

Calipers

The tool

Calipers range in price from a few dollars to \$50 or more, depending on the material, accuracy, and readout type you want. On the cheap end, Lee Valley sells a ½ dozen plastic vernier style for \$8. However, they also sell a top end, machined steel digital unit for \$50. In this case, you do get what you pay for. The plastic ones are great to have around the shop for checking nuts and bolts, dowel sizes, or doing rough measures. The more precise instruments are more suited to our purposes as modellers.

There are three styles of caliper, named for the way they give a reading. Vernier calipers rely on a scale etched into the body, with good eyesight required to determine the actual measurement from an increasingly smaller set of lines. Dial calipers have a stopwatch-like face that indicates the measurement using a pointer. Digital calipers have the advantage of giving a direct reading in numeric form; some convert between millimetres, and inches (decimal and/or fractional) at the push of a button.

Measurement Possibilities

Most calipers are accurate to 1/1000th (0.001) of an inch, or 1/128th when using fractional measurements, and 0.01mm (0.00001m or 10 microns) in metric. Note that micrometers are 10 times more accurate, but this is rarely needed unless you are machining your own live steam engine parts.

There are four basic measurements that can be taken with a caliper: inside, outside, depth, and off-set or step. The geometry of the caliper also makes it possible to transfer measurements, because on most calipers, these four lengths are always equal. See references and attached Lee Valley information for all four measures and parts of the caliper.

One other feature of most dial and digital calipers is the ability to “zero” the instrument at any point. This is handy for example when marking the top and bottom of a window on a wall. Mark the bottom first, and then – without closing the jaws – zero the caliper. Now set the caliper to the height of the window, and mark the top. No addition required!

Measurement technique

Obtaining accurate, consistent readings depends as on proper technique even more than the quality of the measuring tool. Here are some pointers:

- Make sure the measuring jaws are clean and free from dust or grit
- Check the zero setting periodically, especially if you are working to close tolerances

- Use the thin tips of the jaws for most measurements. The wider portion of the jaws is useful for measuring discontinuous surfaces such as drill bits or screw diameters.
- Use the thumbwheel (if present) or light pressure to gently advance the jaws until they close on the work. Use only enough pressure to ensure a snug reading.
- Use the locking screw to keep the reading from changing as the jaws are withdrawn from the work (when transferring measurements). Lift the jaws straight off of the work being careful to keep the caliper perpendicular to the workpiece. Twisting the caliper slightly to either side will change the reading.
- When measuring inside diameters, rotate the caliper slowly around a small arc while applying gentle pressure to the thumbscrew. This will enable the jaws to settle in to the true diameter of the workpiece. Watch the readout and stop when it reaches a maximum reading.

Using the caliper without turning it on...

One of the biggest sources of error in building occurs when a measurement is taken and then recreated at a later time. Locking the head of the caliper at a given measure, and transferring it to another site, rather than re-measuring is the simplest way to avoid this discrepancy. Remember that all four measurements (above) are always equal, allowing transfer between types of measurements as well. E.g. Take the diameter of a dowel using the outside measure, then verify that the receiving hole is big enough using the inside measure.

Care & Feeding

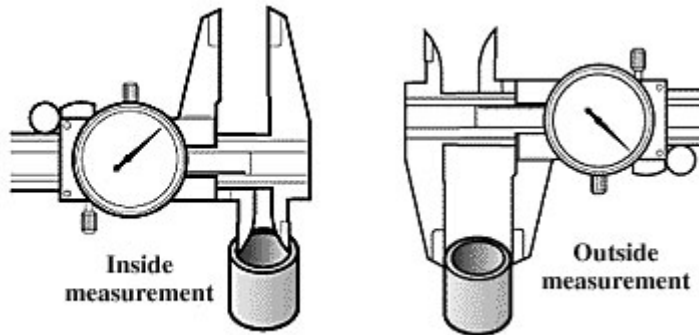
The more expensive calipers are precision instruments. It is important to keep them clean & dry, not subject them to shock, and not use their straight edges for any cutting, tempting as it may be in the moment! Keep them in their cases, and keep the case in a place where other tools and projects will not be piled on top or there is a chance of knocking it to the floor.

Additional information

http://www.mini-lathe.com/Mini_lathe/Reviews/HF_digital_caliper/caliper.htm
<http://littlemachineshop.com/Instructions/UsingCalipers.pdf>

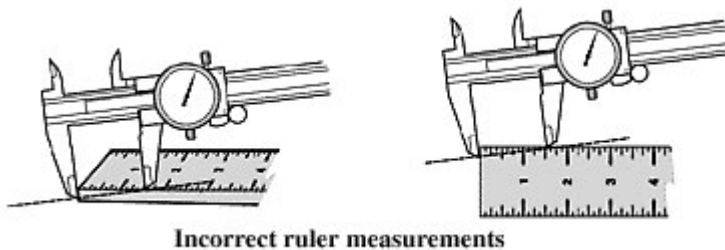
Andrew Batchelor
abatchel5125@yahoo.ca

Using a Caliper – Lee Valley Tools

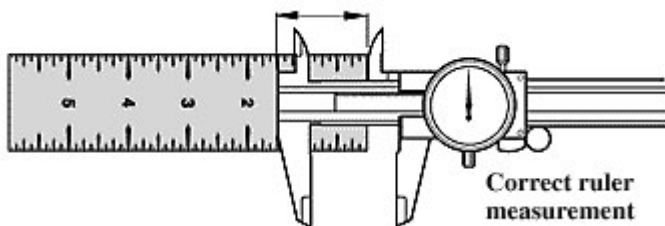


Most people use a caliper only for inside or outside measurements, but most calipers can also be used as a depth gauge. Users tend to forget that aspect.

Moreover, there is one other useful feature of a caliper that most people do not even know exists; that is the ability to read distances from the end of the movable head to the end of the caliper body. This is useful whenever you have to measure from the end of something to a point on its side, e.g., when checking the accuracy of a ruler. If you try to check end accuracy of a ruler using the inside of the jaws, you will always introduce a small error.



This may seem to be trouble free, but first, it is difficult to adjust accurately and second, the more you extend one tip over the ruler end, the greater the error you will introduce. The reading will always be greater than the distance you want to measure.



You can do it all simpler, faster and more accurately by measuring from the tip of the movable head to the tip of the body. Standard dial or vernier calipers are built to facilitate this by having the movable head and the body machined flush when the jaws are closed. (LL - 3/97)