



Report

..Production Technology..

The installation tools used in the engineering workshop and the measuring tools

By

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Introduction:

I prepared this report to explain the installation tools used in the engineering workshop and the function of each, and also explain the measuring tools and how to use them.

1- The fitting shop tools and the function of each:

Fitting Workshop is the process of assembling various parts manufactured in the machine shop. Tools used in Fitting shop:

1- Clamping Tools.

The clamp function is: to hold the work securely in place temporarily, and it must be ensured that the job is not shifted under the cutting forces. It is also necessary for clamping the jig to the work. They are used to hold all types of components between jaws (Fixed Jaw and Movable Jaw) and the clamping gadget plan ought to be such that the working time of jig or installation is slightest conceivable. Hence for tall rates of generation, quick-acting clamps are fundamental though straightforward clamps may be satisfactory for little bunches of work. Here are examples of clamping tools with their function:

- **Bench vice**



These are heavy-duty, usually steel tools, which are commonly used in woodworking. They hold projects in place while you saw, drill, sand, or plane them. Some bench vises are permanently fitted to the bench, while others can be portable, with screws that can easily be undone in order to move the vice to a different area of the workshop.

- **Screw clamps**



These clamps have two handles that can tighten or loosen the grip of the clamp by being screwed through the threads. They offer a very strong hold and are typically utilized in woodworking or metalworking.

- **C clamp**



The 'C' part of the clamp goes around both your work surface and the item you want to clamp down, while a long screw gets twisted around to tighten the jaw and make the clamp secure. Used for carpentry, welding, or cutting.

- **Hand vice**



Use to hold small objects tight while grinding, drilling, filing, hammering, sanding, shaping, etc. Jaws have vertical and horizontal V grooves for holding round objects.

2- Cutting Tools.

The function of the cutting tools is: they are used to remove and cut the excess layer from the sample piece (plate) specified in the specified dimensions, to give the work piece the specific size, shape and precision required. These tools are sharp-edged to facilitate the process of cutting any material. Here are examples of cutting tools with their function:

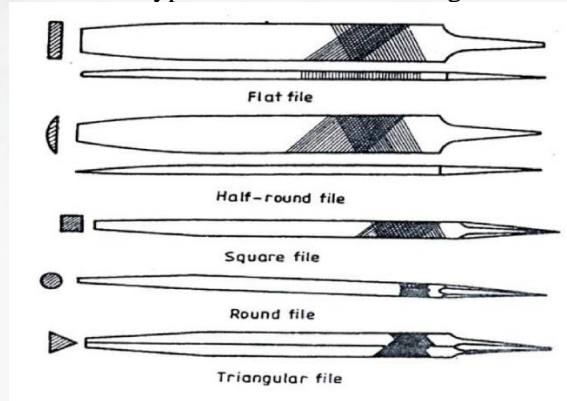
- **Hack saw**



Hacksaw is used for cutting rods, bars, pipes, etc. It consists of a frame, which is made of mild steel.

- **File**

A file is used to cut, trim or finish a job of metal or wood, in order to give them a shape according to our needs such as making the job round, square or angular. File is made from high carbon steel. After chipping a job of metal generally becomes rough and a file is used to make it smooth. There are several file types as shown in the image:



- Flat File: This file is of rectangular cross-section in shape. It is made slightly tapered both in width and thickness. Double cut teeth are cut on the face and simple-cut teeth are cut on the edge. These are used to reduce flat surface by filing of finishing.

- Half-round File: It is a file which is on the side and curved on the other side. Double cut dents are cut on it and like a round file, it is also tapered. With this file, the damaged hole can be set in order again. It is used for filing internal curved surfaces.

- Square file: It is square in shape and somewhat tapered. It is used when the workpiece has a rectangular or square bore.

- Round File: This type of file has two sides, one in the form of a semicircle and the other side is flat. It is used to scrub or finish a circular bore in the work piece.

- Triangular file: It is triangular in shape. Its angles are 60 degrees. Use when we want a "V" engraved on the work piece. It is used for filing corners and angles which are more than 60 degree.

- **Chisels**



A chisel is a tool with a characteristically shaped cutting edge of blade on its end, for carving or cutting a hard material such as wood, stone, or metal by hand, struck with a mallet, or mechanical power. The handle and blade of some types of chisel are made of metal or of wood with a sharp edge in it.

- Drills



Drills are used to make circular holes. These are made up of high-speed steel, chromium steel and carbon tool steel.

- Reamers



After drilling a hole, a reamer is used to finish the drilled hole. It consists of a Body and a Shank.

- Taps



Taps are used to make internal threads in drilled holes. Taps are available in the following three types: 1. Taper or first tap (rough) 2. Plug or second tap (semi-finish tap) 3. Bottoming tap (finish tap).

- Dies



The die is a cutting tool used to cut external threads on cylindrical parts. It is a circular disc of hardened tool steel having a threaded hole and flutes which forms cutting edges. Types of Dies:

1- Solid die. 2-Adjustable split die.

3- Striking Tools.

The function of the striking tools is: they are used to strike or hit the workpiece by the application of external force. With the aim of perforating, cutting, engraving, bending, straightening and fixing to the work piece (plate) to achieve the desired shape.



These are used for striking purposes like punching, chipping, marking, bending, straightening and riveting Hammer is basic striking tool Parts of hammer 1. Peen 2. Face 3. Eye hole 4. Handle 5. Head

4- Marking Tools.

The function of the marking tools is: It is used to map the size on the work piece to distinguish any dimensions on the surface of the work piece. It transports all the little icons that appear on the surface of the work piece, to tell you where to cut, fold, or place adjacent pieces. Here are examples of marking tools with their function:

- Scriber



A scriber is a hand tool used in metal work to mark lines on workpieces, prior to machining. The process of using a scriber is called scribing and is just part of the process of marking out. It is used instead of pencils or ink lines.

- Divider



Used to help scribe an arc or a circle on material. They have two legs and look similar to a compass. One of the legs is firmly placed on the material while the other leg is rotated, scribing a circle or arc onto the workpiece.

- Angle plate



Angle Plates provide a practical means for clamping and holding work in vertical position for layout, tooling and machining. Precision T-Slotted Angle Plates are also used as a vertical reference for inspection. They make an ideal fixture for shaping, planing milling, grinding, drilling and boring operations.

- V-block



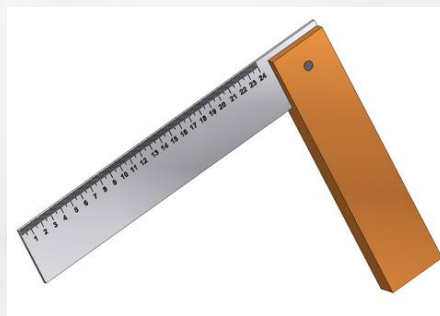
V-Blocks are precision metalworking jigs typically used to hold round metal rods or pipes for performing drilling or milling operations. They consist of a rectangular steel or cast iron block with a 120 degree channel rotated 45-degrees from the sides, forming a V-shaped channel in the top. A small groove is cut in the bottom of the "V".

- Punch



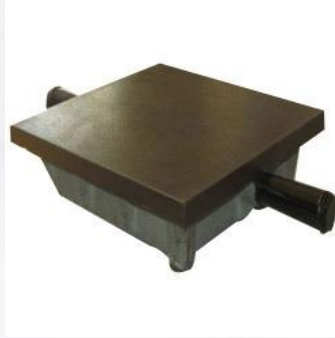
Used to mark a centre mark for drilling. Use a hammer to drive the point of the punch into the metal. This leaves a small surface impression.

- Try Square



The square in the name refers to the 90° angle. To try a piece of wood is to check if the edges and faces are straight, flat, and square to one another. A try square is used for marking and checking 90° angles on pieces of wood.

- Surface plate



A surface plate is a solid, flat plate used as the main horizontal reference plane for precision inspection, marking out (layout), and tooling setup. The surface plate is often used as the baseline for all measurements to a workpiece. Surface plates are a common tool in the manufacturing industry and are often fitted with mounting points so that it can be an integrated structural element of a machine such as a coordinate-measuring machine, precision optical assembly, or other high precision scientific & industrial machine. Plates are typically square or rectangular, although they may be cut to any shape.

5- Measuring Tools:

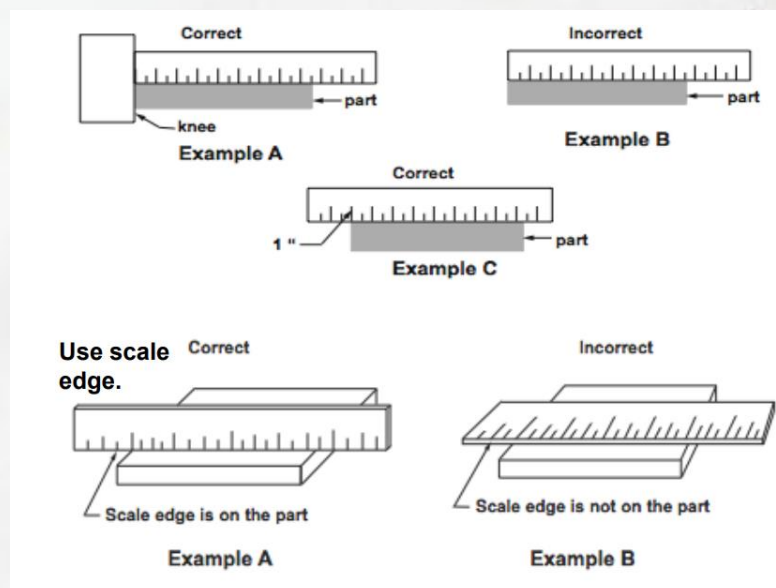
2-The measurement tools and how it uses:

Dimensional measurements with the required level of accuracy are the primary link between the intent of the designers and the product presented. Therefore, it is not easy to produce a product without measuring its dimensions using measuring tools. The most commonly used measuring instruments are described below:

1. Steel rule

Using steel rules:

- Don't use end as reference point, except with "knee"...
- If no "knee", use 1 inch mark as reference.



2. Caliper

Calipers do not have a scale so they cannot be used alone. It just takes the size to be measured and then we use, for example, a steel ruler to read the measurement. Types of calipers and how to use each type are as follows:

- 1- **Outside calipers:** Used to measure thicknesses and outside diameters of materials. They should be placed round a material and the legs tightened so the guiding feet meet the work piece but can be removed without being adjusted. The span of the legs is then measured against a steel rule to give an accurate reading.

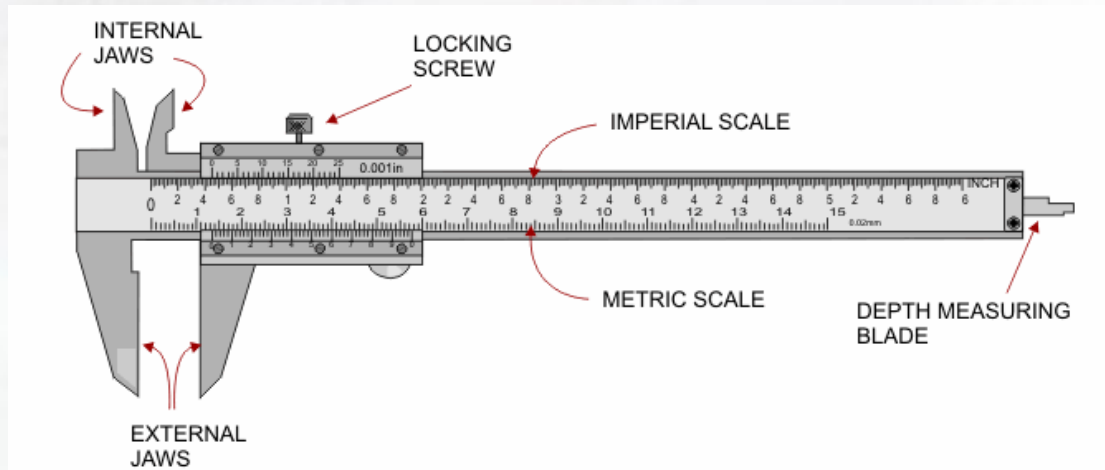


- 2- **Inside calipers:** These are used to measure distances on the inside of materials such as tubes. These callipers have two legs with guiding feet pointing outwards. The legs are placed inside the material or object to be measured and then extended until the feet make contact with the material. The span of the legs is then measured against a steel rule to give an accurate reading.



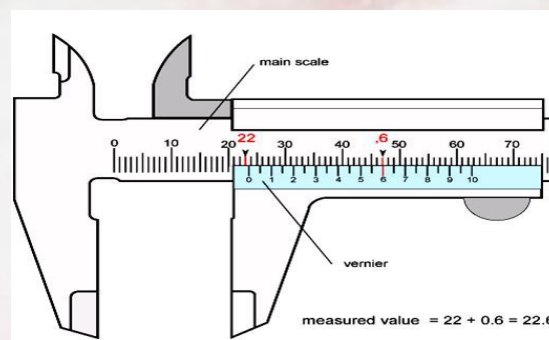
3. Vernier Caliper

It's a precise measuring device that can measure diameter, thickness, depth and take compound measurements. It consists of two jaws and those are Upper Jaw and the Lower Jaw. Upper Jaws are used to measure the Inner diameter of the given specimen whereas Lower jaws are used to measure the outer diameter of the given specimen. It consists of two scales. One is the Main Scale and the other is the Vernier Scale. Both these scales are measured in Inches as well as in millimeters. The locking pin is used to tighten the jaws at the given measurement. The Vernier caliper is an extremely precise measuring instrument; the reading error is $1/20 \text{ mm} = 0.05 \text{ mm}$.



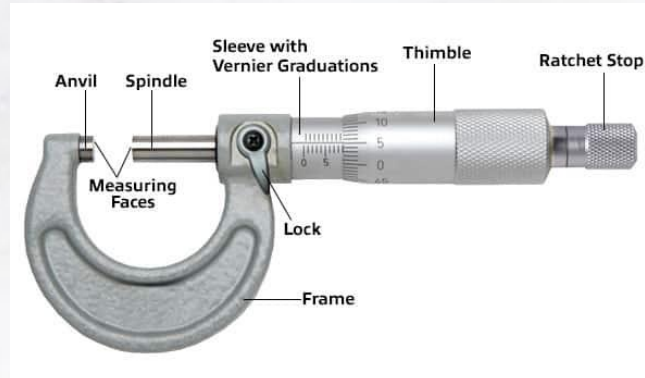
How to use a vernier caliper:

- Close the jaws lightly on the object to be measured.
- If you are measuring something with a round cross section, make sure that the axis of the object is perpendicular to the caliper. This is necessary to ensure that you are measuring the full diameter and not merely a chord.
- Ignore the top scale, which is calibrated in inches.
- Use the bottom scale, which is in metric units.
- Notice that there is a fixed scale and a sliding scale.
- The boldface numbers on the fixed scale are centimeters.
- The tick marks on the fixed scale between the boldface numbers are millimeters.
- There are ten tick marks on the sliding scale. The left-most tick mark on the sliding scale will let you read from the fixed scale the number of whole millimeters that the jaws are opened.

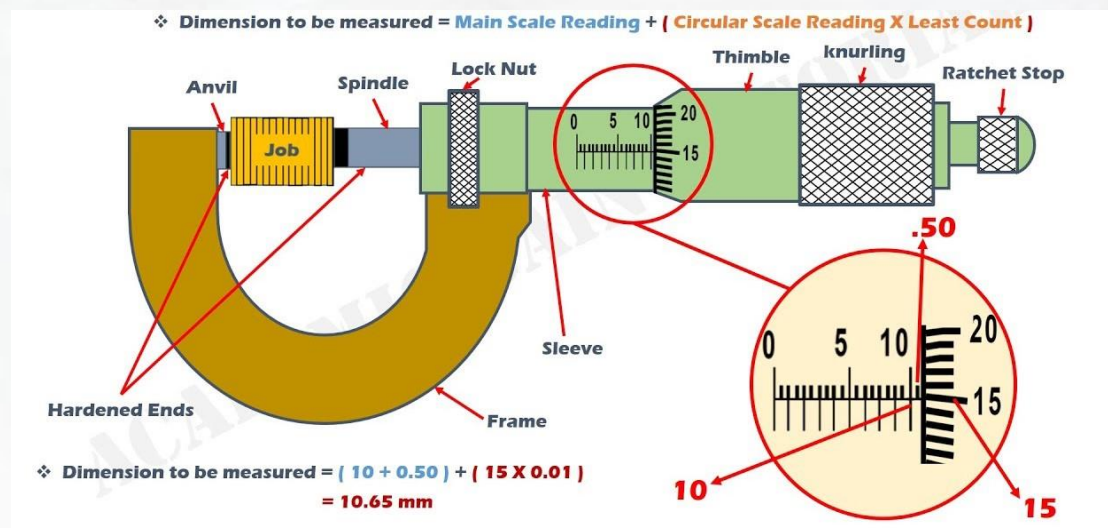


4. Micrometer

A micrometer is a measuring instrument that can make very accurate measurements. Most micrometers are designed to measure within a thousandth of an inch. Accurate measurements like these are essential even when the smallest distance between objects can cause problems or difficulties.



- 1- The micrometer is held correctly by positioning the work is placed into position, and the thimble is rotated until the part is clamped lightly between the anvil and the spindle.
- 2- The workpiece being measured must be held, and then placed between the anvil and the spindle.
- 3- We move the spindle to fix the work piece in the micrometer, then the measurement will be read as shown in the picture.



Conclusion:

In conclusion, I have explained in detail the fitting tools in the engineering workshop and the function of each with its examples and the function of these examples. Tools used in the fitting workshop were clamping tools, cutting tools, striking tools, marking tools and measuring tools. I explained the measuring tools by mentioning what are the measuring tools and how they are used I hope that I have clarified all that is required of me to the fullest.