VERNIER

VERNIER CALLIPER

Introduction

The origin of calipers can be traced back to the 9th A.D. The second addition to reducing the margin of error was that of a vernier which was done by a French mathematician Pierre Vernier in 1631.

The main use of Vernier calipers is to measure the internal and external dimensions or distance extremely accurately. Vernier calipers are preferred over other flat devices such as rulers as they have an extremely small reading error that of 0.05mm, which is around 0.0019 inches.

There are mainly two types of vernier calipers, one is manual and has two scales one empirical and one metric, and the other one is the digital vernier caliper which boasts an LCD screen that displays the reading. The manual vernier calipers are still much preferred by the people as they are much cheaper than the digital ones and are not dependent on power.

Composition

**A Vernier Caliper has following parts:**

1. **Outside jaws:** It used to measure the external dimension of objects.
2. **Inside jaws:** It used to measure the Internal dimension of objects.
3. **Measuring Depth Probe**: It is used to measure the depth of objects.
4. **Main Scale** (cm).
5. **Main Scale** (inch).
6. **Vernier Scale** (cm).
7. **Vernier Scale** (inch).
8. **Retainer:** It used to block the movable part.

Characteristics

### Application

* Medical usages
* Science labs
* Industries such as steel and aerospace
* Educational sectors

MICROMETER SCREW GAUGE

Introduction

A micrometer screw gauge is a device widely used in the mechanical engineering field for measuring extremely small dimensions. Though it belongs to the family of calipers, and also consists of two different scales.

The hand tools are used in telescopes or microscopes to measure the potential diameter of microscopic objects.  
Micrometers are not always in the form of calipers, but their spindle is very accurately machined screw. The part to be measure will be placed between the spindle and the anvil. This spindle moves toward the object to be measured when the ratchet knob is turned and the object is lightly toughed against the anvil.

Composition

A micrometer is composed of the following parts:

* **Frame** – It is the C-shaped body that holds the anvil and barrel in constant relation to each other. The frame is heavy and has high thermal mass. To prevent substantial heating up, it is covered by insulating plastic.
* **Anvil** – The shiny part the spindle moves toward and the sample rests against.
* **Barrel**– Stationary round component with a linear scale on it.
* **Screw**­– Found inside the barrel and is considered the heart of the micrometer.
* **Locknut** – Component that one can tighten to hold the spindle stationary.
* **Spindle** – Shiny cylindrical component that causes the thimble to move toward the anvil.
* **Ratchet Stop** – The device on the end of the handle that limits applied pressure by slipping at a calibrated torque.

Characteristics

In a micrometer screw gauge, there are two gauge readings is taken, the first is the main scale reading followed by the circular scale reading. The instrument has two adjustment keys, one is for moving the spindle toward the anvil. The other key serves as a lock when the gauge is achieved.

Applications

* **Machines with moving parts** – Parts that move in and out of each other such as the piston need to remain in a steady straight line, otherwise, the slightest bit of sway can lead to faults.
* Bearings and pipe fittings need precise measurements for their optimal functioning.
* Micrometers are a preferred tool for measurement of the thickness of items such as metals.

HEIGHT GAUGE

Introduction

* A height gauge is a measuring device used for determining the height of objects, and for marking of items to be worked on. These measuring tools are used in metalworking or metrology to either set or measure vertical distances; the pointer is sharpened to allow it to act as a scriber and assist in marking out work pieces.

Composition

Height gauges consist of a sliding carriage with a moving stylus or scribe that is mounted to a vertical axis beam or column that contains a measuring scale. The beam is configured so that it is perpendicular to the base of the height gauge, which is typically made using a rigid material to add stability to the instrument for measurements. The beam or column height can vary from 6 inches or less to upwards of 6 feet, depending on the model. Custom gauges may extend the column height even higher. The carriage movement is controllable and may be adjusted by a set of adjustment screws for coarse or fine adjustments and may be locked into position as needed. A measuring jaw is used whose upper and lower surfaces are parallel to the base of the height gauge. In the case where it is desired to scribe the workpiece, a specialized scribing attachment can be used in place of the measuring jaw.

Application

* To measure the distance from a reference surface to a specific feature of a part to verify that it meets specifications and tolerances
* To scribe a part with accurate vertical dimensions or features from a datum plane so that additional machining can be done
* To perform 2D measurements of part features
* To verify center-to-center dimensions
* To measure flatness
* To measure angles
* To measure straightness/squareness or perpendicularity of parts

Depth gauge

Introduction:

A depth gauge is a device for measuring depth underneath a reference surface. They include depth gauges for underwater diving and similar packages, and engineering gadgets used to degree the intensity of holes and indentations from a reference floor.  
A diving intensity gauge is a strain gauge that presents the equivalent intensity underneath the free floor in water. the connection among intensity and pressure is linear and accurate sufficient for maximum realistic functions, and for plenty functions, such as diving, it's far honestly the stress that is critical. it is a piece of diving system utilized by underwater divers, submarines and submersibles.

Composition: depth gauge consists of a**transparent tube open at one end. It has no moving parts**, and the tube is commonly part of a circle or a flat spiral to compactly fit onto a support.

Application:

The main use of the depth gauges is for making precise measurements of depth dimensions in industrial and production applications. Some of the various other applications of depth gauges are as follows:

a) Depth gauges are used in medical applications as surgical instruments (surgical or orthopedic depth gauge)

b) Diving depth gauge for monitoring the depth of divers.

c) There are also lower precision depth gauges which are used for measuring the remaining tread on vehicle tires (tire tread depth gauge) or for checking the depth of threads cut on threaded fasteners (thread depth gauge).

**V BLOCKS**

V Blocks are tools used to retain material while doing machining operations like drilling or milling, etc.

A jig structure called a "V Block" is composed of cast iron and has True V faces (grooves) and slots.

V Blocks