

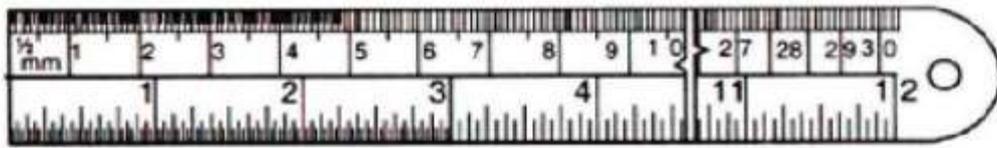
MANUFACTURING LAB III

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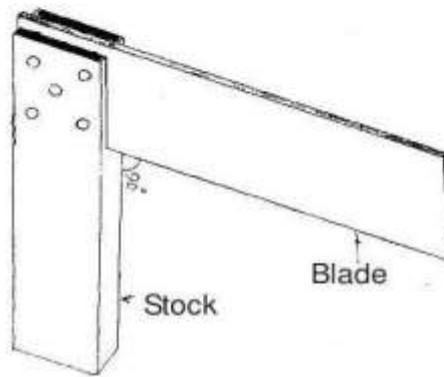
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FITTING

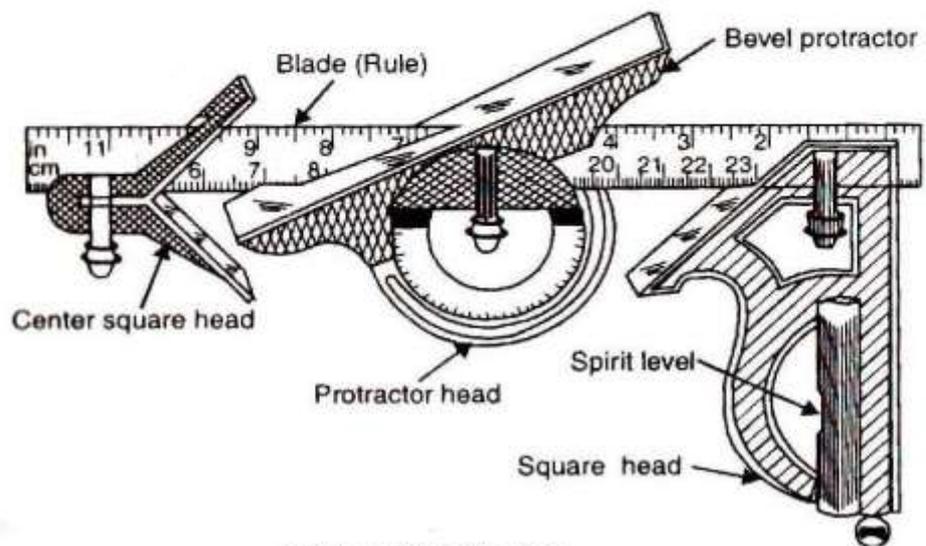
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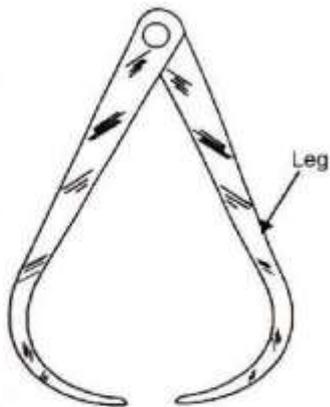
STEEL RULE



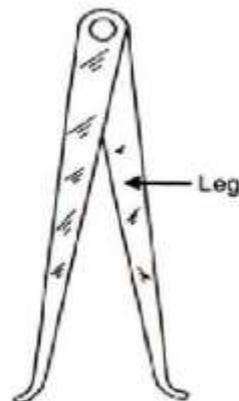
TRY SQUARE



COMBINATION SET



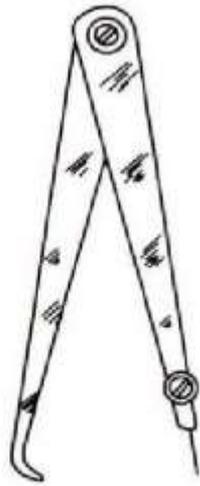
FIRM JOINT OUTSIDE CALIPER



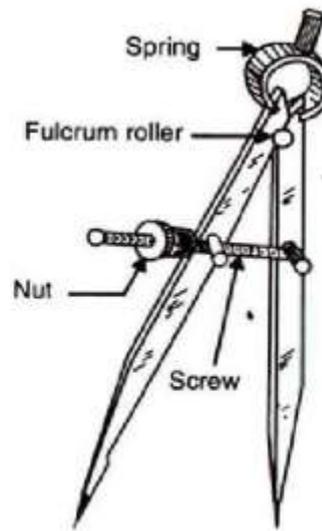
FIRM JOINT INSIDE CALIPER

SAFETY PRECAUTIONS IN FITTING SHOP

1. Shop floor should be kept clean, free from debris, scrap, oil and grease.
2. Do not touch the chip as it comes out of the job.
3. When using grinding machine protect your eyes with goggles.
4. Always work under sufficient light.
5. Do not wear loose dress.
6. Never use hammers with loose heads.
7. Provide guards between opposite vices.
8. Files must have well fitted handles.
9. See that the job is properly fitted to the vice.
10. Do not blow filing when hacksawing.
11. Ease up the pressure when hacksawing is nearly through.
12. Use the right tool for the right job.



ODD LEG CALIPER OR JENNY CALIPER



DIVIDER



Prick punch



Centre punch



Dot punch

TAPS



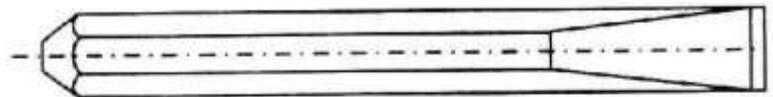
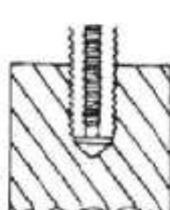
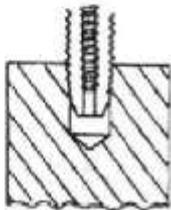
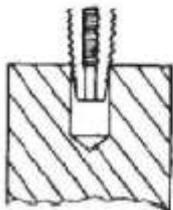
Taper Tap



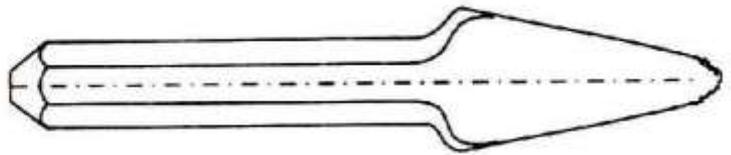
Intermediate Tap



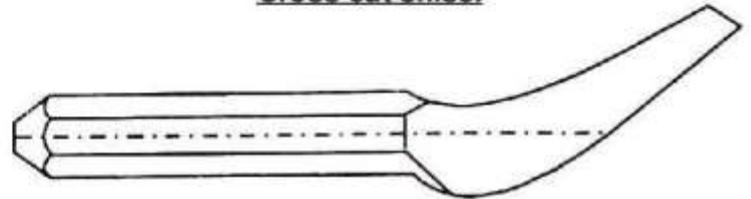
Bottoming Tap



Flat Chisel



Cross cut chisel



Half round chisel



Diamond point chisel

COMMON TOOLS AND THEIR APPLICATIONS

1. STEEL RULE.

The steel rule is one of the most useful tools in the workshop for taking linear measurement of blank to an accuracy of 0.1mm to 0.5 mm. It consists of a strip of hardened steel having line graduations on it. Steel rule is made 150,300 and 1000mm long.

2. TRYSQUARE

Trysquare is made in one piece of both beam and blade. This is used when it is necessary to get another edge or surface exactly at right angle to a perpendicular surface. It also used for laying out work. The right angle of any square may be tested by placing the beam of the surface against a straight edge with the blade resting on a smooth surface.

3. COMBINATION SET

This is a very useful measuring instrument used in the fitting and machine shop. It combines in one instrument a square head, a center head, and bevel protractor. The three heads are held on the beam that acts as a rule is marked either in inches or centimeters or in both. Length of the rule varies from 200 to 6000mm.

4. OUTSIDE CALIPER

An outside caliper is a two legged steel instrument with its legs bent inwards. It is used for measuring or comparing thickness, diameters and other outside dimensions. The size of a caliper is specified by the greatest between the legs that be opened.

5. INSIDE CALIPER

An inside caliper is exactly similar to an outside caliper in appearance its legs bent outside. This is used for comparing inside diameters, distance between shoulders or other parallel surface of any inside dimensions.

6. HERMAPHROODITE (JENNY OR ODD LEGG) CALIPER

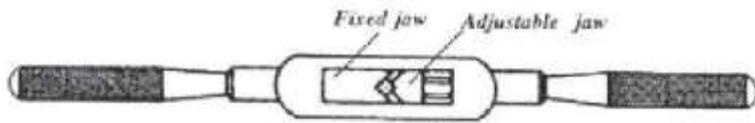
This is called odd leg caliper. It has one pointed leg with a divider and one bent leg. This is used for locating the centers of founded bar and making lines parallel to the edge of the work.

7. DIVIDER

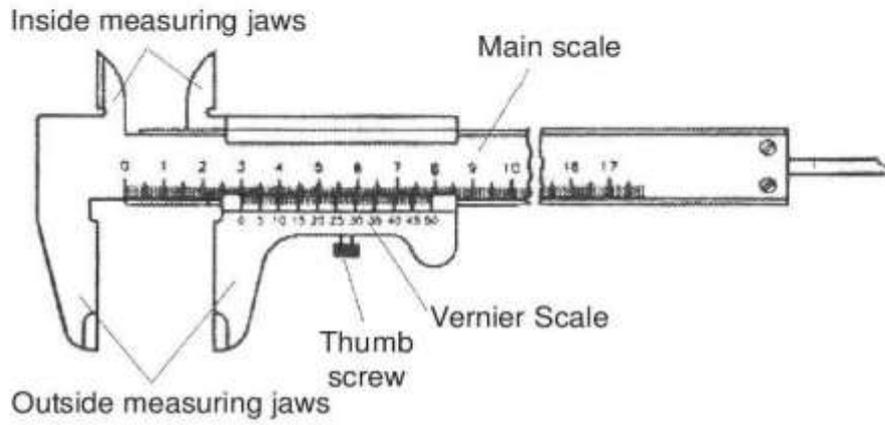
A divider is similar in construction to a caliper except that both legs are straight with sharp hardened points at the end. This tool is used for transferring dimensions, scribing circles and doing general layout work. In practice one point is placed in the center.

8. PRICK PUNCH

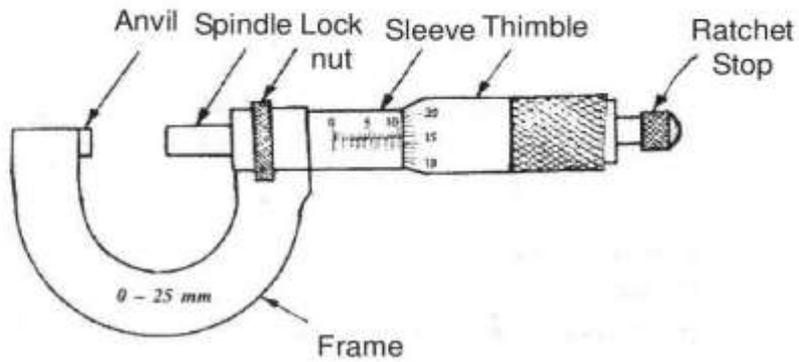
It is sharply pointed tool. The tapered point has an angle of 30° . It is used for making small dots along the lay out lines in order to make them last longer.



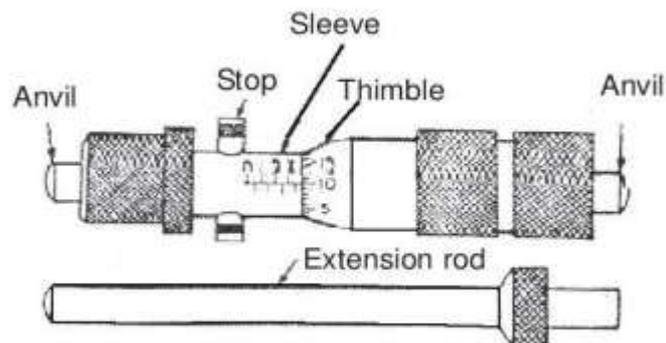
Adjustable Tap Wrench



Vernier Caliper



Outside Micrometer



Inside Micrometer

9. CENTER PUNCH

It is identical to prick punch except that its point angle is grounded to 90° . It is used to mark the center point of holes that are to be drilled.

10. DOT PUNCH

Dot punch are used to make dots or points along the scribed line. The tapered point has an angle of 30° to 60°

11. CHISELS

Cold chisel is used for cutting and chipping away the pieces of metal, and is made of carbon steel usually of rectangular, hexagonal or octagonal cross sections. This chisel is divided into cutting edge, shank and head, and this is generally specified by the length and width of the cutting edge.

Eg :- A 25mm. cold chisel means a chisel with a 25mm. Wide cutting edge.

(a) Flat chisel: It is the chisel that is used for most of the general chipping operations.

(b) Crosscut chisel: It is used for cutting grooves, large surface and is also used in cutting key way in wheels and shafts.

(c) Half round chisel: It is used for cutting oil ways or grooves in bearings, bosses and pulleys etc. They are also used for setting over pilot holes.

(d) Diamond point chisel: This is used for cutting "V" grooves, cleaning corners and squaring small holes.

12.SET OF TAPS

(a) Taps: Taps are used to cut threads on the made of a hole, as in a nut. They are three types (i) Taper Tap (ii) Second Tap or Plug Tap and (iii) Bottom Tap. This is also specified in Tougher, Intermediate and Finisher Tap respectively.

(b) Tap Wrench: It is used for holding the tap. It may be either fixed adjustable.

13.CALCULATION OF TAP DRILL SIZE

Before tapping we have to make drill hole. The size of the drill may be delivered from the following formula.

$$D = T - 2d$$

[Where 'D' – is the diameter of tap drill size. 'T' – the diameter of tap or bolt to be used and 'd' the depth of thread. $D = 0.61 * p$ (Approx) 'p' is the pitch of thread]

14.VERNIER CALIPER

Vernier calipers are widely used for precision measurements of length, thickness, and inside and outside diameters. They are manufactured with metric unit accuracy or least count of 0.1, 0.02 or 0.05mm.

In vernier scale mm. long directed into 10 equal plants. Each dimension in the main scale is 1mm. Therefore one division in the vernier scale is $9/10 = 0.9\text{mm}$.

$$\begin{aligned}\text{Least count} &= \mathbf{1 \text{ main scale division} - \text{vernier scale division}} \\ &= \mathbf{1 - 0.9} \\ &= \mathbf{0.1\text{mm.}}\end{aligned}$$

15. OUTSIDE OR EXTERNAL MICROMETER

It is used for measuring outside dimensions like diameters of a rod and thickness of the parts, to the accuracy of 0.01mm. pitch of the screw spindle is 0.5mm. One complete turn of the thimble, the spindle moves 0.5mm. 50 equal divisions were marked on thimble. The thimble is rotated only one division on its level edge, ie $1/50$ of a turn.

$$\begin{aligned}\text{Least count} &= \mathbf{0.5/50} \\ &= \mathbf{1/100} \\ &= \mathbf{0.01\text{mm}}\end{aligned}$$

16. INSIDE MICROMETER

It is used for measuring inside dimension of the object such as inside diameter of a hole and width of a slot. It is manufactured to measure over 50mm variation up to 13mm. for larger variations extension rod is used. The principles and workings are the same as outside micrometer.