

GrimScythe2001

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### 1. INTRODUCTION TO TRADE:

Fitting consists of a hand work involved in fitting together the components. It is usually performed at a bench equipped with a vice and hand tools.

An operator who does the fitting job is called a fitter and the work done by him is called fitting.

There are various groups of fitters, such as branch fitters, assemble fitters, erection fitters etc. Here we study about a bench fitter.

The bench fitter must know the terms of fitting such as to fit on, to fit up, to fit under etc. which shows the position of fitting such as vertical, horizontal, inclined, parallel etc. with the terms of the mode of fitting such as push fit, drive fit, running fit etc. In all the terms, the running fit mating compound components have a close relationship with each other and when they function together is termed as fitting.

After the completion of as many operations, the jobs come out successfully from the workshop. Therefore, the fitters must know the various operations as well as the details of the tools such as definition, material parts, types, uses, care, maintenance etc.

## STATEMENT OF EXPENSES

For the month of January 1852  
I have the honor to state that the expenses of the  
Institution during the month of January were \$1000.  
The amount of money received from the State of Maine  
was \$1000.00 which was used to pay the expenses of the  
Institution.

## 20. SAFETY PRECAUTION:

Before entering the workshop, all are bound to adopt the safety precaution rules strictly to avoid any possible accidents. Many of the accidents occur due to carelessness, since they fail to follow the safety rules.

The following points are simple but they are the main causes of accidents:

1. Improper dress
2. Poor Judgement.
3. Lack of Interest.
4. Ignorance
5. Fatigue
6. Inattentiveness
7. Over-confidence
8. Worries
9. Dullness
10. Insufficient space
11. Poor physical fitness
12. Improper handling of tools and devices
13. Lack of seriousness

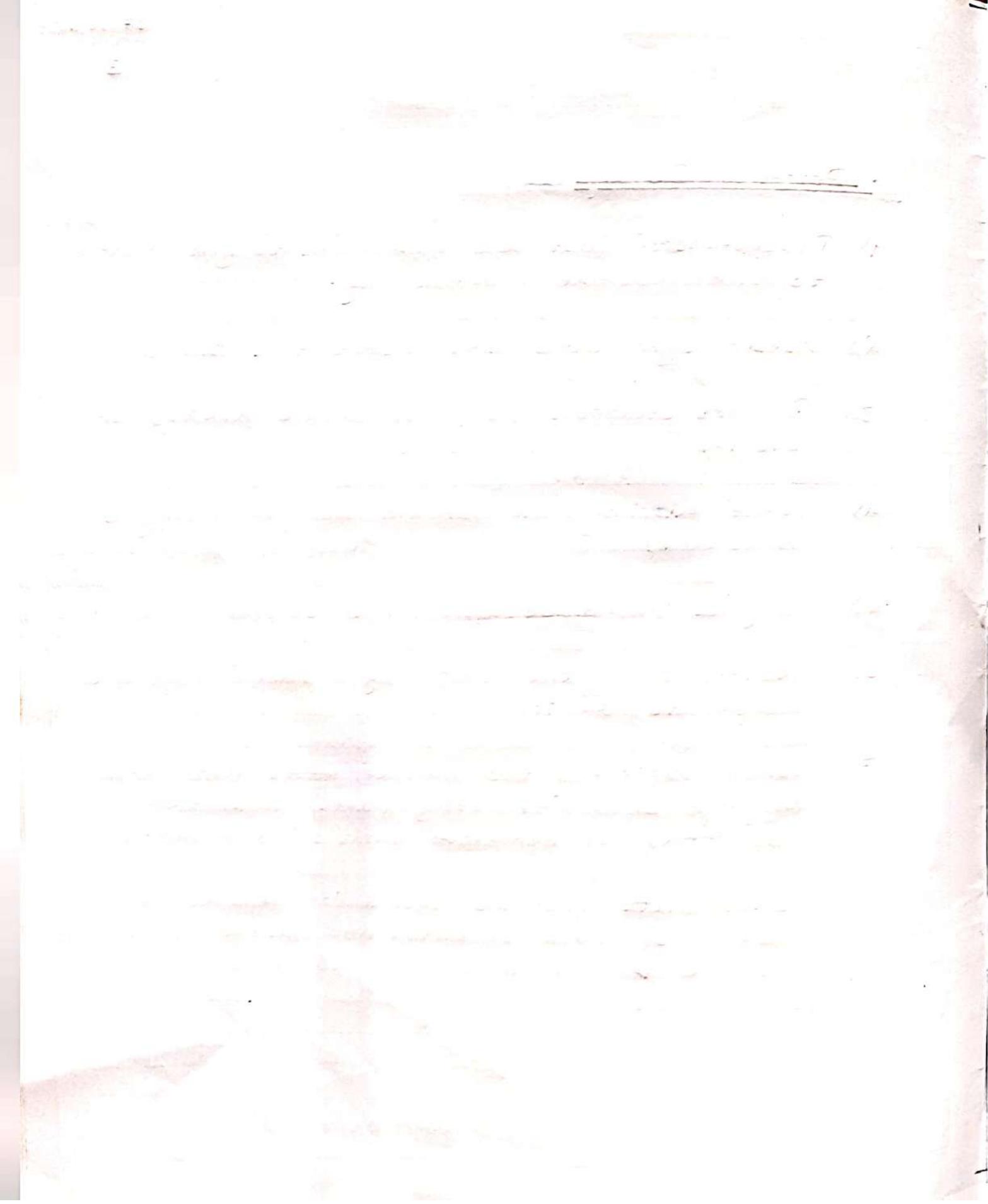


• Personal Safety:

- 1) Protect self first and never fail to give protection to the machine immediately.
- 2) Wear tight dress and insert the shirts.
- 3) Rubber chappals (slippers) should always be avoided.
- 4) While working, we should not wear ring or a watch.
- 5) Goggles should be worn while chipping or grinding.
- 6) Never clean the chips by hands. Always use brush to do so.
- 7) While operating the machine, never put hands or legs or other body parts near the operating or dangerous parts of the machine.
- 8) Immediate first aid should be applied in case of burn or cuts, and further treatment should be carried out immediately.

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### 3. A FEW OPERATIONS:

Marking, chipping, sawing, filing, scraping, soldering, drilling, reaming, threading, grinding, riveting, brazing, forging, welding etc.

#### (i) FILING:

Filing is the most important operation and is usually done after chipping. It serves to remove the burr from the cuts and clean the fault of the cuts, and to finish the final shape of a work-piece.

#### HINTS ON FILING:

- (a) A file should not be used without a handle.
- (b) File should be used as per the nature of work.
- (c) Smooth files should be used only on finishing stage.
- (d) Do not let file to hit the vice floor.
- (e) Never rub your fingers on the jar or the file.
- (f) A tuning file should not be continued.
- (g) Pressure should not be applied on return stroke.

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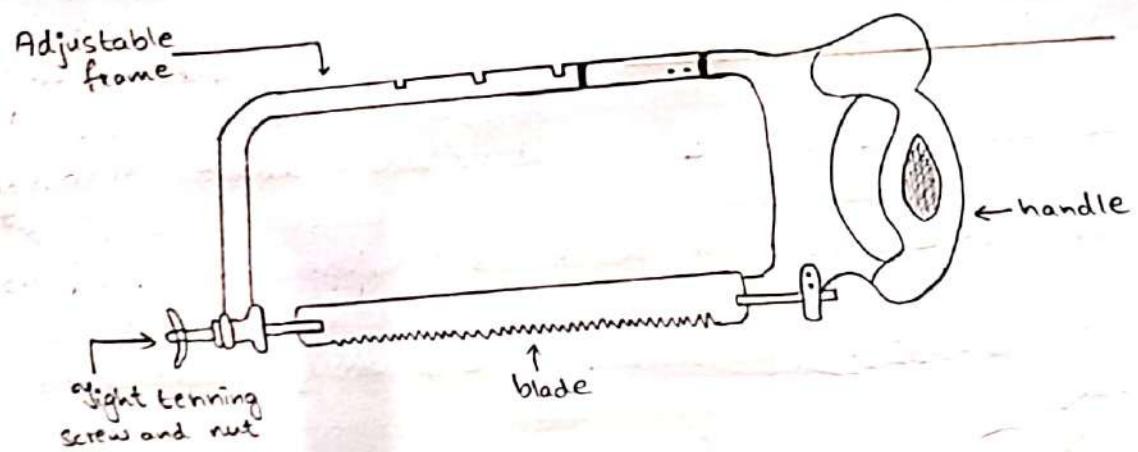
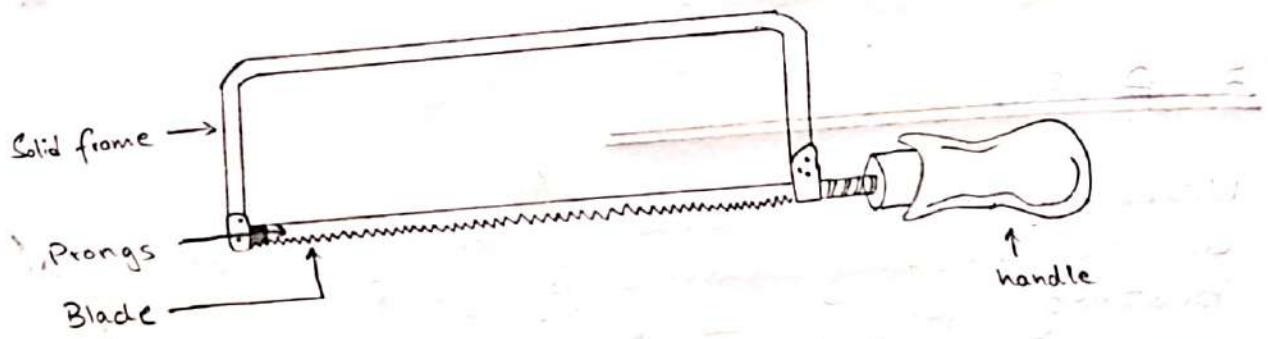


fig.: Different parts of hand saw

(ii) SAWING:

Hacksawing is the quickest method of severing, shaping and slotting cold metal. The work to be sawn should be held tightly on the vice.

(iii) MARKING:

Marking out consists of marking on the job a series of definite lines or positions. These lines act as a guide to the fitter who will have to work on the job after it has been marked out.

(iv) DRILLING:

It is a operation of producing circular holes in a metal piece. This is done with the help of a drilling machine. The pillar drilling machine is frequently used for fitting shop.

4. CUTTING Tools:(i) HACKSAW:

The hacksaw is used for sawing all metals except hardened steel. A hand hacksaw consists of a frame handle, prongs, tightening screw and nut and a blade. The frame is made to hold the blade tightly. They are made in two types-

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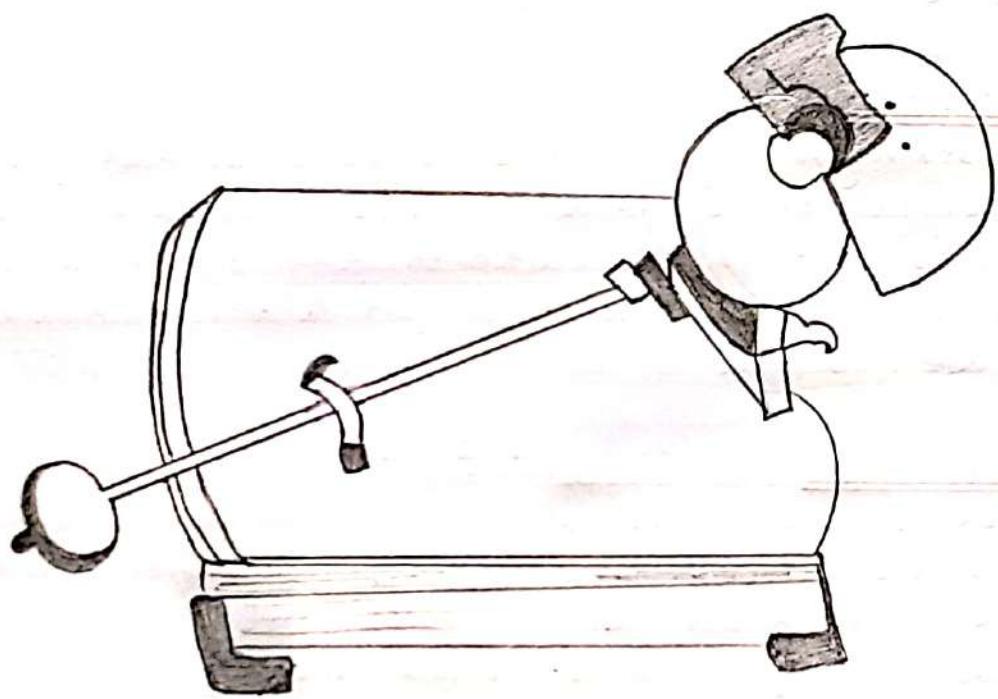


fig.: Chop Saw

a) The solid frame in which the length can't be changed.

b) The adjustable frame which has a back that can be lengthened or shortened to hold blades of different length.

Hacksaw blades are made of special steels. The blades may be hard or of the most flexible type. All the hard blades made of high speed are used for cutting the harder metals.

#### 8.(iii) Power Hacksaw:

The power hacksaw is very similar to the hand hacksaw with the addition of a suitable driving mechanism. The drive is given either by a belt from a line shaft or by an enclosed motor. Suitable mechanisms are provided where by the length of the stroke and the weight applied may be varied or many metals cutting fluid is used during the sawing and this is pumped on the blades while the machine is working.

#### (iii) Chop Saw:

A chop saw is a power tool used to make quick, accurate crosscut in a work piece at a selected angle. It is commonly used in framing operations and the cutting of moldings. Most chop saws are relatively small and portable.

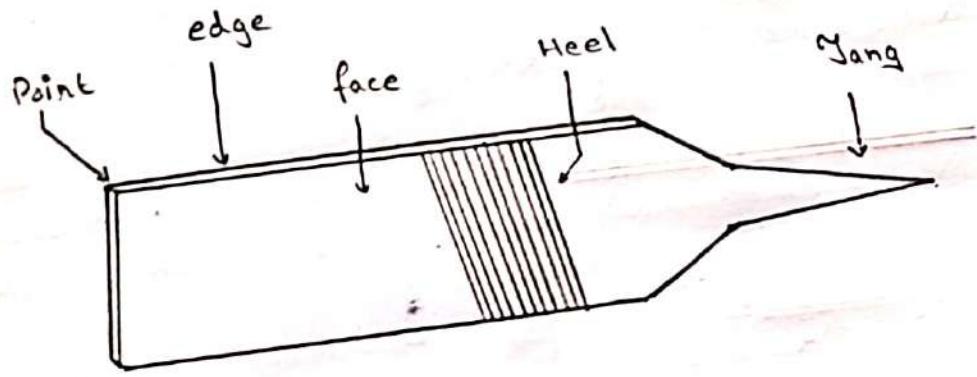


fig: Different Parts of File

with common blades' sizes ranging from eight to twelve inches.

Chop saw makes cut by pulling a spinning circular saw blade down onto a work piece in a short, controlled motion. The workpiece is typically held against a fence.

(iv) FILES:

A file is a hardened piece of high grade steel with standing rows of teeth. It is used to cut, smooth, adjust to fit metal parts. It cuts all metals except hardened steel.

A file consists of the following parts-

- (i) Tang
- (ii) Handle
- (iii) Ferrule
- (iv) Edge
- (v) Heel
- (vi) Shoulder
- (vii) Tip or point
- (viii) Side.

The tang is pointed out part which is fitted to the handle. The point is next to the handle. The safe edge or side of a file is that which has no teeth.

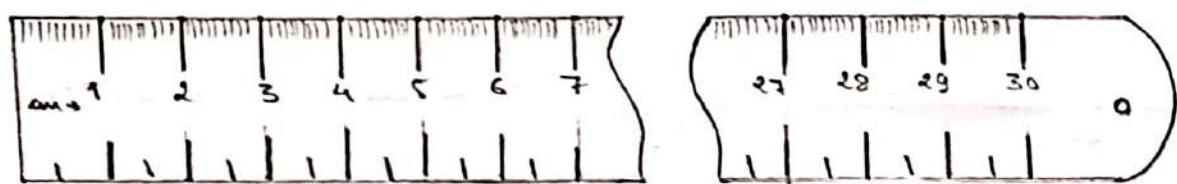


fig.: Steel Rule

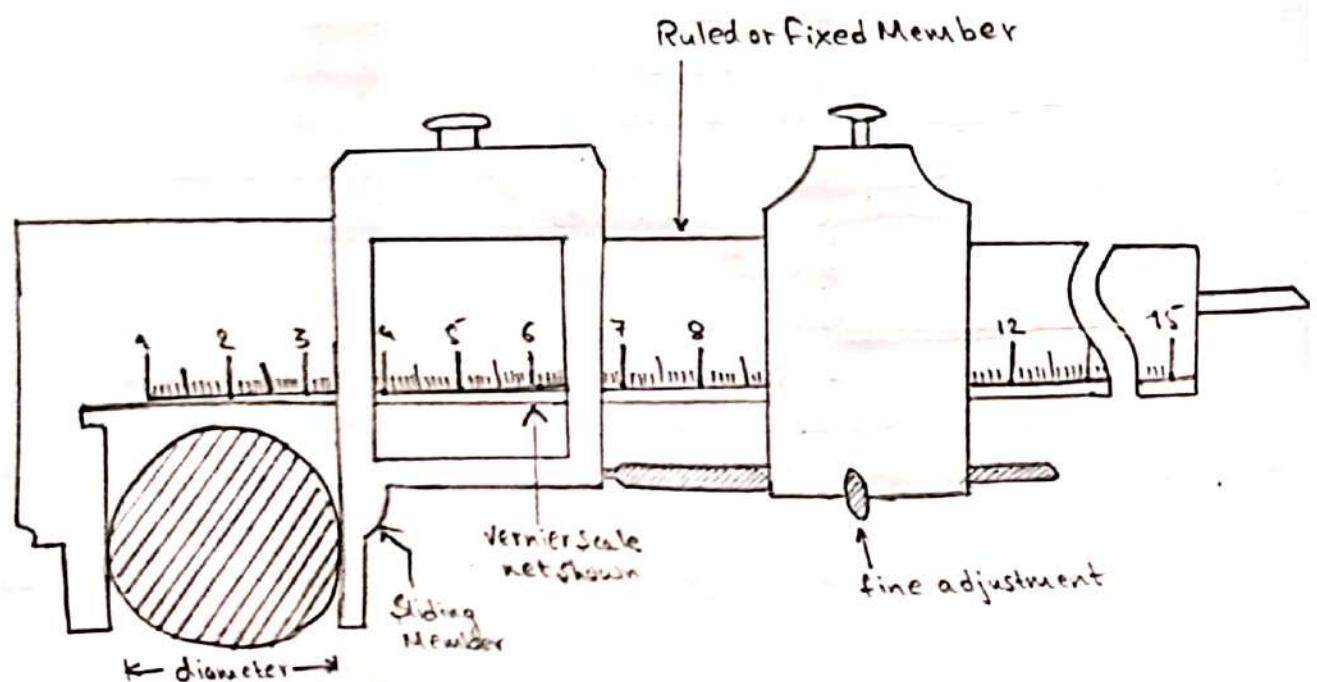


fig: Vernier Calliper

## S. MEASURING TOOLS:

### (i) STEEL RULE:

The steel rule is one of the most useful tool in the shop for taking linear measurement of blanks and articles to an accuracy from 1.0 to 0.5 mm. It consists of a strip of hardened steel having line graduations engraved at interval of fraction of a standard unit of length. Depending upon the interval at which the graduations are made the scales can be manufactured in different sizes and styles.

### (ii) VERNIER CALLIPER:

The vernier calliper is primarily intended for measuring both inside and outside diameters of shafts, thickness of parts, etc. to an accuracy of 0.02 mm by a vernier scale attached to the calliper. A vernier scale is the name given to any scale making use of the difference between scales which are nearly, but not quite alike, for obtaining small differences.

It comprises a beam or main scale which carries the fixed graduations, two measuring jaws, a vernier calliper head having a vernier scale engraved unit and an auxiliary head can be locked.

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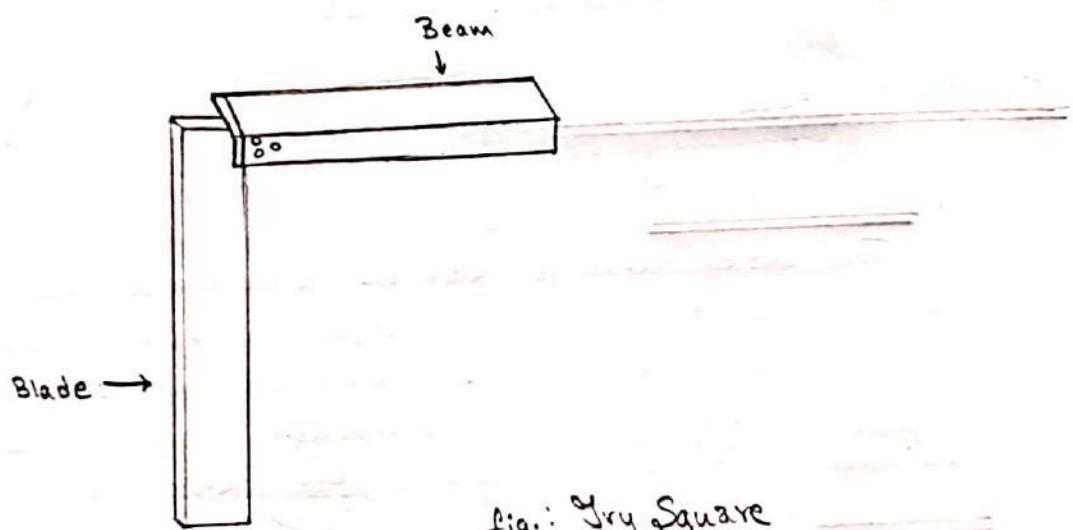


fig.: Try Square

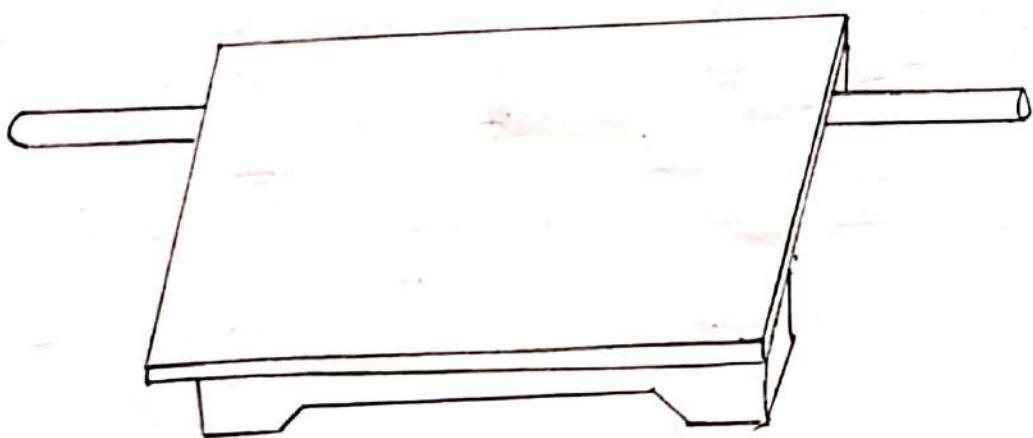


fig.: Surface Plate

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to the main scale by the knurled screw attached to each hand.

### (iii) TRY SQUARE:

The try square is made in one piece, both blade and beam. This is used when it is necessary to get another edge or surface exactly at right angles to an already trued edge or surface and also for laying out work. The squares of any square may be tested by placing the beam of the square against a straight edge with the blade resting on a smoother surface, while in this position a line may be scribed along the edge of the blade.

## 6. MARKING TOOLS:

### ii) SURFACE PLATE:

The surface plate is used for testing the flatness of work itself and is also used for larger jobs.

Surface plates are made of grey cast iron and of solid design or with ribs. They should be well and reflection free illuminated and rest horizontally on a firm support, the working height being about 800mm from the plate.

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fig: Prick Punch

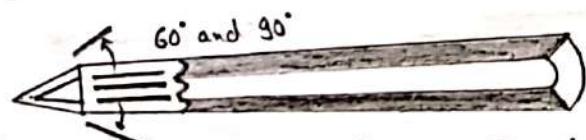


fig: Center Punch

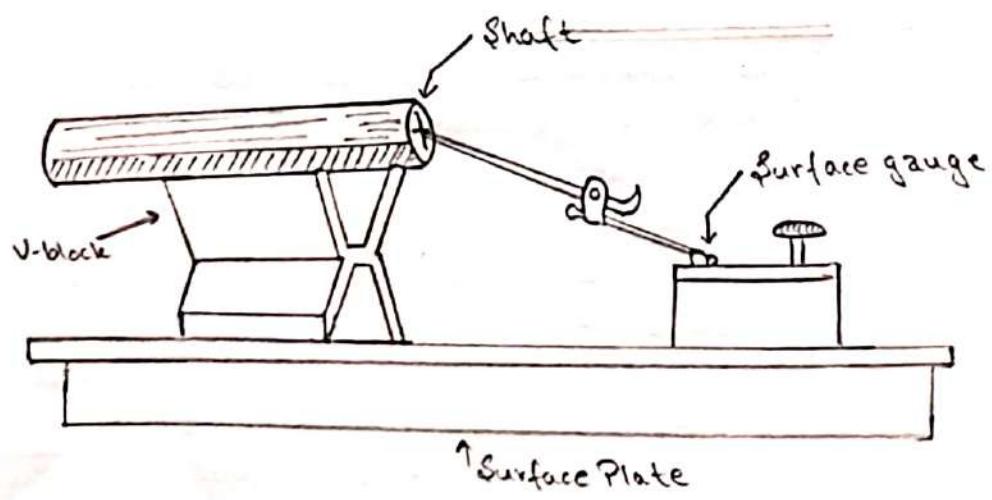


fig: Use of a V-Block

(iii) SCRIBER:

The scriber is a piece of hardened steel about 150 to 300 mm and 3 to 5mm. In diameter pointed one or both sides (ends) like 2 needle. It is held like a pencil to scratch or scribe lines on metal. The bent end is used to scratch lines in places where the straight end cannot reach. The ends are sharpened on an oilstone when necessary.

(iv) PUNCH:

A punch is used in a bench work for marking out work, locating centres etc. in a more permanent manner. Two types of punches are used :  
 (a) Prick punch  
 (b) Centre punch

The prick punch is a sharply pointed tool. The tapered point of the punch has an angle of usually  $40^{\circ}$ . It is used to make small punch marks on layout lines in order to make them last for a year.

The center punch looks like a prick punch. Its point has an angle more obtuse than that of prick punch point, this angle usually being  $60^{\circ}$ . It is used only to make the prick marks larger at the centers of holes to be drilled.

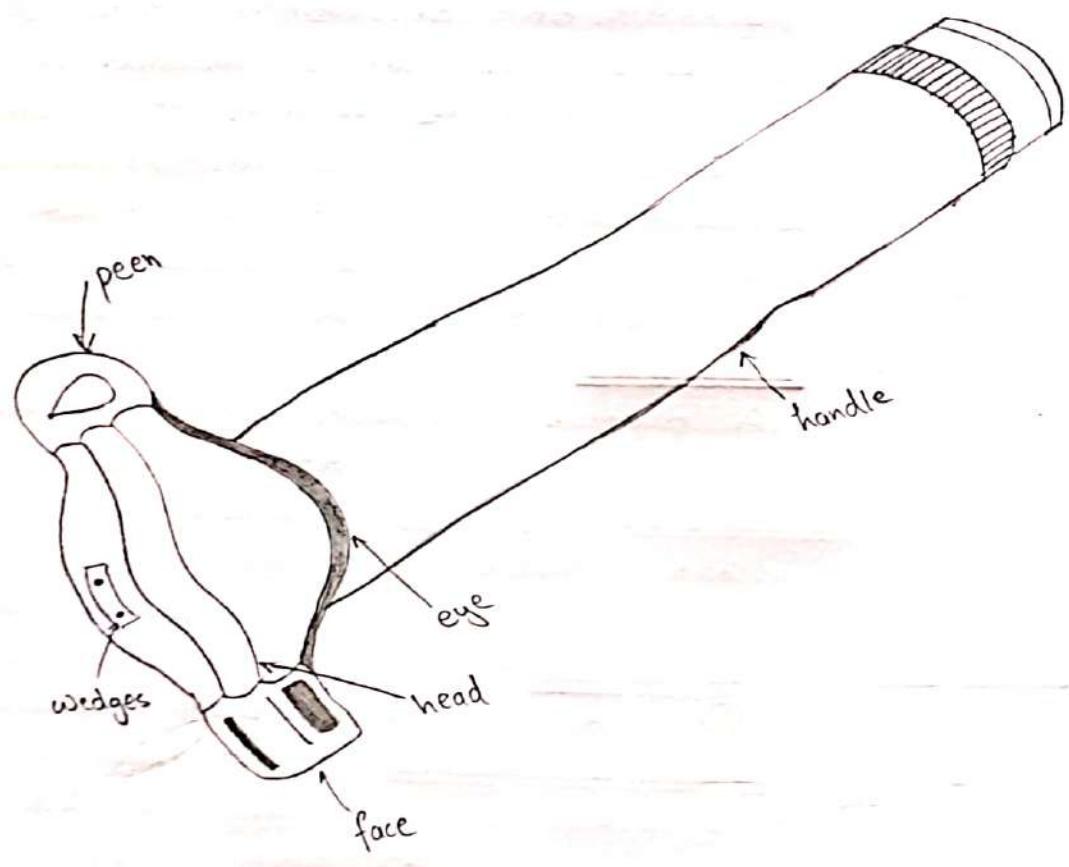


fig: Hand hammer

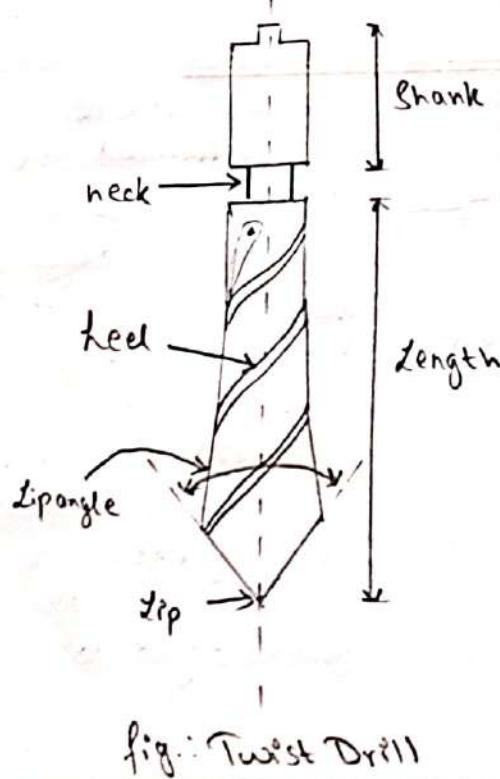
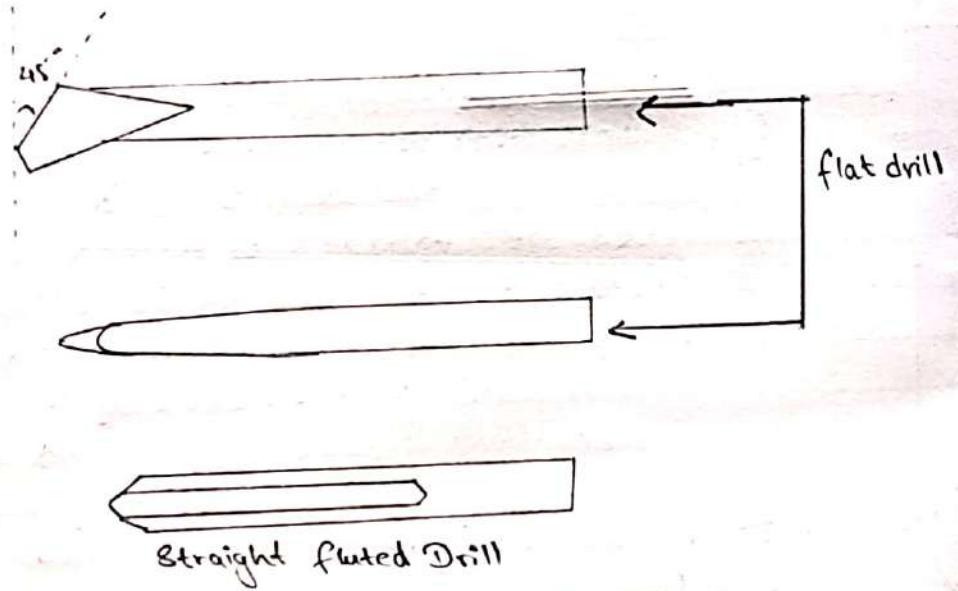
(iii) V-Block:

The V-block is a block of steel with V-shaped grooves. Roundly shaped work pieces which are to be marked or drilled are placed on V-supports. In this way they are firmly supported in a horizontal position and cannot rotate easily. V-block of the following sizes are found to be most useful of length from 50 to 250 mm. Width and height from 50 to 100 mm. For long cylindrical work, several blocks of the same size are used as set.

7. Hand Tools:(i) STRIKING Tool - HAMMERS:

Hammers are used to strike a job or a tool. They are made of forged steel of various sizes (weights) and shapes to suits various purposes.

A hammer consists of four parts namely peen, head, eye and face. The eye is normally made oval or softs. The end of the handle which fits into the eye is spread or split by forcing a metal wedge into it to prevent the hammer & head from flying of handly during striking. The handle



is made of elastic wood or bamboo and is so shaped and sized that when gripped it gives an easy feel to the hand.

Hammers are classified according to the shape of the peen; as ball peen, cross peen and straight peen hammers.

## 8. DRILLING TOOLS:

### (i) DRILL:

A drill is a tool for making tool holes twist in a metal piece. It usually consists of two cutting edges set out at an angle with axis. There are three types of drills:

- (a) flat drills
- (b) straight fluted drill
- (c) Twist drill.

For rapid and accurate work, twist drills are nearly universally adopted. The best cutting angle is  $118^\circ$  and to obtain the correct diameter of the hole, the drill should be ground with both the tips at  $59^\circ$  to the axis of the drill with the lengths of cutting edges exactly equal. There are two types of twist drill: (a) Parallel Shank  
(b) Tapered Shank.

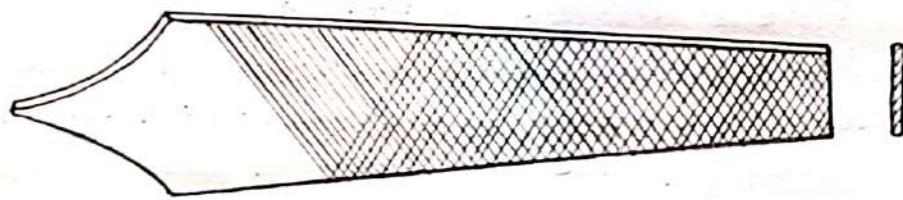


fig.: Flat file

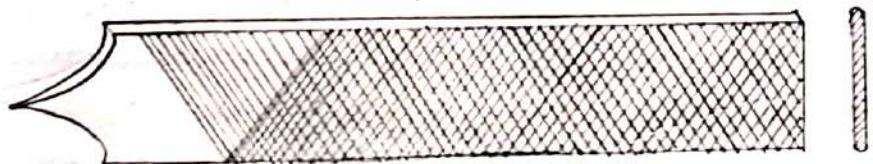


fig.: Hand file

### a. CLASSIFICATION OF FILES:

The most widely used hand tools to be found in engineering workshop is the file. A file is a hardened piece of high grade steel with slanting rows of teeth. It is used to cut, smoothen or fit metal parts. They are divided as follows:

#### (i) FLAT FILES:

This is tapered in width and thickness and one of the most commonly used for general works. They are always double cut on the faces and single cut on the edges.

#### (ii) HAND FILE:

This is parallel in its width and tapered in thickness. A hand file is used for finishing flat surfaces. It has one edge (i.e., it is blunt) and therefore, is useful where the flat file can not be used they are always double cut.

#### (iii) SQUARE FILE:

This is square in cross section double cut and tapered towards the point. This is used for filling square corners, enlarging squares or rectangular openings as splines and key words.



fig.: Pillar file

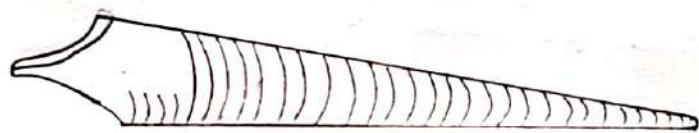


fig.: Half Round file

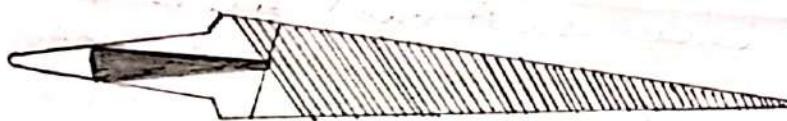


fig.: Triangular file

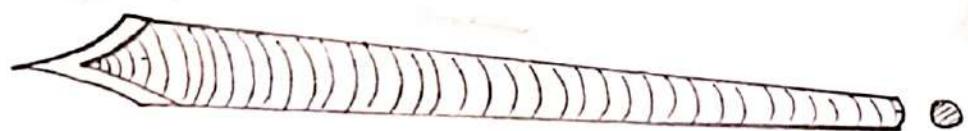


fig.: Round file

(iv) PILLAR FILE:

Pillar files are double cut, narrow and of rectangular section. It has one safe edge and is used for narrow work, such as keyways, slots and grooves.

(v) ROUND FILE:

They are round in cross section and usually tapered. When they are termed traileid. When parallel, they are described as as parallel round. Round files are used for filing curved surfaces and enlarging round holes and forming fillets. They may be single cut or double cut.

(vi) TRIANGULAR FILE:

Three square or triangular file is tapered, double cut and shaped is that of an equilateral triangle. They are used for rectangular cuts and filling corners less than  $90^\circ$ .

(vii) HALF ROUND FILE:

This is tapered double cut and its cross section is not a half circle but only about one-third of a circle. This circle file is used for round cuts and filling curved surfaces.

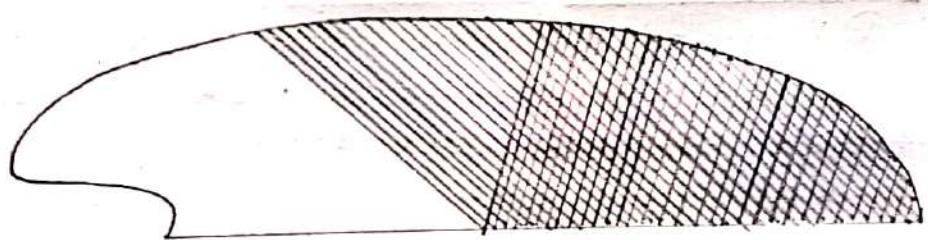


fig.: Knife Edge File

(viii) KNIFE EDGE FILE:

This is shaped like a knife, tapered in width and thickness and double cut. They are used in filling narrow slots, notches and grooves.

CARE OF FILES:

- i) Never use a file on hard metals and narrow edge.
- ii) Arrange the files placing separately.
- iii) Never use a file before cleaning oily substance.
- iv) Never use a file on tempered parts.
- v) Do not use the tongue tongue of the files and screw driver.
- vi) Never file the drop since its property is brittleness.

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JOB DIARY:

NAME OF THE JOB: FORMATION OF "RIGHT ANGLE"

MATERIALS REQUIRED: (71 x 39 x 5) mm mild steel (metal)

PROCESSING OF JOB:

All dimensions are in mm, and all angles are right angle.

Corner cutting angle = 45°

Drilling diameter = 10mm

OPERATIONS INVOLVED:

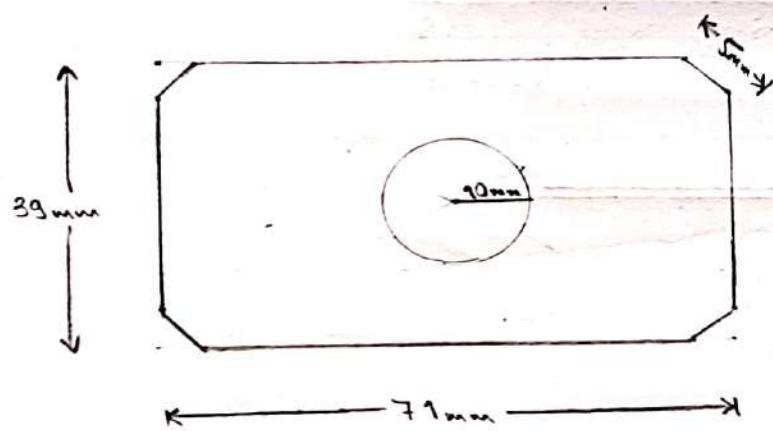
- (i) Chopping
- (ii) Measuring
- (iii) Marking
- (iv) Cutting
- (v) Filing
- (vi) Drilling

PROCEDURE:

- (i) The long metal piece was cut by a chop saw.
- (ii) The cut metal was measured by a steel rule.
- (iii) The measured part was marked by a scriber and marking related tools such as dot punch, chalk, powder and surface plate.

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- (iv) The marked distance was cut using chop saw.
- (v) It was then filed using flat file
- (vi) The middle hole marked was drilled using pillar drill machine.
- (vii) The final piece then formed by checked by try square.

RESULT:

The right angle was formed wlp with chambered corners.

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