

COURSE: ADVANCED MANUFACTURING PROCESSES

Module No. 1: INTRODUCTION

Lecture No-1

Manufacturing and Manufacturing Systems

Manufacturing covers wide areas of inputs, processes and products. It reaches out to the demands in production for thousands of different varieties and types of goods. These demands range from large ships to hand drilling equipment, and from micro circuits to automobiles. The number and complexity of processes involved in the production of these goods varies drastically. The extent of alterations involved in these processes form the very basis for getting a bird's eye view of the manufacturing activity. Some are simple primary product and some are simply transformed products such as basic metallic shapes, paint and utensils. The next are moderately transformed products such as wires, rods, metal pipes and tubes, while others are elaborately transformed products such as prefabricated metal shapes, wire products, glassware and ceramic products. The mechanization and extent to which it is involved in the process of production gives another view of manufacturing. Manufacturing covers a very wide range of situations right from robot controlled highly mechanized lines of production to some simple day to day use equipments with mechanical activities.

Thus, manufacturing industries, today, encompasses a dimension scale of more than fifteen orders of magnitudes. The design and manufacture of huge machinery, ship and spacecrafts on one side while nano and pico technology on the other side of the dimension scale, highlights the challenges ahead for engineers and technologists. With the advancement of technology newer materials, energy sources, manufacturing technology, decision-making and management techniques are being developed. These unfold lot of opportunities for the scientific and academic fraternity. At the same time, newer challenges in the form of environmental and other issues put stringent requirements on the technology. Global competition, the thrust on quality and demand for higher productivity are some of the challenges before the present industrial and manufacturing units. To survive and to succeed further, the competitors have a unique

option, which is understanding of the dynamic changes that are taking place in the business environment. In view of the above, a nation should develop and update its infrastructure, such that the new and advanced technology gets into hand in hand, with the ongoing time.

What is manufacturing?

There are many ways and definitions available to explain the concept of manufacturing. Some of these definitions are listed below:

- A. The process of converting raw materials into finished products
- B. Manufacturing is defined in the Macquarie Dictionary as the making of goods or wares by manual labor and / or by the use of machinery, especially on a large scale
- C. Manufacturing is a very broad activity, encompassing many functions – everything from purchasing to quality control of the final product
- D. Chemical or Physical transformation of the materials, substances or components into some new products
- E. Manufacturing is a value addition activity to the raw materials, substances or components
- F. Manufacturing is a process through which products are made through various production activities
- G. Manufacturing may be considered as a system, wherein there is an integration of people, equipment, policies and procedures to accomplish the objectives of an organization i.e. production of the required product.
- H. Manufacturing is the use of machines, tools and labor to make things for use or sale
- I. Manufacturing is an application of different resources such as machinery and people used for converting the materials into finished goods

Manufacturing System

In order to consider manufacturing, as a system; we need to look beyond the conversion of raw materials and processes which lead to finished products. The understanding of the manufacturing system as a whole helps in identifying, which process parameters and functions of the organizations are important; this helps to make decisions about the economical ways of producing the end products. There are several factors which are usually considered in taking a final and relevant decision about the best way of producing the desired end product. A manufacturing system can be considered as a simple input-output system at the first stage as shown in Fig. 1.1.1

Fig. 1.1.1(Click here)

The input-output system does not provide the sufficient information about all the aspects of manufacturing. Manufacturing involves more than just processing of raw materials. The overall manufacturing system starts from the market or specifically from the customer requirements and ends when the product reaches the hands of customers. The present day trends also look beyond the delivery of the product to the customer i.e. after sale, services offered by the organization. The basic model at Fig. 1.1.2 is further expanded to incorporate most of the functions involved in an organization for the design, planning and manufacturing of a product. The manufacturing system incorporating all the above aspects (holistic approach) as shown in Fig. 1.1.2

