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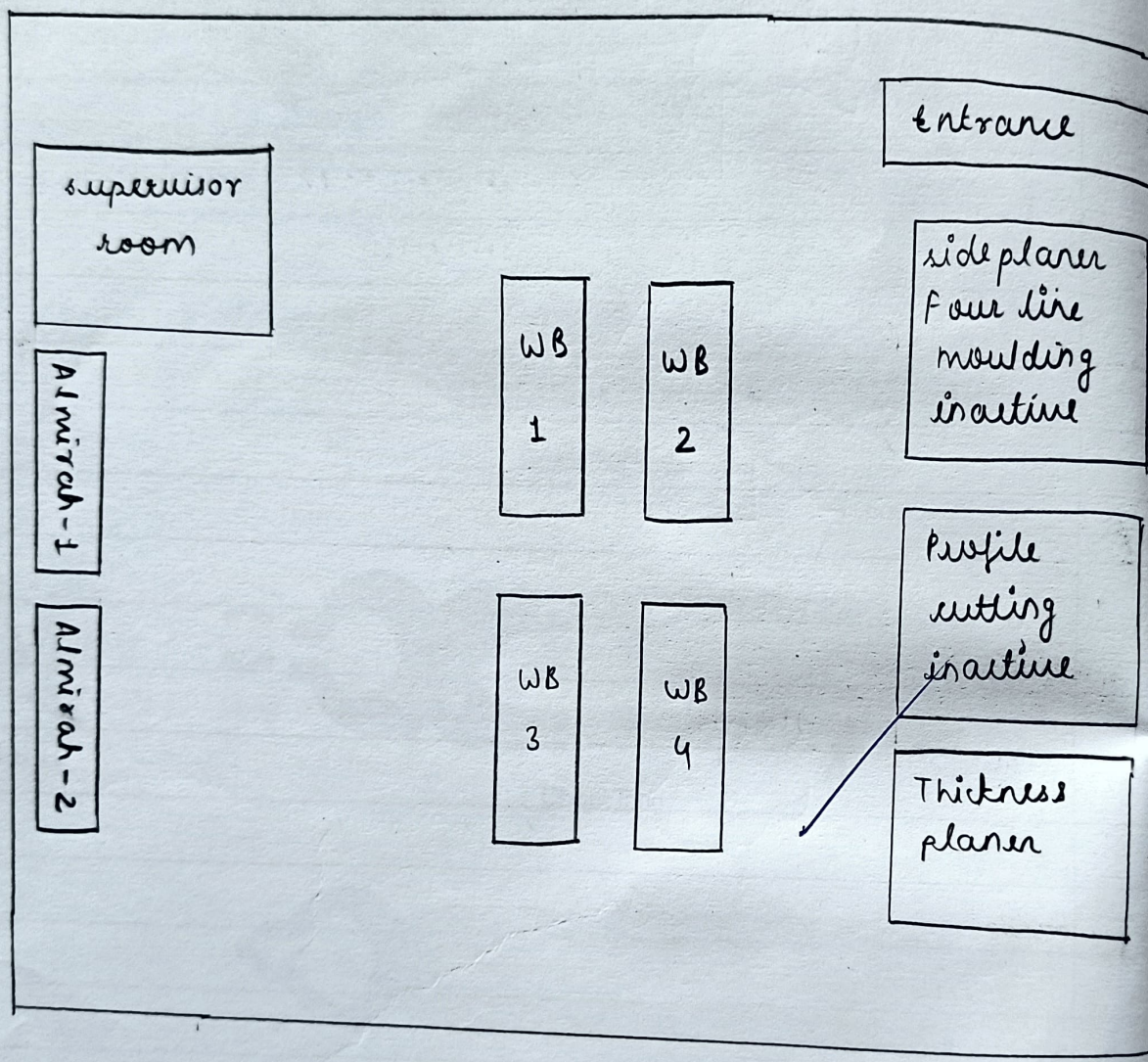

Signature

CARPENTRY SHOP

* Introduction

Carpentry deals with construction such as making roofs floors, partition, etc. of a building by means of wood with help of carpentry tools.

The term joining is used for connecting wooden parts with diff joints such as making of doors, window, stairs, etc.

The timber is the material used for carpentry & joinery work. It is wood obtained from exogenous trees by cutting these after their full growth. The following technical terms relating to timber must be clearly understood.

1. Standing or stationary timber : It is timber obtained from living tree.
2. Rough timber : It is timber obtained after falling a tree
3. Converted timber: It is timber which has been into various market sizes such as beams, pattern, planks
4. Dressed timber : It is timber which has been sawn, placed and worked to the required conditions
5. Structural timber : It is the timber used in framing & load bearing structure

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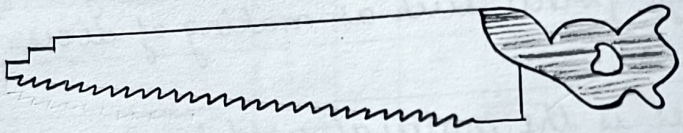
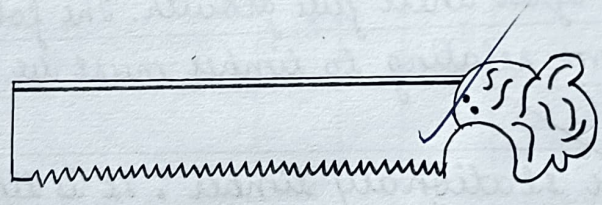


RIP SAW



DOVETAIL SAW

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Serial No. 3

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Carpentry shop forms one of the basic shops and is an important wing as all manufacturing process revolve around it.

Hence, carpentry may be described as a trade that deals with timber which is used in building work, furniture work, interior decoration work, wooden toys, geometric instruments agricultural implements shitting work, pattern making, etc.

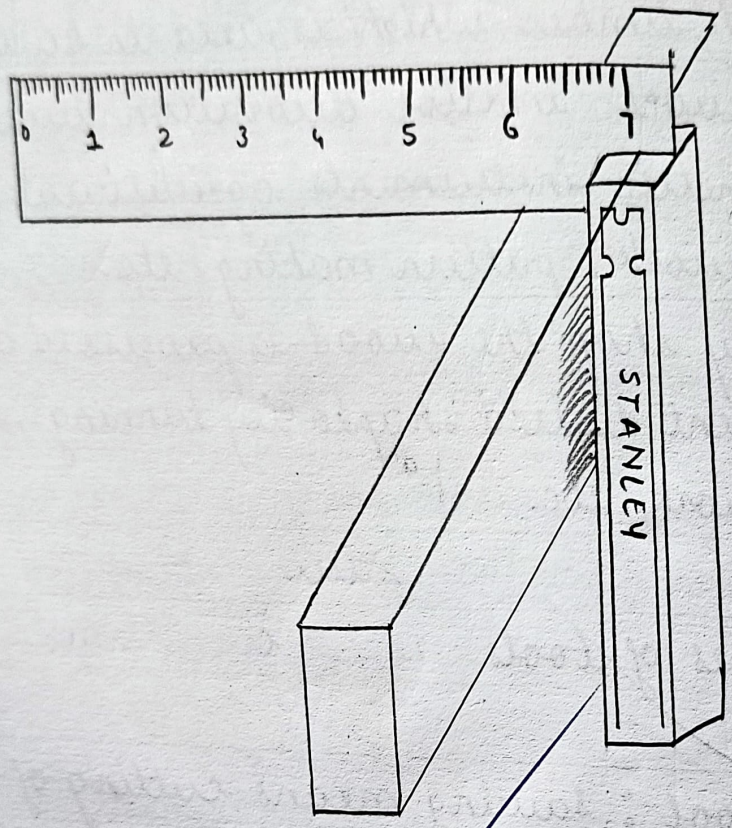
In carpentry shop the wood is processed and given rigid different desired shapes by turning, sawing, joining work, etc.

Various types of tools

1. Sawing tool : Sawing means cutting of wood along the grains examples are :

a. Rip saw : It is used for sawing along the grain Its teeth are like series of chisel. Its blade length varies from 50 to 70 m and width 10 to 18 cm near handle and 6 to 10 cm near tip of blade

b. Cross-cut saw : It is used for saving accross the grains. Its length varies from 50 to 70 cm & the tooth pitch varies from 3 to 5 min.



Try square

Signature

c. keyhole saw - It is a smaller and finer compass saw and is used for interior cutting

d. Dovetail saw - It is small back saw used for making dovetail joints. The length of the saw varies from 20 to 30 cm. The tooth profile is an equilateral triangle with pitch 1.75 mm. The teeth are finer and not set.

2. Making and measuring tools

1. Measuring tapes: measuring tapes are of flexible steel or reinforced cloth tapes and are available in various size according to its measuring length
They vary 2M to 30M in length

2. Try square: It is used to check the squareness of any work. For example when we at a rectangle piece of wood and after planning it we check out its corner with help of try square whether angles are 90° or not.

3. Marking guage: It is used to mark the length of wood with the help of it, we can measure required distance b/w two certain pts. It is an important marking tool

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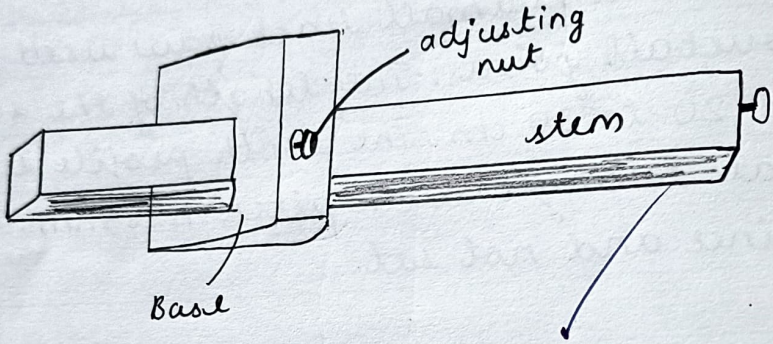
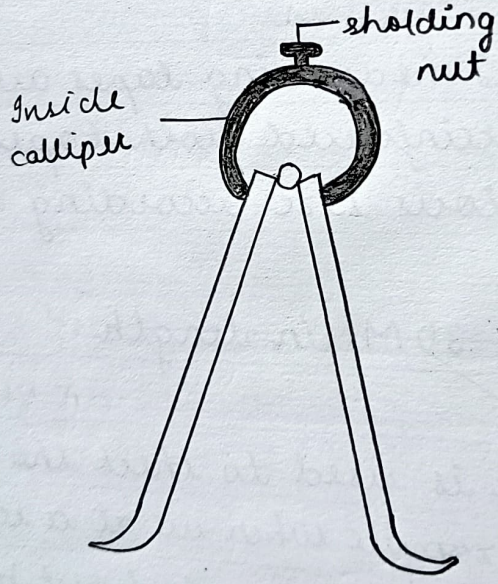


MORTISE GAUGE



No. 5

and can also be used for various purpose. It consist of wooden stem around 200 m long.

4) Mortise guage : It is similar to marking guage in working but it has two marking pts. one fixed & other adjustable and is used for marking 2 || lines for making.

5) Inside Calliper : It is used to measure internal and external diameter of circular objects.

6) Divider : It is similar to a calliper but legs are straight so as to mark the arcs and circles on surface.

STRIKING TOOLS :

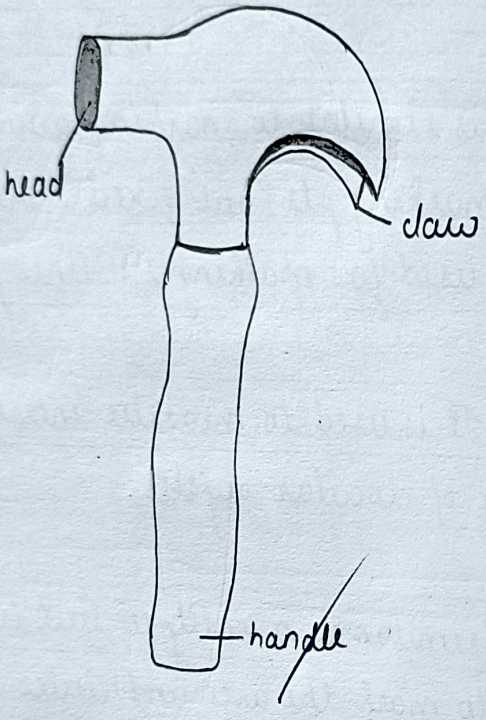
1) Claw hammer : It is hammer which is used for both striking as well as pulling the nails. It can be used for both the purposes.

2) Ball pin hammer : It is also a type of hammer used for driving the nails. It is used to strike on nails, etc.

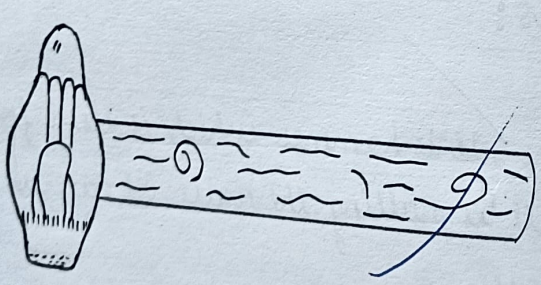
3) Wooden hammer : It is used for hitting chisels and for fixing the jobs.

Serial No. .....

① CLAW HAMMER



② BALL PEN HAMMER



Signa

CHISELS :

1. Firmer chisel : It is normal duty chisel. It is striked by matter for narrow work.

2. Mortise chisel : It is heavy duty chisel to with stand several strain as in forming where deep cuts are necessary. An iron edge is fitted to end of hand to withstand force of heavy hammer used is dusing tool in wood

3. Socket chisel : It is a heavy duty chisel to withstand several strain as in forming where deep cuts are necessary. An iron edge is fitted to end of hand to withstand force of heavy hammer used

4. An axe : It is made up of carbon steel with one edge and is striked to cut wooden logs.

PLANNING TOOL :

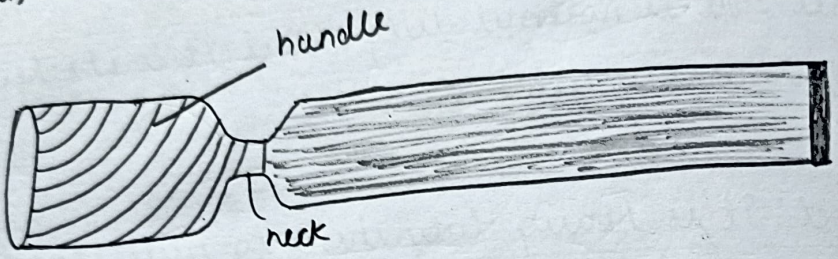
1. Wooden Jack Plane : It is a planner made up of wood consisting of blade, wedge and handle.

2. Metal Jack Plane : These are used as planning tools and made up of metal. These are more deniable and produces

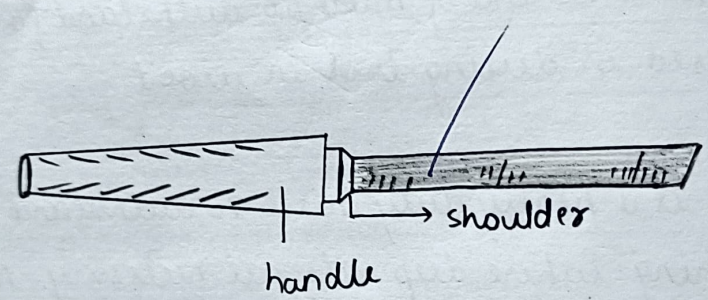
Serial No. .....

Dated .....

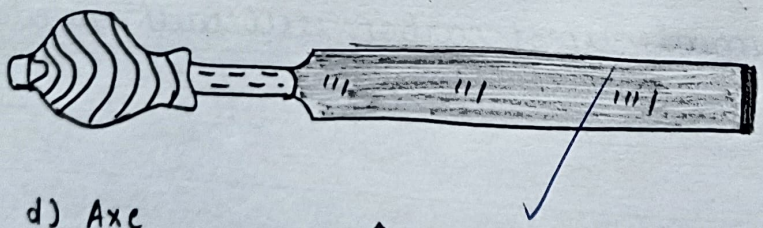
a) Forner chisel



b) Mortise chisel



c) socket chisel



d) Axe

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high degree of finish

3. Smoothing plane: It is used for smoothing purpose after application of jack plane.

Boring tools

1. Auger: made up of carbon steel provided with threads and during point for boring. It is derived by hands.

Miscellaneous tools

1. Screw driver: It is used for driving non screws into wood and for unscrewing purposes

2. Rasp: Rasp is like a filter provided with strong jaws on surface for scrapping of wood on surface. It is operated by hand.

Serial No. .....

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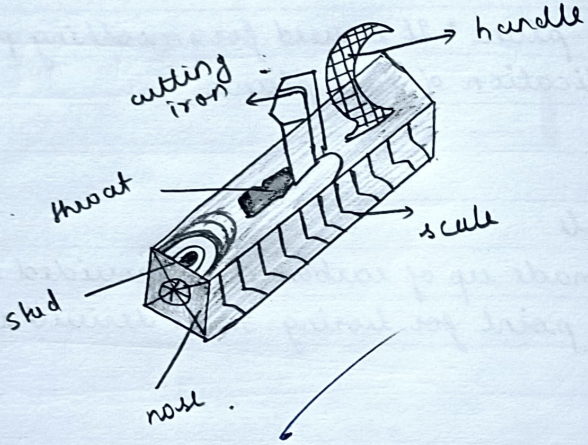
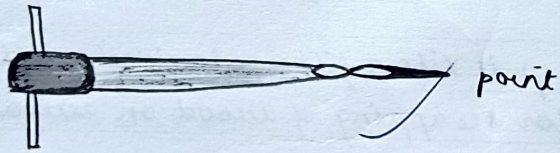
c) Wooden Jackplane



1) Auger



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No. 2

#	Carpentry machinery
1.	Surface and thickne
	Its various parts:
	i) Body
	iii) Top
	v) starter
	vii) thickness table
	Its uses: For surfa
2.	Universal woods
	It is used alo
	Its various parts
	i) Body
	iii) Top
	v) Thickness
	vii) starter
	Its working:
	1) surface plann
	2) moulding
	3) grooming

Carpentry machinery

1. Surface and thickness planer

Its various parts:

i) Body
ii) Bottom
iii) Top
iv) motor
v) starter
vi) surface table
vii) thickness table

Its uses: For surface and thickness planning

2. Universal woods working machine (9-1)

It is used along the grains

Its various parts are:

i) Body
ii) Bottom
iii) Top
iv) surface
v) Thickness
vi) motor
vii) starter

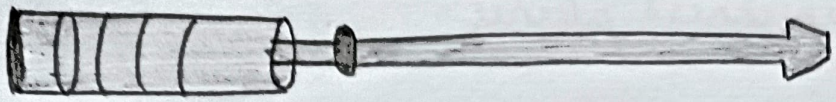
Its working:

1) surface planning
2) moulding
3) grooming

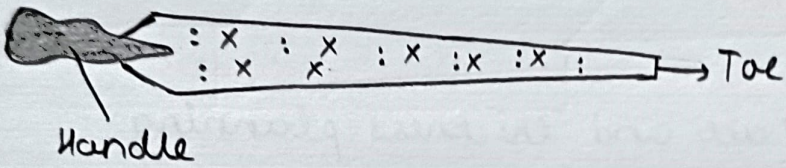
Serial No. .....

Dated .....

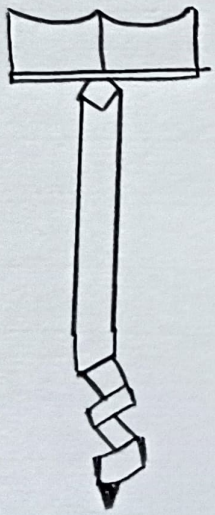
1] screw driver



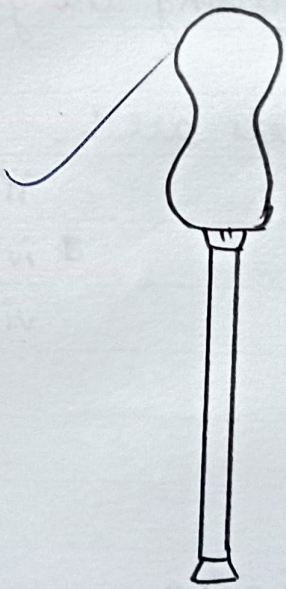
2) Rasp



1) Gamlet



2) Brodwal



Signature

4) Boring
5) Thickness planning
6) Mortise seasoning
7) circular saw cutting
8) Tarning
9) Ascending

carpentry joints

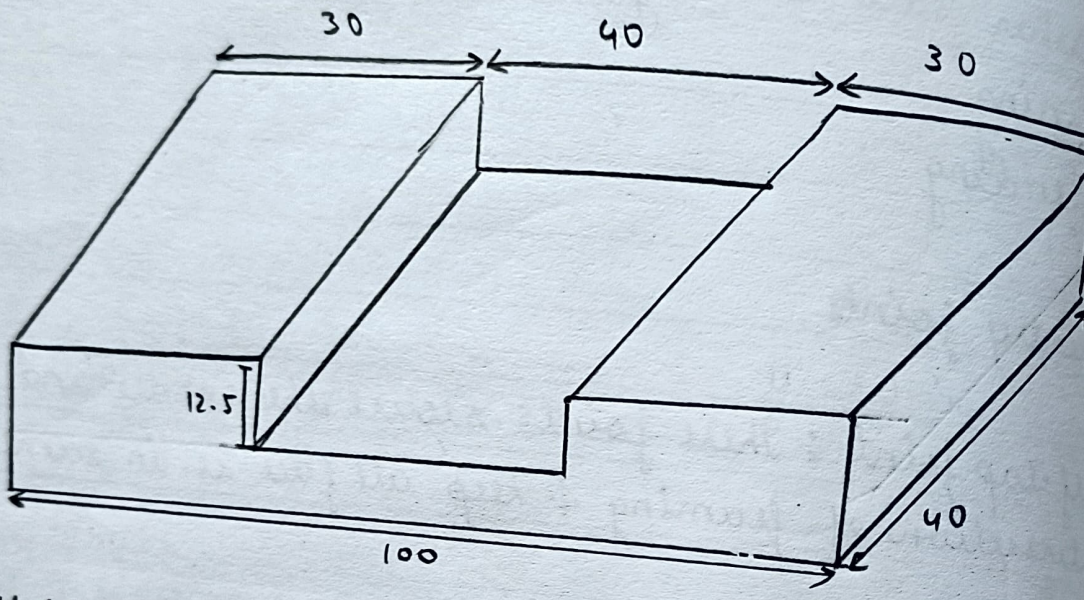
1. Half lap joint : These joints secure the corner and intersection of framing & keep all face ie. in same plane

2. Mortise and tenon joint : This joint is the most common joint used by carpenter. It consists of a rectangular pig (tenon) fitting into a rectangular hole

3. Screw joint : It is used where two pieces are to be secured securely

Serial No. .....

Drawing



Note: all dimensions are in mm

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erial No. 10 Dated

EXERCISE

* **Aim:**

To prepare half lap joint as per drawing.

* **Material required:**

Partial wood of size 3-55 / 2-5-26

* **Tools**

Wood working bench, carpentry vice, hand saw, tenon saw, pencil, rasp cut file, mortise gauge, try square, mortise chisel, firmer chisel

* **Procedure.**

1. Cutting
2. Planning
3. Right angle checking
4. Marking
5. Chiseling & cutting
6. Half lap cutting
7. Joining
8. Finishing

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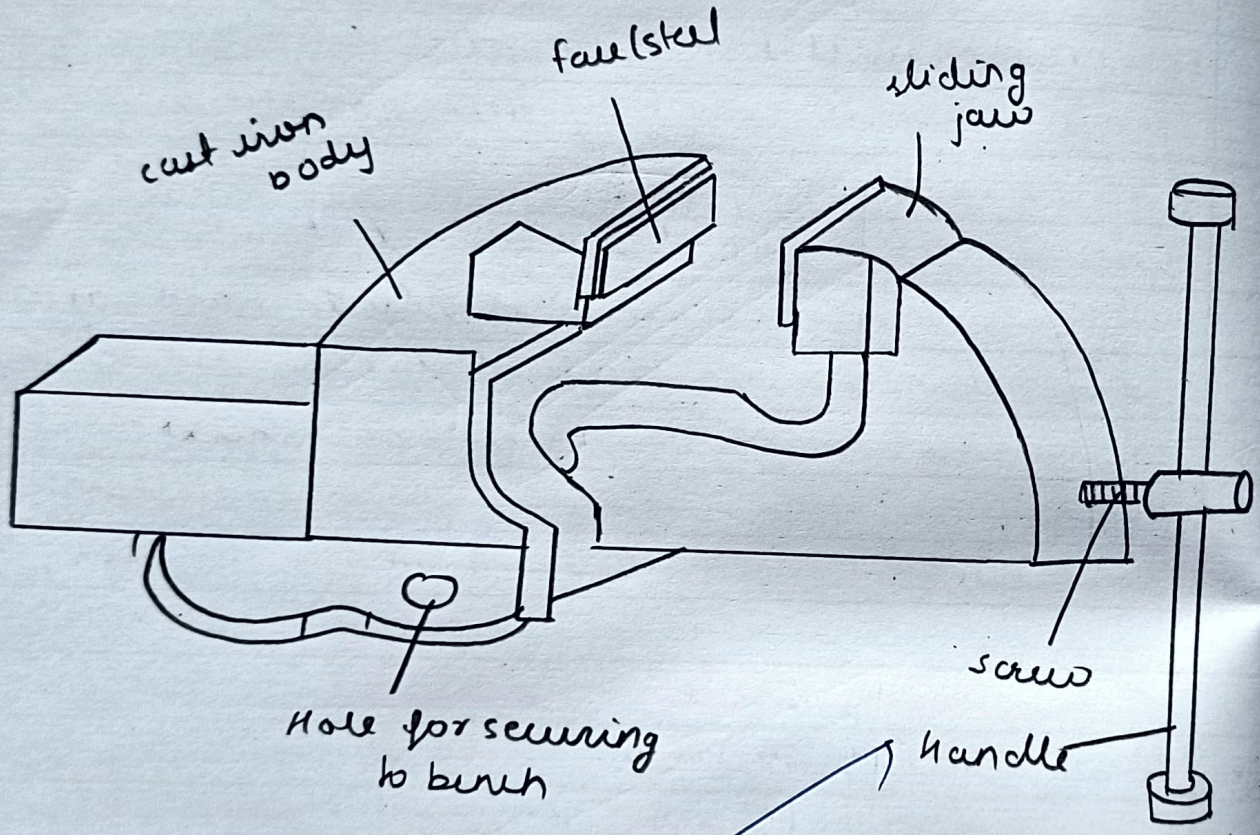

Bench Vice

Signature

Serial No. 12 Dated

FITTING WORKSHOP

Introduction :

Fitting play an important role in every day engineering workshop to complete and finish the job to desired accuracy filing, drilling, sawing, chipping, etc. after machine operation.

Fitting is a significant component of mechanical assembly. A fitters work is essential when different component are to be assembled in position - alignment of machine parts, bearing, slides, etc. call for fitters work

Much of fitters work consists of finishing components as they come from the machine shop and fiting them together to build complete assemblies. This involves fitting of burrs and sharp edges, removing metal and cutting threads with dies

The use of ordinary hand tools, but it is unlikely that he could be as efficient as one, had started from the beginning.

Safety precautions :

1. The files without handle should not be used.
2. There should be no grease or oil on surface of file or job.

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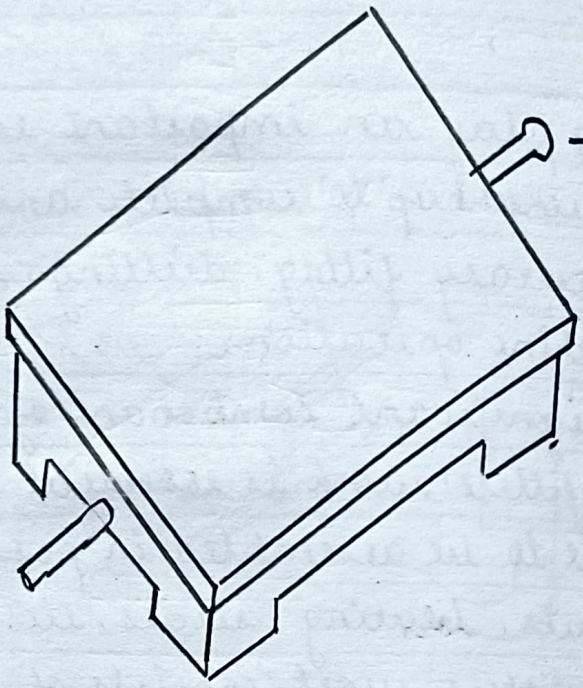
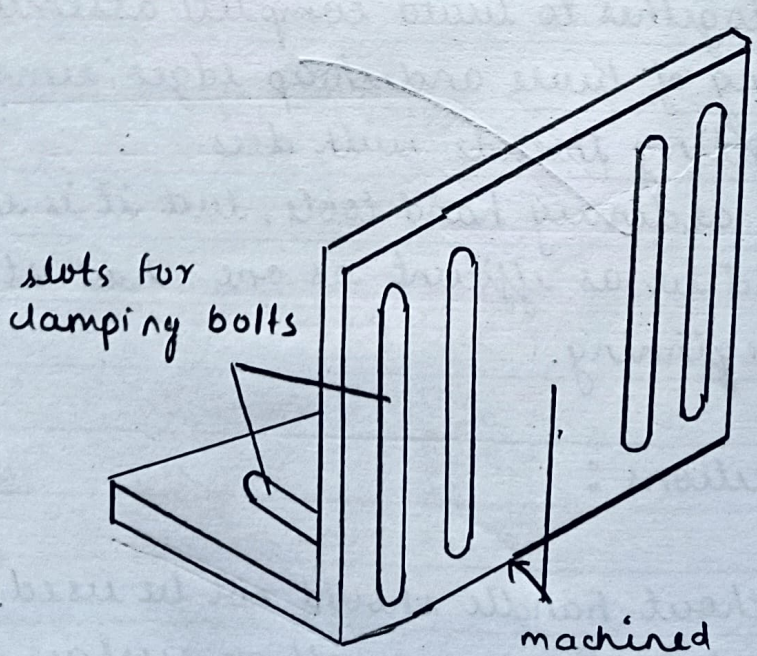


surface plate



3. Job should be hold firmly on vice
4. Files should be help away from measuring tools.
5. Do not clean job by hand during filing operation
6. We must be aware of working of machine before use
7. Use of blank tools should not be avoided. files should be used perpendicular to work piece, otherwise inclined surface may be generated.

Common Hand tools

a] Hammers : consist of head and shaft. The shaft should be of appropriate size for the head. It is used to strike the job. A hand hammer weight 0.25 lb to 3 lb. Various types of hammer.

i] Ball pin hammer :
It is used for stiking on hand tools and for rivelding over the ends of rivels

ii] Cross pein hammer :
It is similar to ball pein hammer in shape & size except the pein. It is used for bending, stretching hammering inside curves and riveting in wood position

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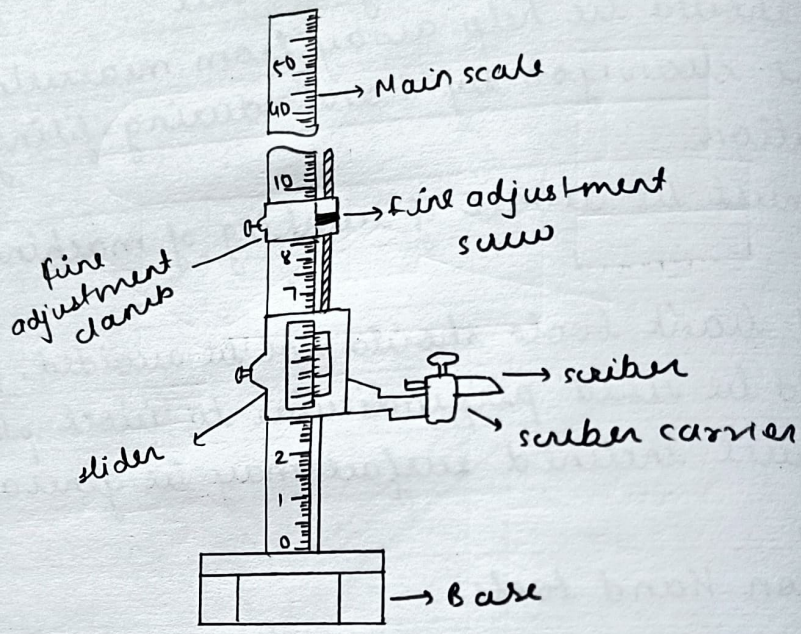
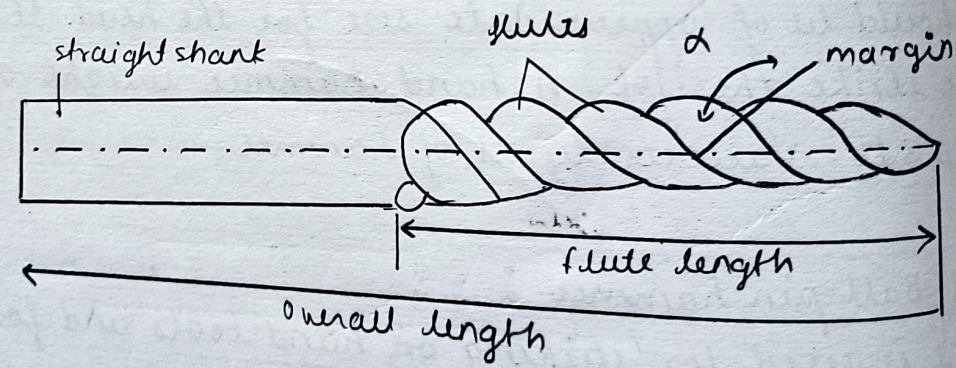


Vernier height guage



α - Helix angle

Twist drill

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iii) Straight pein hammer:

A pein straight is used for stretching or peining the metals. It is used at places where ball pein could not reach

iv) A soft hammer:

It is used to strike a blow with a minimum damage to the surface or when it is necessary to prevent damage to finished surface.

ब) Files

Files are used for smoothing or abrading material. It is most widely used hand tent. It consist of a) body b) long c) detachable handle. It is categorized under following subcategories

i) On basis of grades

depending upon pitch of teeth, files are categorised as a) rough b) bastard c) smooth d) second cut

ii) On basis of type of cut

Files are categorized as

a) single cut files

b) double cut files

c) Rash cut files

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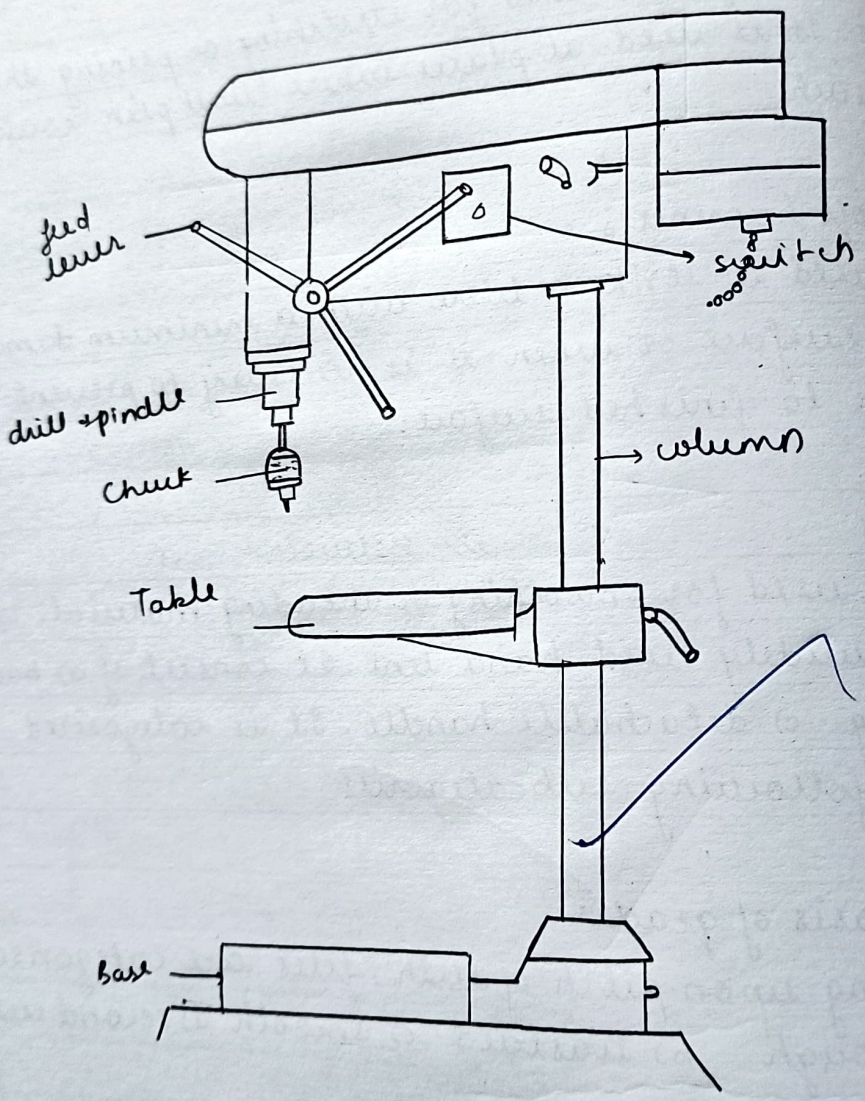

Benchdrill

iii) On the bas

a) Flat file :
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b) Square fi
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c) triangul
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d) Round
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e) Half
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iii) On the basis of shapes

a) Flat file : It is used for general surfacing work both faces are double cut and both edges are single cut. It is tapered in width and thickness.

b) Square file :
It is used for filling in corners. It is double cut on all sides and tapers

c) triangular file :
It is used for filing corners between 60° and 90°

d) Round file :
It is used for opening out holes and rounding inside corners.

e) Half round file :
The flat side is used for general work and the half round side for filling concave surface. It is double cut on both sides.

f) Knife edged file :
It is used for cleaning out acute angled corners the two faces are double cut while the edge is single cut.

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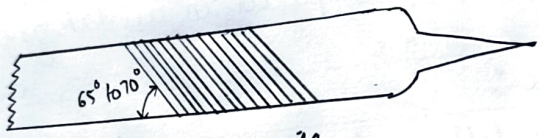
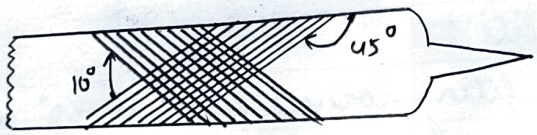


Single cut file



double cut file

g) needle files :
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Scrapers
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g) needle file:
They are externally delicate and are used for fine work such as picked designs in the metal.

Scrapers
It consist of a handle and a blade. It is a hand cutting tools which is used to remove metal from surface in the form of thin slices to produce fine, smooth surface.
Following are some types of scrapers.

i] Flat scraps
It is used for remaining slight irregulate from flat surface.

ii] Half round scraps
It is used for scraping internal cylindrical surface. It removes high spots in bores and bearing to give right type of fill to mating shaft

iii] Three square scraps
Looks some as half round scraps but since it comes to a sharp point at the tip. It removes burrs at the edge of small holes where half round scraps could not enter.

Chisels

A cold chisel is a bruger tool used to shear, cut and chipe cold metal one end of chisel is hardened and ground to make agent cutting edge.

Cold chisel are used in repair work such as removal of rivet heads or the cutting of nuts and bolts which are rusted.

Their are four types of chisel :

i] Flat chisel

It is the most commonly used cold chisel. It is used for chipping flat surfaces, dressing the fine off castings, cutting sheet metal, etc.

ii] Cross cut chisel

It has a slimmer blade and is intended for chipping key ways and slots, thus it is more important than in case of the flat chisel that the cutting edge be wider then the blade to stop jamming

iii] Round - nose chisel

It is used for cutting grooves

iv] Diamond point chisel

It is used to cut vee grooves in metal to chip through

plate to clean out internal angles and to square up corner of slots.

Drills

A drill is used for machining holes in the materials using a drilling machine following are some types of drills.

i] Twist drills

Parallel shank drill are made up to 19mm in diameter they are mainly used with hand tools or small pillar drilling machine.

Parallel shank:

Size range from 0.20 nm upto 16mm

Taken shank drill are used to give a more positive drive and where quick changing is necessary

ii] Straight fluted drills

Have grooves or flutes running parallel to the drills axis This drill is incarument in standard practise as the chips do not come out of the hole automatically. It may be used for drilling brass, copper or rotten materials.

iii) Flat drills

These are seldom used now. They are unsuitable for deep holes as the swarf is not cleared.

Taps:

Taps are used to cut internal threads, in nuts or huts. either left or right hand.

Taps are usually made in sets of three

i) The taper tap

usually has two or three threads chamfered. the second tap can finish a through hole

ii) The plug hole has a full-sized untapered thread to the end and is the main finishing tap. In case of blind hole a plug hole must be used.

Dies

A die is used to cut external thread on the bolts, pipes, etc. the thread may be right or left hand. Different type of digs are.

a) Button dies

Allows limited amount of adjustisement in the depth it civil cut by means of screws in the stock which

spring it open or shot.

ii) Half dies:

It have the advantage of taking smaller cuts to reach carrot size the amount of material taken off can be controlled.

iii) Solid dies:

solid die nut is used repair a damaged thread not to cut a new one.

Calliper

Caliper are used to transfer and compare a dimension from one object to another or from a part to scale.

Outside calliper

The legs of outside calipers are current and turn inwards towards the points. They are used to take measurements of the job

Inside caliper

The legs of inside calliper are straight and turn outward towards the points. They are used for taking inside measurements.

POWER TOOL

1. Impact wrench

Specifications

M6 - M18 , 70 - 250 Nm , 230 V - 500 W , 2.4 A 50 Hz

5870005 43 , N last - 500 1300 min

Use:

Impact wrenches are widly used in industries such as automatic repairs , hearing equipment maintainence , product assembly , major construction project and any other instances where a high torque output is needed.

2. Cordless screw driver

Specification

Torque , max (hard . screwdriving application)
30 Nm

Torque , max (soft screw driving application 15 Nm)

No load speed (1^{st} gear / 2^{nd} gear)
(0 - 400 / 1. 4000 rpm)

Battery type	N : Od
Battery voltage	14 . 4 V
Battery capacity	1.5 A
weight including battery	1.7 kg

Dated .....

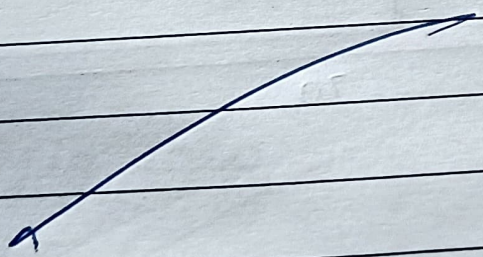
Hack Saw :

It is two dial tool used fitter for cutting rods, pipes and brass of desired length. It consist of metal frame which may be solid.

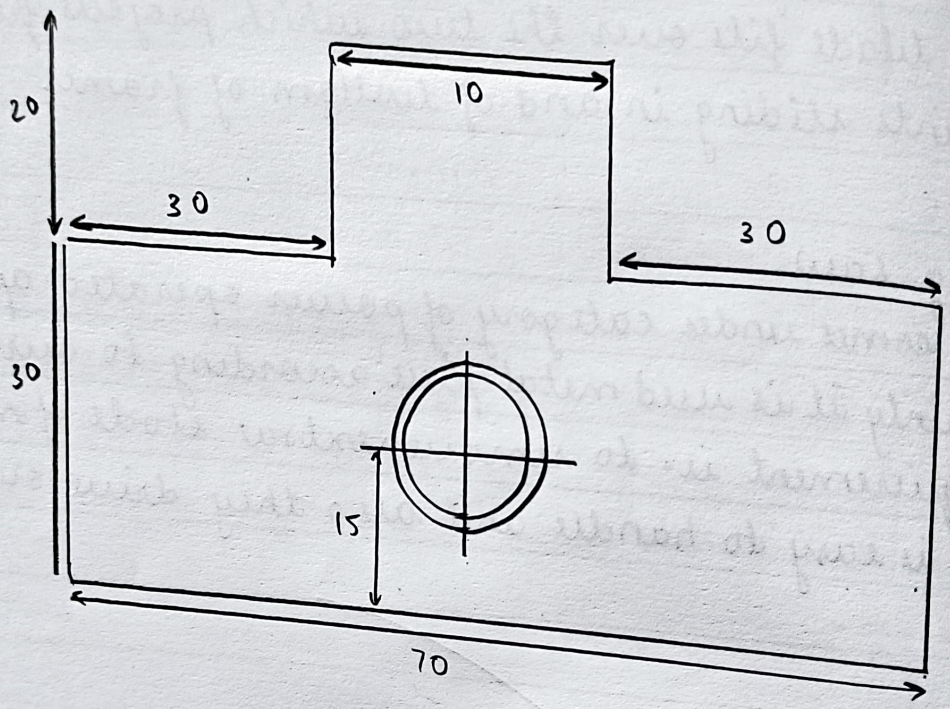
The blade fits over the two which projects from two points sliding in and of bottom of frame.

Jig saw

It comes under category of power operated appliances Mainly it is used metal pipe according to our requirement ie. to remove extra stock of material It is easy to handle and also they drive our time.



EXERCISE



EXERCISE

- **Aim**

To prepare multi operational job as per drawing

- **Material required**

Acrylic sheet 75 x 55 x 8 mm

- **Tool required**

Bench vice, Bastard jig file, smooth file, surface plate, steel foot rule, try square, vernier height guage, Jig saw, cordless drilling machine

- **Procedure**

1. cutting by jig saw
2. Right angle
3. Marking
4. Square cutting by Jig saw
5. Drilling by cordless drilling machine
6. Tapping M107
7. Finishing
8. Inspection

. Precautions

1. Files without handles should not be used
2. There should be no grease or oil on surface of job
3. Do not wear loose cloth in shop
   Job should be held firmly in vice
4. Must aware yourself about work of machine
   before start.
5. Files should be kept away from measuring
   instrument.

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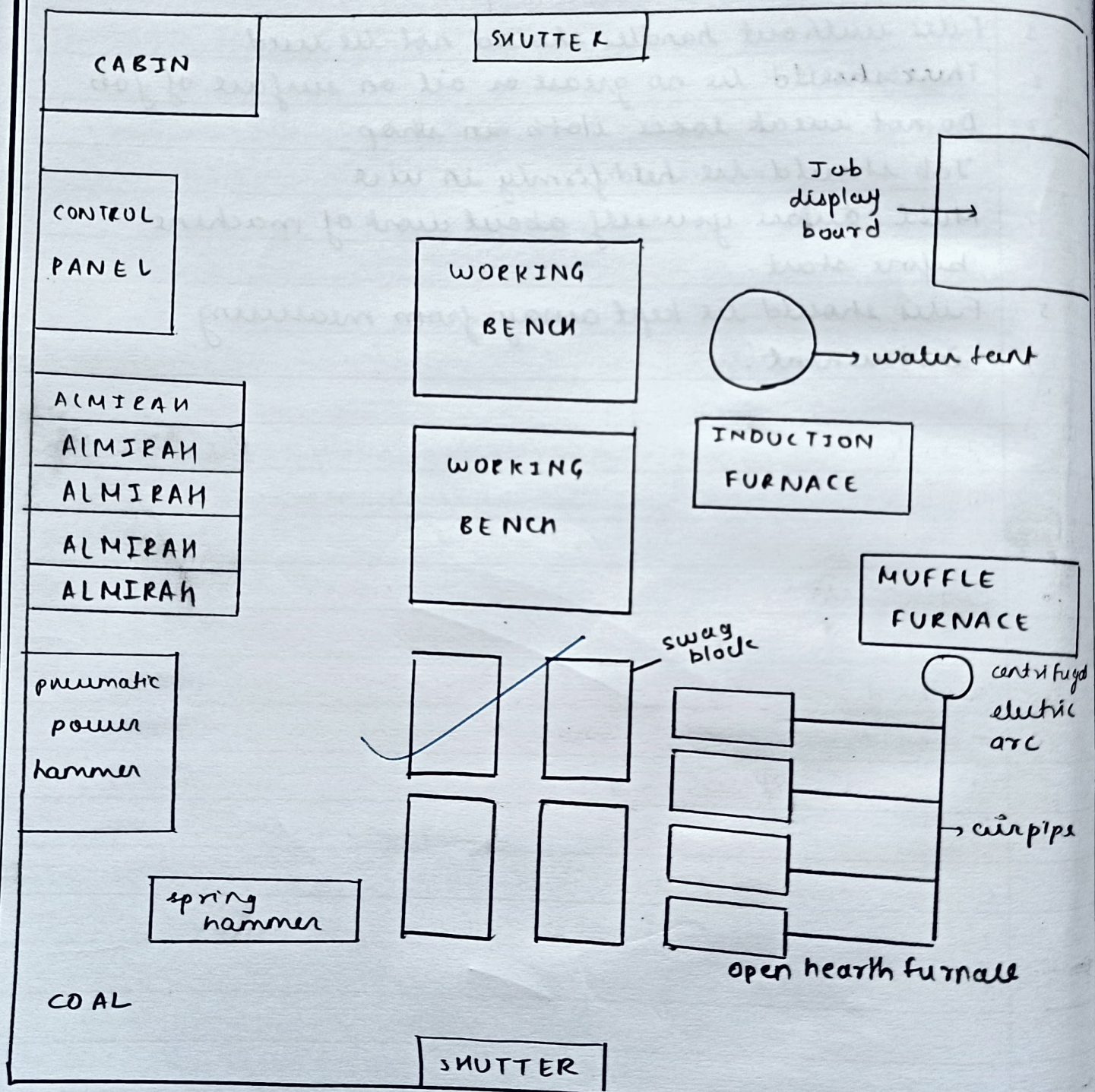
layout of smithy shop.



Signature

SMITHY SHOP

- **Introduction:**

In order to produce the desired shape or to improve the properties of any metal, shaping is done. Shaping process may be divided into two main groups:

a) cutting
b) non cutting

- Smithy is defined to handle relatively small jobs only such as that can be treated in hearth or open fire, and the work is carried out by using of hand hammers or small power hammers.

- Forging refers to the production of those jobs which must be heated in closed furnaces. The part of the job where forging is done is turned as forge.

- Forging is defined as the controlled plastic deformation or working of metal into predetermined shapes.

- Forging implies the use of powerful pressure from a hammer or press on metal which has been heated to a plastic range.

The normal plastic range for steels and high strength alloys is from about 1038°C to 1260°C, for brasses and bronzes from about 593°C to 928°C and for aluminium & magnesium alloys, from about 343°C to 510°C

During forging, the material should have sufficient flow properties and work at the upper limit of material potential strength so as to fill the die cavity without resulting in cracks in the material

Forging is cost effective way to produce net-shape or near-net-shape components. Virtually all metals can be forged. This makes an extensive range of physical and mechanical properties available in products with the highest structural integrity

* Advantages of forging

Forged parts possess high ductility and great resistance to impact and fatigue loads. Forgings refines the structure of the metal. It results in considerable saving in time, laborer and material as compared to the production of similar item by cutting from solid stock and then shaping it forging distorts the previously created

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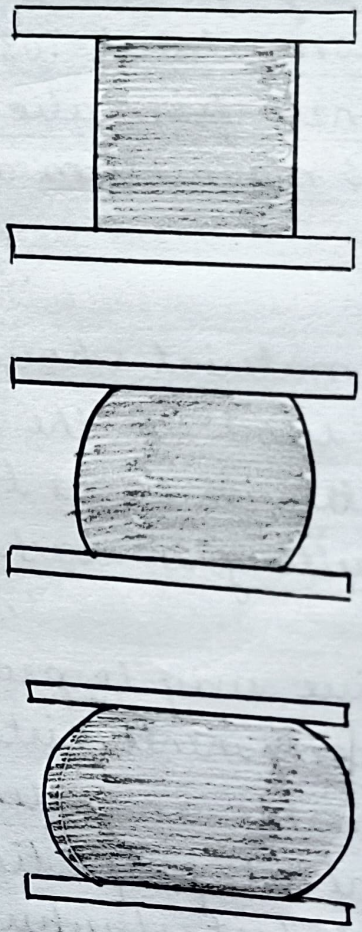

Open die forging

Signature

unidirectional fibre is created by rolling and increases the strength by setting the direction of grains.

Because of intense working, flaws are rarely found. so have good reliability. The reasonable degree of accuracy may be obtained in forging operation. The forged parts can be easily welded

Disadvantages of forging

Rapid oxidation in forging of metal surface at high temperature results in scaling which scars the dies. The close tolerances in forging operations are difficult to maintain. Forging is limited to simple shapes and has limitation for parts having undercuts, etc. some materials are not readily worked by forging. The initial cost of forging dies and the cost of their maintainence is high. The metals gets cracked or distorted if worked below a specifies temperature limit. The maintainence cost of forging is also very high

Types of forging

1. Open die forging

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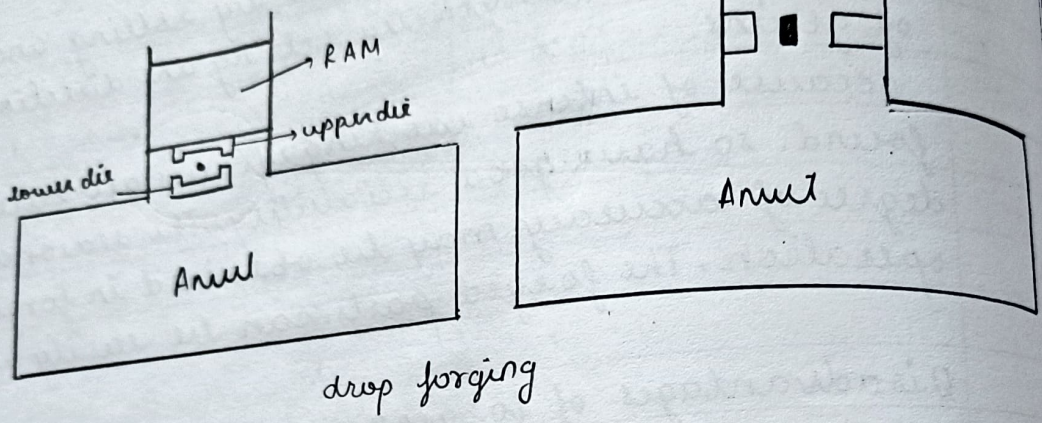
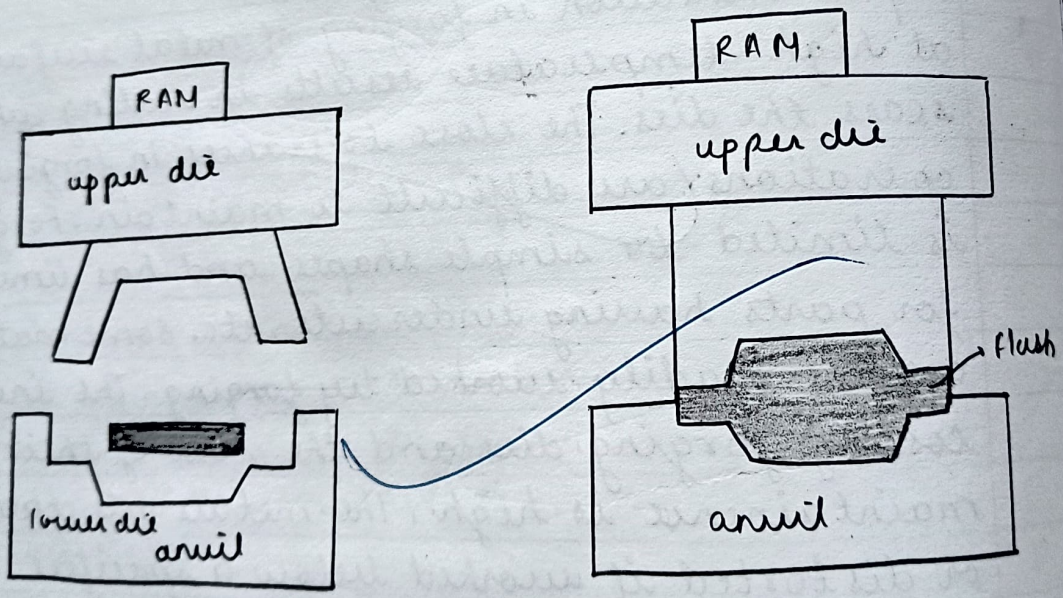


drop forging



Press forging

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2. Closed

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In this type of forging process the work piece is heated to very high temperature and it is placed on a flat surface and hit using a hammer to obtain the desired shape. This type of forging is very simple and flexible. It is very much useful in producing rough component like chisels, bolts and rectangular circular, hexagonal shapes. In this the forging hit is either by hand or by power.

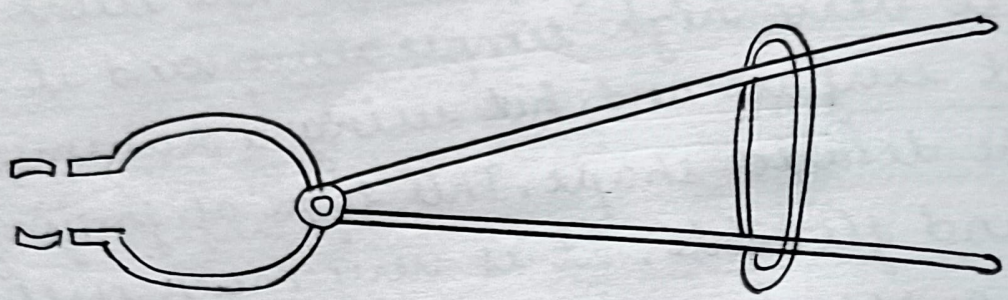
2. Closed die forging

i) Drop forging

The impression die used in this process is called as closed die. The upper die is fitted on the ram and lower die is fitted on the anvil. Both the dies have impression. Two rollers are held on the board supporting the ram. These roller rotates in opposite direction to each other. This makes it to drive the board upward and lifts the ram

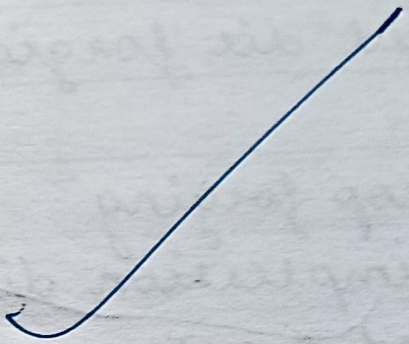
ii) Press forging

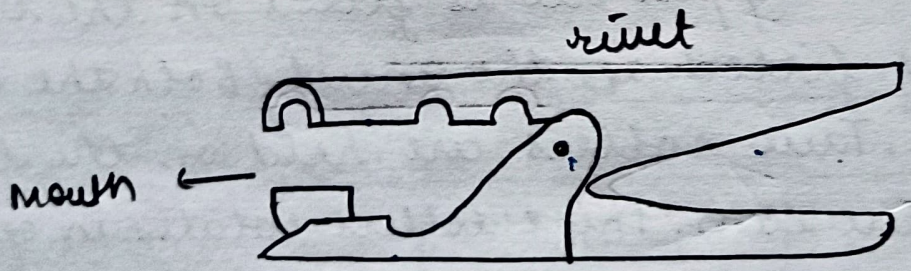
It is done with the help of a press. The press may either be operated mechanically or hydraulically. It is a slow squeezing process rather than delivering blows.



Round nose

gad tongs





The lower die is fitted with the anvil and the upper die is fitted with ram. The ram is slowly moved down & it slowly presses the metal. The finished component may be removed from the die with the help of ejectors in die set.

(iii) Upset forging

The process is generally used to make head of bolts, rivets or pins. The shape of the head may be square, hexagon or hemispherical. The machine holds a die set which consist of fixed die and movable punch. The heated metal bar is held punch. So desired shape is obtained with the help of die-cavity.

(iv) Roll forging

The roll forging machine consist of two horizontal rolls. The heated metal bar is passed between the two rolls. Roll forging is performed in an impression-die. A bar of heated rod is passed between the rolls. As the rolls rotate heated metal is used for reducing the cross sectional area and for producing taper ends

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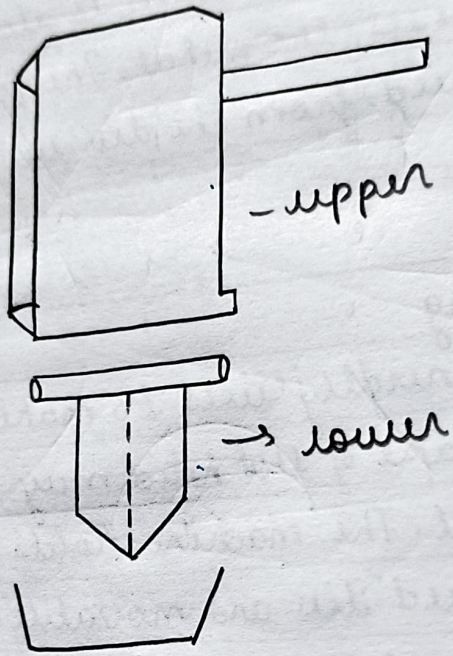
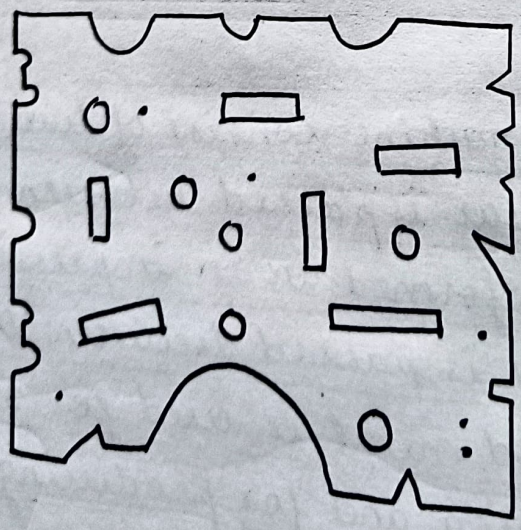


rollers



swage block

Serial No.

Tools used for smithy shop

1. **Tongs :**

The work to be forged is generally held with tongs. The tongs generally used for holding work are :

1. The gad toys are used for general pick up work, either straight or tapered.
2. The straight-tip fluted tong used for square, circular and hexagonal bar stock.
3. The ring tong used for bolts, rivets and other work for circular section
4. The flat tong used for holding work of rectangular section

2. **Fullers**

Fullers are used for work reeking done a piece of work. They are made in top and bottom tools as in case of swages. Fullers are made in various shapes and sizes according to needs, the size denoting the width of the ruler.

3. **Anvil**

The anvil is an important smith tool. It is used for supporting the work while hot metal hammering The hardie hole is of square shape and is used for

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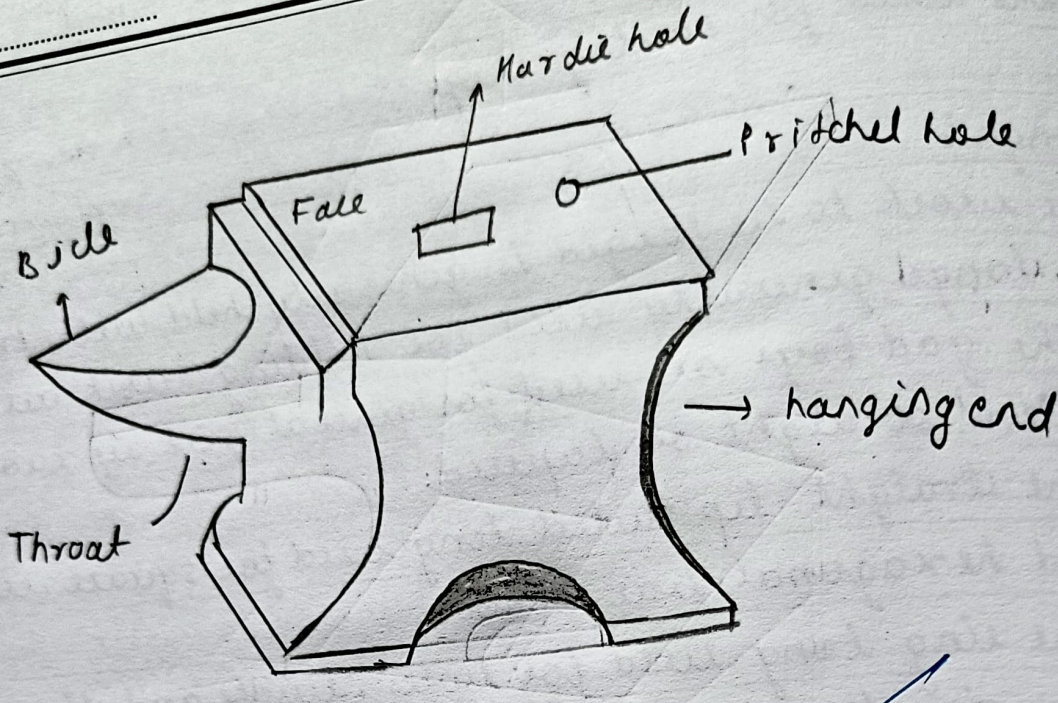
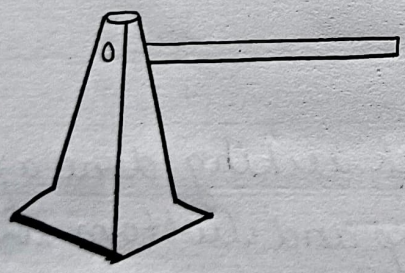
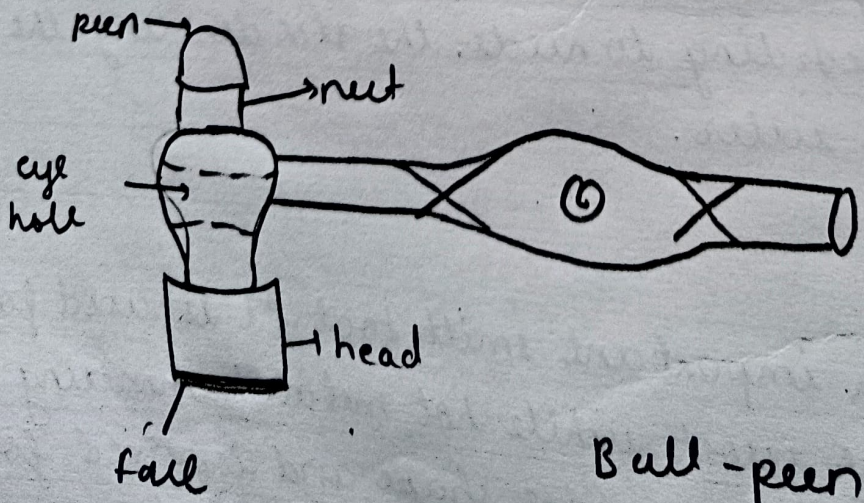


Anvil



Flatter



Ball-peen hammer

holding square shank of swages, fullers, etc while the pritched hole is of circular shape is used for bending rods of small diameter and as a die for hot punching

4. Swage Block

It is a block of cast steel consisting of a number of slots of different shapes and size along its four side faces. It has through holes from top face to bottom face which vary in shapes and sizes, heading, bending punching and forming operations. The swage block is supported on a cast iron base.

5. Hardie

It is fitted in the hardie hole provided in the tail of anvil. It has a cutting edge at the top of body. During cutting or shaving operation. Chisel are used in conjution with this bottom cutting tool. It is made by high carbon steel.

Flatter

A flatter is used to finish off surface and flattened roughly of large surface area. Flatter is used after using hand hammer and remove the marks of the hammer.

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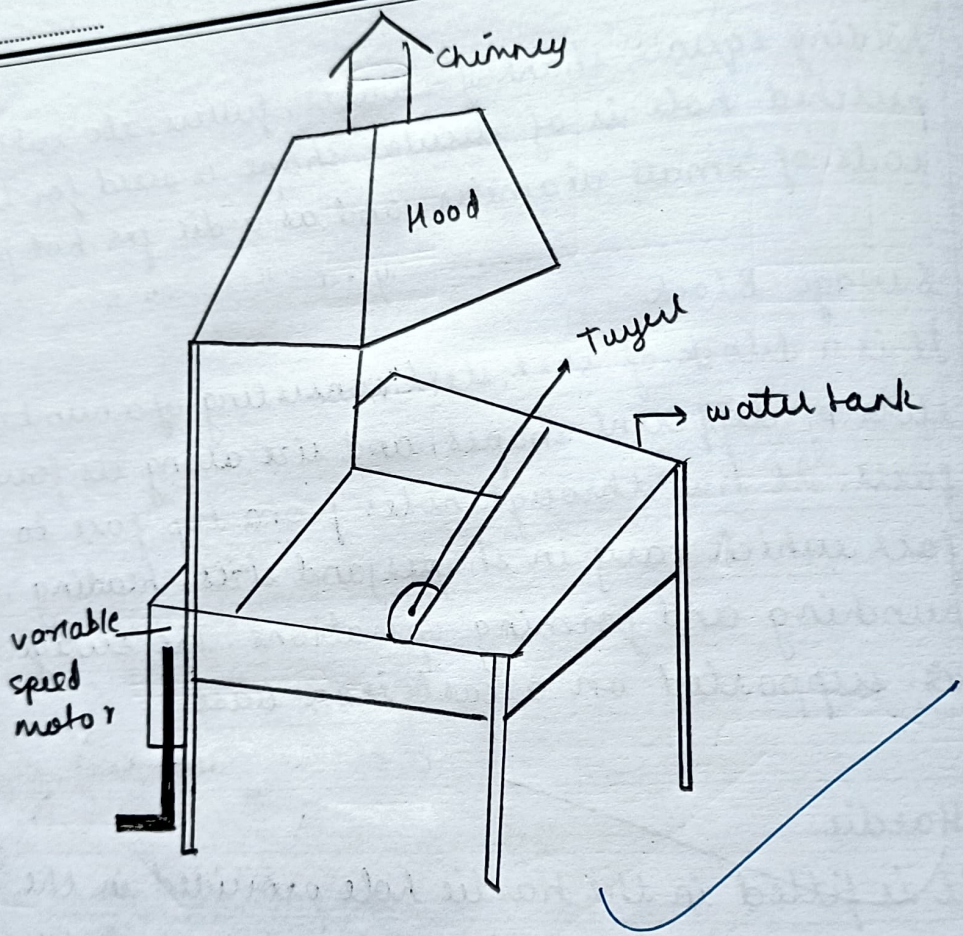


open hearth furnace

Serial No. 32

Dated .....

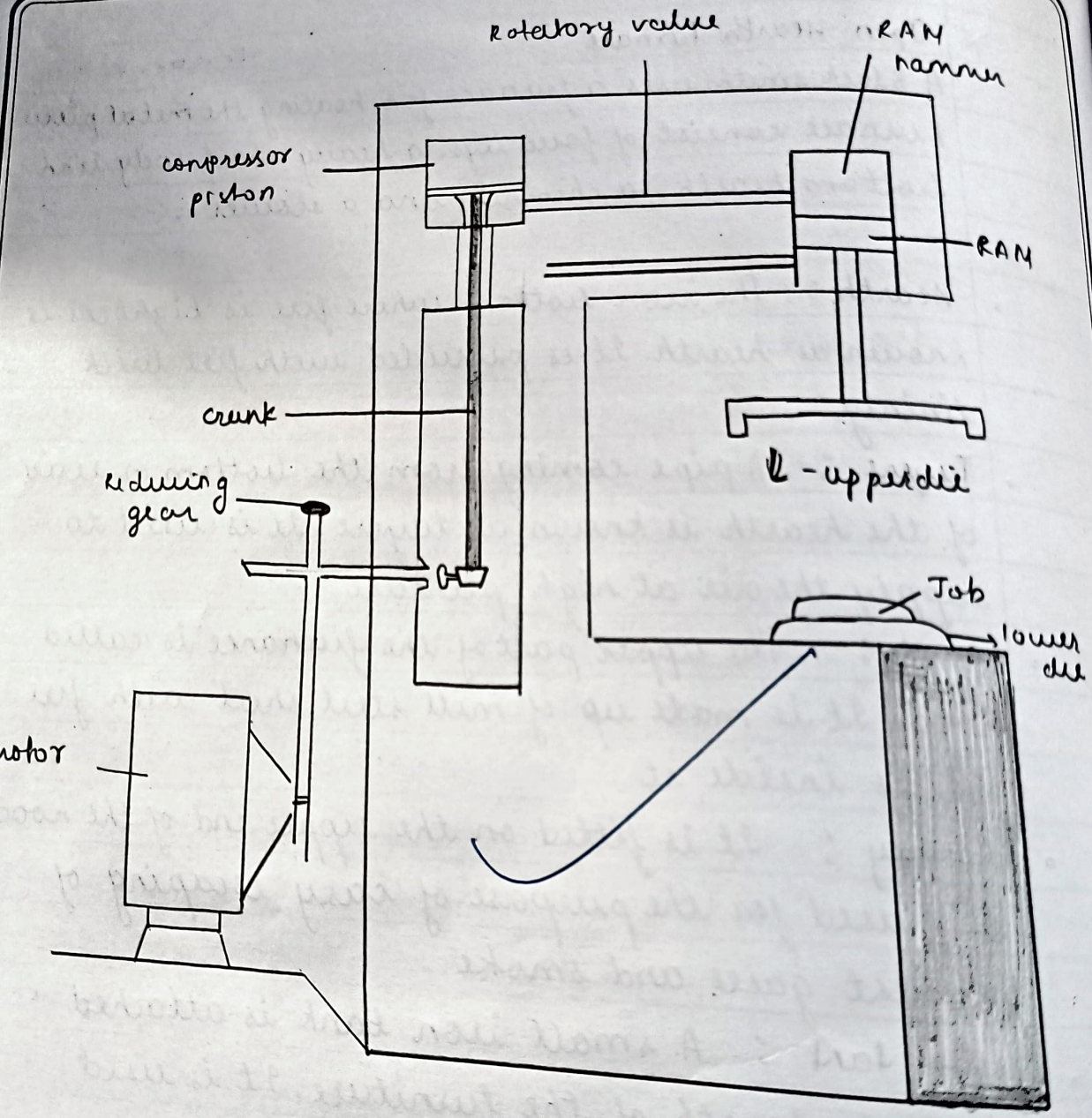
* Open Hearth Furnace

A Black smith uses a furnace for heating the metal pieces. Furnace consist of four legs. a heavy sheet body iron bottom hearth. a chimney and a blower

- Hearth : The iron bottom where fire is bightess is known as hearth. It is provided with fire brick lining.
- Tuyere : A pipe coming from the bottom or rear of the hearth is known as tuyere. It is used to supply the air at high pressure
- Hood : The upper part of the furnance is called hood. It is made up of mill steel sheet with fire bricks inside it
- Chimney : It is fitted on the upper end of the hood It is used for the purpose of easy escaping of exhaust gases and smoke
- Water tank : A small iron tank is attached with the hearth of the furniture. It is used for dipping purposes

* Accesories for forging furnace

- Shovel : It is used to place the coal into the furnace hearth.



Pneumatic power hammer

Signature

Blower : It is used to supply air at high pressure to the hearth

Poker : It is hand rod used to strike fire. Poker is made up of mild steel

Regulator or Air value : It is used to control the supply of air to the hearth. Air supply is controlled by increasing or decreasing the passage of air

Pneumatic (power Hammer)

Introduction

The process of imparting a desired shape to a metal piece by heating and hammering is known as forging In the forging, power hammer is used for given the desired shape to a hot metal. The pneumatic hammer is widely used for given the shape and operated by electric power. In these hammers, the compressive force is applied continuously and the material is gradually pressed or squeezed into the required shape. Power pneumatic force have the compressor to generate the air and air is used for given the movements of tap and spindle. It consist of two cylinder in front of the hammer and other is in back position. The piston of back cylinder is connected to a meter by a crank and connecting rod.

This piston of front cylinder carries a type which slides between the inside fixed guides. Air is passed through two air values in front cylinder below & above piston.

During operation, piston of sack cylinder moves downward then in front cylinder piston got motion upward due to creation of vacuum. When piston of sack gets upward front cylinders, piston goes downward due to compressed air which is created in front cylinders. Intensity of blow control by operating values which is controlled by liver or pedestral

Working Principle

Hot metal is supported in the anvil and hammered by top of the hammer, which is operated by pressing foot pedestral by pressing foot pedestral air is allowed to enter the front cylinder where top and spindle got the motion up and down and to give required shape to hot metal

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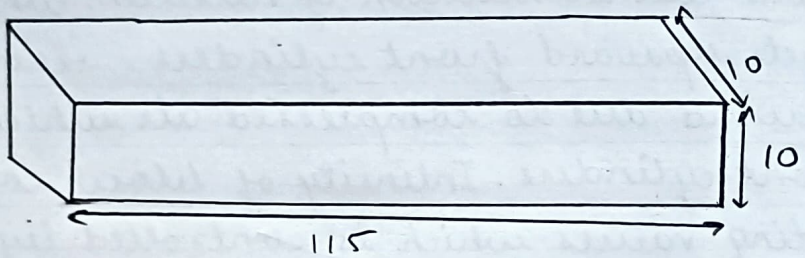
PRACTICE JOB



All dimensions are in mm

Signature

PRACTICE JOB

Aim :

To prepare a square job as per drawing given alongside

Material required :

MS Round ϕ 16 x 10mm, steam coal

Tool required

Open hearth furnace, Ball pen hammer, round mouth tongs, square mouth tong, anvil, poker shovel, steel foot rule

Steps / operation

1. Holding
2. Heating
3. Hammering
4. Swaging
5. Upsetting
6. Measuring
7. Finishing

Schedule

Introduction about tools, machines like power

hammer, spring hammer, induction heating furnace and muffle furnace layout of shop. Practice the operation like holding, heating, hammering, swaging and upsetting

Precautions

1. Hold the job firmly in the tong
2. Do not touch the hot job with bare hands
3. Draw out the job from furnace when it becomes in yellow hot state.
4. Heat the work piece to the specified temperature.

Sir