DIFFERENCE BETWEEN ADDITIVE AND SUBTRACTIVE MANUFACTURING

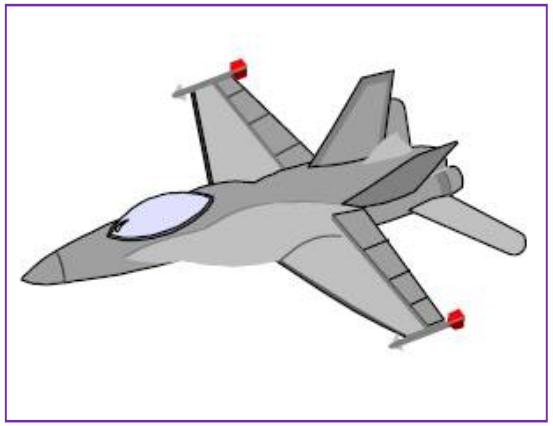
Sl. No	Additive Manufacturing/3D Printing/Rapid prototyping	Subtractive Manufacturing
4	Volumetric density of the constrictive material of final component can be controlled during operations.	Material density cannot be controlled during operation.
5	No material wastage takes place in these processes.	These processes are associated with material wastage in the form of chips, scrabs, etc.
6	Complex shape can be easily fabricated.	Subtractive manufacturing processes having limited capability in fabrication of complex shape
7	Structures containing fully closed internal hollow parts can be produced.	Structures containing enclosed hollow parts cannot be produced by these processes, unless joining is allowed.

RAPID PROTOTYPING (RP)

- Global competition, customization, and continued demands for cost savings are forcing **companies** to look for new technologies to improve their business processes and speed up the product development cycle.
- Rapid Prototyping (RP) has emerged as a key enabling **technology** with its ability to shorten product design and development time.
- **RP technologies** can be virtual and physical.

DEFINITION OF A PROTOTYPE

- A prototype is the first or original example of something that has been or will be copied or developed; it is a model or preliminary version.
  - e.g.: A prototype supersonic aircraft.



TYPES OF PROTOTYPES

- **Implementation of the prototype:** It is usually implemented **full-scale** as well as being fully functional.
- **Form of the prototype:** Purely based upon the **assumed** principles or science. Ex: cellular telephone that looks and feels very much like the real product but **without its intended functions.**
- **Approximation of the prototype:** Model can be a very **rough representation** of the intended product.

PROTOTYPING - DEFINITION

- Rapid Prototyping (RP), as defined in this text, refers to the layer by- layer fabrication of **three-dimensional physical models directly** from a computer-aided design (CAD).
- It provide designers and engineers the capability to print out their ideas in three dimensions.
- Rapid Prototyping has also been referred to as layer manufacturing, solid free-form fabrication, additive manufacturing and **Three-dimensional (3D) Printing**.

THREE-DIMENSIONAL (3D) PRINTING

- This technologies are able to produce physical model in a layer manner directly from their CAD models without any tools, dies and fixtures and also with little human intervention.
- It is capable to fabricate parts quickly with complex shape easily as compared to traditional manufacturing technology.

❖ **This course focuses on introduction about 3D printing, materials, Classification processes, and their applications.**