

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION TO 3-D PRINTING

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. Now, you can create a complete model in a single process using 3D printing. The basic principles include materials cartridges, flexibility of output, and translation of code into a visible pattern.



Fig 1.1 Typical 3-D printer

3D Printers are machines that produce physical 3D models from digital data by printing layer by layer. It can make physical models of objects either designed with a CAD program or

Industrial design, architecture, engineering and construction, automotive, aerospace, dental and medical industries, education and consumer products.

1.2 HISTORY OF 3-D PRINTING

- In the history of manufacturing, subtractive methods have often come first. The province of machining that is generating and creating exact shapes with high precision was generally a subtractive affair, from filing or turning through milling and grinding.
- The technology for printing physical 3D objects from digital data was first developed by Charles Hull in 1984. He named the technique as Stereo lithography and obtained a patent for the technique in 1986.
- This was called Rapid Prototyping technologies, this is because the processes were originally conceived as fast and more effective method of creating a prototype for product development within industry.
- 3D systems first commercial RP systems the SLA-1 was introduced in 1987 and following rigorous testing the first system was sold.
- While Stereo lithography systems had become popular by the end of 1980s, other similar technologies such as Fused Deposition Modeling (FDM) and Selective Laser Sintering (SLS) were introduced.
- Throughout the 1990's and early 2000's a host of new technologies continued to be introduced, still focused wholly on industrial application and while they were still largely processes for prototyping application.
- In 1993, Massachusetts Institute of Technology (MIT) patented another technology, named "3 Dimensional Printing techniques", which is similar to the inkjet technology used in 2D Printers.
- In 1996, three major products, "Genisys" from Stratasys, "Actua 2100" from 3D Systems and "Z402" from Z Corporation were introduced.
- In 2005, Z Corp. launched a breakthrough product, named Spectrum Z510, which was the first high definition color 3D Printer in the market.
- Another breakthrough in 3D Printing occurred in 2006 with the initiation of an open source project, named Reprap, which was aimed at developing a self-replicating 3D printer.

- In January 2009 the first commercially available 3D-Printer in kit form and based on the reprop concept was offered for sale. This was called the BfB RapMan 3D printer.
- Very recently Engineers at the University of Southampton in the UK have designed, printed, and sent skyward the world's first aircraft manufactured almost entirely via 3-D printing technology. The UAV dubbed SULSA is powered by an electric motor that is pretty much the only part of the aircraft not created via additive manufacturing methods