The premier source of tooling, parts, and accessories for bench top machinists.

Basic Layout

Layout is an important part of machining especially when working with castings, forgings and weldments. It is important that you lay out carefully to make sure you have enough material to "clean up" all important surfaces.

Even though I have a DRO on my mill and work from the drawing, I usually lay out parts so that I have a double check on the positions of holes and other elements. I set the tool position from the drawing dimensions, then double check that the tool is over the scribed lines on the workpiece.

Work Surface

Most layout work is done on a flat surface. This is traditionally a granite surface plate. Granite surface plates are very flat and very stable.

Because surface plates are heavy, the shipping cost may be more than the cost of the surface plate itself. This may make the total cost prohibitive for a home shop machinist.

There are several more economical solutions for hobby work where absolute accuracy is not required. You can use a sink cutout from a granite countertop. You can also use a piece of thick (3/8" and up) piece of plate glass. Both surfaces are flat enough (sub 0.001") to use for most work.

Layout Dye

Before you can scribe lines on a metal surface you have to color it with layout dye. Layout dye is a fast drying "paint" that can be easily removed when you are done making the part.

Dykem is blue layout dye that provides a thin blue film without cracking or chipping. The container has a brush in the lid to make application easy.

Another option is to use a dark colored marker, such as a black Sharpie. With a wide tip Sharpie, it's easy to "paint" small areas.

Basic Layout Tools

These are some tools that are used in layout work. Some of these tools have uses beyond layout work, but this document covers their use in layout work only.

Scriber

The scriber is the "pencil" of layout work. Its sharp point creates thin lines in the layout dye. Tip the handle of the scriber away from the straight edge so the point is as close to the straight edge as possible.

Rigid Steel Rule

Use the rigid steel rule for measuring and as a straightedge for drawing lines. The steel rule included in the layout tools package is graduated in 32nds and 64ths on one side and mm and 0.5 mm on the other. Its graduations are fine enough for most layout work.

When you measure with a steel rule, be sure the graduations on the rule are adjacent to the part being measured. When the rule is laid flat on the part, you cannot get an accurate measurement because of parallax.
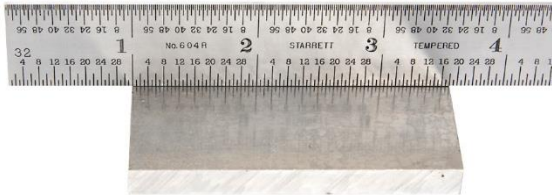
Good technique

Poor technique

Hermaphrodite Caliper

Besides having a great name, the hermaphrodite caliper is very useful in layout work. Use it to draw lines parallel to the edge of the workpiece.

Machinist Square Set

Use a machinist's square as a straightedge for drawing lines that are perpendicular to the edge of the workpiece. You can also use them to check that the sides of the workpiece are straight and square with each other.

Protractor

Use the protractor as a straightedge for lines at other angles to the edge of the workpiece.

Prick Punch

The fine point of the prick punch allows you to position it precisely over scribed lines locating the position of a hole to be drilled. Tap it gently with a light hammer.

Center Punch

Use the center punch to enlarge the 'divot' created with the prick punch so that it is large enough to catch the center drill as you start to drill a hole.

Height Gage

The height gage is used to measure height from a flat surface. It can also be used to scribe lines that are parallel to and a specified distance above the work surface. To measure with the height gage:

1. Position the scriber so that it gently touches the work surface. The reading on the display should be zero at this point. If not, press the Zero button.
2. Place the object to be measured on the work surface and move the scriber up so that it rests gently on the top surface of the object. Adjust the lock screws to hold the slider in place.
3. Read the display to find out the height of the object.