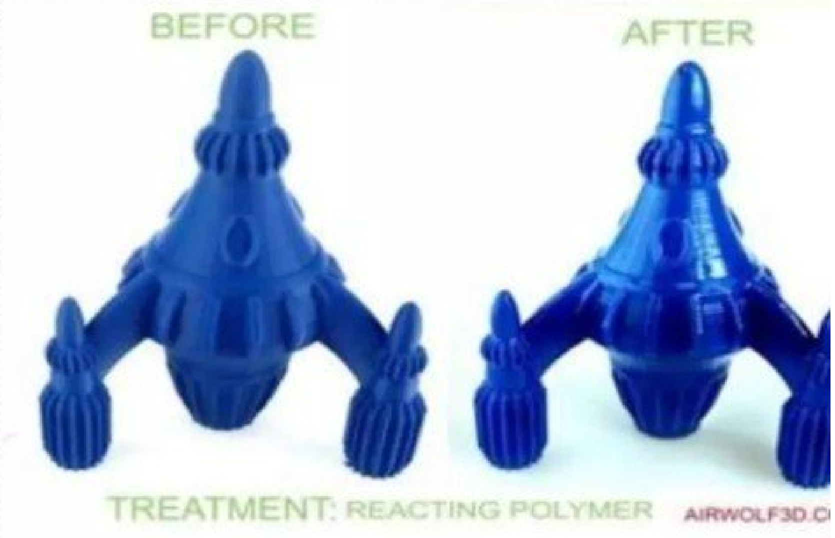
Steps involved:

1. **MODELING:** Modeling Additive manufacturing takes virtual blueprints from *Computer Aided Design* (CAD) or *animation modeling software* and "slices" them into digital cross-sections for the machine to successively use as a guideline for printing computer aided design animation modeling software.

2. **PRINTING:** To perform a print, the machine reads the design and lays down successive layers of liquid, powder, or sheet material to build the model from a series of cross sections. These layers, which correspond to the virtual cross sections from the CAD model, are joined together or automatically fused to create the final shape. Advantage: Ability to create almost any shape or geometric feature.



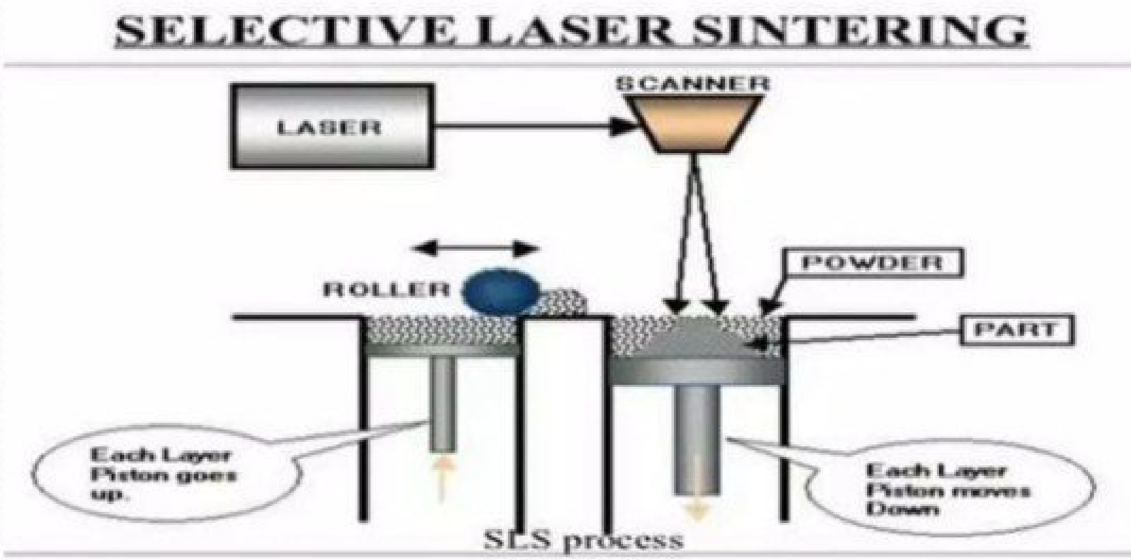
3. FINISHING: Though the printer, the produced resolution is sufficient f many applications, printing a slightly oversized version of the desired object in standard resolution, and then removing material with a higher-resolution subtractive process can achieve a higher-resolution.



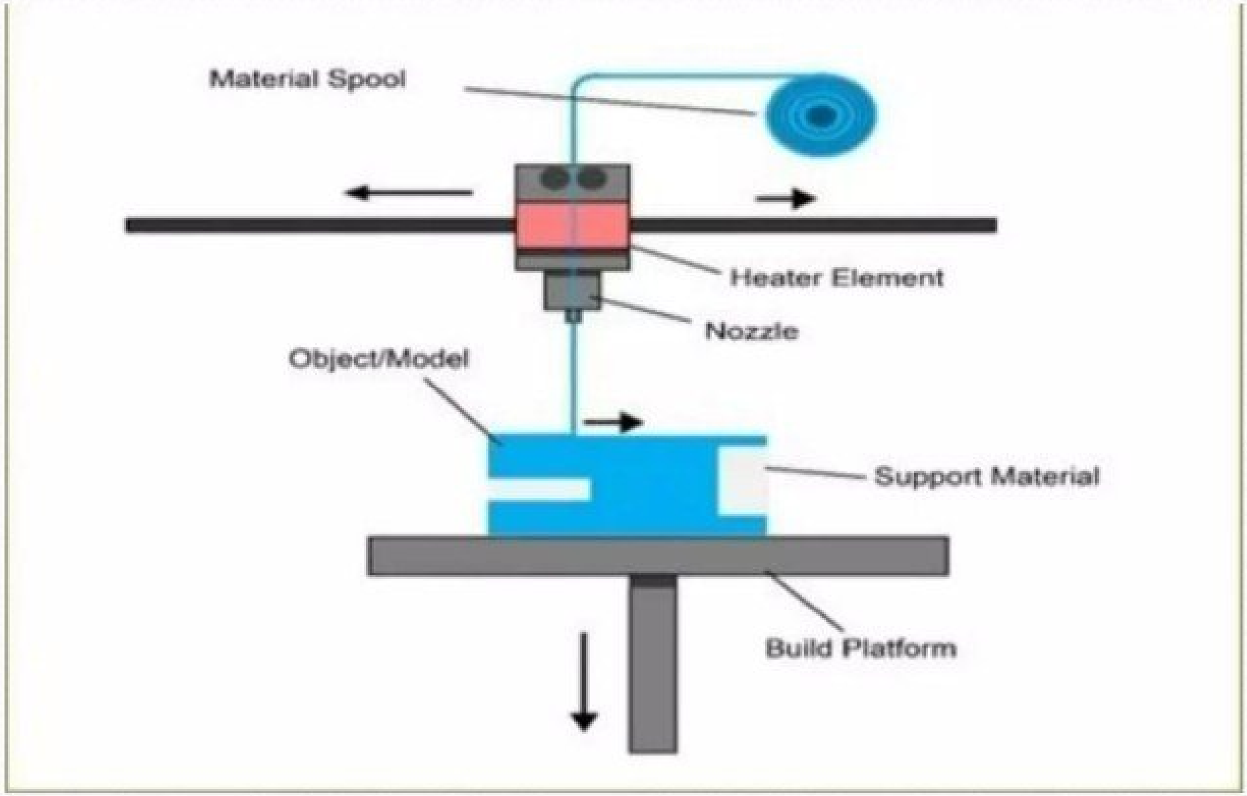
METHODS AND TECHNOLOGIES

- Several ways to realize 3D objects – Selective Laser Sintering (SLS)
  Fused Deposition Modeling (FDS)
  Stereo Lithography (SLA)

➢ **Selective Laser Sintering (SLS) :** This builds objects by using a laser to selectively fuse together successive layers of a cocktail of powdered wax, ceramic, metal, nylon or one of a range of other materials. The laser fuses small particles of plastic, metal, ceramic or glass powders into a 3-dimensional mass.



- **Fused Deposition Modeling (FDS) :** This method uses a plastic filament metal wire as input material to an extrusion nozzle.
- The nozzle is heated to melt the material and can be moved in both horizontal and vertical directions by CAM.
- The material hardens immediately after extrusion from the nozzle.



APPLICATIONS

- **FASHION**- Fashion designer Iris van Herpen and shoe designer Rem D Koolhaas have collaborated to create 3D- printed shoes that look like tree roots. The shoes were presented at Paris Fashion Week during Iris van Herpen's couture show.
- **GAMES & ENTERTAINMENT** - 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.
- **BIONIC EARS** - Scientists, including an Indian- origin researcher, have created a 3D- printed bionic ear that can "hear" radio frequencies far beyond the range of normal human capability. Using off-the- shelf printing tools, the scientists at Princeton University explored 3D printing of cells and nano particles, creating the bionic ear.

FUTURE

- Future applications for 3D printing might include creating open-source scientific equipment to create open source labs.
- Science-based applications like reconstructing fossils in Paleontology.
- Replicating ancient and priceless artifacts in archaeology.
- Reconstructing bones and body parts in forensic pathology.
- Reconstructing heavily damaged evidence acquired from crime scene investigations.
- The technology currently being researched for building construction.

EFFECTS AND CHALLENGES

Space exploration:

- Making spare parts on the fly
- Cheaper and more efficient space exploration

Social change:

- Conventional relationship between the home and the workplace might get further eroded.

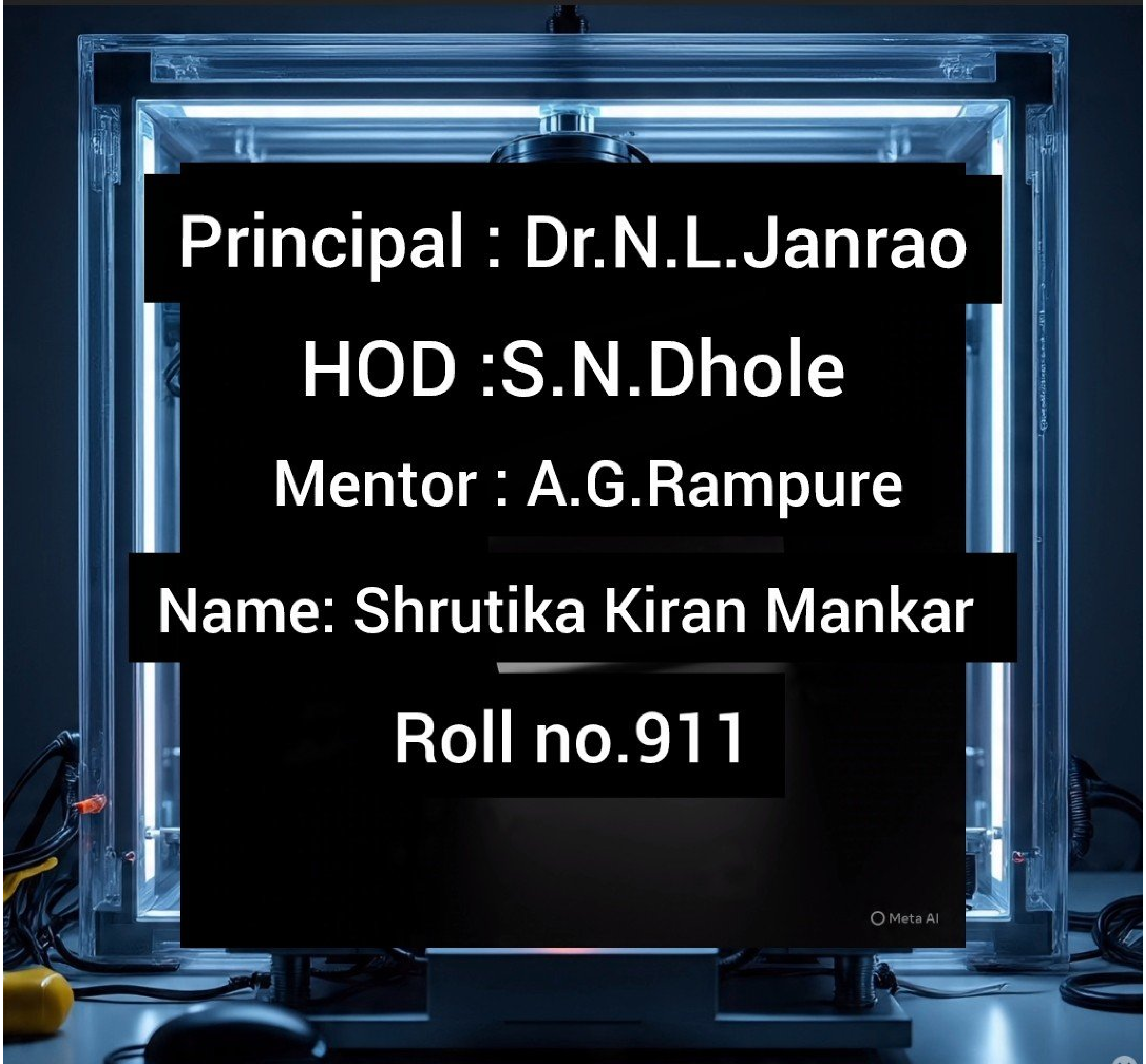
- It becomes easier to transmit designs for new objects around the globe.
- Intellectual property rights of the 3D printer users.
- Nearly anything can be printed by 3D printers and this is troubling prospe if criminals use 3D printers to create illegal products.
- Firearms could be downloaded and reproduced by anybody with a 3D printer.

ADVANTAGES

- Flexible Design - 3D printing allows for the design and print of more complex designs than traditional manufacturing processes
- Rapid Prototyping
- Print on Demand
- Strong and Lightweight Parts
- Fast Design and Production
- Minimizing Waste
- Cost Effective
- Ease of Access

CONCLUSION

- 3D printing has a bright future, not least in rapid prototyping (where its impact is already highly significant), but also in medicine the arts, and out space.
- Desktop 3D printers for the home are already a reality if you are prepared pay for one and/or build one yourself.
- 3D printers capable of outputting in color and multiple materials also exis and will continue to improve to a point where functional products will be able to be output.
- As devices that will provide a solid bridge between cyberspace and the physical world, and as an important manifestation of the Second Digital Revolution, 3D printing is therefore likely to play some part in all of our futures.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THANK YOU…