Fitting Shop

Fitting shop

Objective:

At the end of this chapter students able to

- Understand operations in fitting shop,
- Understanding various tools used in fitting shop,
- Practice on fitting shop.

Fitting shop

Safety precaution and rules

1. **Proper clothing:** You must not wear loose clothes that can be caught in moving machinery. You must wear tight clothes
2. **Proper eye protection:** You must always wear goggles to protect your eyes while you are working in the workshop.
3. **Remove tie and jewelry:** Ties, watches, rings and other jewelers increase the chance of getting caught by moving machinery. You must remove them before entering the workshop.
4. **Cut or secure long hair:** Long hair is also dangerous as it may be caught by the machine and pulls you into it.
5. **Proper shoes:** You must not wear sandals or soft shoe inside the workshop as they will not Protect your feet from falling objects. A safety shoes (steel-toe shoes) will protect your feet if you accidentally drop something.

Fitting shop

- **Fitting:** Fitting means preparing matching parts to touch or join each other in such a way that one will turn inside of another and one will slide upon another or the part hold tightly together.
- **Fitting shop:** Fitting shop is a place where fitting or assembling work is carried out. Some repair/maintenance and Die punch work is also carried out in Fitting shop.
- The term **bench work** denotes the production of an article by hand on the bench. Whereas fitting is the assembling of parts together and removing metals to secure the necessary fit, and may or may not be carried out at the bench.
- Although in today's industries most of the work is done by automatic machines, but bench and fitting work also plays a significant role for completing and finishing a job to the desired accuracy. They still require some minor operations to be performed to finish the job by hand.
- It helps to understand the sophisticated machines easily, the start of each machines

Fitting shop

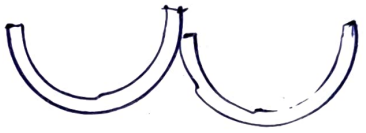
Operations the Fitting Shop

- The hand operations in fitting shop include measuring and marking, filing, sawing, scraping, drilling, tapping, Dieng, grinding, etc., using hand tools or power operated portable tools.
- Measuring and inspection of components and maintenance of equipment is also considered as important work of fitting shop technicians.

Fitting work requires the use of a large number of hand tools and other devices or equipment that involve a number of operations for accomplishing the work to the desired shape and size. Some of the commonly used tools are discussed as under.

Fitting Shop Tools

- Marking and measuring
- Cutting tools
- Holding tools
- Striking tools
- Finishing tools

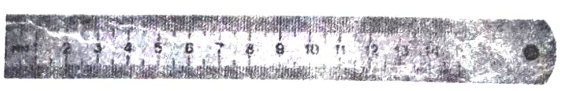




Measuring and marking tools

- **Measurement** is the act of determining a target's size, amount, or degree of something using instrument or device.
- Marking is done on the job to locate the exact point where we have to carry out some other processes like sawing, drilling etc. It includes lines(straight, curved and irregular) and point marking.
- This type involves steel rule, try square, divider, caliper(inside, outside, and odd leg), scriber, punch (dot, center), vernier caliper, micrometer, surface gauge, drill gauge, combination set, V-Block, surface plate

1. Steel rule





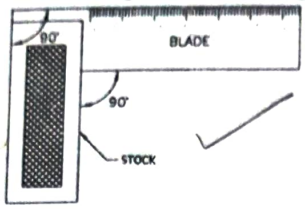


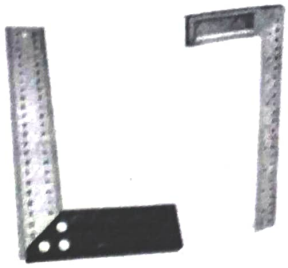
- A rule made from stainless steel that feature either metric or inch (or both) scales along its length. The least count is1mm. One end is usually flat whilst the other end (frequently including a hole for hanging) is usually round.
- Used to mark or measure material.

Measuring and marking tools

2. Try square

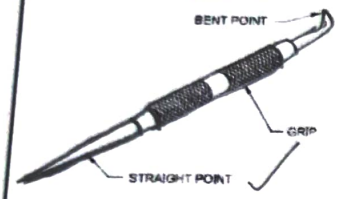
- Is an L-shaped tool used for marking and checking 90° angles on workpieces.

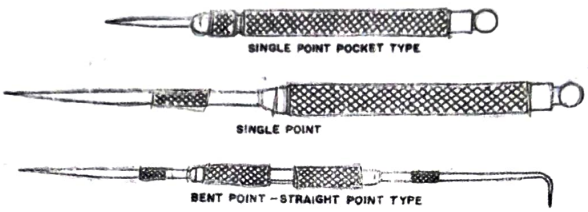


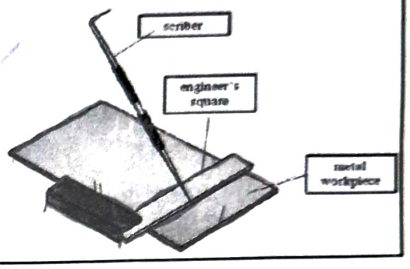


3. Scriber:

- A scriber is a slender steel tool, used to scribe or mark lines on metal work pieces. It is a steel wire and its one end is sharply pointed and hardened to mark layout lines on the sheet metal.





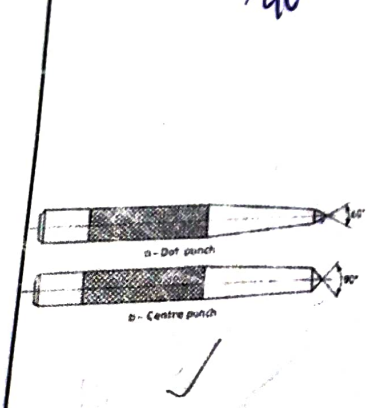


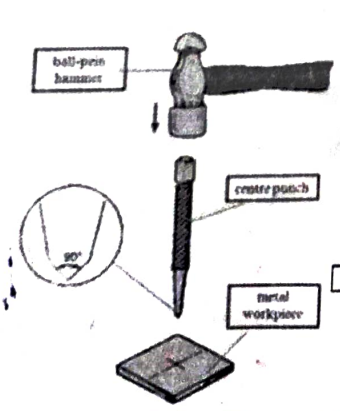
Measuring and marking tools

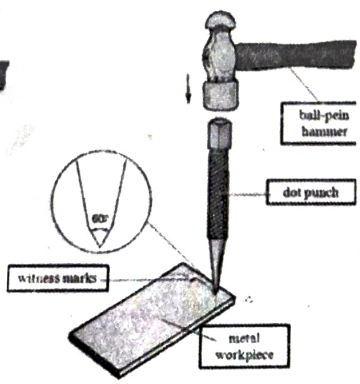
4. Punch

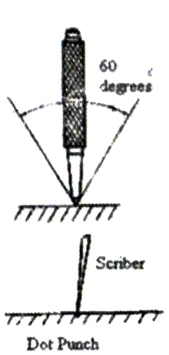
- **Dot punch:** This is used to lightly indent along the layout lines, to locate center of holes and to provide a small center mark for divider point, etc. For this purpose, the punch is ground to a conical point having 60 degrees included angle.
- **Center punch:** It is sharply pointed tool. The tapered point of punch has an angle of usually 60 degree. it is used to make small punch marks on layout lines.

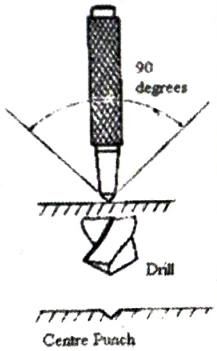
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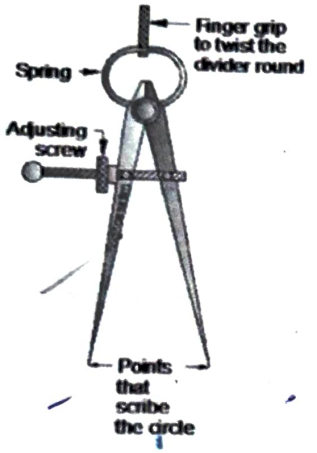




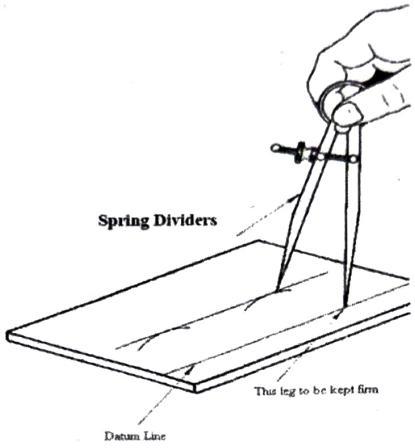
Measuring and marking tools

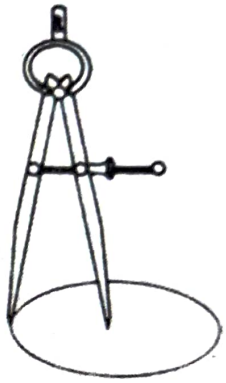
5. Divider:

This is used for marking circles, arcs, laying out perpendicular lines, bisecting lines, etc., Dividers are used to draw circle or arcs on sheet metal and to divide the lines into two equal parts









Measuring and marking tools

6. Caliper:

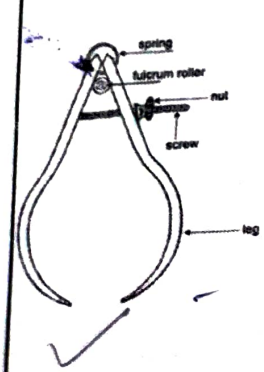
A caliper is used to transfer and compare dimensions from one object to another or from a part to a scale.

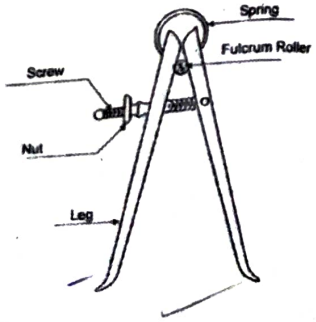
(a) Inside caliper:

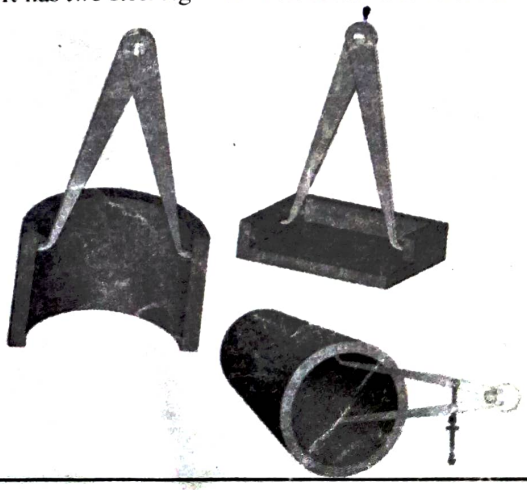
These are also of two types ordinary, spring type. It has two steel legs, which are bent outward. These are used to set internal dimensions, to transfer them to work.

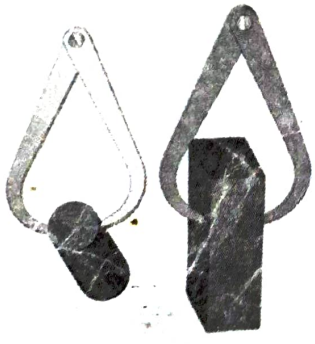
(b) Outside caliper :

These are also of two types ordinary, spring type. It has two steel legs that are bent inward. These are used to measure the out side dimensions of round objects.





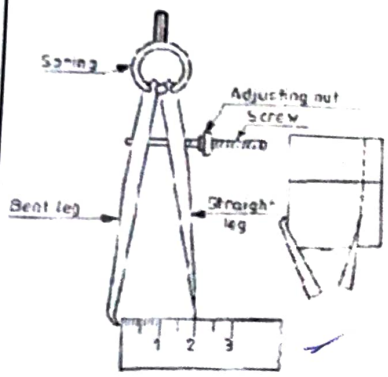


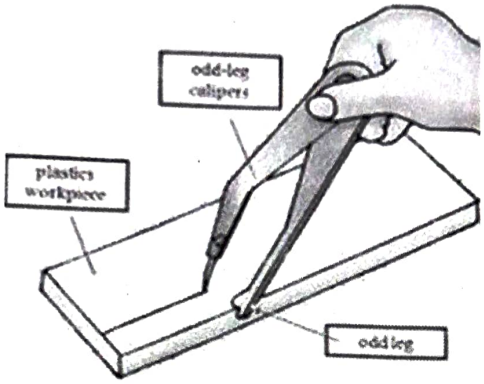


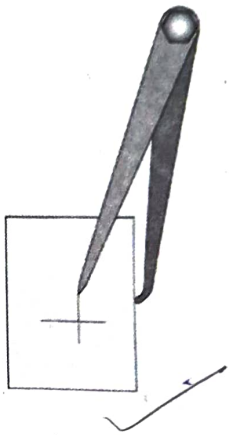
Measuring and marking tools

(c) Odd leg caliper

It is made of steel tapered strip, which is hinged between washers at one end, one leg is bent at the tip inwardly and the other has a straight pointed end. It is used to find the center of a bar. It is extremely used for scribing lines parallel to edge of work.



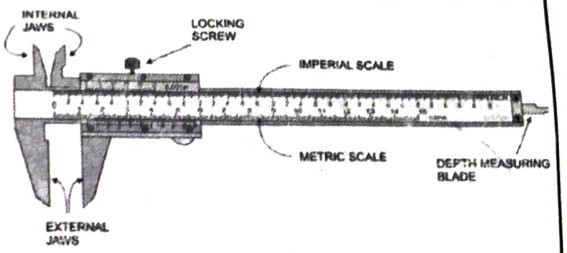


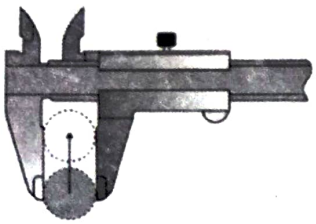


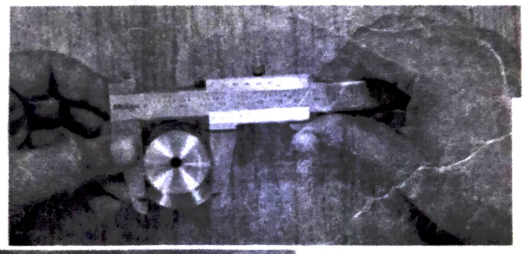
Measuring and marking tools

7. Vernier Calipers

These are used for measuring outside as well as inside dimensions accurately. It may also be used as a depth gauge. It has two jaws. One jaw is formed at one end of its main scale and the other jaw is made part of a vernier scale. It is used for measuring dimensions up to 0.02 mm.

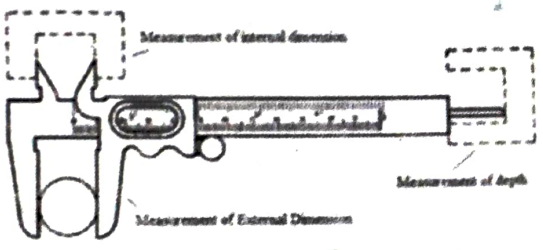








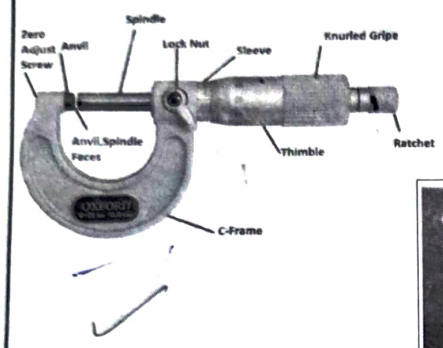


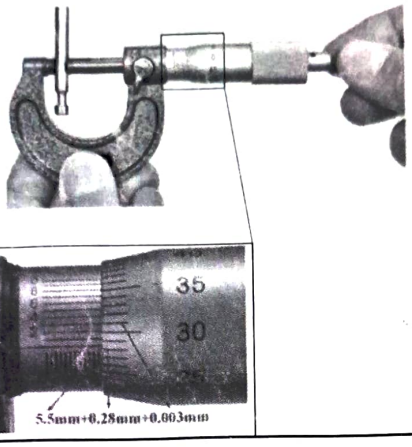


Measuring and marking tools

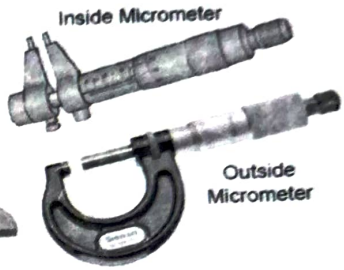
8. Micrometer

Micrometers are instruments used to measure distances to the nearest one-thousandth of an inch. The measurement is usually expressed or written as a decimal. There are three types of micrometers which are commonly used: the outside micrometer, the inside micrometer, and the depth micrometer. This is used to measure the thickness of the metal sheet accurately up to 0.01 mm.






Depth Micrometer



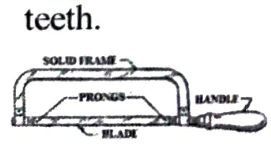
Cutting tools

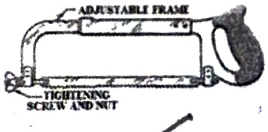
Cutting tools plays a most important role in removing excess metal from the job to obtain desired finished part.

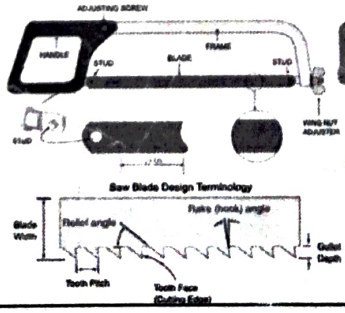
1. Hack-Saw

The hacksaw is used to cut metal. It consists of a metal frame and blade as main part. The frame can be either of fixed type, which can accommodate the same length of blades or adjustable type which is capable of accommodating different lengths of blades.

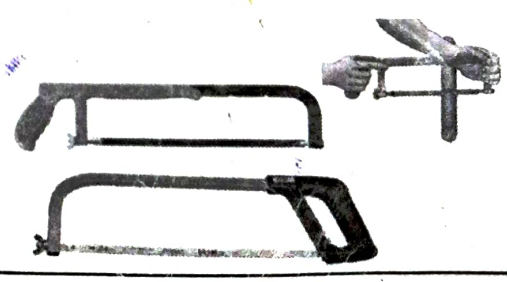
Hack saw blades are made of high carbon steel or low alloy steel. The blades in common use are generally 0.7 mm thick, 12.7 mm wide and 20 cm to 30 long. About 5 to 7 teeth per cm length of blade from the course group and 8 to 12 teeth per cm from the fine group of teeth.











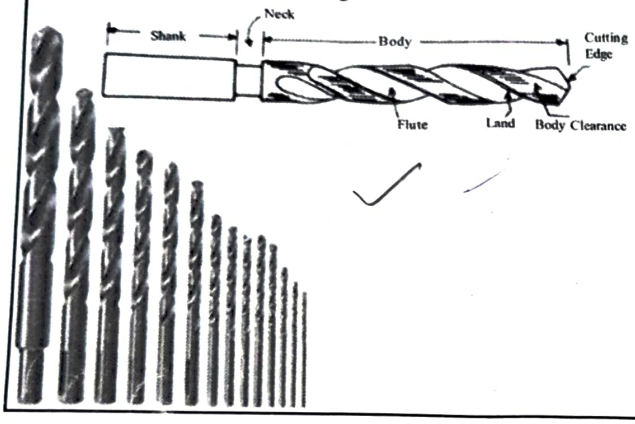
Cutting tools

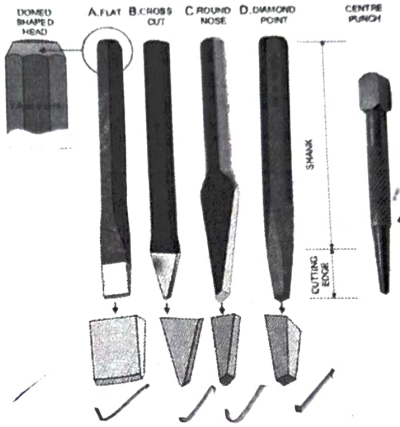
2. Chisels

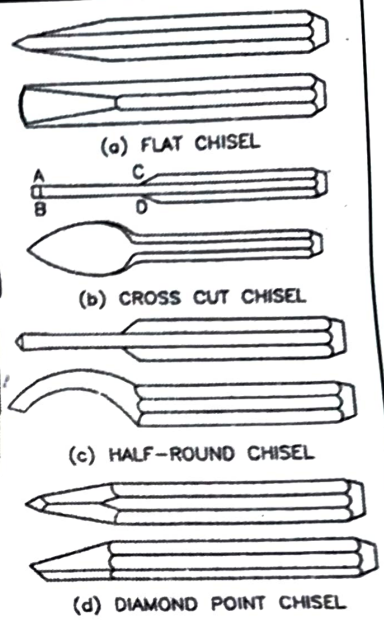
Chisels are used for cutting thin sheets and to remove excess material from large surfaces. In this case the surface finish and accuracy are usually poor.
Forms: Flat, Cross-cut, Round nose and Diamond point. All the chisels are forged from bar stock of carbon steel, to the desired shape and the cutting edge ground to the correct angle and obtain a sharp cutting edge.

3. Drill

A drill is a tool for making holes in a metal.





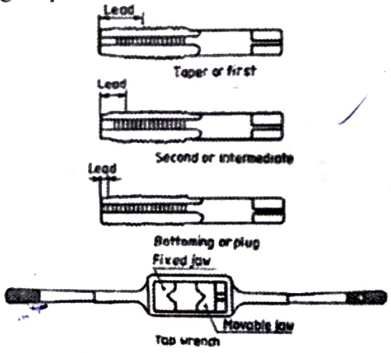


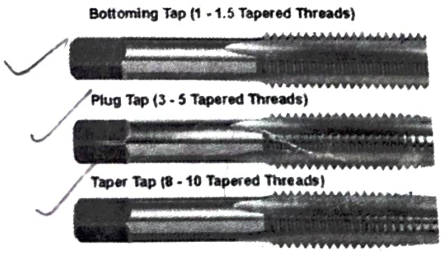
Cutting tools

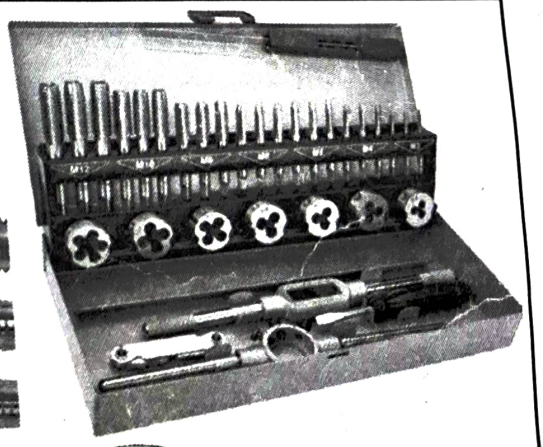
4. Threading tools Tap and die

a) Tap

Used to cut the internal screw threads. Taps are made of hardened High Carbon Steel or High Speed Steel. The ends of the shank are square to fit a wrench





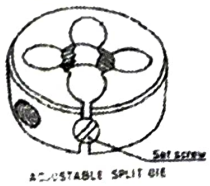


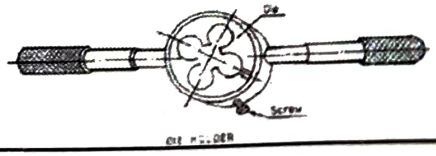
b) Die and die sets

Dies are used for cutting external threads on round bar or tubes.

Dies are made of Hardened High Carbon Steel or High Speed Steel.





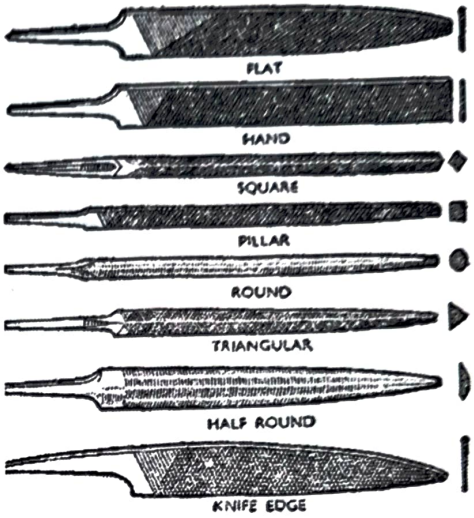


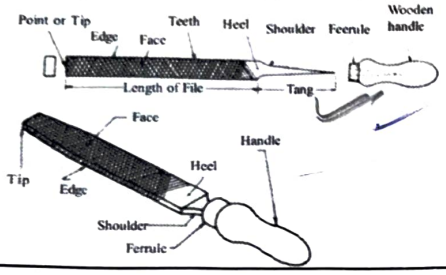
Finishing tools

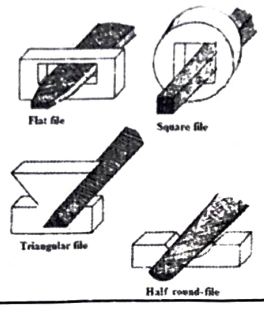
1. Files

File is a cutting tool with multiple teeth like cutting edges used for producing smooth surface. The accuracy that can be achieved from 0.2 to 0.05 mm.

All the files consist of two main parts, toothed blade and a pointed tang, which is fitted in a handle. Files are generally forged out of high carbon steel, followed by cutting of teeth, hardening and tempering etc. Common shapes of the files available are flat, hand, square, pillar, round, half round, triangular, knife edge, etc.



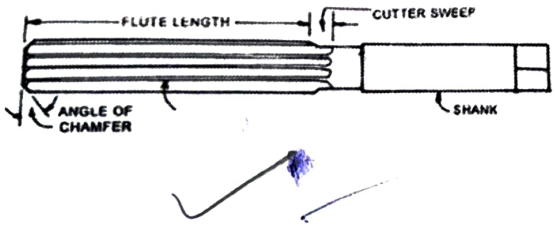


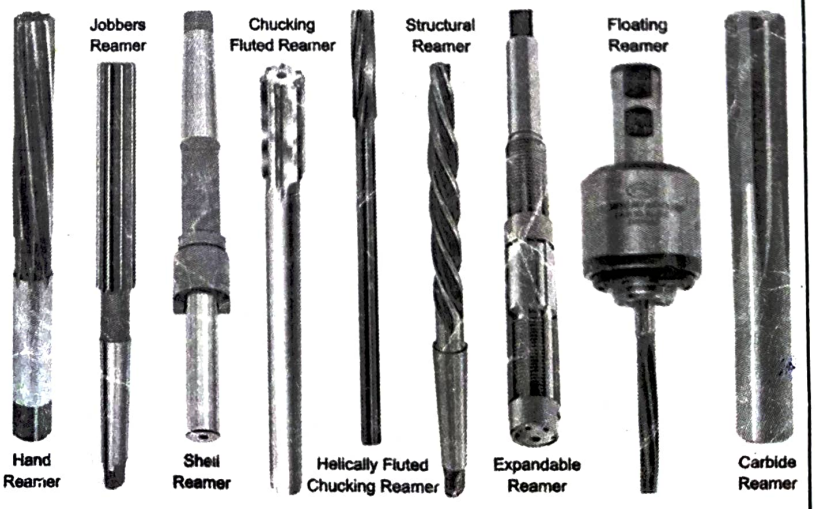


Finishing tools

2. Reamer

Functions of reamer are to control the diameter of a hole to improve the internal surface finish to improve the roundness of the hole.

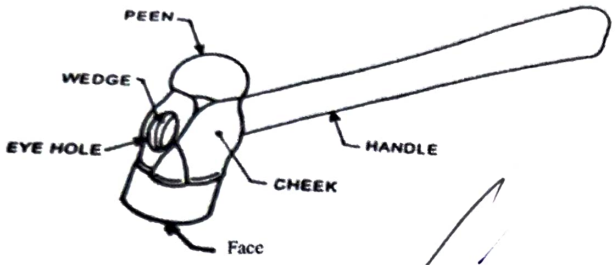




Striking tools

1. Hammers

It is used for striking chisels in chipping and cutting and the punch in marking. All the hammers used in a fitting shop are similar in construction to the smith's hand hammers, such as ball peen, cross peen, straight peen, etc. The only difference lies in weight. They are made of forged steel of various sizes and shapers to suit various purposes like punching, chipping, marking, bending and riveting.





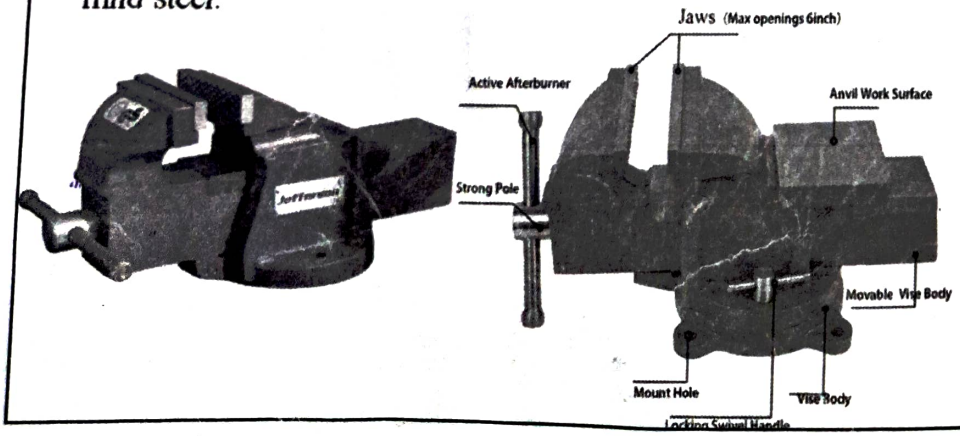
Holding tools

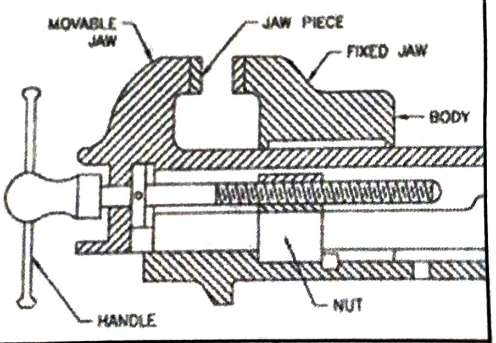
1. Vices

It is a work holding device used to grip the job tightly in position during various operations carried out in a fitting shop. The width of the jaws determines the size of the vice.

a) Bench vice:

It is used tool for holding the work. It essentially consists of a cast steel body, a movable jaw, a fixed jaw, both made of cast steel, a handle, a square threaded screw and a nut all made of mild steel.

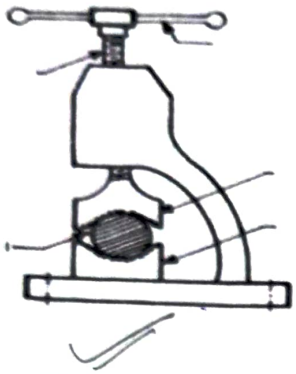


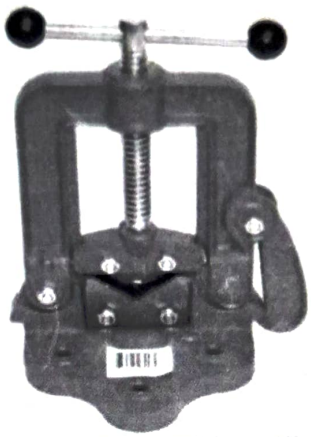


Holding tools

b) Pipe vice

It is used to hold pipes. It consists of a vertical screw with square threads. A handle is attached on the top of the screw. A movable jaw is fixed on the lower end of the screw. It grips the pipe at four points. The jaws of this pipe vice are v shaped. This can be fixed on the bench or it can be grouted.

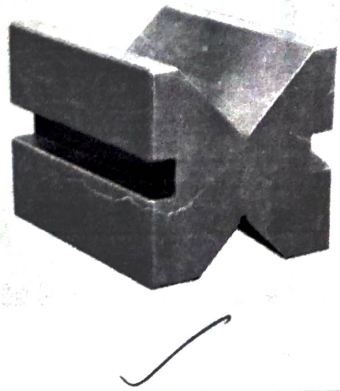


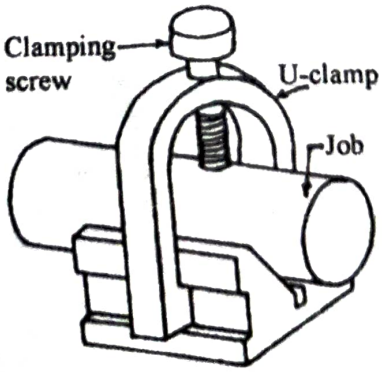


Holding tools

c) 'V' –Block

A 'V" block serves as a very useful support to the work in marking. It usually works in conjunction with a U-clamp. It is very suitable for holding round bars in drilling operations when the axis of the drill is to be kept normal to the axis of the bar.





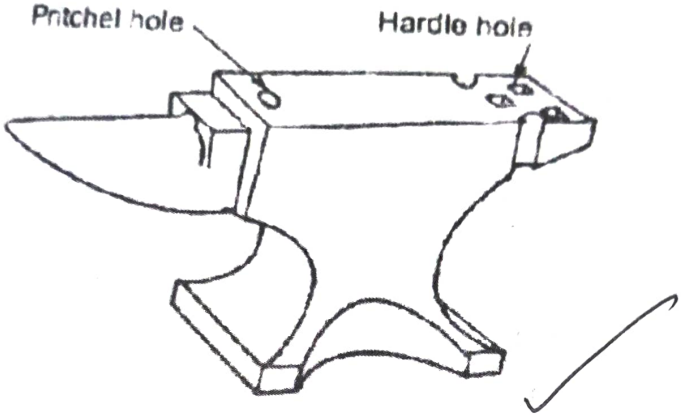
d) 'C'–clamp



Supporting tools

1. Anvil

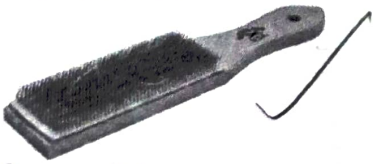
The anvil forms a support for blacksmiths work when hammering and it is also used in work shop to support the work pieces when they are made to chiseling and punching operations.



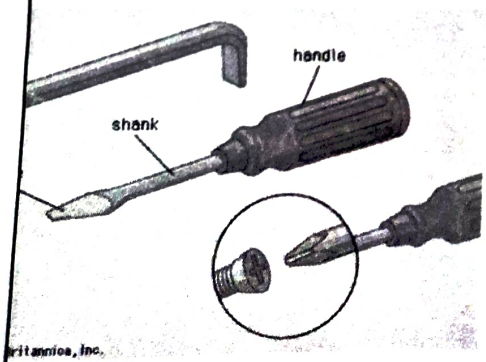
Miscellaneous tools

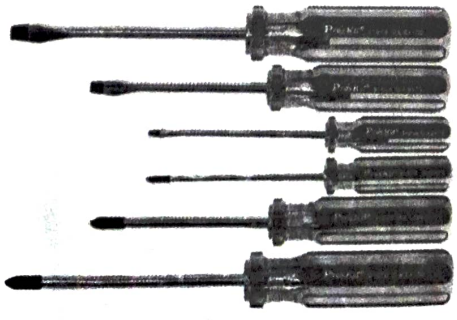
In addition to the above tools, the following tools are widely used in fitting.

1) **File Card:** It is the short wire brush used to remove small chips called pins, and to clean the file.



2) **Screw driver:** used for tightening and loosening the screws.







Miscellaneous tools

3) Spanner: These are also called wrenches, are used for tightening or loosening nuts and bolts. The following types of spanners are widely used in fitting.

a. Single end Spanner
b. Double end Spanner
c. Adjustable Spanner
d. Box Spanner

