NAME : PRINCE MAURYA

ROLL NO : 21D80005

BLACKSMITHY WORKSHOP

INTRODUCTION

Forging is a bulk phenom deformation Process in which the work is compressed between two dies.

According to the degree to which the flow of the metal is constrained by the dies.

- A metal is shaped by compressive forces.
- Oldest metal working process - 4000 BC
- Can be performed with a hammer and anvil.

Typical forged products

- Bolts
- Rivelts
- Connecting Rods

FORGING TERMINOLOGIES

- Hot forging

Plastically deforming an alloy at a temperature above its re-crystallization point.

- Open forging / Hand forging

→ Made with repeated blows in an open die

→ The operator manipulates the workpiece in the die.

- Impression die forging / Precision forging

→ Any further refinements of the blocker forgings.

→ The finished part more closely resembles the die impression.

• Cold Working

→ It is metal forming performed at room temperature.

- Advantages ÷ better accuracy, better surface finish, high strength and hardness of the part, no heating is required.
- Disadvantages ÷ higher forces and power, limitations to the amount of forming, some material are not capable of cold working.

• Warm Working

→ It is metal forming at temperatures above the room temperature but below the recrystallization temperature.

- Advantages ÷ lower force and power, more complex part shape, no annealing is required.
- Disadvantages ÷ some investment in furnaces is needed.

• Hot Working

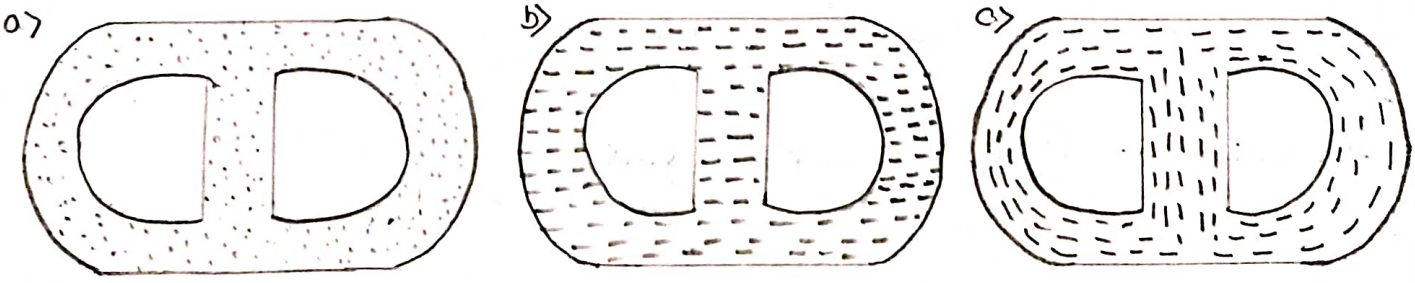
→ It involves deformation of preheated material at temperatures above the crystallization temperature.

- Advantages ÷ big amount of forming is possible, lower forces and power are required, forming of materials with low ductility, no work hardening and therefore, no additional annealing is required.

GRAIN STRUCTURE

- Parts have good strength.
- High toughness
- Forging require additional heat treating.

a) b) c)

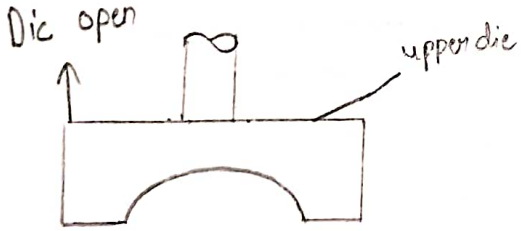


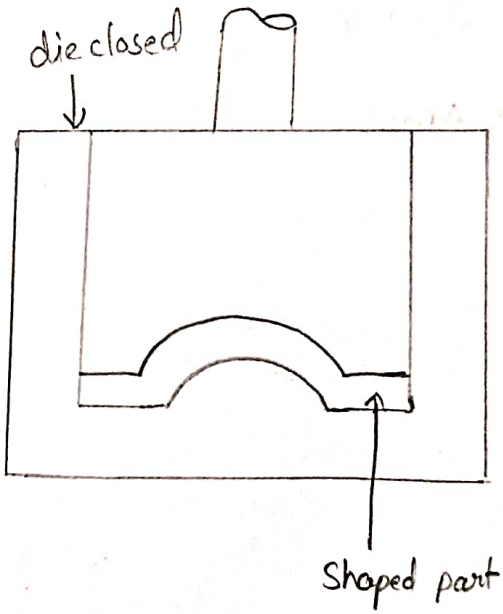
ADVANTAGES OF FORGING

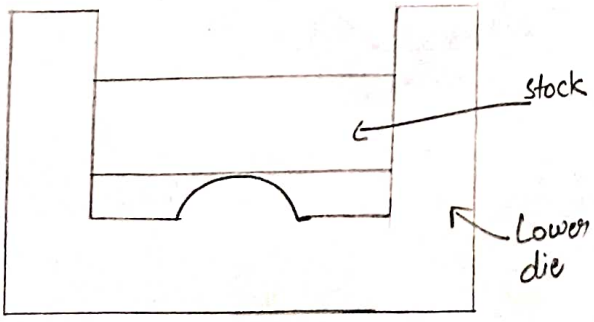
- Uniformity of qualities for parts subject to high stress and loads.
- No weight loss
- Close tolerance.
- Less machining or no machining in some cases.
- Smooth surface
- High speed of production.
- Incorporation in welded structures i.e., what can be welded easily.

DISADVANTAGES OF FORGING

- High tool cost
- High tool maintenance
- Limitation in size and shape.





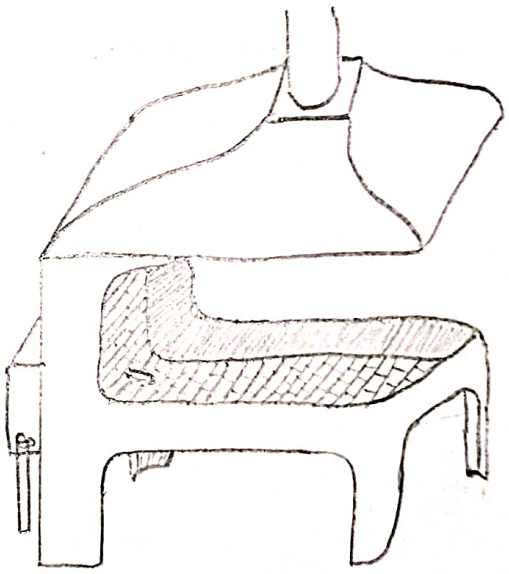


TOOLS AND EQUIPMENTS USED

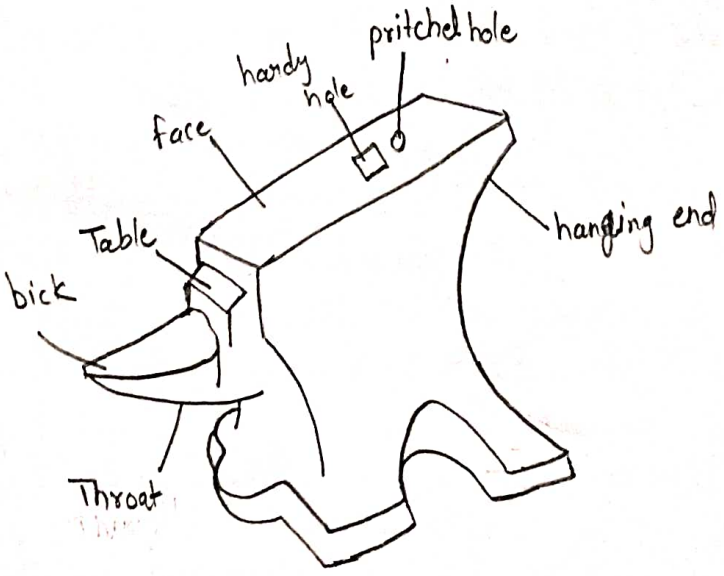
- Black smith forge hearth
- Anvil
- Swage block
- Hammers
- Tongs
- Chisels
- Punches
- Drifts
- Fullers
- Swages
- Flatters
- Set Hammers

→ Black Smith forge hearth

- Hearth
- Tuyere (Nozzle)
- Hood
- Water tank
- Blower
- Chimney



→ Anvil



→ Swage Block (made of cast iron or cast steel)

- It is carrying a number of slots of different shapes and sizes along its four side faces. The job is to be given a desired shape is kept similar shaped slot.

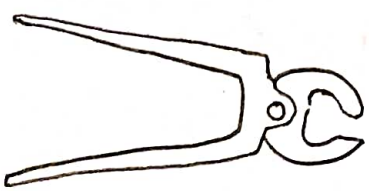
→ Hammers

- Ball peen Hammer
- Sledge Hammer
  - straight peen sledge hammer
  - cross peen sledge Hammer
  - Double faced sledge Hammer

→ Tongs

Tongs are used ~~to~~ for holding and turning hot metal pieces. Depending upon their use tongs are classified as belows:

- Square Hollow tong
- Pincer tong
- Close flat tong
- Chisel tong
- Pick up tong
- Round hollow ~~toung~~ tong

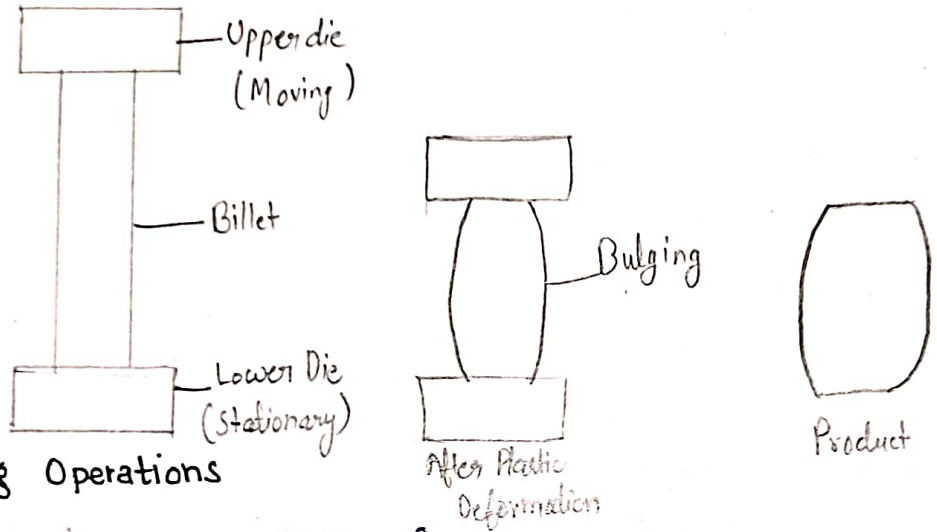


FORGING OPERATIONS

- **Upsetting forging**

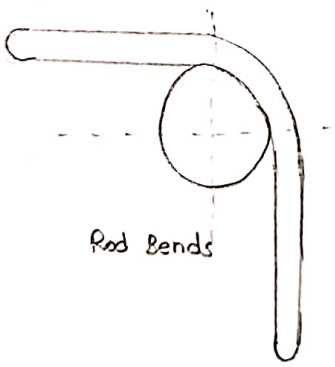
→ Upset forging increases the diameter of the workpiece by compressing its length.

→ A few examples of common parts produced using the upset forging process are engine values, couplings, bolts, screws, and other fasteners.



- **Bending Operations**

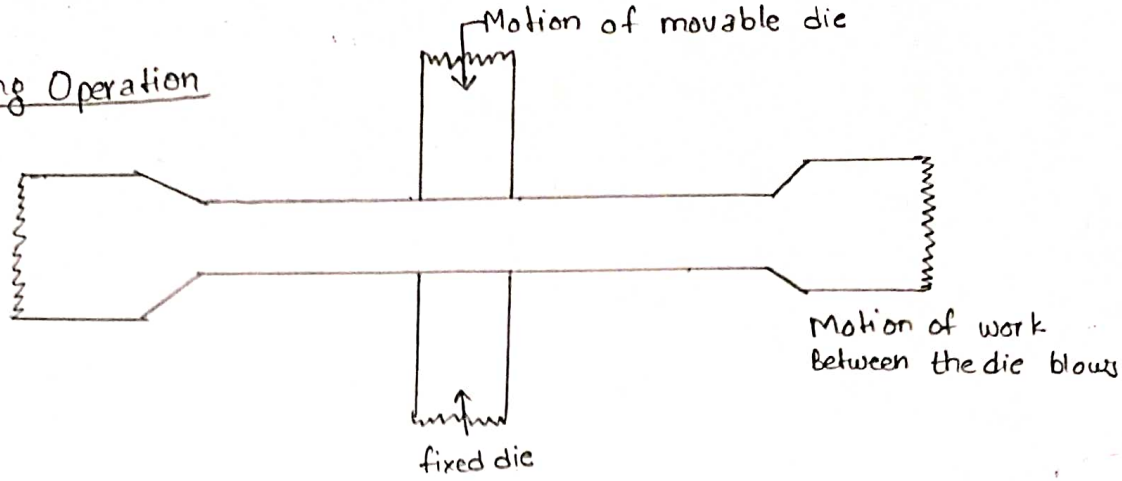
Bending is very common forging operation. It is an operation to give a turn to metal rod or plate. This is required for those which have bend shapes.



- **Drawing**

This is the operation in which metal gets elongated with a reduction in the cross sedation area. For this, a force is to be applied in a direction perpendicular to the length axis.

Drawing Operation



- **Fullering**

It is similar to material cross section is decreased and length increased.

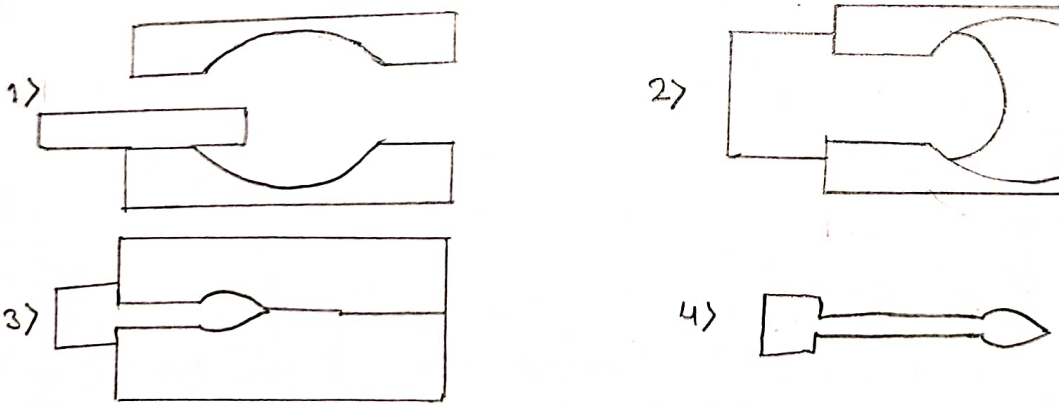
→ To do this; the bottom fuller is kept in angle hole with the heated stock over the ~~pulley~~ fuller.

→ The top fuller is then kept above the stock and then with the sledge hammer, and the force is applied on the fuller.

- **Edging**

→ It is a process in which the metal piece is displaced to the desired

→ Edging is frequently as primary drop forging operation.



- **Punching**

→ It is a process of producing holes in the metal plate is placed

→ By pressing the punch over the plate the hole is made.