1. **EXPERIMENT No. :** 02

2. TITLE : Job Process Operation in Fitting shop & Tools' Description.

3. OBJECTIVE : i) To be familiarize with different types of tools used.
ii) To be familiarize with different types of job operations performed.

4. INTRODUCTION : The term Fitting is related to the assembly of parts, after bringing the dimension or shape to the required size or form, in order to secure the necessary fit. The operations required for the same are usually carried out on a workbench, hence the work is done on the bench is called Fitting work.

5. TOOLS USED : The following tools are generally used.

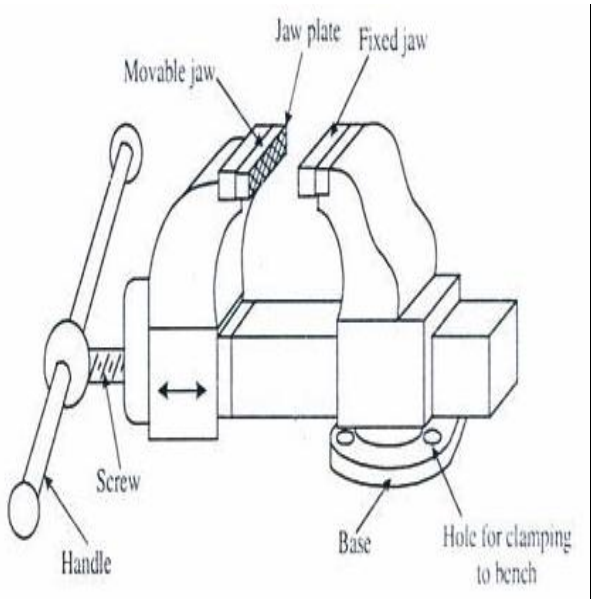


Fig : BENCH VICE

The bench vice is a holding device which is used to hold the work piece when performing Filling and Cutting on the job. Bench vice has two jaws one is fixed (Stationary jaw) and another is movable (Sliding jaw). Sliding jaw slide over the slide face, when the handle is rotated in the clockwise direction it is subjected to tight by mean of the thread which is mounted on the rod. The body is not movable to any direction is called a fixed body and the lower part of bench vice is called base.

Fig : C-CLAMP

A C-clamp or G-clamp is a type of clamp device typically used to hold a wood or metal work piece, C-clamps or G-clamps are typically made of steel or cast iron.

The size of a C-clamp is measured by its jaw capacity—the dimension of the largest object the frame can accommodate with the screw fully extended. Most range in jaw capacity from 2" to 10". Also important is depth of throat, the distance from the center line of the screw to the inside edge of the frame.

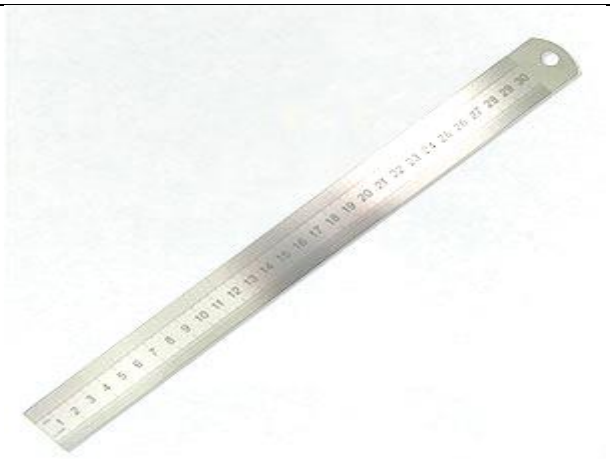


Fig : STEEL RULE

The steel rule is an easy and quickest means to measure the linear dimensions of a component with limited accuracy.

This is manufactured from bright, hardened and tempered steel to provide flexibility. Its faces are ground and engraved with line to denote the lengths.

 Fig : TRY SQUARE	The try-square is composed of two parts, the stock and the blade. They are usually made from bright mild steel with the blade being hardened and tempered so that it resists damage. It is used for measuring the accuracy of a right angle (90 degrees); and is also used to check the straightness of a surface or correspondence to an adjoining surface.

 Fig : SCRIBER	Scribers are made from a rod of Hardened and Tempered Tool Steel which has been ground to a fine point at one or both ends. They are used to mark lines - usually when working in metal.

 Fig : DIVIDER	Dividers are one of the earliest and most basic types of mathematical instrument. In their simplest form, dividers consist of a jointed pair of legs, each with a sharp point. They can be used for geometrical operations such as scribing circles but also for taking off and transferring dimensions.
 Fig : HACKSAW	Hand hacksaw is a cutting tool which is used in the fitting shop for manual cutting. It has three parts, Handles, Hacksaw frame, and blade. The blade is made of high-speed steel or high carbon steel and the frame is made of mild steel. The blade is adjusted with the help of wing nut. The teeth of a blade generally forward direction. Blades are specified by length, width, thickness and and the number of teeth per inch (TPI) which are usually in the rangeof 250 to 300 mm, 13 to 16 mm, 0.63 mm to 0.8 mm and 14 to 32 respectively. Blades have 14, 18, 24, 32 teeth per 25mm (inch). A blade with 14 TPI is coarse whilst a

	blade with 32 TPI is very fine.

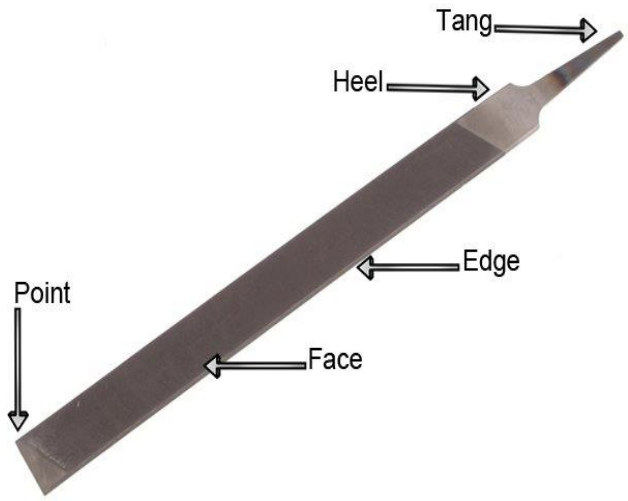


Fig : FLAT FILE

A flat file is a tool used to remove fine amounts of material from a work piece. Most files are made from high carbon steel where the Length has been hardened and tempered. Files are usually made in two types of cuts, SingleCut and Double Cut. The Single Cut File has a single row of teeth extending across the face at an angle of 65° to 85° for the length of the file. The Double Cut File has two rows of teeth which cross each other. For general work, the angle of the first row is 40° to 45°, and the angle of the second row can be anywhere between 30° and 87°.

Files are also classified by the coarseness of the teeth.

- Rough
- Bastard
- Smooth
- Very Smooth

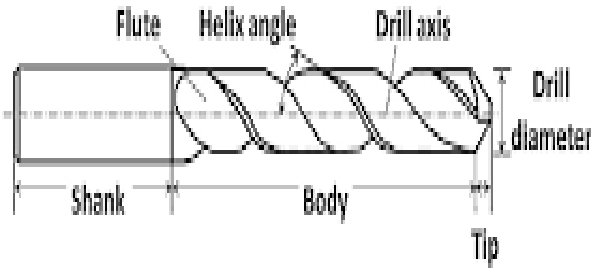
 Fig : TRIANGULAR FILE	Their triangular filesare used mainly for filing corners with angles less than 90 degrees.

 Fig : ROUND FILE	Round files are used for filing concave surface and also for enlarging round holes.

 Fig : HALF-ROUND FILE	The Half-Round File is Double Cut on the flat side and Single Cut on the curved side. It tapers slightly towards the point in both width and thickness. It is used for filing concave surfaces and the flat face is used for filing convex surfaces.for filing concave surfaces and internal corners.

 Fig : BALL PEEN HAMMER	The hammer is defined as a device used to deliver blows to an object or strike another object. It is also used for striking purposes while punching, bending, chipping, and riveting. The hammer consists of a handle to which a heavy head, usually made of metal is attached, with one or more striking surfaces. The hammer is specified by its weight (125 grams to 1500 grams) and the shape of the peen. This is

	made of Cast steel or carbon steel. Ball peen hammer:This is the most common type of hammer which has a ball-shaped end of the head opposite to the striking face.

 Fig : TWIST DRILL	Twist drill is a cutting tool comprised of cutting point at tip of a shaft with helical cutting edge. The following are the main parts of a twist drill. 1. Body: It is the main part of the tool, it extend from the drill shank to the tip of tool. 2. Shank: It is the cylindrical portion of the drill that held in holding device. It may be straight or tapered. 3. Drill axis: An imaginary center line. 4.Flutes: It is the groove in twist drill, which provides lip or cutting edge. 5. Flank: Surface of drill which extends behind the lip to the flute. 6. Lip: It is the cutting edge formed at the intersection of flank and flute. 7. Helix angle: It is the angle

	of flute in relation to the work surface. this angle varies from 18 to 45 degrees.

	A tap wrench is a hand tool used to turn taps or other small tools, such as hand reamers. A tap is used to cut or form a thread on the inside surface of a hole.Reamer is applied to finish drilled holes accurately to size and with a good surface finish.

Fig : TAP WRENCH	

 Fig : DIE WITH HOLDER	A die is used to cut an external thread on cylindrical material, such as a rod, which creates a male threaded piece which functions like a bolt. Dies are generally made in two styles: solid and adjustable.

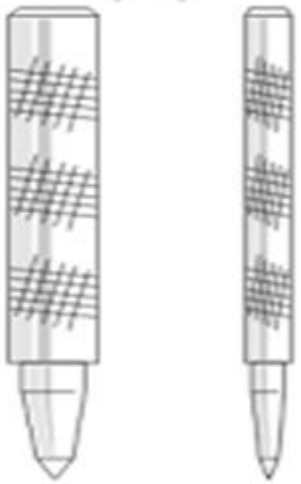
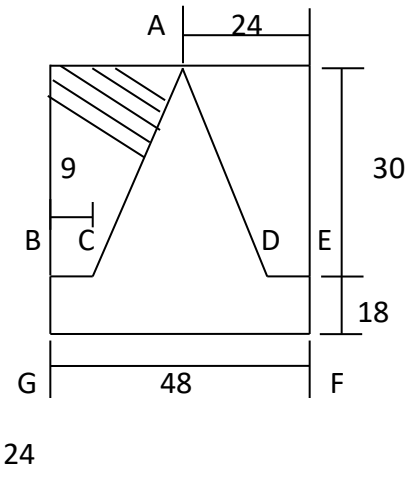
 Fig : CENTER PUNCH & PRICK PUNCH	A center punch is used to mark the center of a point. It is usually used to mark the center of a hole when drilling holes. The tip of a center punch has an angle between 60 and 90 degrees. A prick punch is similar to a center punch but used for marking out. It has a sharper angled tip to produce a narrower and deeper indentation. The indentation can then be enlarged with a center punch for drilling. The tip of a prick punch is 40 degrees It is also known as a dot punch.

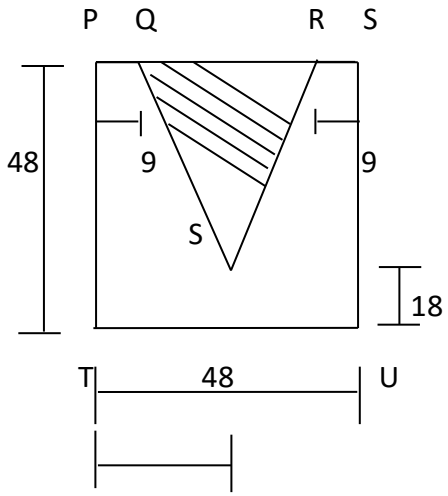
 Fig : LETTER PUNCH	 Fig : NUMBER PUNCH	Letter punches and number punches are used to emboss the impression of a letter or number into a work piece. They are most common in the reverse image, this allows the end result to be immediately readable, however they may be made as a positive image. This is essential in the case of die or mold making and ensures that the finished product will be readable, as a die is a negative image.

6. JOB PIECE : A 100mm long mild steel flat bar of 50mm.

MALE PART



FEMALE PART



(All dimensions are in mm)

7. JOB OPERATIONS PERFORMED : The following job operations are performed to make a fitting job- fitting of male and female part. (Hash part of above fig. to be removed)

i) Chalking

ii) Marking

iii) Cutting

iv) Filling

v) Punching

7.i) Chalking :

7.ii) Marking :

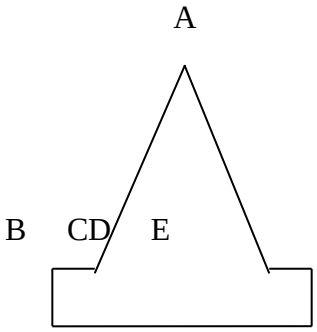
7.iii) Cutting :

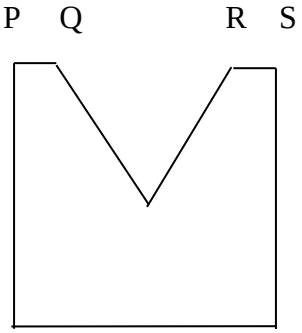
7.iv) Filing :

7.v) Punching :

8. INVESTIGATION REPORT :

MALE PART **FEMALE PART**





F GVT

MALE PART	Name of sides	Desired dimension in mm	Observed dimension in mm	FEMALE PART	Name of sides	Desired dimension in mm	Observed dimension in mm
	BC				PQ		
	DE				RS		
	EG				ST		
	BF				VT		
	FG				VP		

9. CONCLUSION : Write in your own words.