

Workshop Practice

TA 102

Lec 1 : Manufacturing Concepts

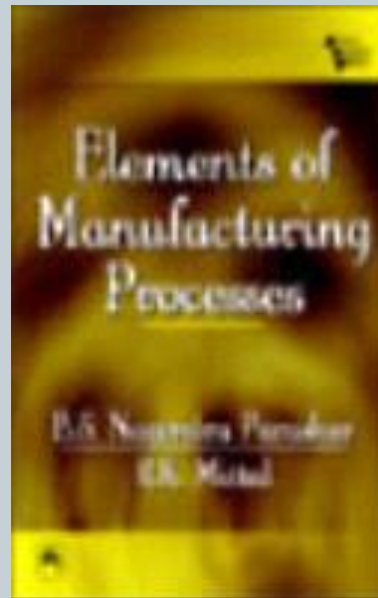


BY PROF.A.CHANDRASHEKHAR

(a) Text Books:



- Elements of Manufacturing Processes by B.S.Nagendra Parashar, R.K.Mittal, Prentice Hall, New Delhi,2003.

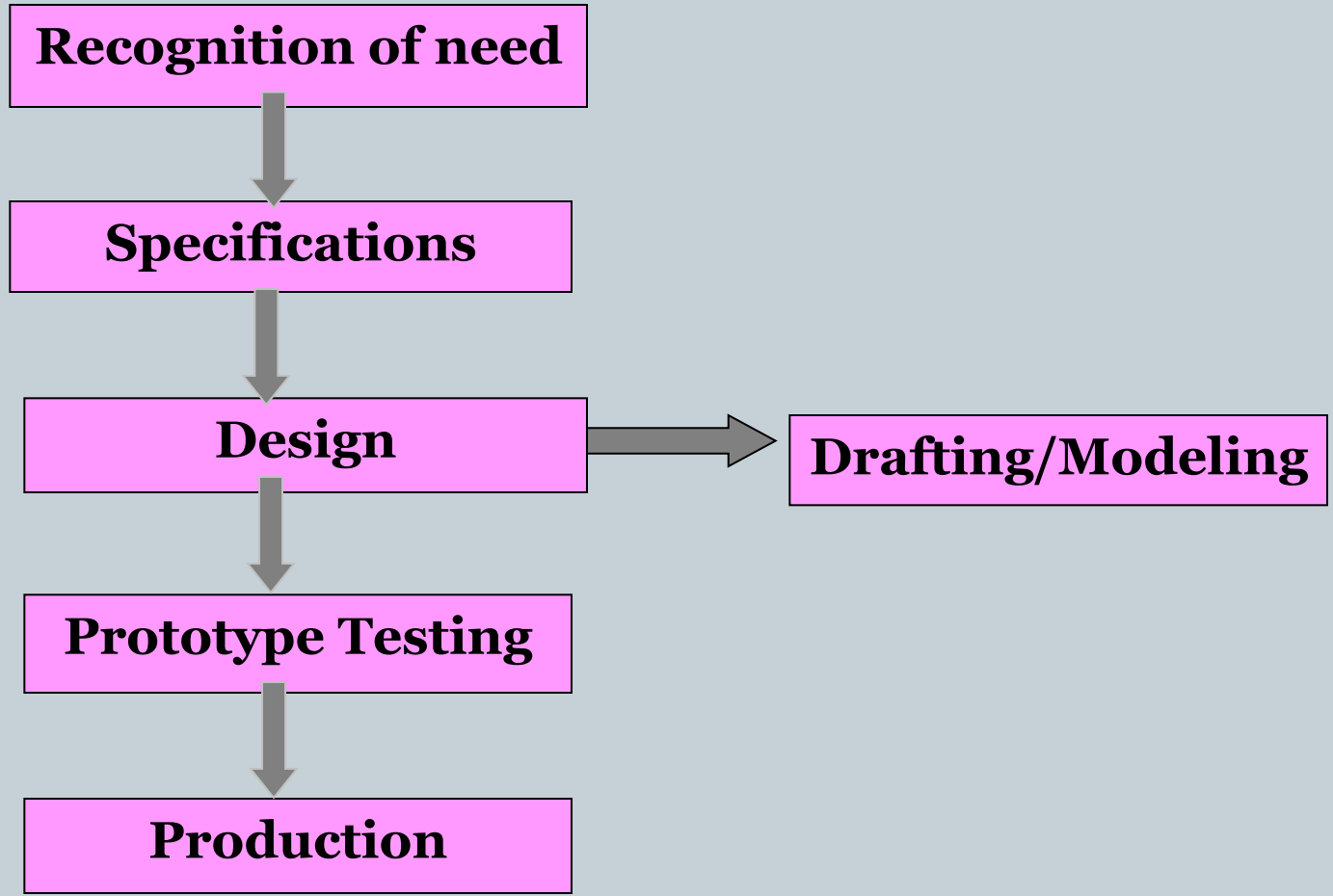


(b) Reference Book(s):



- Principles of Manufacturing Materials and Processes by J.S.Campbell, Tata McGraw-Hill, New Delhi, 1999.
- Workshop Technology Part I, II & III by WAJ Chapman, Butterworth Heinemann, 2001, 1995, 1998 respectively.
- Materials and Processes in Manufacturing (8th Edition) By E. PaulDeGarmo, J.T.Black , Prentice Hall, New Delhi2003.
- Workshop Manual by P Kannaiah & KL Narayana SciTech Publications,2005.

Introduction



Manufacturing Concepts



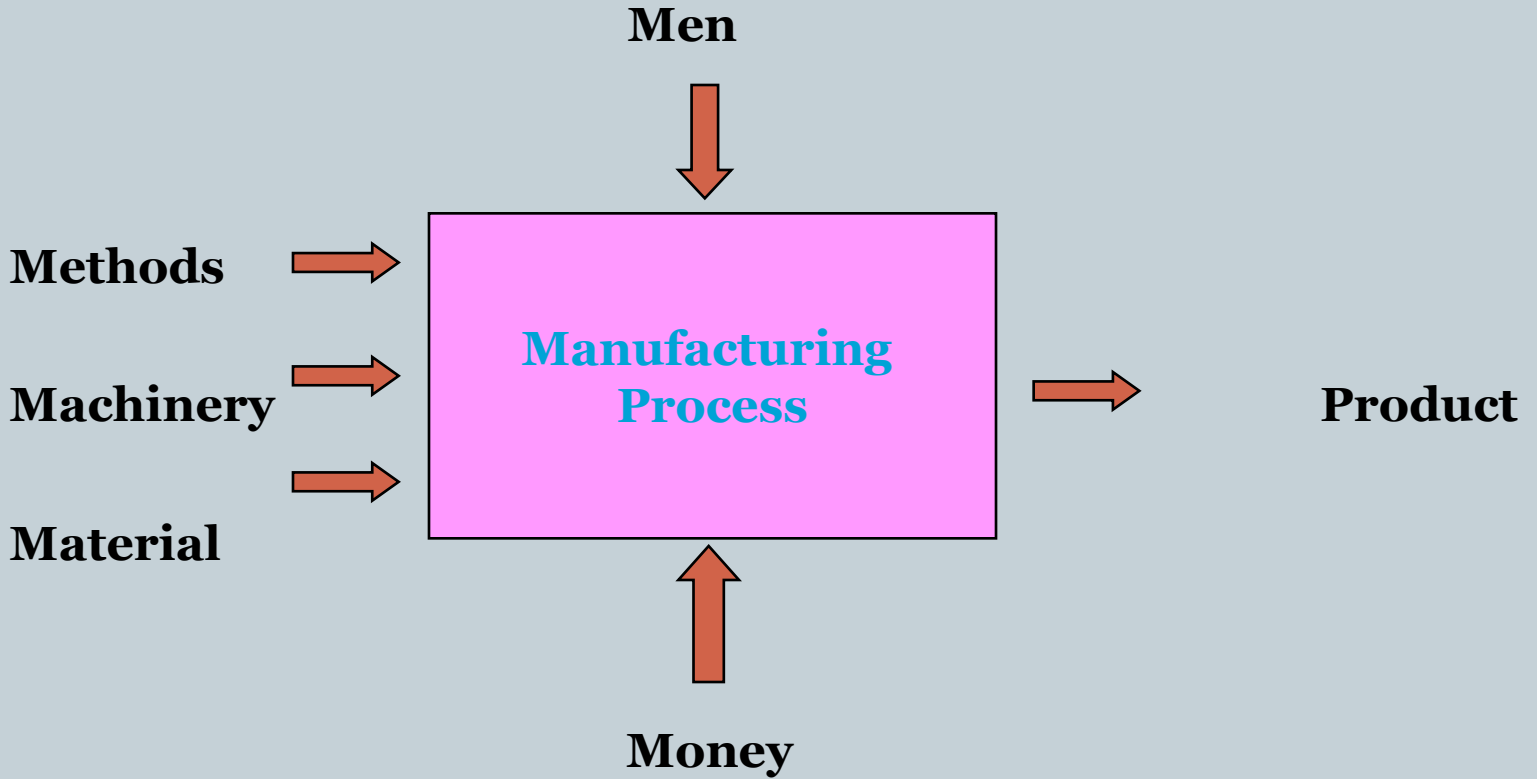
- **Raw material** – The material as found in nature is called Raw material
- **Product** – Any object made by us for any specific purpose is called a product.
- **Manufacturing** – The process of making a product is called manufacturing. It is the process of converting Raw material into **Product**

For carrying out manufacturing activity we require 5 M's



- Material
- Methods
- Machinery
- Men
- Money

Manufacturing Process and its interaction with the 5 M's



Manufacturing Processes



Manufacturing Processes are broadly classified in to five groups:

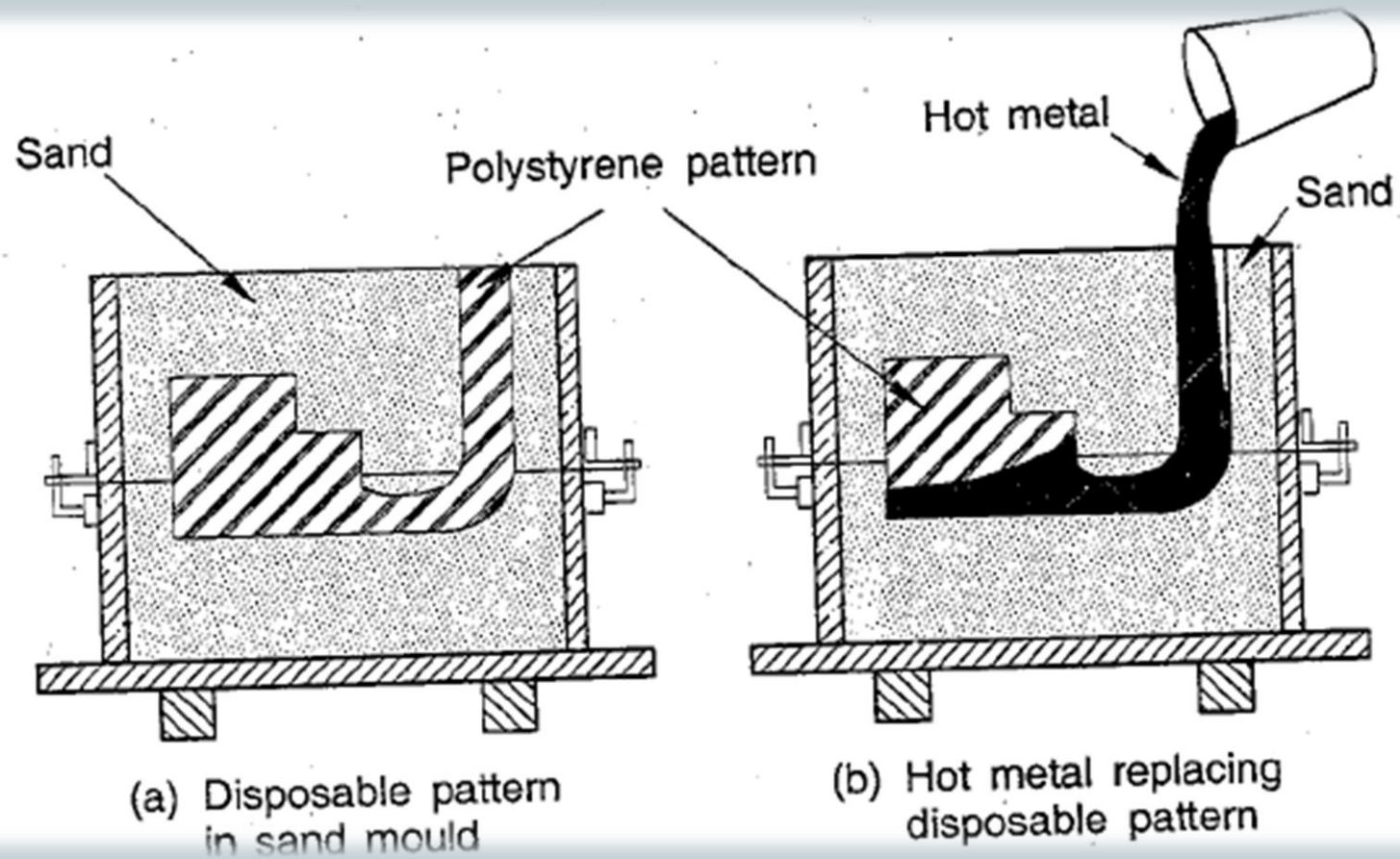
1. Casting
2. Machining
3. Forming
4. Powder metallurgy
5. Joining

CASTING

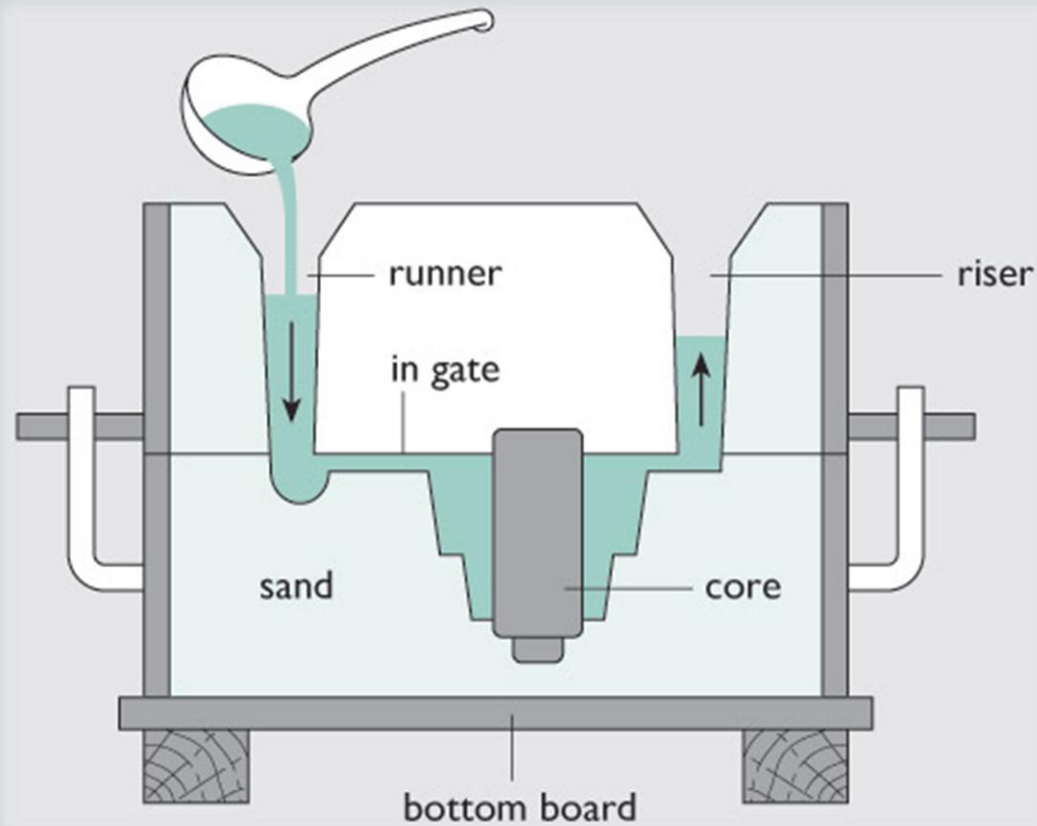


- casting may be defined as a metal object obtained by pouring molten metal in to a mould and allowing it to solidify.
- Casting process is based on the property of liquids to take up the shape of the vessel containing it.
- Molten metal when poured in to a cavity of desired shape (called mould) flows in to every nook and corner of the cavity and fills all the shape.

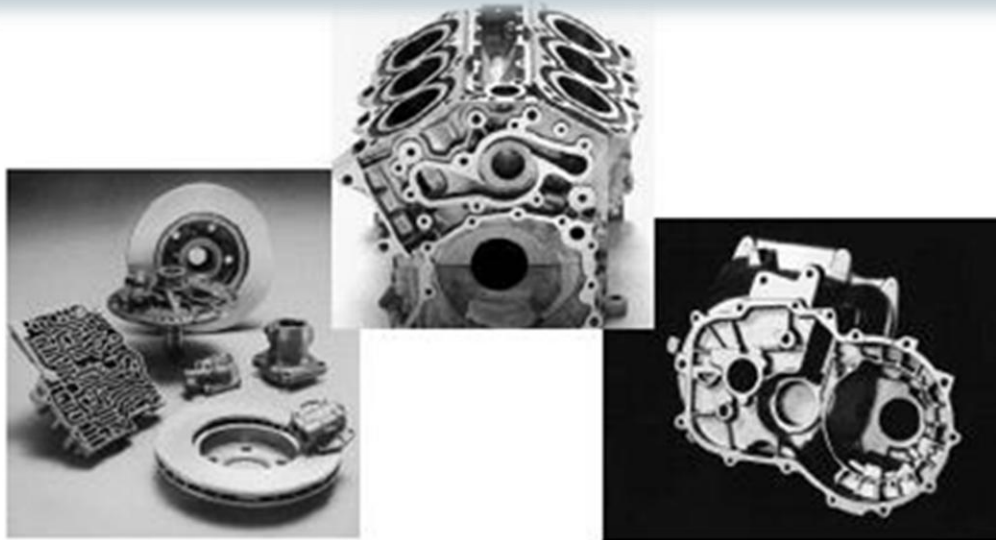
The Casting Process



The Casting Process



Metal Cast Parts

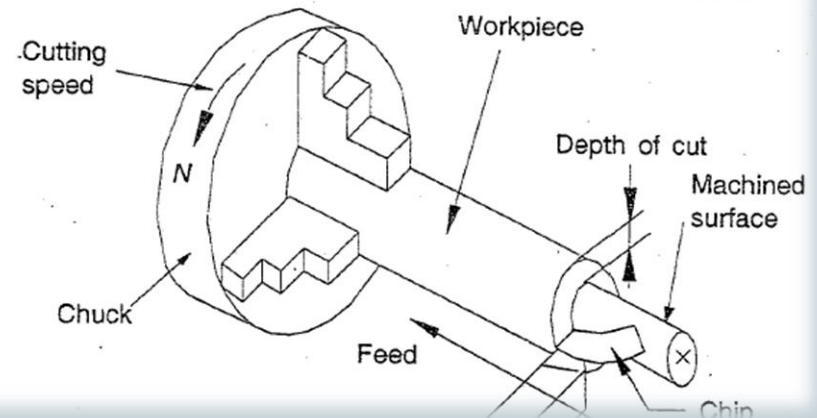


Metal Cast parts

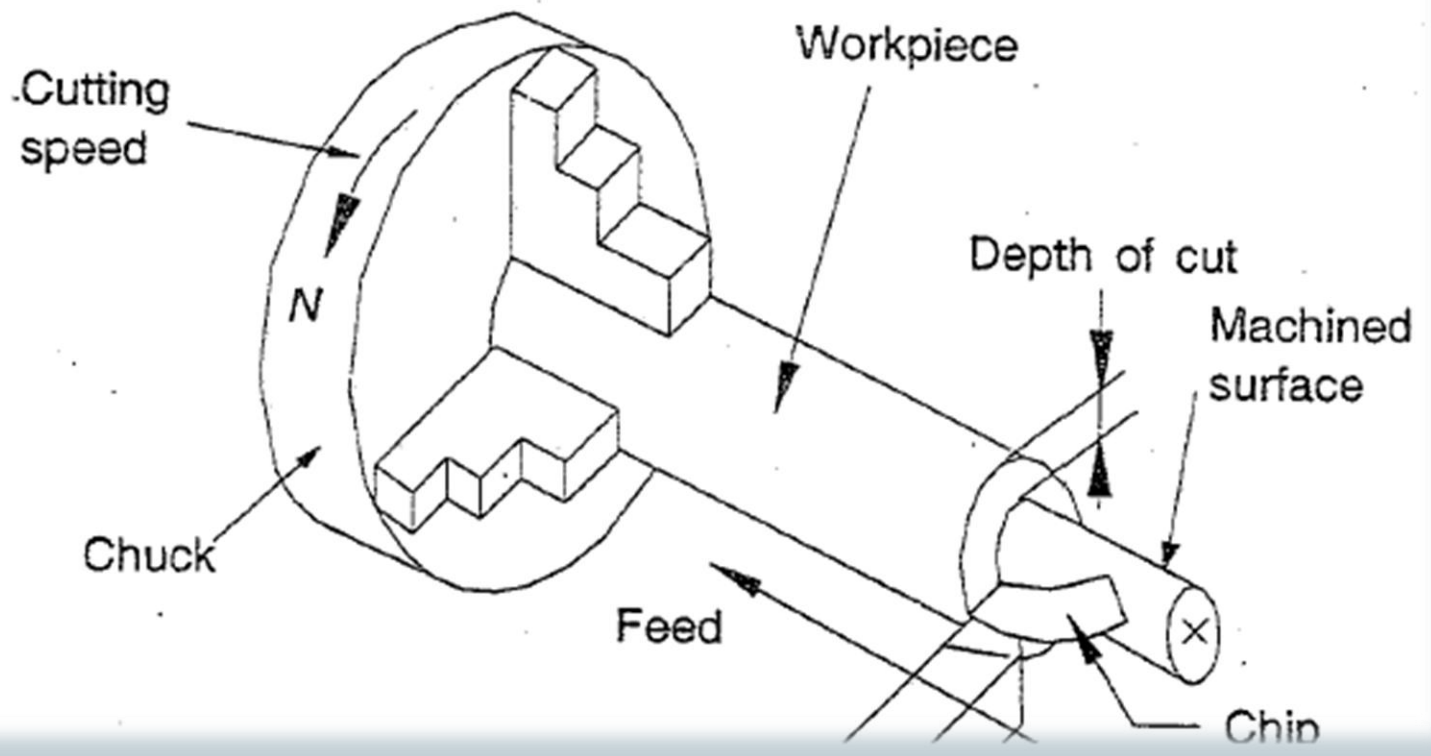
MACHINING



The process of manufacturing a component by removing the unwanted material using a machine is known as **Machining** and when used with metals it is referred to as **metal machining** or **metal cutting**.



Metal Cutting Operation on a Lathe – the turning operation



Machined Parts

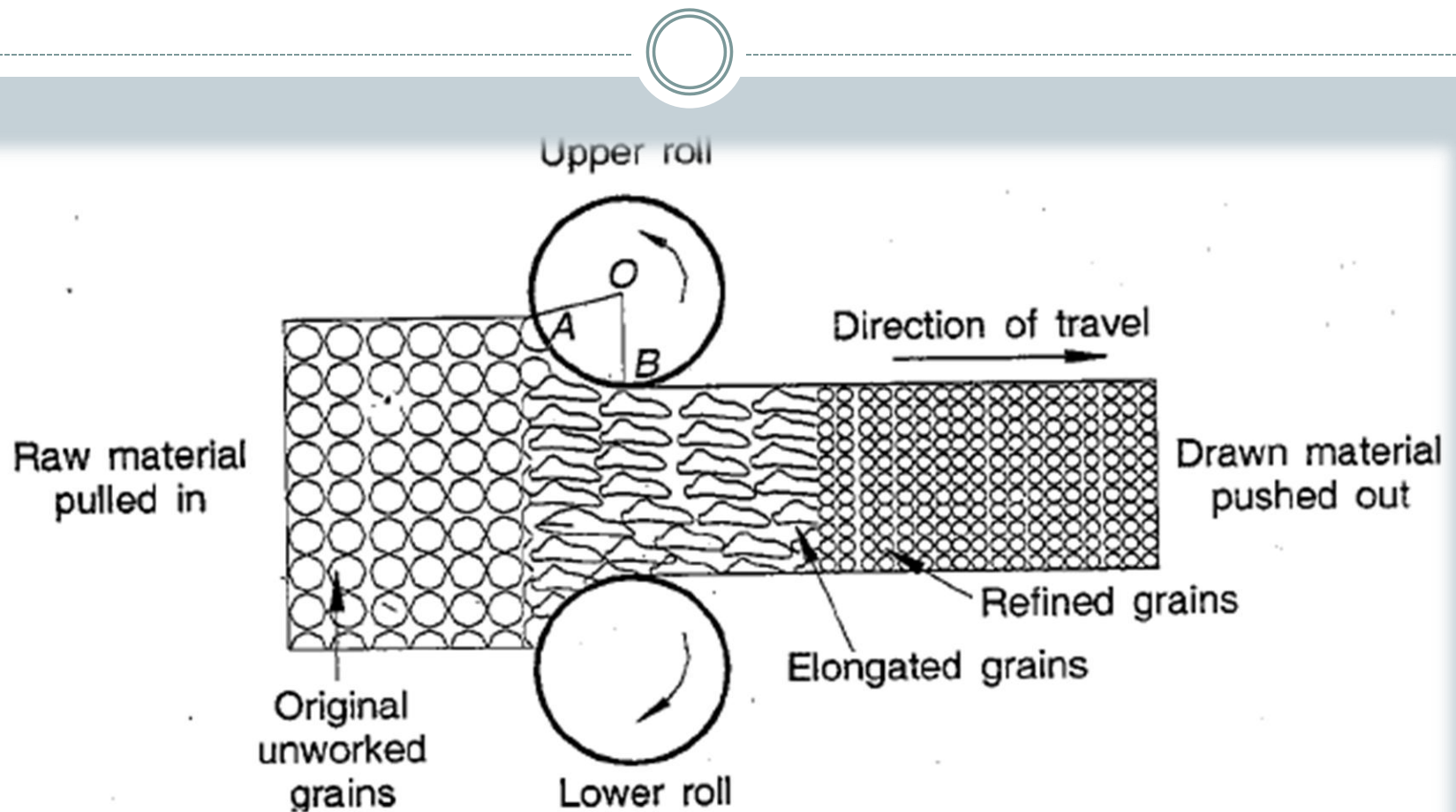


FORMING



- Shaping of a component by the application of external forces is known as the metal forming.
- Metal forming can be described as a process in which the desired size and shape are obtained through the deformation of metals plastically under the action of externally applied forces.

A Typical metal forming Operation – the rolling of metal



Rolling process and deformation of grains in rolling.

POWDER METALLURGY



- Fine powdered materials are blended, pressed into a desired shape in a die and then heated in a controlled atmosphere to bond the contacting surfaces of the particles and get the desired properties.

JOINING



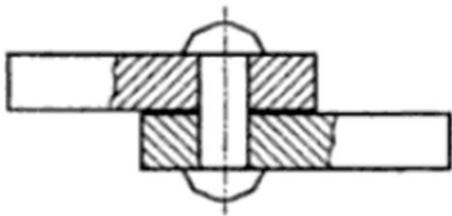
- Two or more pieces are joined together to produce the required shape and/or size of the product.
- All joining processes can be categorized based on the type of joint produced under two categories:
 1. Permanent Joint
 2. Temporary joint

Joining (contd.)

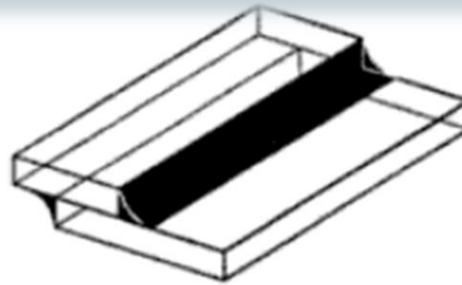


- **Permanent Joint:** the joint is made such that it has the properties similar to the base metal of the two parts.
- Permanently joined parts cannot be separated in to their original shape, size and surface finish.
- A **temporary joint** can be easily dismantled separating the original parts without any damage to them.

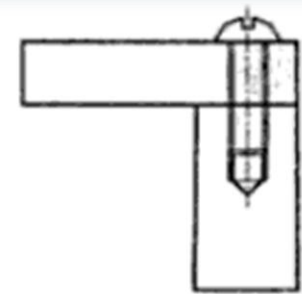
Examples of Joints made by different joining processes



Joint made with rivett



Joint made by welding



Joint made with a screw

ALLIED ACTIVITIES:



1. Measurement
2. Assembly
3. Property changing

Measurement & Inspection



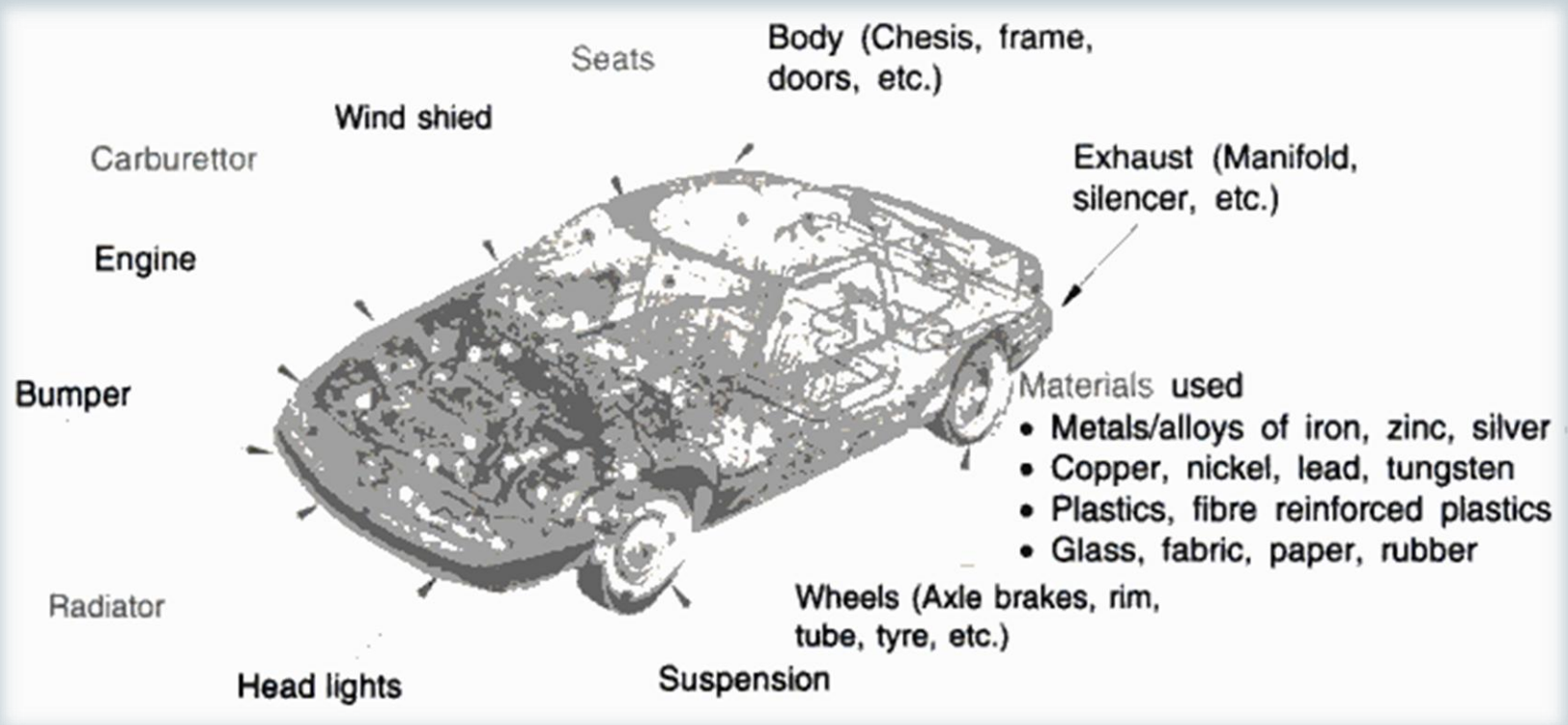
- For a pencil we check diameter, length, surface smoothness for it to perform intended function.
- Specified size must be measured and checked.

ASSEMBLY



- Ball pen consists of body, Refill, Barrel, cap and refill operating mechanism.
- The process of putting the parts together to form the product, which performs the desired function, is called **assembly**.

Car with Major Parts



Property Changing



- We should know what materials are available, their strength, hardness, availability and costs.
- Hard material is difficult to machine So we make it soft by heat treatment. We anneal it. This is called property changing.

Selection Of Manufacturing Process



The selection of suitable process is based on the following considerations:

- Volume of Production
- Expected Quality and Properties of the components
- Technical Viability of the process

Types of Production



- Based on the quantity of Product, Manufacturing activity can be classified under the following three categories:
 1. Job Shop Production
 2. Batch Production
 3. Mass Production

Types of production



- **JOB SHOP PRODUCTION** - Low volume of production and variety of work
- **BATCH PRODUCTION** - The manufacture of medium quantity of an item or product
- **MASS PRODUCTION** - Manufacture of identical products in Bulk quantities

Thank You

