

BLACK SMITHY SHOP

Introduction: Black smithy may be defined as the process of heating metal pieces up to its plastic state and then applying external pressure on metal pieces to acquire desired shapes and sizes.

Tools / Equipment

1. Supporting Tools: Tools used in smithy work for holding and supporting purposes are :

- a) Leg vice: It is used to hold the hot job / work piece for further operations like hammering and bedding, etc. this is generally made up of mild steel.
- b) Anvil: It is used to provide support to withstand blow of hammer, normally made up of casted mild steel or wrought iron.
- c) Swage block: It is also a supporting device which have a number of slots and holes of different shapes which give support to job for obtaining the desired shape and size.
- d) Tongs: It is a holding device used to hold the job while some operation is to be carried out. It is made up of mild steel. On the basis of application, it may be classified into following types:

1) Flat tong	4) Square hollow tong
2) Flat mouth tong	5) Pick up tong
3) Round tong	6) Side bit tong.

2. Striking Tools : To provide a blow or impart load on job to acquire desired shape and size. Hammer is generally made up of high carbon steel / tool steel by forging method. It is specified by its weight excluding the handle.

a) Hand Hammer: The hammers which are operated by manual energy come under this category. On the account of their shape, it may be further divided into following types:

- 1) Ball pin hammer 3) Straight pin hammer
- 2) Cross pin hammer 4) Sledge hammer .

b) Power Hammer: Some heavy hammers are operated by other power (hydraulic or electric) than manual power. They are used in heavy blow such as spring hammer, pneumatic hammer, steam hammer and drop hammer, etc.

3. Cutting Tool : The tools which are used in cutting metals in smithy shop.

→ Chisel : It is most widely used as a cutting tool. On the basis of its working condition, it may be classified into hot chisel and cold chisel.

4. Miscellaneous Tools / Device :

i. Punch : Punch is a tool used to make a hole in metal in hot condition

as per the requirement of different size and shape.

2. **Drift**: It is used to expand the size of a hole after punch.
3. **Fuller**: It is generally used in increasing length of metal in hot condition and in making neck of job, etc. It is made in 2 parts - one is top and another is bottom.
4. **Swage set**: These are generally used in shaping metal in different shapes like cylindrical, square, hexagonal and octagonal, etc. in hot position of metal.
5. **Flatter**: It has a flat surface and a rode handle. It is used in single part and used in making surface more flat and smooth. It is placed above the work piece / job while hammering is done on the flatter, so that there are no dents on the surface of job / work piece.

5. **Smith Forge**: The furnace desired for heating purpose for metal job is known as hearth or smith forge, it may be classified as follows :

- 1) Open hearth forge 2) Close hearth forge 3) Oil fired furnace.

6. Operations carried out in Smithy Shop :

- | | | |
|------------|------------------------|------------------|
| 1) Heating | 4) Punching & drifting | 7) Drawing down |
| 2) cutting | 5) Setting down | 8) Swaging |
| 3) Bending | 6) Upsetting | 9) Forge welding |

PRACTICAL NO. : 1

Objective: To make a square of a round mild steel bar.

Material Required: Mild steel bar (diameter = 10mm, length = 200mm)

Tools Required:

1. Open hearth cool furnace oil, furnace with boiler
2. Anvil (100kg)
3. Cross pin sledge hammer (5kg)
4. Scale (300 mm)
5. Flat tongs (300 mm)

Processes Involved:

1. Drawing
2. Upsetting

Procedure:

1. Oil furnace is started and working is put on flame and on becoming red hot, the piece is put with a tong and placed over anvil.
2. Position the red hot work piece on the anvil by one person and a proper hammering is done by second person till flat shape is formed.
3. Again heat up the job to red hot and put the piece by rotation 90° angle with earlier position and proper hammering is done by other person till all 4 faces are flattened uniformly and an equal rod is obtained.

Result Analysis: We made a square, cuboidal work piece through hammering and heating.

Learning Outcomes: After performing this practical, I learnt how to use the oil furnace, the types of tongs & hammers, all the safety precautions, the procedure of holding the workpiece, flattener, and the sledgehammer for hammering process.

Applications: Blacksmiths produce objects such as gates, grilles, railings, light fixtures, furniture, sculpture, tools, agricultural implements, decorative items, cooking utensils, and weapons.

Precautions:

1. Avoid plastic wearing
2. Wear only cotton cloths.
3. Avoid scattering of unwanted tools near work piece
4. Job must be held rigidly with the tong.

PRACTICAL NO. : 2

Objective: To make a mild steel chisel / nail.

Material Required: Mild steel bar (Round and square cross section)

Tools Required:

1. Open hearth oil furnace is oil, furnace with boiler.
2. Anvil (100 kg)
3. Cross pin sledgehammer (5 kg)
4. Scale (300 mm)
5. Flat tongs (300 mm)

Processes involved:

1. Drawing
2. Upsetting

Procedure:

1. Oil furnace is started and work piece is put inside the furnace and on becoming red hot, the piece is held with a tong and placed over anvil.
2. For chisel, position the red-hot work piece on the anvil by one person and a proper hammering is done by second person till a sharp edge of chisel is formed.
3. For nail, position the red hot work piece on the anvil by one person and proper hammering is being done by other person till a pointed tip of nail is formed.

4. Again heat up the job to red hot and put the piece by rotation in different angles with reference to earlier position & proper hammering is done by other person till all the sides are as per the designed shape of chisel and nail.

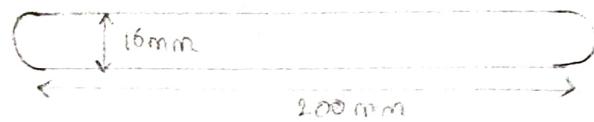
Result Analysis: we made a final work piece that is chisel and a nail.

Learning Outcomes: After performing this practical, I learnt the procedure of hammering so that we can make chisels and nails while the metal work piece is red hot.

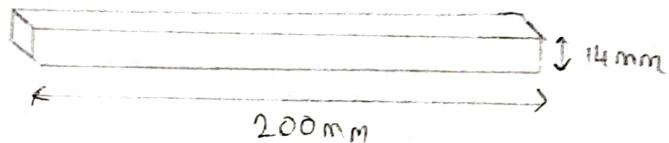
Applications: In earlier days, nails were made by blacksmiths that were used for various operations. We can also make chains, household tools and various other products in the blacksmithy shop.

Precautions:

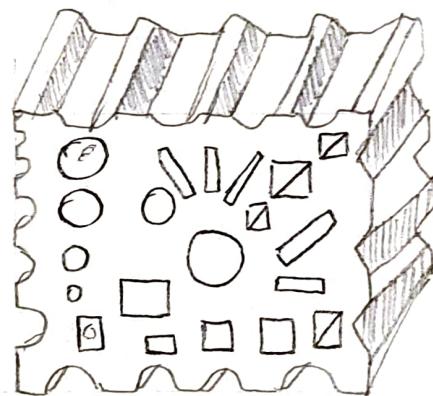
1. Avoid plastic wearing.
2. Wear only cotton clothes.
3. Avoid scattering of unwanted tools near work place.
4. Job must be held rigidly in the tong.



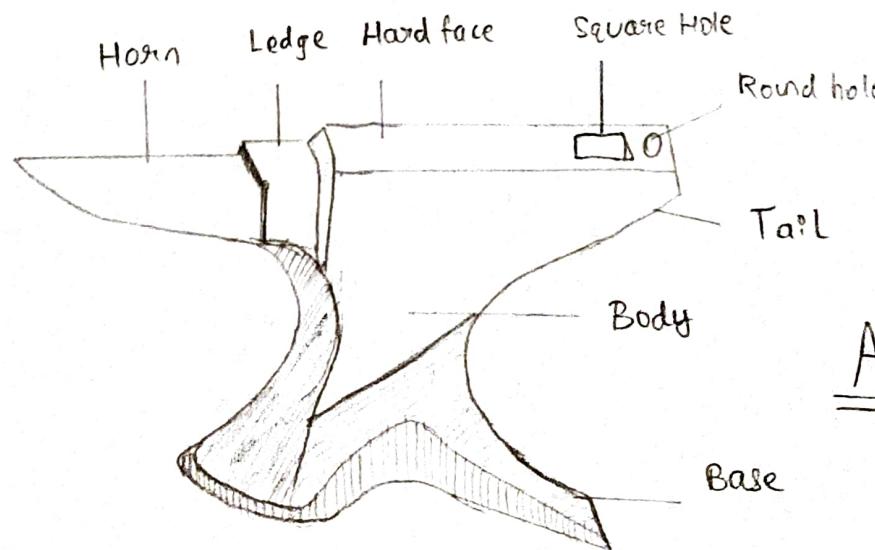
METAL JOB



FINAL JOB



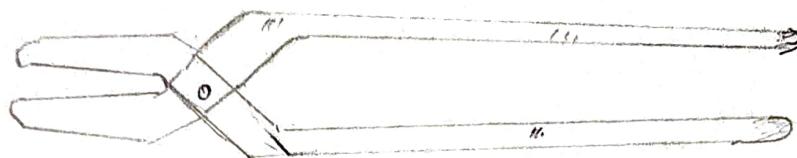
SWAGE BLOCK



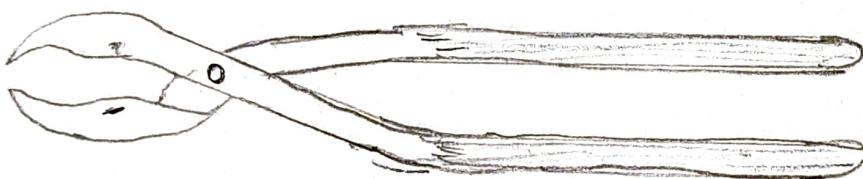
ANVIL



CLOSED MOUTH TONG



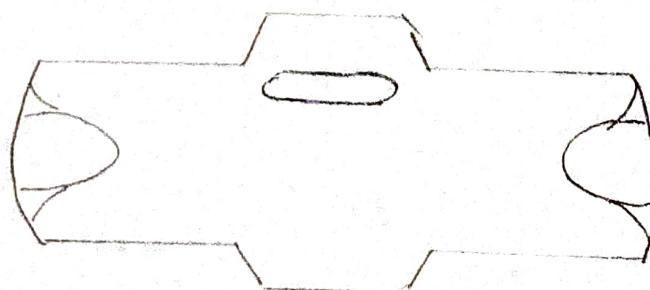
OPEN MOUTH TONG



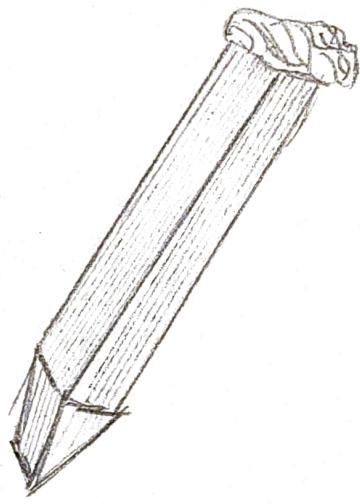
ROUND HOLLOW TONG



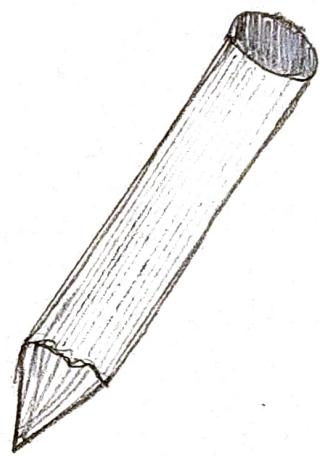
CLOSED HOLLOW TONG



SLEDGE HAMMER DOUBLE FACE



MILD STEEL CHISEL



MILD STEEL NAIL