Virtual Learning

Unmanned Flight Safety and Operations

Dial Caliper Measurement

May 21, 2020

Unmanned Flight Safety and Operations
Lesson: May 21, 2020

Objective/Learning Target:

Students will learn to measure inside and outside diameters to 1/1000 of an inch using a dial caliper.

Bell Work:

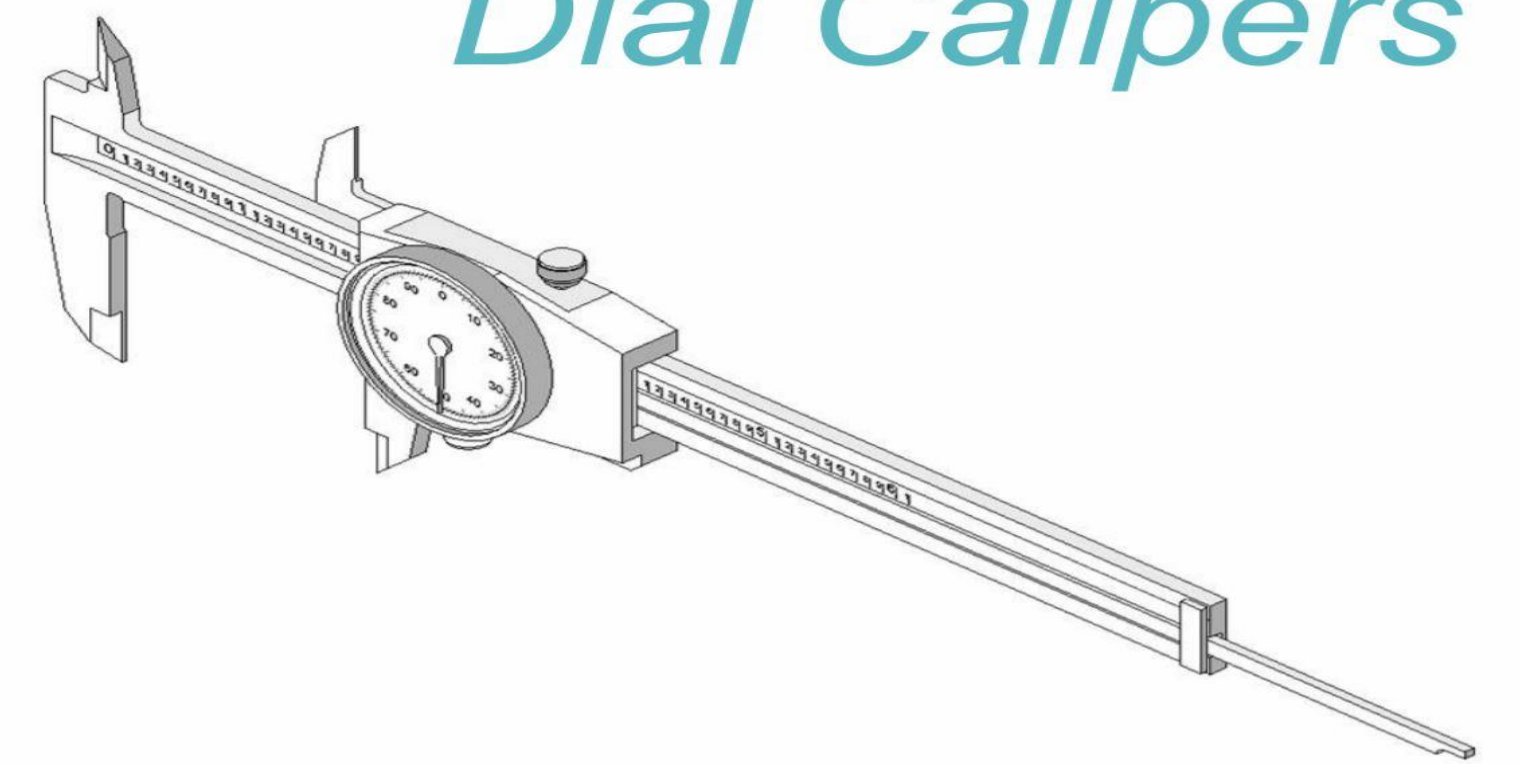
What do you think are the differences are measuring with a ruler and a pair of dial calipers?

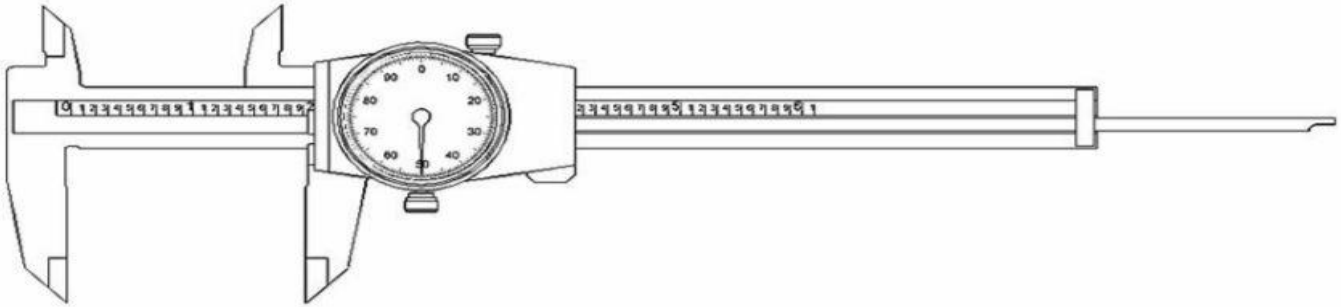
Let’s Get Started:

Watch Videos:

- How to Read a Dial Caliper
- Adam Savage's Favorite Tools: Dial Caliper

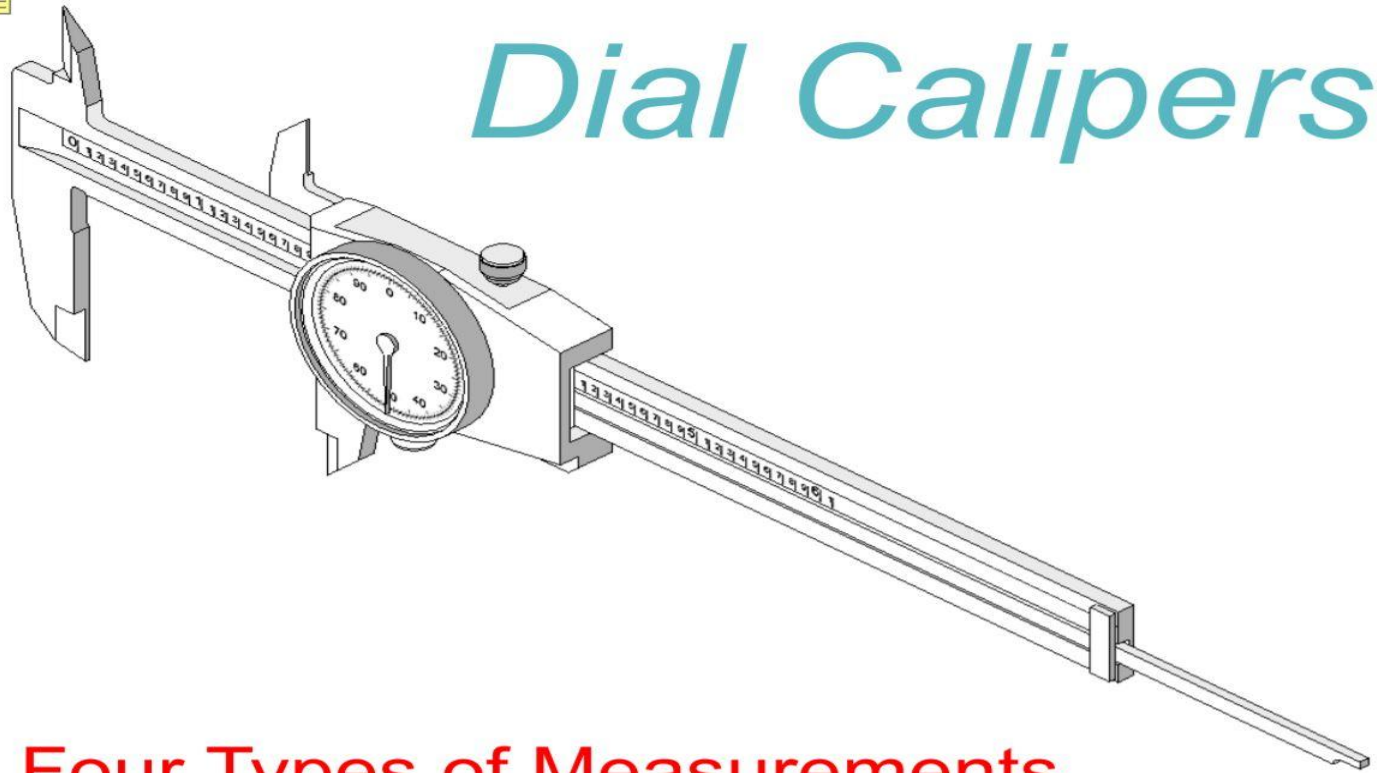
Dial Calipers

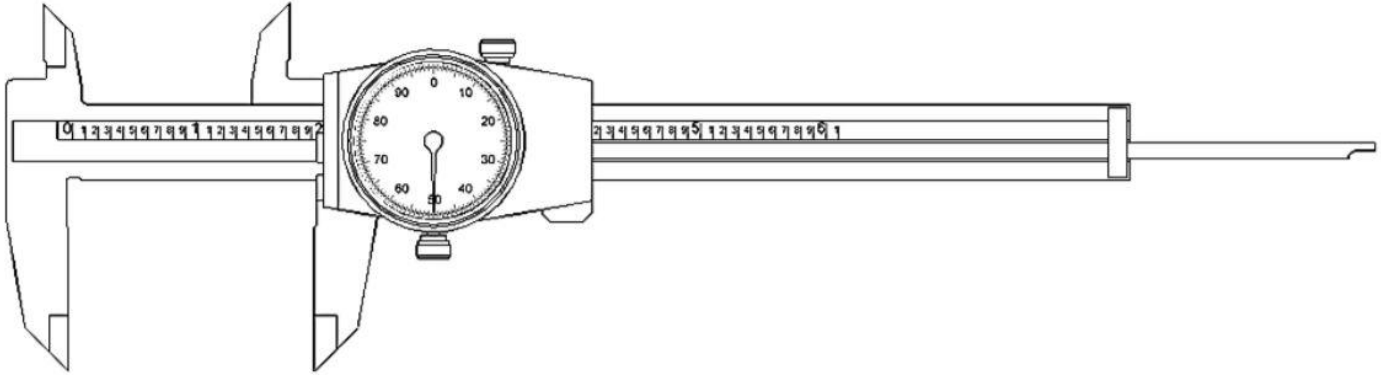




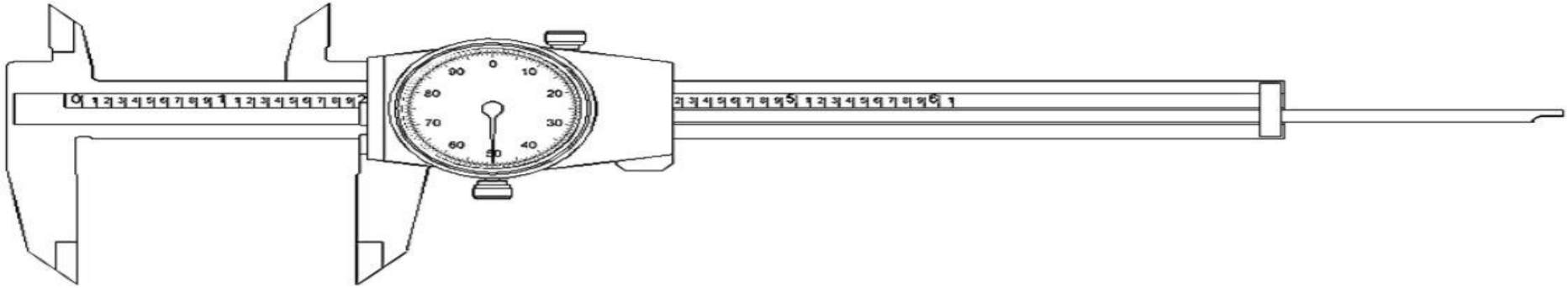
Dial Calipers are arguably the most common and versatile of all the precision measuring tools used by engineers and manufacturers.

Dial Calipers

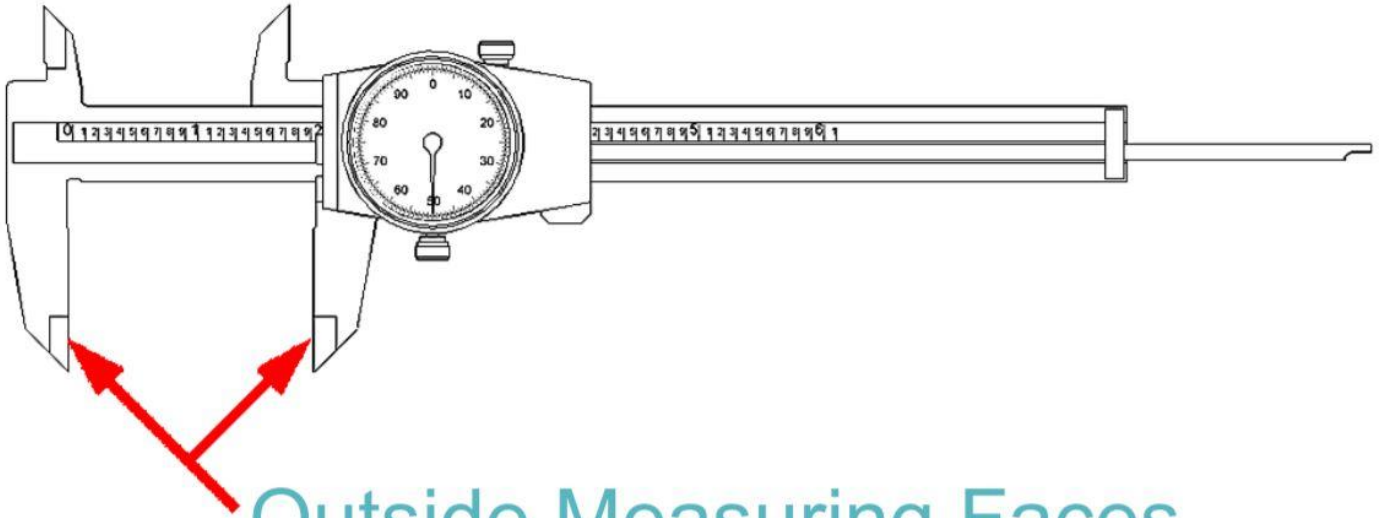




Dial calipers are used to perform four common measurements on parts…

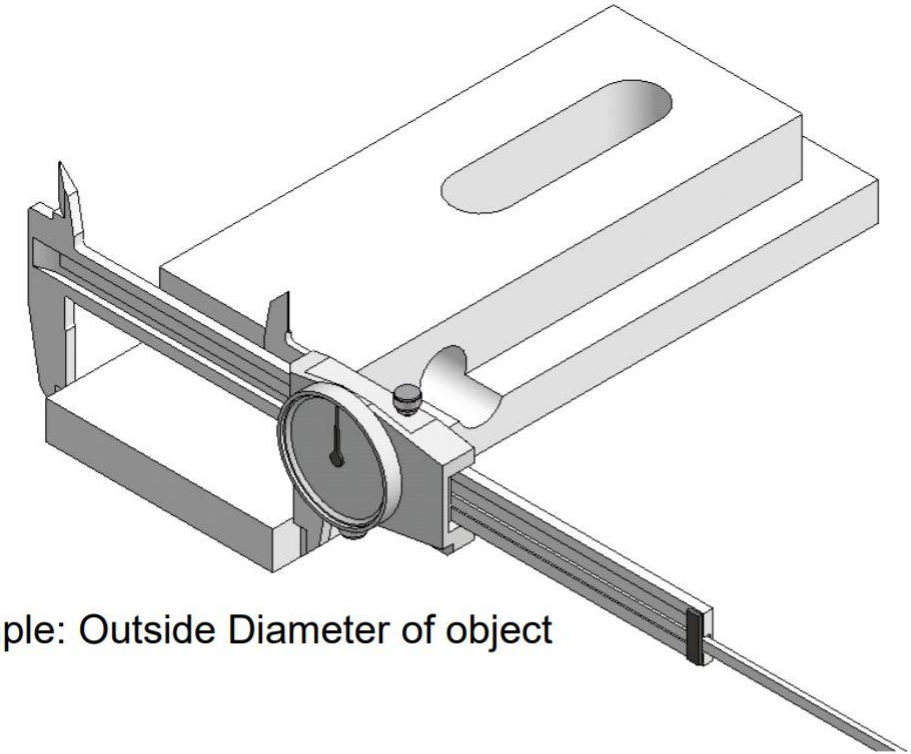


1. Outside Diameter or Object Thickness
2. Inside Diameter or Space Width
3. Step Distance
4. Hole Depth



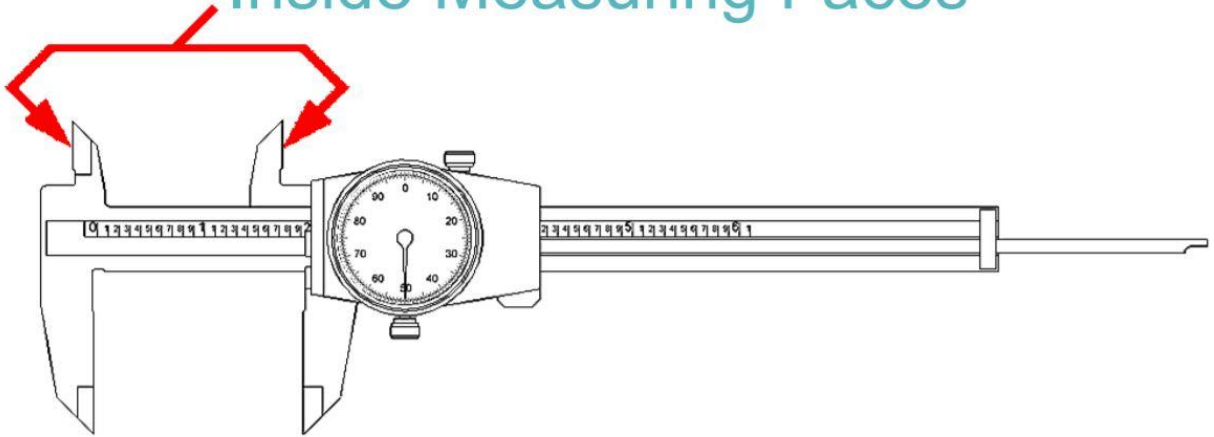
Outside Measuring Faces

These are the faces between which outside length or diameter is measured.



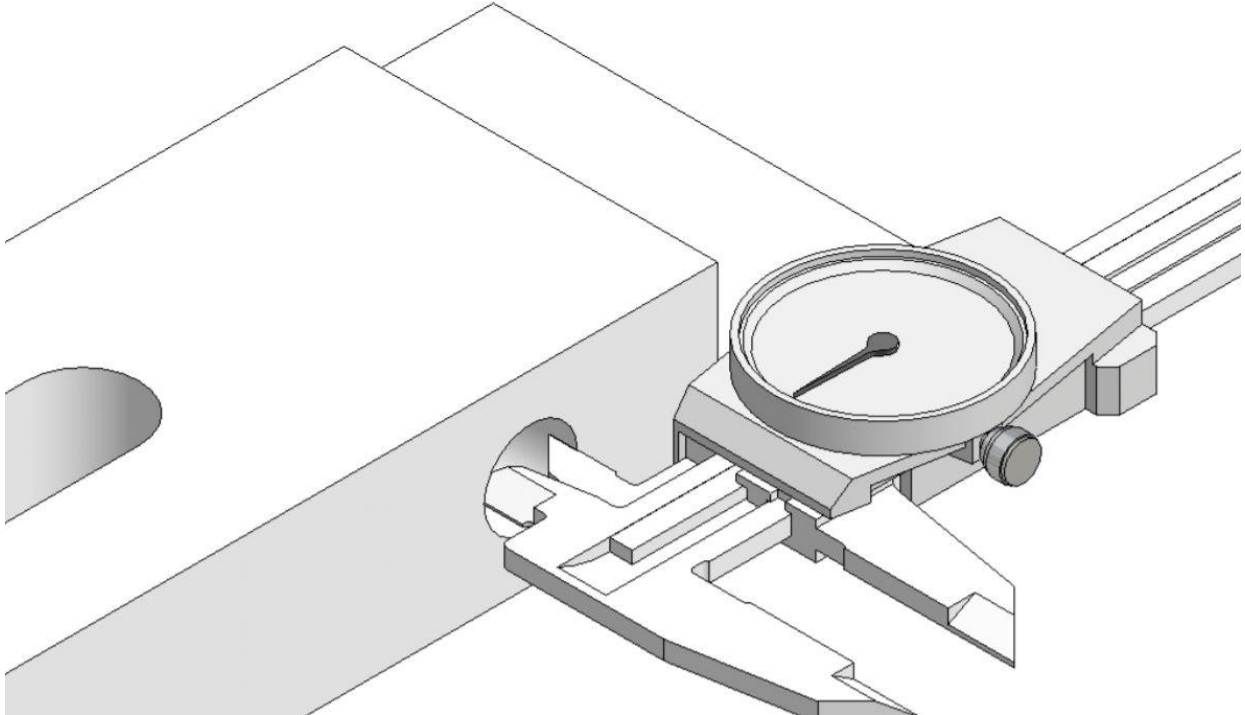
Example: Outside Diameter of object

Inside Measuring Faces

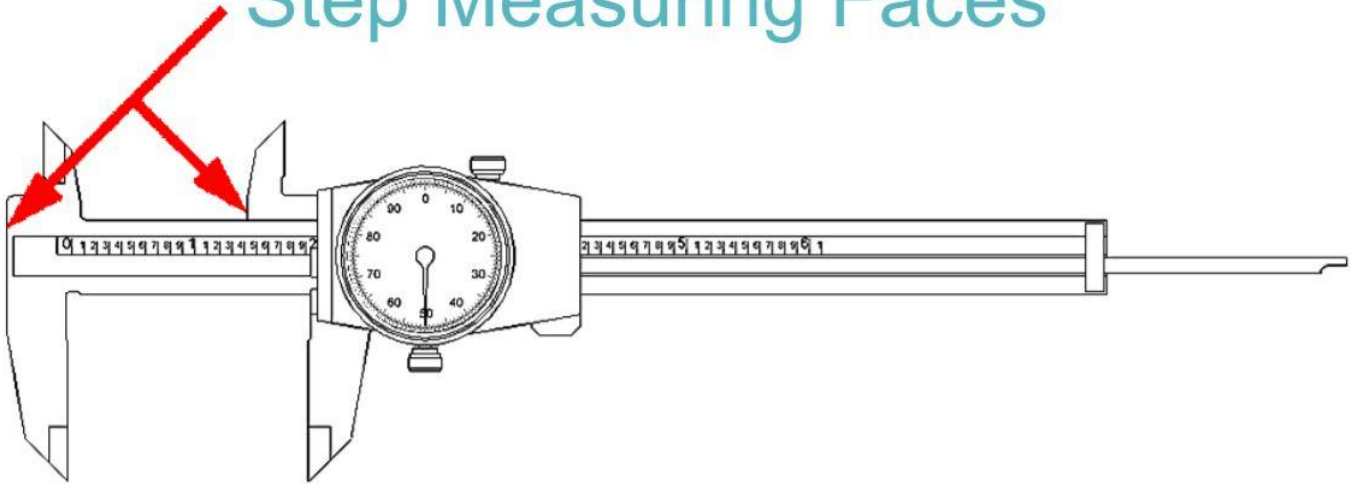


These are the faces between which inside diameter or space width (i.e., slot width) is measured.

Example: Inside measuring

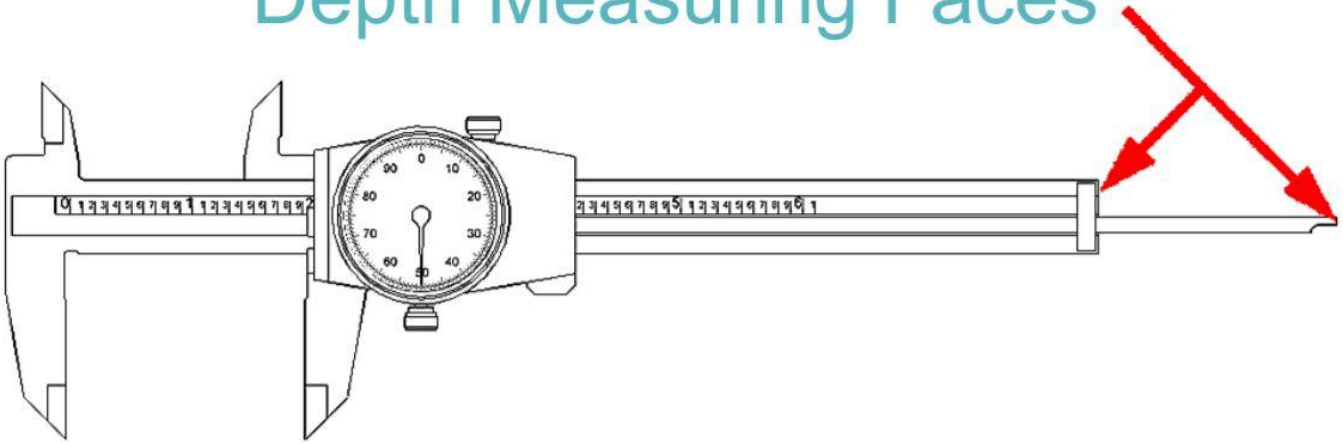


Step Measuring Faces

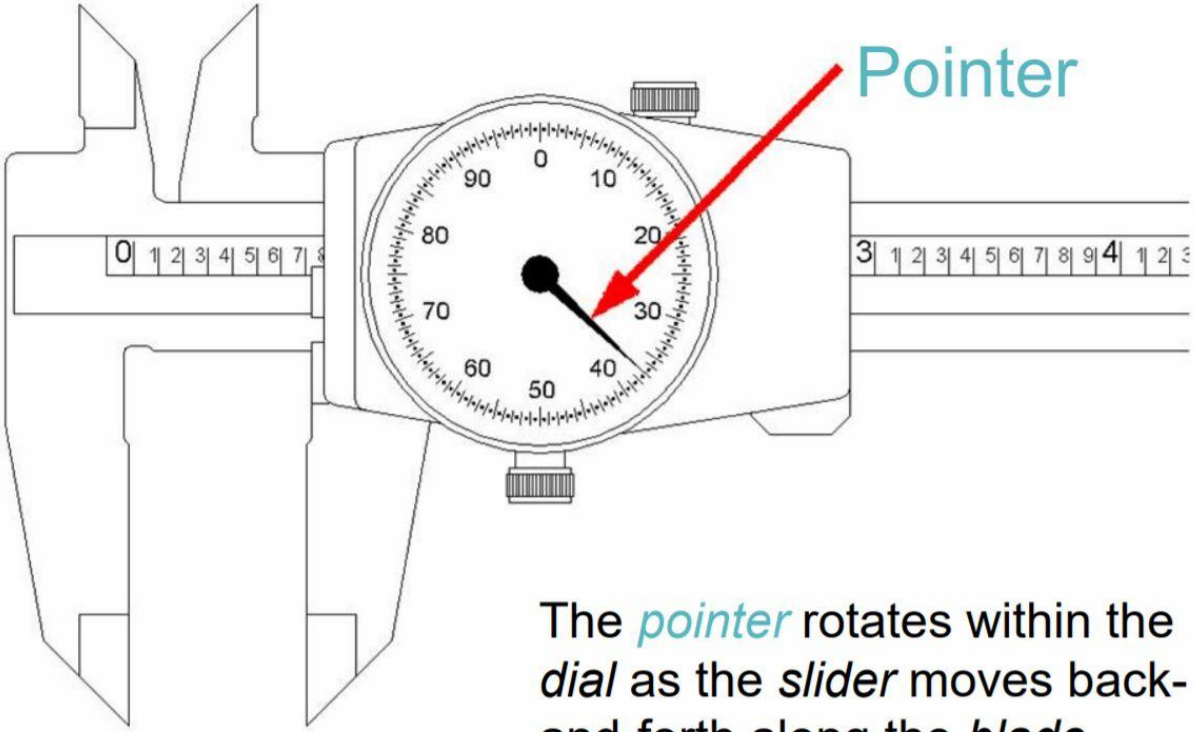


These are the faces between which stepped parallel surface distance can be measured.

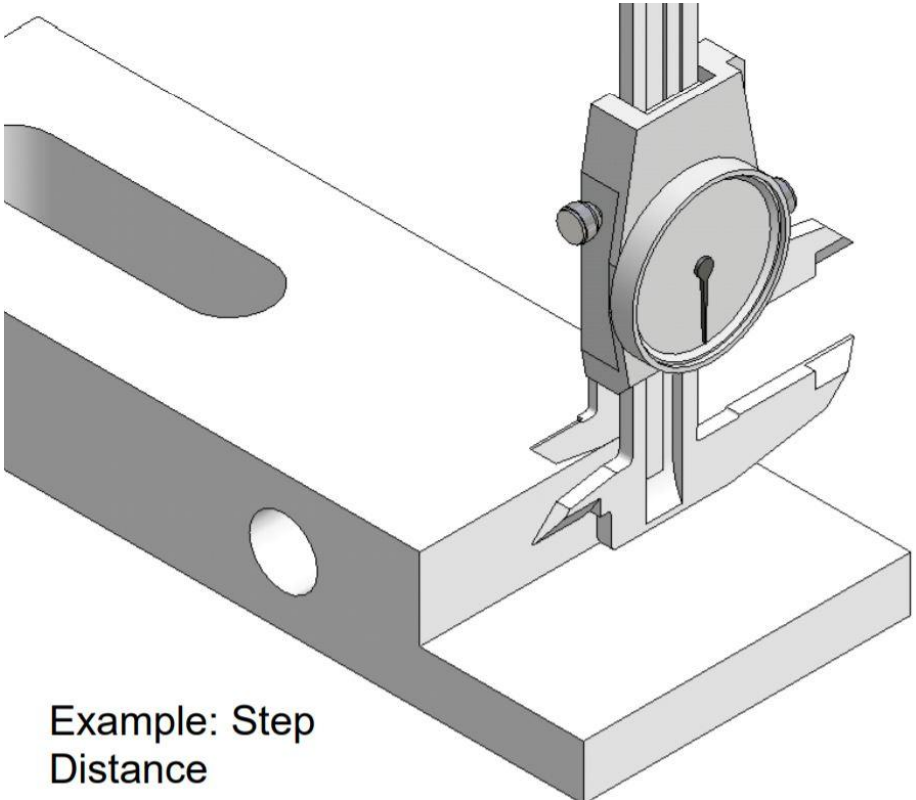
Depth Measuring Faces



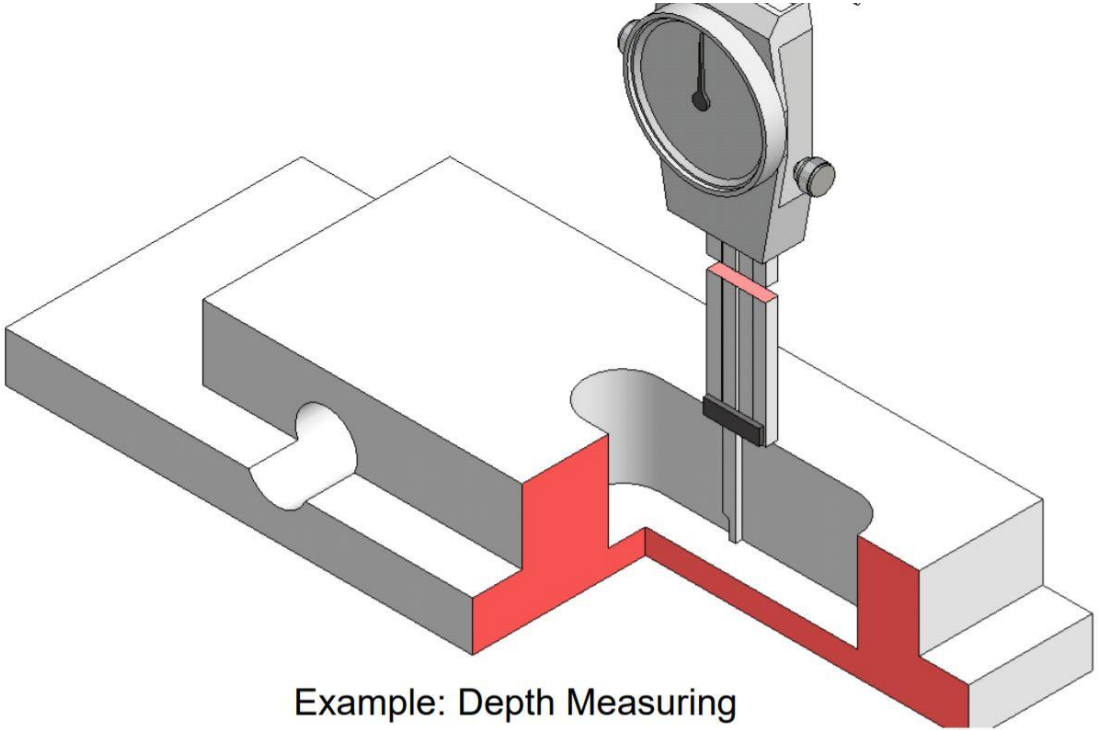
These are the faces between which the depth of a hole can be measured.



The *pointer* rotates within the *dial* as the *slider* moves back-and-forth along the *blade*.



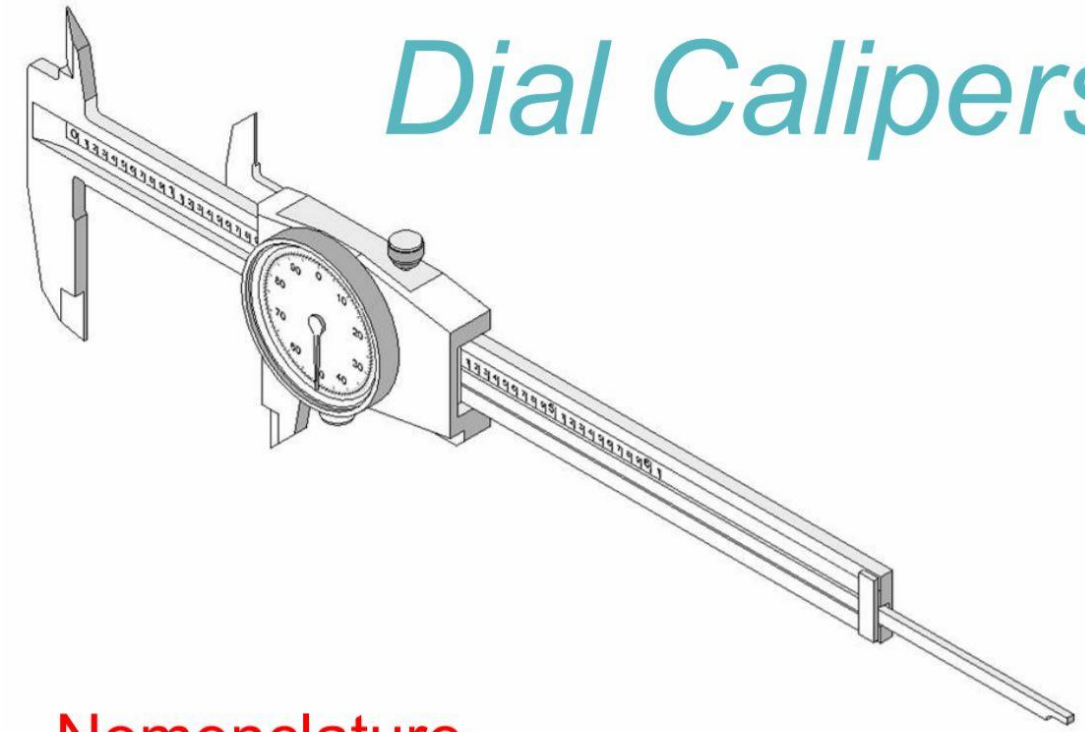
Example: Step Distance



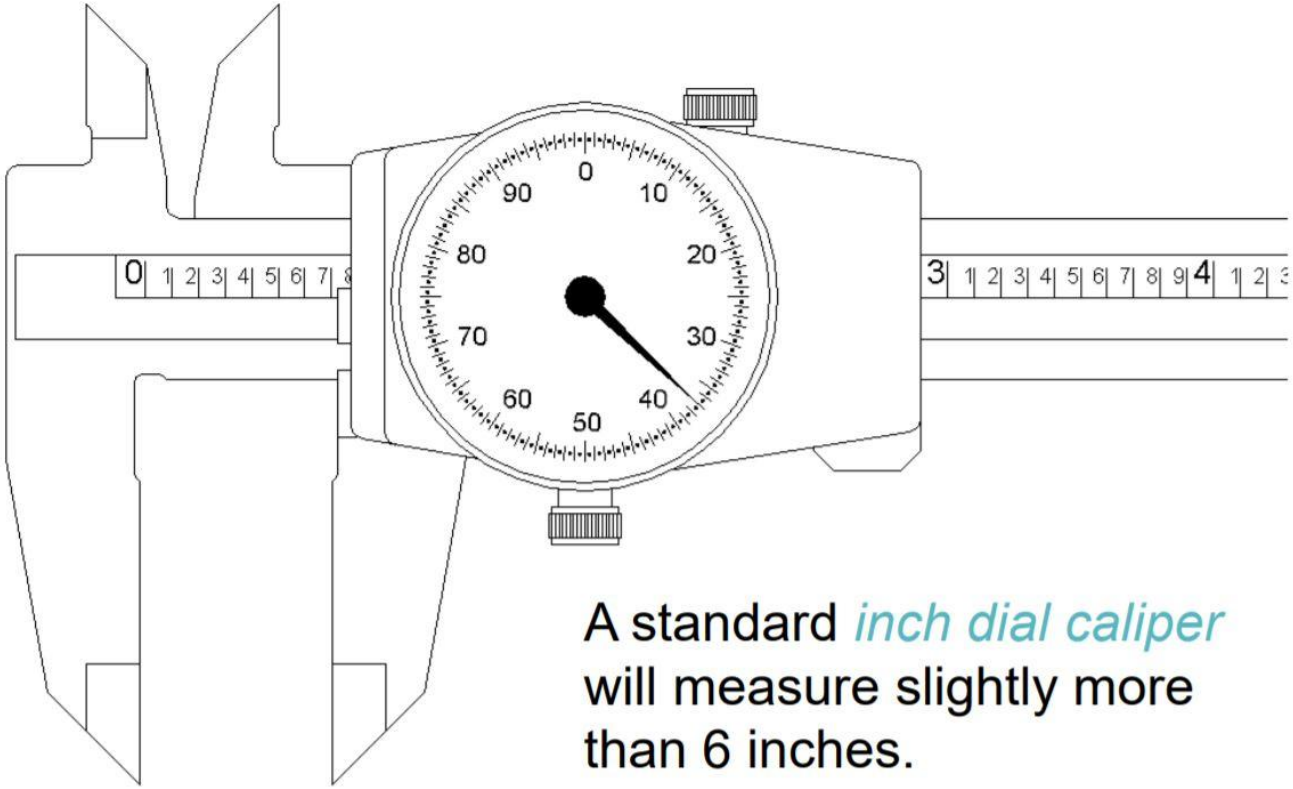
Example: Depth Measuring

Note: Work piece is shown in section. Dial Caliper shortened for graphic purposes.

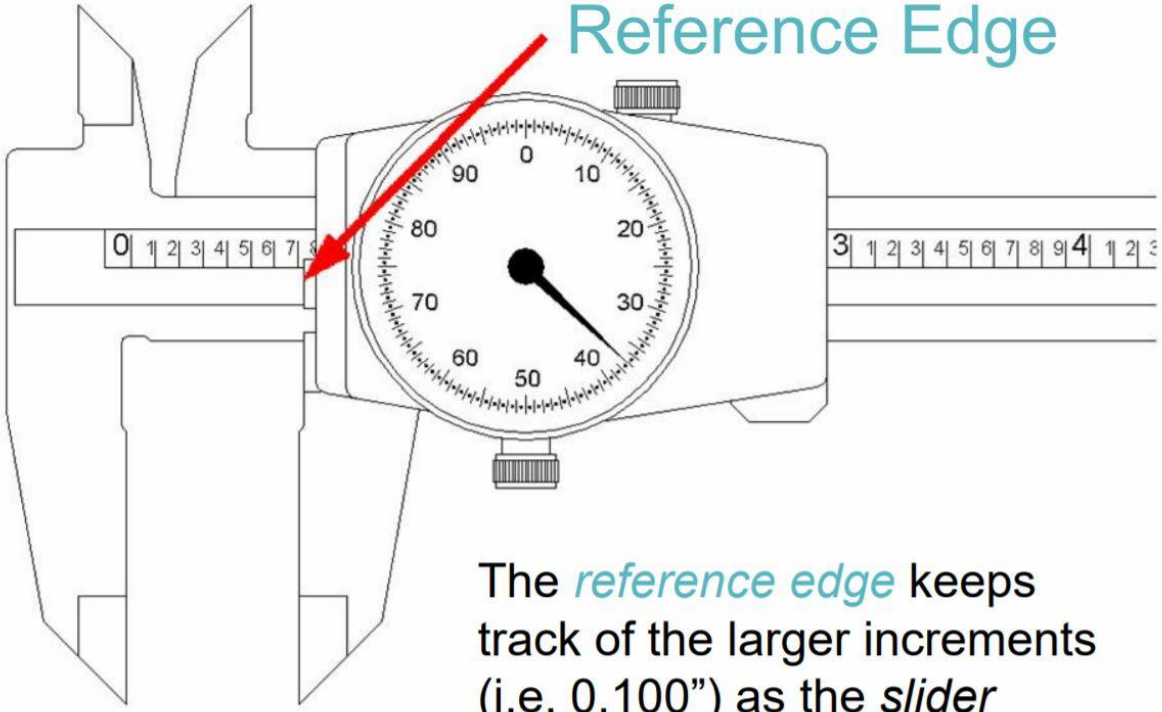
Dial Calipers



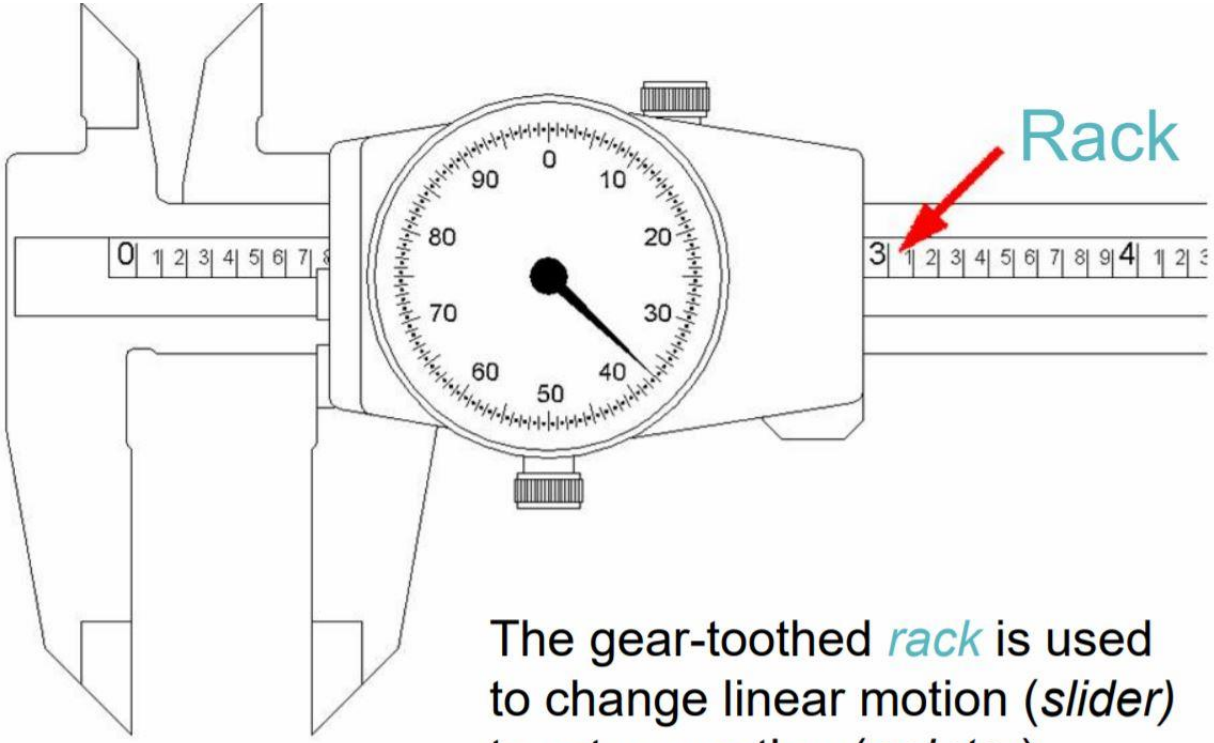
Nomenclature



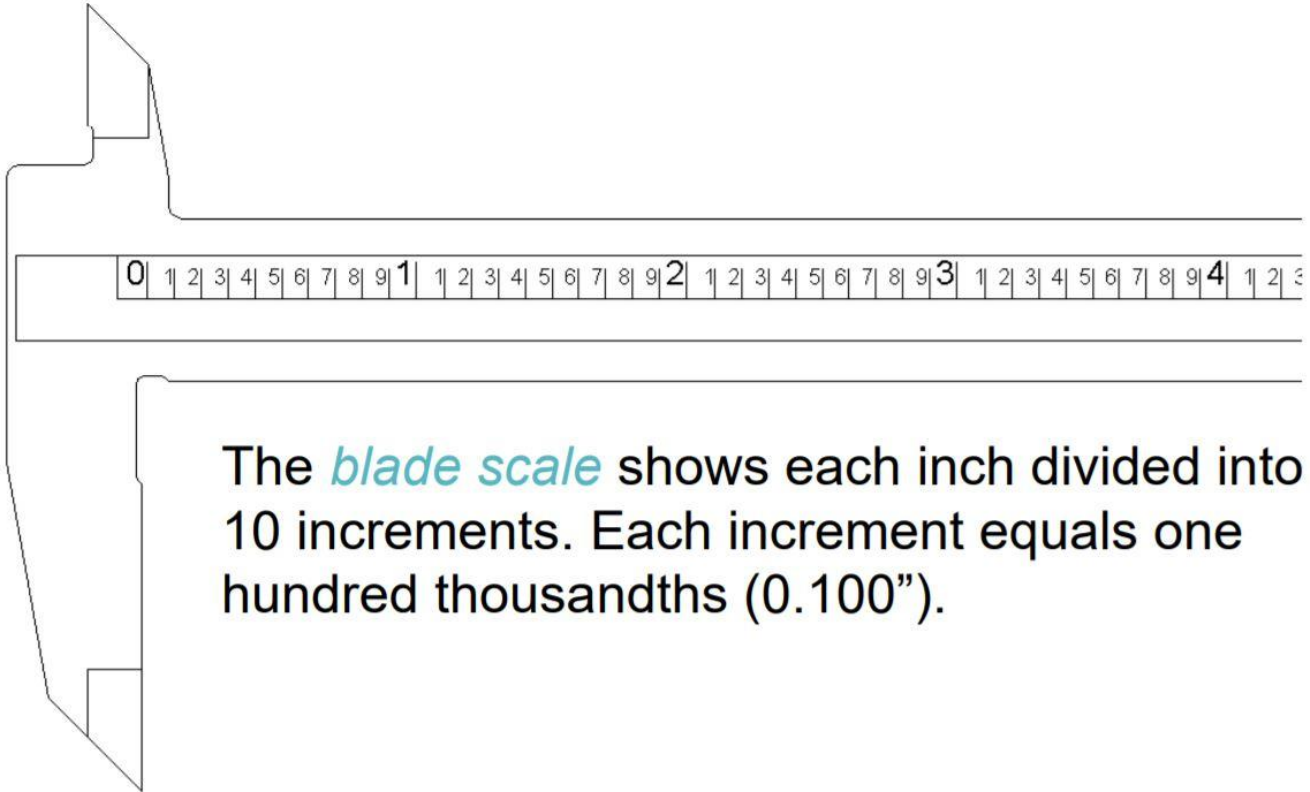
A standard *inch dial caliper* will measure slightly more than 6 inches.

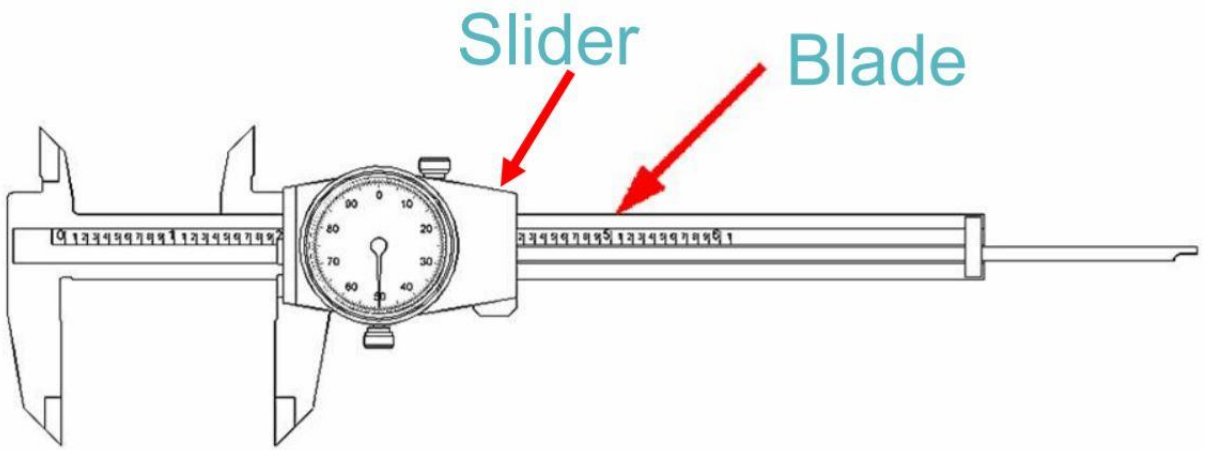


The *reference edge* keeps track of the larger increments (i.e. 0.100") as the *slider* moves along the *rack*.



The gear-toothed *rack* is used to change linear motion (*slider)* to rotary motion (*pointer*).

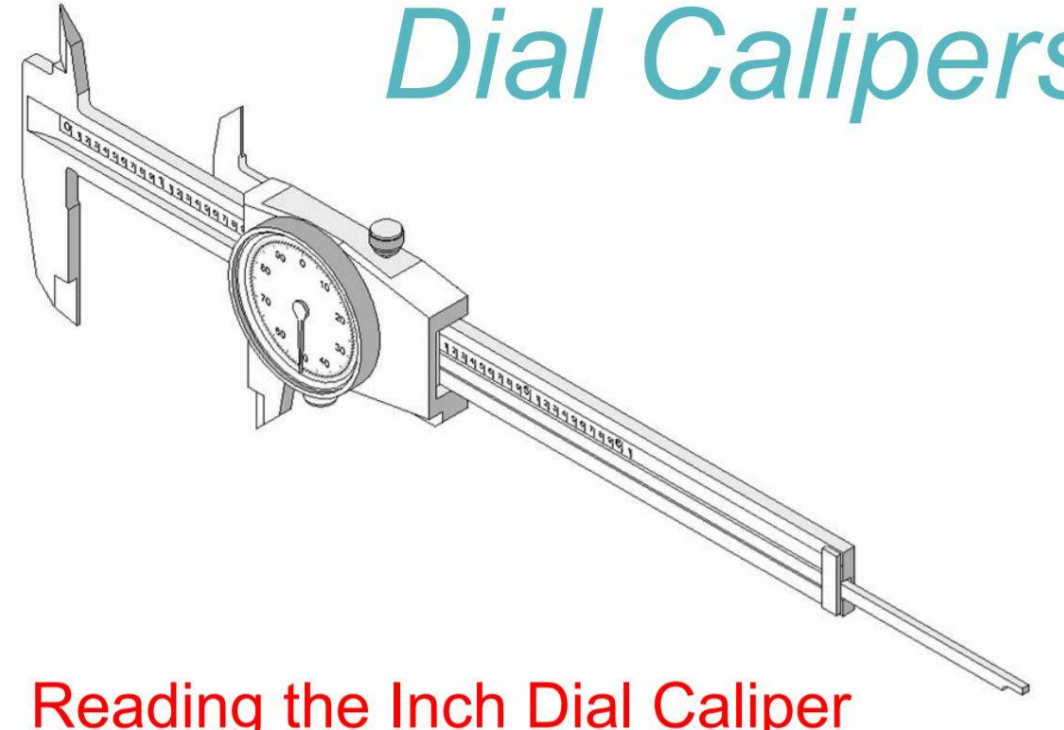

0 1 2 3 4 5 6 7 8 9 1 1 2 3 4 5 6 7 8 9 2 1 2 3 4 5 6 7 8 9 3 1 2 3 4 5 6 7 8 9 4 1 2
The blade scale shows each inch divided into 10 increments. Each increment equals one hundred thousandths (0.100”).



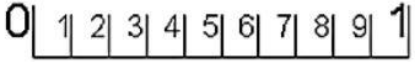
The *blade* is the immovable portion of the dial caliper.

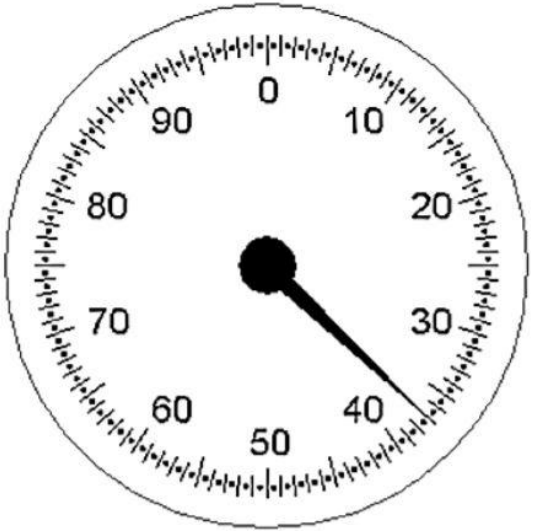
The *slider* moves along the *blade* and is used to adjust the distance between the measuring surfaces.

Dial Calipers

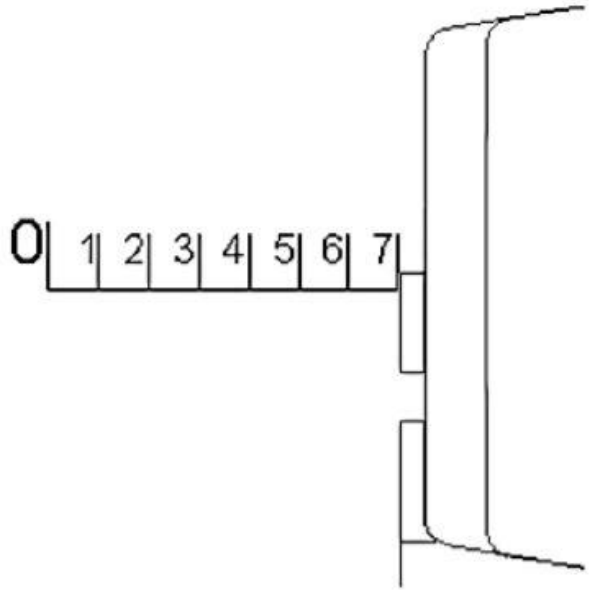


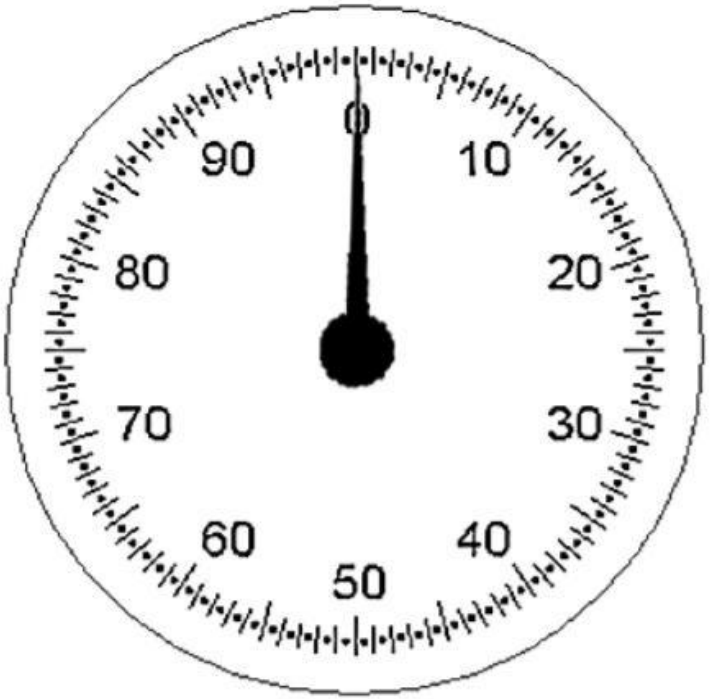
Reading the Inch Dial Caliper



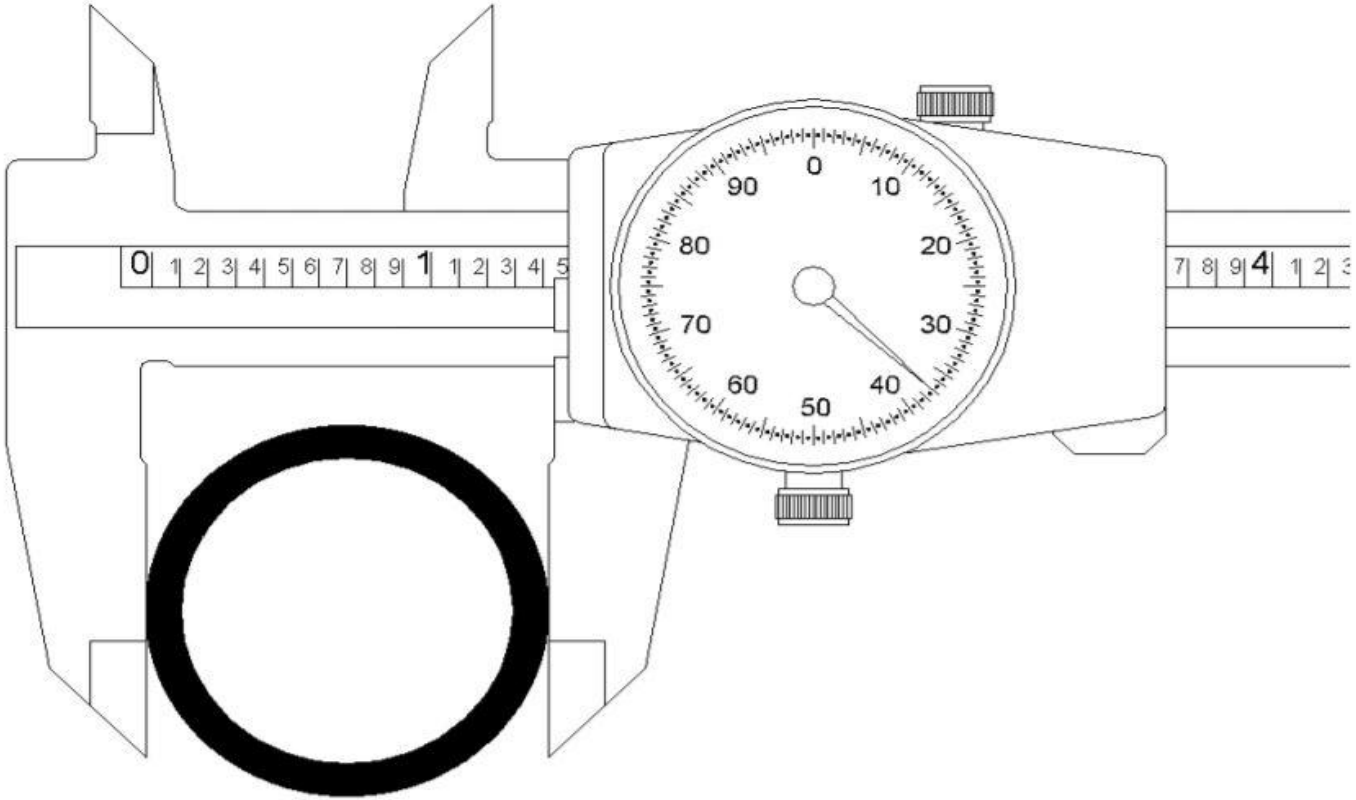


The *dial* is divided 100 times, with each graduation equaling one thousandth of an inch (0.001”).

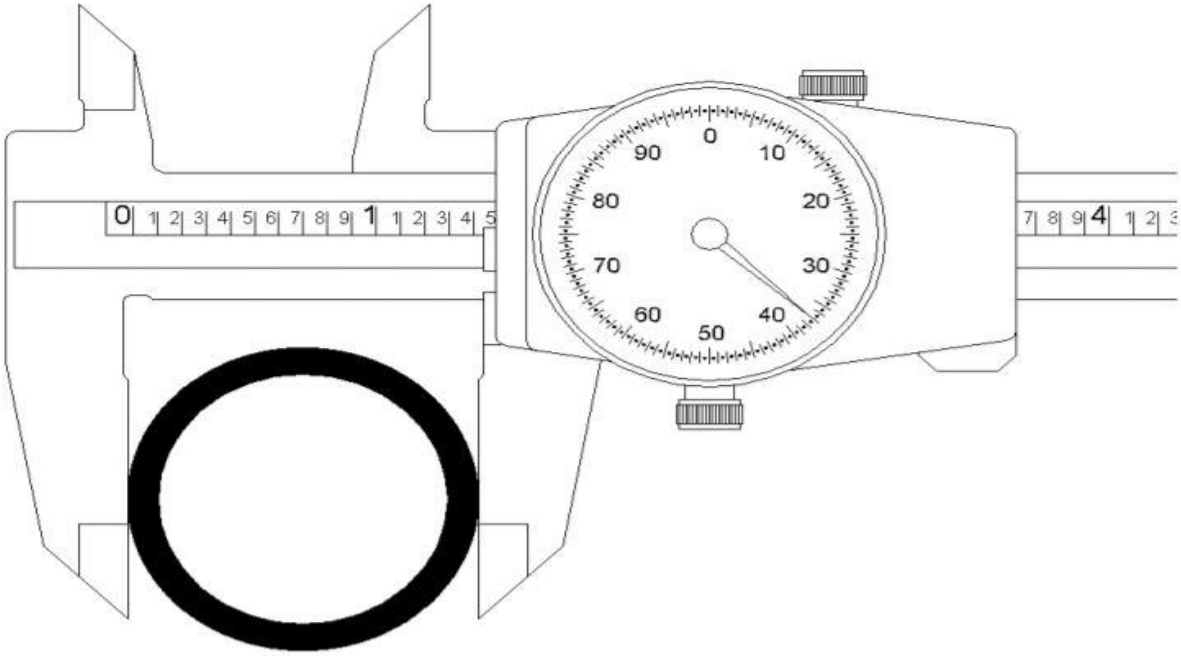




Every time the *pointer* completes one rotation, the *reference edge* on the *slider* will have moved the distance of one *blade scale* increment (0.100”).



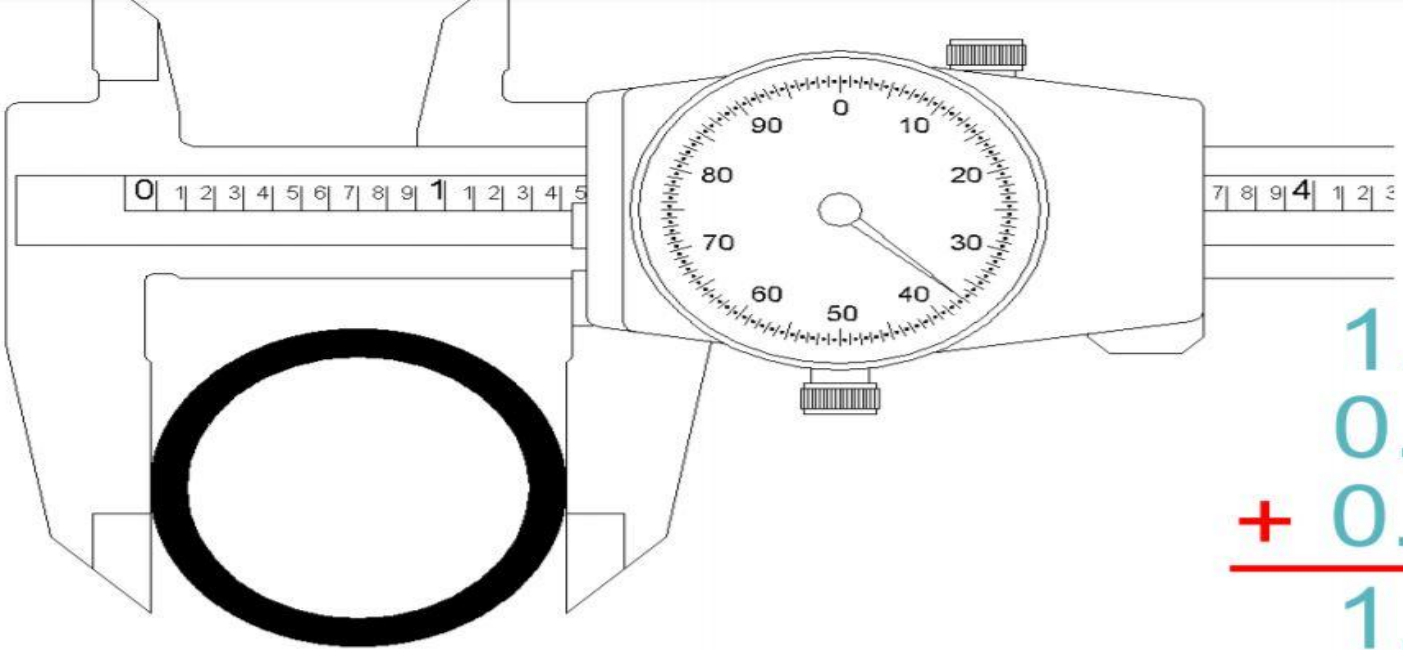
To determine the outside diameter of this pipe section, the user must first identify how many inches are being shown on the *blade scale*.



1.000”
0.400”

The *reference edge* is located between the 1 and 2 inch marks.
So, the user makes a mental note…1 inch.

The user then identifies how many 0.1” increment marks are showing to the right of the last inch mark.
In this case, there are 4…or 0.400”.

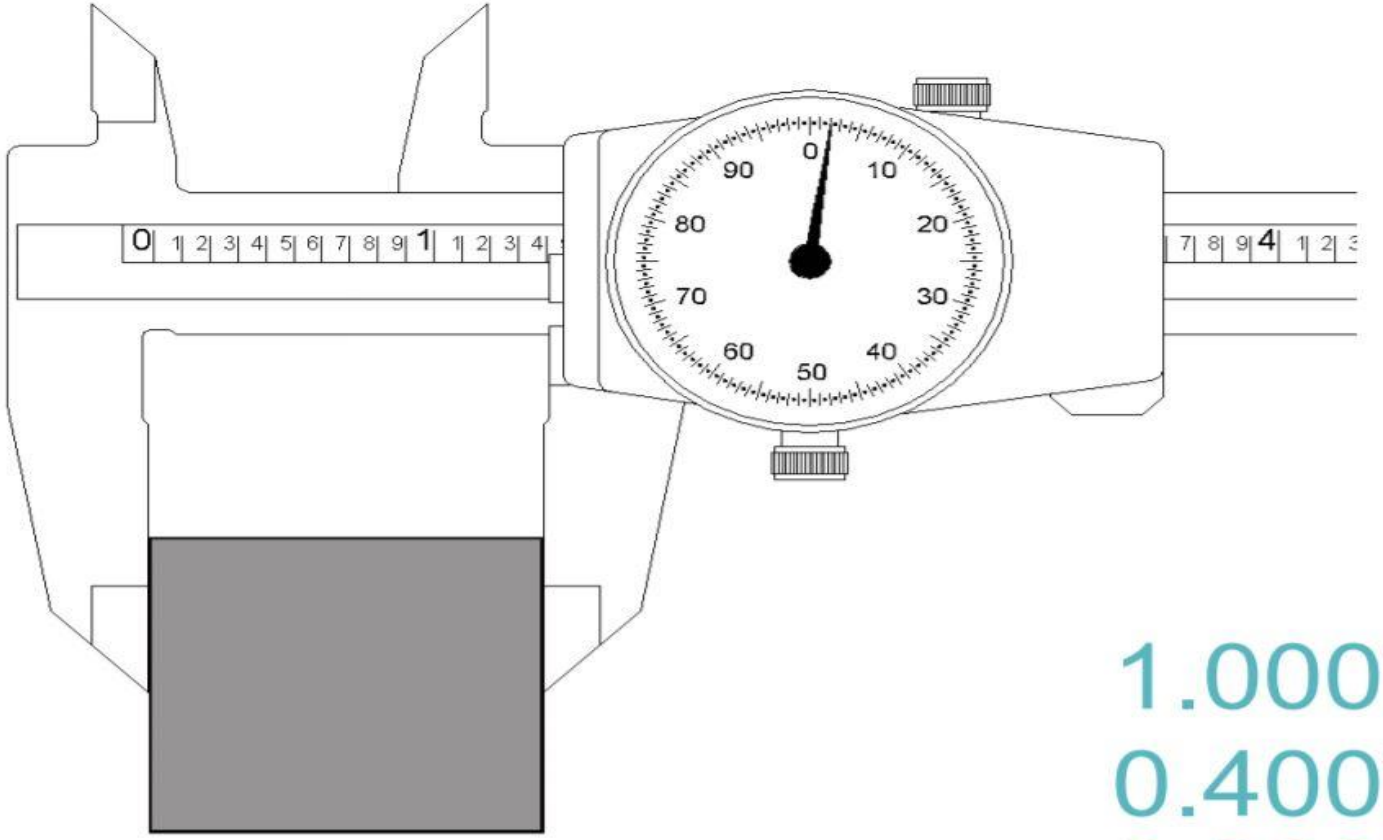


1.000”
0.400”
+ 0.037”
1.437”

Next, the user looks at the *pointer* on the *dial* to see how many thousandths it is pointing to.

In this case, it is pointing to 37…or 0.037”.

The user then adds the three values together…



How wide is the block?

1.000”
0.400”
+ 0.002”
1.402”