

VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY, BURLA



(Formerly University College of Engineering, Burla)

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VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY, ODISHA, BURLA
(Formerly University College of Engineering, Burla)



**DEPARTMENT OF
METALLURGICAL & MATERIAL ENGINEERING**

Name of Experiment FITTING SHOP
Experiment No. 1 Date 18/09/21

NAME	<u>Sk Abdul Azharuddin</u>
YEAR	<u>1st</u>
ROLL NO.	<u>2002100016</u>

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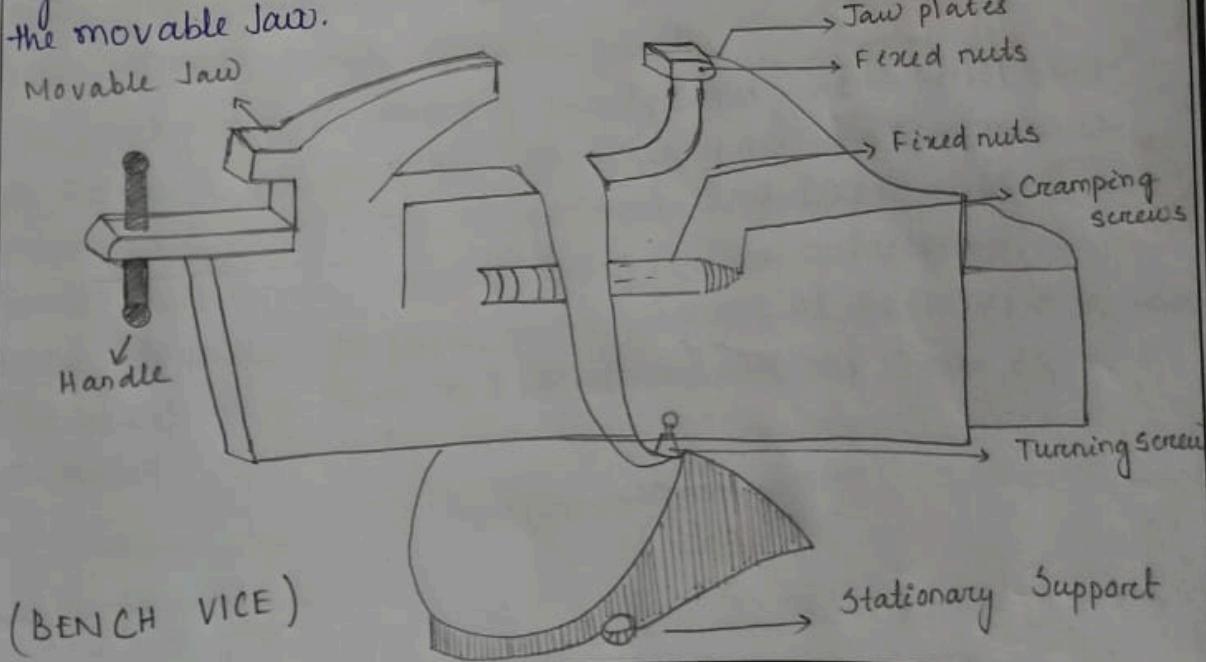
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① Tools and equipments:

Bench vice :-

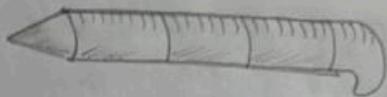
The most commonly used is the engineer's parallel jaw bench vice, sometimes called bitter is vice. It must be fixed to the bench with coach screws or nuts and bolts. The vice essential consists of cast iron body, a fixed jaw, a movable jaw plates are fixed to the jaw by means of set screws and they can be replaced when move. The holding jaws of the jaws plates have teeth bar holding jaws of the jaws plates mark piece firmly held between the jaws. protective gels as 'cramps' which can made of lead, fibre, this plate etc. are therefore usually fitted over the jaws to prevent the damaging the surfaces of the finished work. The movement of the vice is caused by the movement of the screw through the fixed under the movable jaw.





② SCRIBER:

Scriber is a piece of hardened steel about 150 to 300 mm. and 3-5 mm is diameter pointed one or both ends like a reedle. It's used like pencil to scratch or scribble lines on plane where the straight lines can't reach. The ends are sharpened in an distant when necessary.



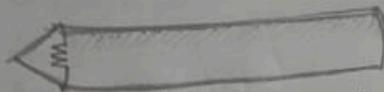
(SCRIBER)

③ PUNCH:

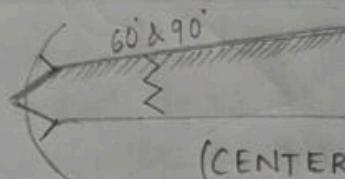
A punch is used in a bench mark for marking out mark, locating centres etc. in a more permanent manner. Two types of punches are used.

① prick punch ② centre punch.

The prick point is sharply pointed tool. The tapered point of the punch has an angle of usually 40° . It's used to make them last longer. The centre punch look like a quick punch point. This angle usually being 60° . The centre punch is used to make the prick punch longer at the centre of the holes. The punch is a steel rod of 90-150 mm and 13 mm in diameter.



(PRICK BUNCH)

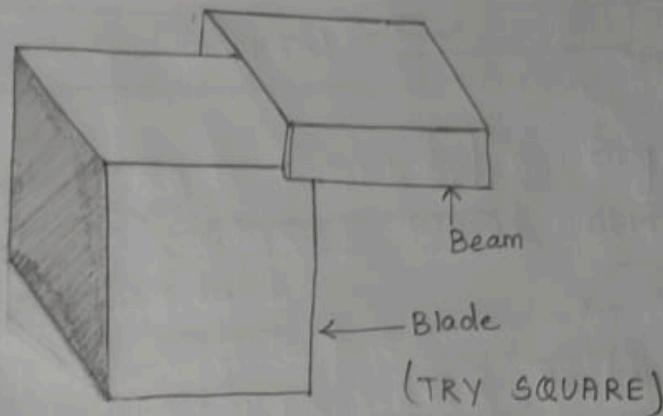


(CENTER PUNCH)



4. TRY SQUARE :-

The try square is made in one piece both blade and beam. This is used when it's necessary to get another edge on surface everyday and also for laying out match. The squares of try 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 the position a line may be along the edge of the blade.



5. HACK SAW :-

The hack saw is used for sawing metal except hardened steel. A hand hack saw consists of frame handle, lightening screw and nut and blade. The frame is made to hold the blade tightly. They are made in two types: The solid frame in which the length can't be changed and the adjustable frame which has a back that can be lightened or shortened to hold blades of different length. Hack saw blades are made of special steels, for hard.

The angle plate which is made of grey cast iron has two plane surfaces at right angles to each other. This is used in conjunction with the surface plate for supporting work in the perpendicular position. It has various slots in it to enable the work to be held firmly by bolts and clamps.

14.19 TRY-SQUARE

The try square as shown in Fig. 14.30 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.

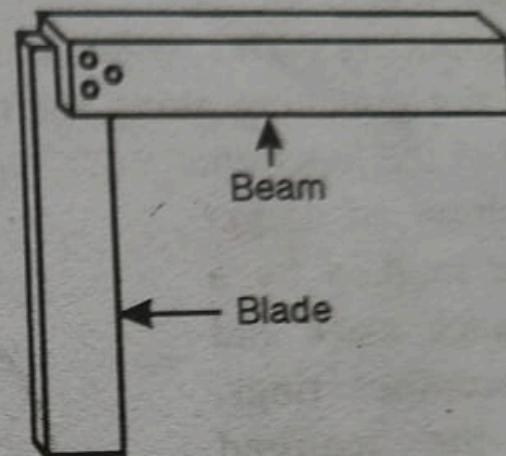


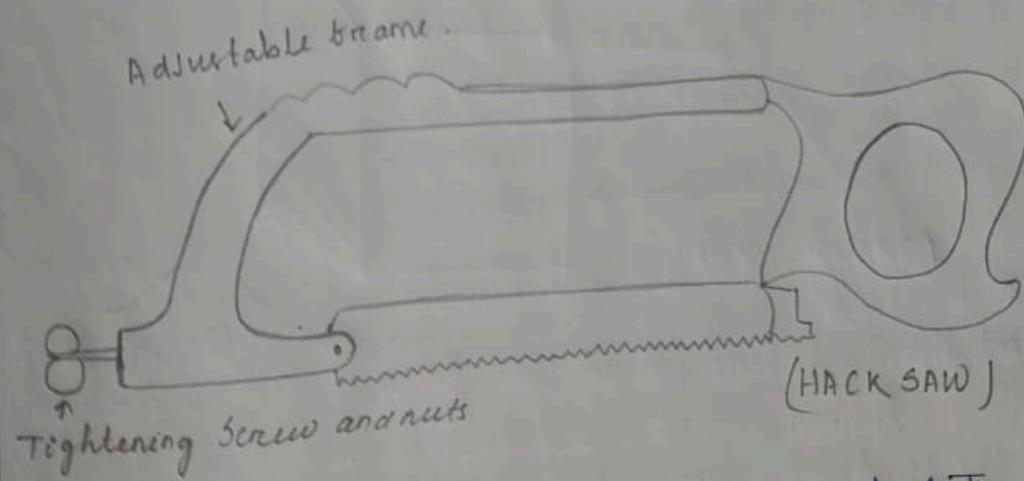
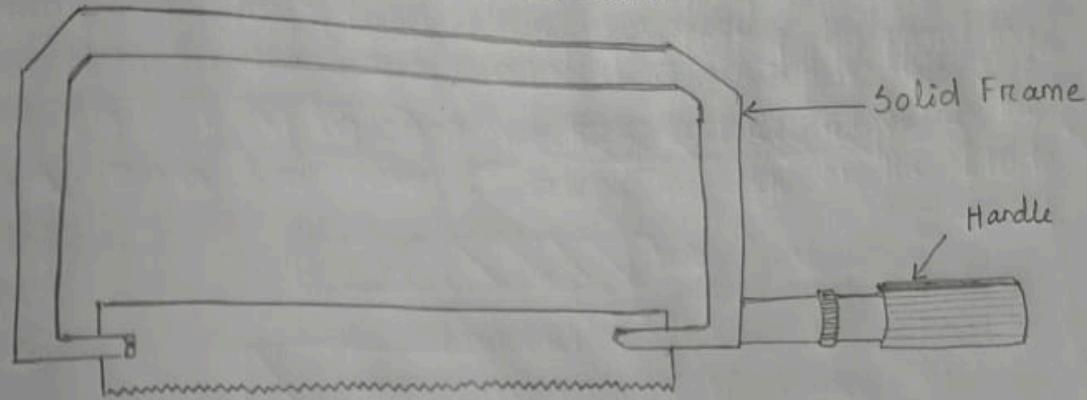
Figure 14.30 Try square

14.20 MARKING OUT

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



Blades either high carbon steel, low alloy and hard through out or the more flexible type, which has a soft back and hard cutting edge. Blades are measured by the (i) length (ii) width (iii) thickness (iv) pitch of teeth.



HAMMER:

Hammers are used to strike a joint or a tool. They are made of forged steel of various size (weight) and shapes to build various purposes. A hammer consists of 4 parts, namely, peen, head, eyes and face. The eye is normally made or elliptical in shape. Hammers are classified according



to the shape of peen as ball peen, cross peen and straight peen
hammers varies from 0.11 to 0.91 kg.

(i) Ball - Peen Hammer:

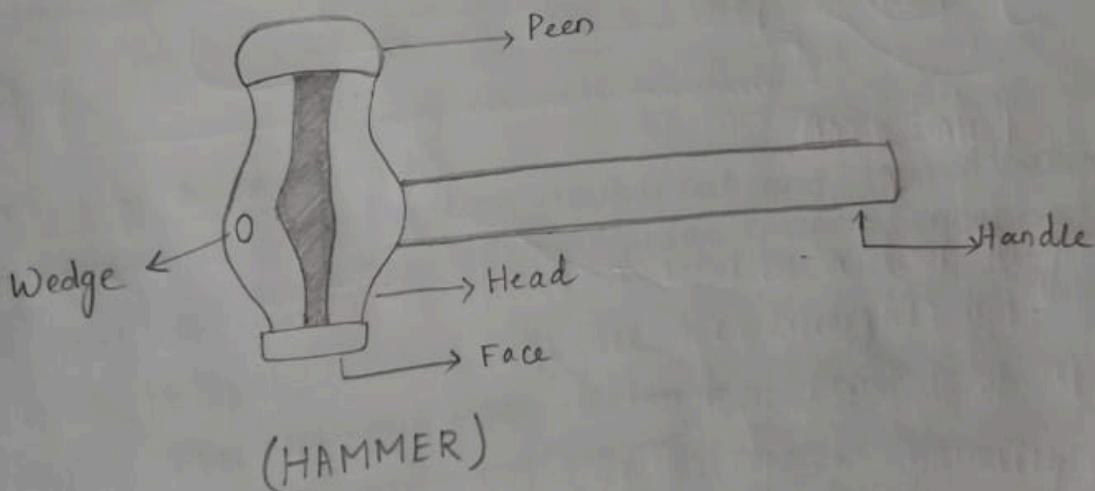
This is the most common form of hammer and is sometimes called engineer's hammer or chipping hammer and the peen has a shape of a ball which is hardened and polished. This hammer is chiefly used for chipping and riveting. The size varies from 0.11 to 0.91 kg.

(ii) Cross - peen hammer:

This hammer is similar to ball-peen hammer in shape and size except the peen which is across the shaft on edge. This is mainly used for bending, stretching, hammering into shoulder inside etc. The size is from 0.12 - 0.91 kg.

(iii) Soft - hammer:

It is necessary to strike a metal with minimum damage to the surface, a soft hammer called mallet is used.





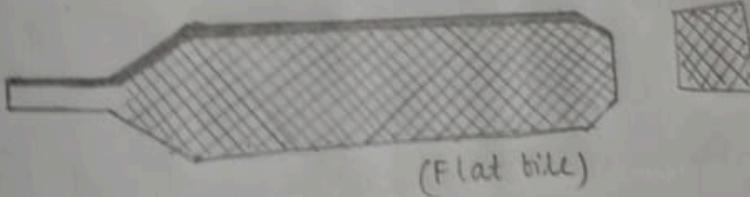
⑦ FILES:-

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

- ① Tony: It's the pointed part without fitted into the handle.
 - ② Point: The point is the end opposite the tang.
 - ③ Heal: The heal is next to the handle.
 - ④ The sabre edge or side of a file is that which has no teeth.
- * sizes
 * Types of cut of teeth
 * Sutitional form.

(a) Flat file:-

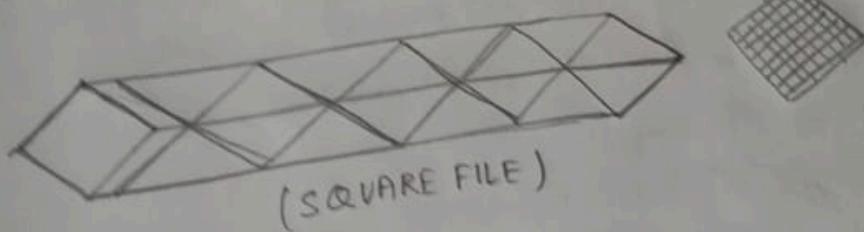
This is tapered in width and thickness and one of the most commonly used files for general work. They are always double weight.



(Flat file)

(b) Square files:

It's square in cross-section, double cut and tapered towards the point. This is used for biting square corners, encasing solane.



(SQUARE FILE)



(c) Triangular tile:

Triangular tile is tapened double cut and the shape is that often equilateral triangle . They are used for rectangular cuts and tiling.

used shapes. They are :

Flat file : This is tapered in width and thickness, and one of the most commonly used files for general work. They are always double-cut on the faces and single-cut on the edges.

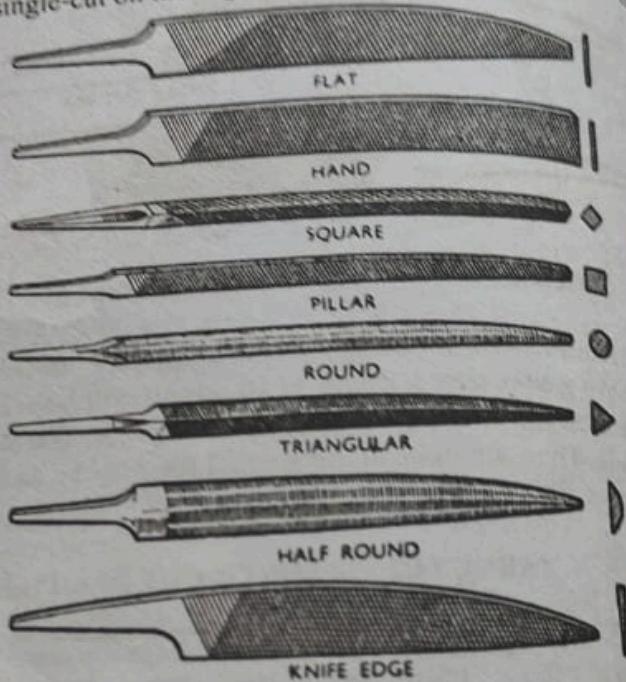


Figure 14.16 Shapes of file

Hand file : This is parallel in its width, and tapered in thickness. hand file is used for finishing flat surfaces. It has one edge (i.e. it is unic) and therefore, is useful where the flat file cannot be used. They are always double-cut.

Square file : This is square in cross-section, double-cut, and tapers towards the point. This is used for filling square corners, enlarging square or rectangular openings as splines and keyways.

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.

Round file : They are round in cross-section and usually tapered when they are termed rat-tailed. When parallel they are described 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.

Triangular file : Three square cut, and the shape is that of an equilateral triangle with rectangular cuts and filing corners.

Half-round file : This is not a half circle but only about a quarter of a circle with round cuts and filing curved surfaces.

Knife edge file : This is thin and double-cut. They have deep grooves.

There are a number of other special purpose files such as the file, needle file, riffler, etc. A riffler file has fine teeth, about 100 mm long. They are used for riffling work. A needle file is made in various sizes and is used for cutting small holes. They are extremely thin and sharp. They are curved upwards at the bottom of a sinking and for filing curved surfaces.

Specification. When a file is required, the following specification should be given :

1. Length, say, 100 mm
2. Shape, say, flat

14.7 FILING

Filing is the most important operation in workshop technology. Filing is usually an after operation which serves to remove the burrs and to finish the final shape of a part. The tooling allowance should be kept as accurate as possible, i.e., within 0.05 mm, in order to get a good finish.

Working with the file. The worker should stand in a vice and should be in a comfortable position. The left foot in the direction of filing should be placed at an angle of 45° to the body.

The proper hand grip for holding the file for satisfactory filing will be as follows. The worker should hold the file with his right hand and should grip the handle of the file with the fingers. The thumb of the hand should be placed on the file in the middle of the handle.

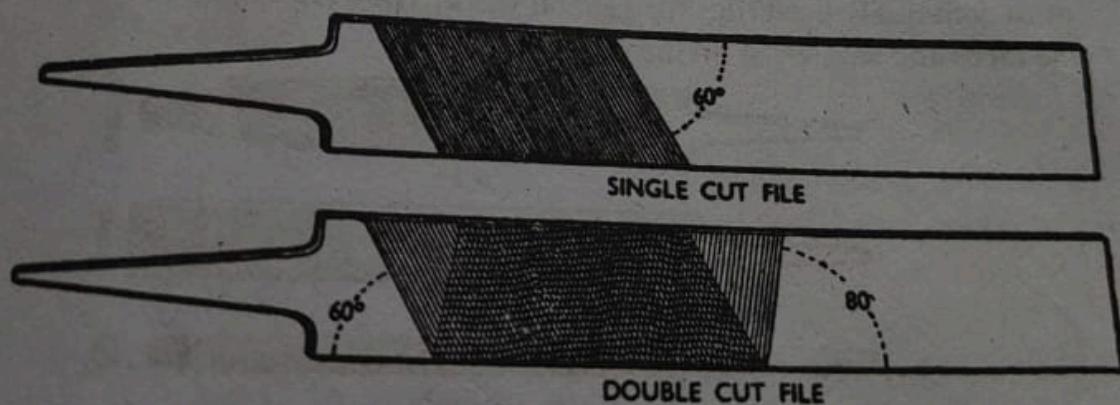


Figure 14.15 Single-cut and double-cut of a file

Table 14.2 will give a fair idea of the number of teeth or cut in each of the above grades over a length of 10 mm. It will be seen from the table that the coarseness of a file changes with its length. The larger the file, the coarser it is. Thus, a rough cut, on a small file may be as fine as a second-cut on a larger file.

TABLE 14.2 GRADE OF CUT IN A FILE

14.6 FILES

The most widely used hand tool to be found in an 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, smooth, or fit metal parts. It cuts all metals except hardened steel.

A file consists of the following parts as shown in Fig. 14.14. The *tang* is the pointed part which fitted into the handle. The *point* is the end opposite the tang. The *heel* is next to the handle. The *safe edge* or side of a file is that which has no teeth.

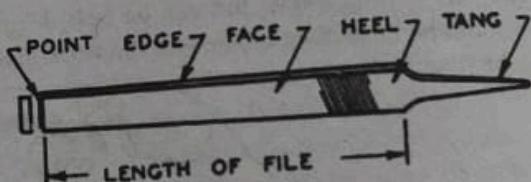


Figure 14.14 Different parts of a file

Files are classified and named according to the three principal factors—sizes, type or cut of teeth, and sectional form.

Size. The size of a file is its length. This is the distance from the *point* to the *heel*, without the tang. Files for fine work are usually from 100 to 200 mm and those for heavier work from 200 to 450 mm in length.

Cut of teeth. Cuts of files are divided into two groups as shown in Fig. 14.15. These groups are : (1) single-cut (2) double-cut.

On *single-cut* files the teeth are cut parallel to other across the file at an angle of about 60° to the centre line of the file. Such files are frequently termed as "flats" and are chiefly used on very hard metal. *Double-cut* files have two sets of teeth, the over-cut teeth being cut at about 60° and the up-cut at 75 to 80° to the centre line.

Single-cut and double-cut files are further divided according to the coarseness or spacing between the rows of the teeth. In descending order of roughness they are listed as :

- | | |
|--------------------|----------------------|
| 1. Rough (R) | 4. Smooth (S) |
| 2. Bastard (B) | 5. Dead smooth (DS) |
| 3. Second cut (SC) | 6. Super smooth (SS) |

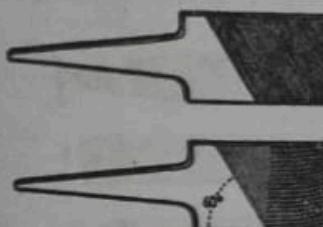


Figure 14.15 Single-cut

Table 14.2 will give a fair idea of the above grades over a length of 100 mm. It is seen that the coarseness of a file changes as the number of teeth per centimetre increases. Thus, a rough cut, on a file of 100 mm length, has 10 teeth per cm, while a fine cut on a lager file, has 49 teeth per cm.

TABLE 14.2 GRADING OF FILES

Type of cut	Number of teeth per 100 mm		
	100	150	200
Rough	10	8	7
Bastard	18	13	11
Second cut	21	17	14
Smooth	30	24	20
Dead smooth	35	33	28
Super smooth	63	49	40

Rough cuts are used for trimming the rough edges of a workpiece. Standard cut used for general work on soft metals and gives a good finish.

Shapes. The shape of a file is determined by the shape of the tang. Files are made in hundred of shapes.

Triangular file : Three square or triangular file is tapered, double-cut, and the shape is that of an equilateral triangle. They are used for rectangular cuts and filing corners less than 90° .

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 file is used for round cuts and filing curved surfaces.

Knife edge file : This is shaped like a knife, tapered in width and thickness and double-cut. They are used filing narrow slots, notches, and grooves.

There are a number of other types of file in less common use. They are all used for special purposes and not in general use. They are wording file, needle file, riffler, etc. A *wording file* is a thin flat file having fine cut teeth, about 100 mm long. This is widely employed for all kinds of fine work. A *needle file* is made in sizes from 100 to 200 mm, of various shapes and cuts. They are extremely delicate and are used for fine work. Rifflers are curved upwards at the ends into an arc. They are used to reach the bottom of a sinking and for filing the insides of castings.

Specification. When ordering a file following informations should be given :

1. Length, say, 100 mm.
2. Shape, say, flat
3. Single or double cut
4. Roughness, say, bastard



Aim of the experiment :-

To prepare a rectangular joint from sample of mild steel of $(14 \times 44 \times 8)$ mm.

Tools and equipments:-

(i) Bench vice

(ii) Scribe

(iii) Punch

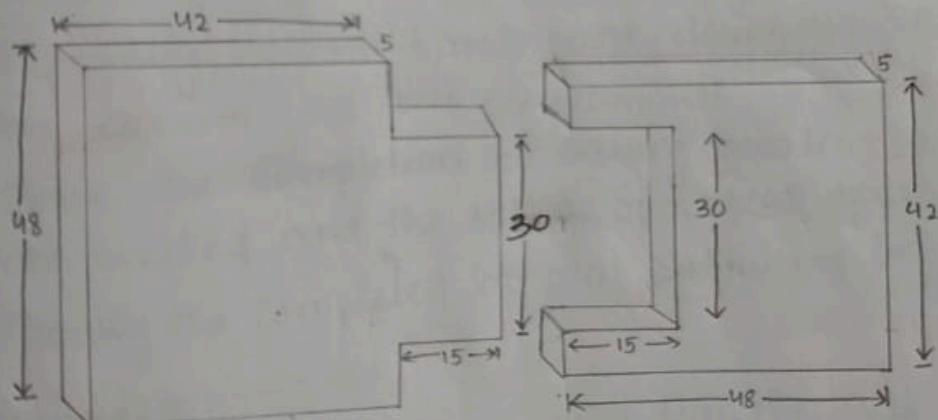
(iv) Try square

(v) Hack saw

(vi) Hammer

(vii) Files.

Diagram:-



(all are in mm)

• Dimension in mm

• Material : mild steel

$(14 \times 44 \times 8)$ mm

• 5mm Tapered at each side.



Procedure:

- ① At first the measurement of all unfinished work pieces were checked. The measurement of these unfinished work pieces were taken a little more than that.
- ② Therefore after a tile was taken and all the four surfaces of the work piece was fitted as per the required dimension.
- ③ The angle and dimension were checked by the try square.
- ④ Then with the help of a saw, the sawing operations were carried out.
- ⑤ With the help of a punch, the points on the line of measurement was marked.
- ⑥ Sawing operation were carried out taking extra measurements in order to prevent any damage.
- ⑦ Especially for the female point, diagonally sawing operation was carried out for easy removal.
- ⑧ After the completion of sawing operation, the dimensions were checked and the fitting operation was carried out.
- ⑨ Finally the completed job was submitted for evaluation.

Precaution:

- ① We should wear apron while doing the work
- ② There should be tight connection between the bench vice and the work place.
- ③ The work piece must be thoroughly fitted to remove rest.
- ④ Sawing must be done on the inner or outer side of the machine.
- ⑤ Sawing must be done smoothly.



Conclusion:

By the biting job we made a rectangular joint having a a biting between the male and female part.

Thus binally the rectangular joint of the metal with male part and female part with demensions $(29.98 \times 14.98 \times 8)$ mm³ and $(30 \times 15 \times 8)$ mm³ respectively .

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