Engineering

Dial Caliper Measurement
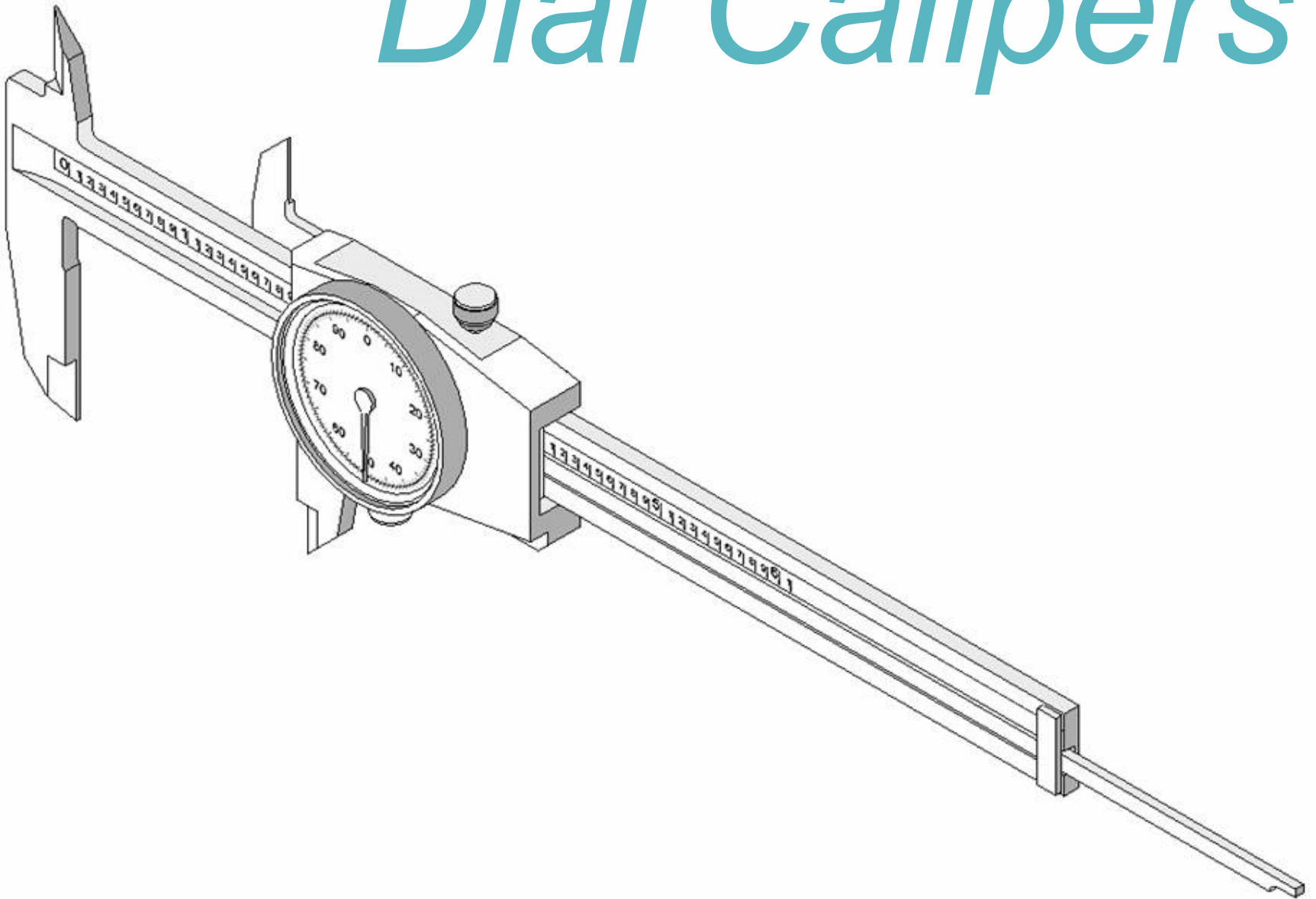
April 7, 2020

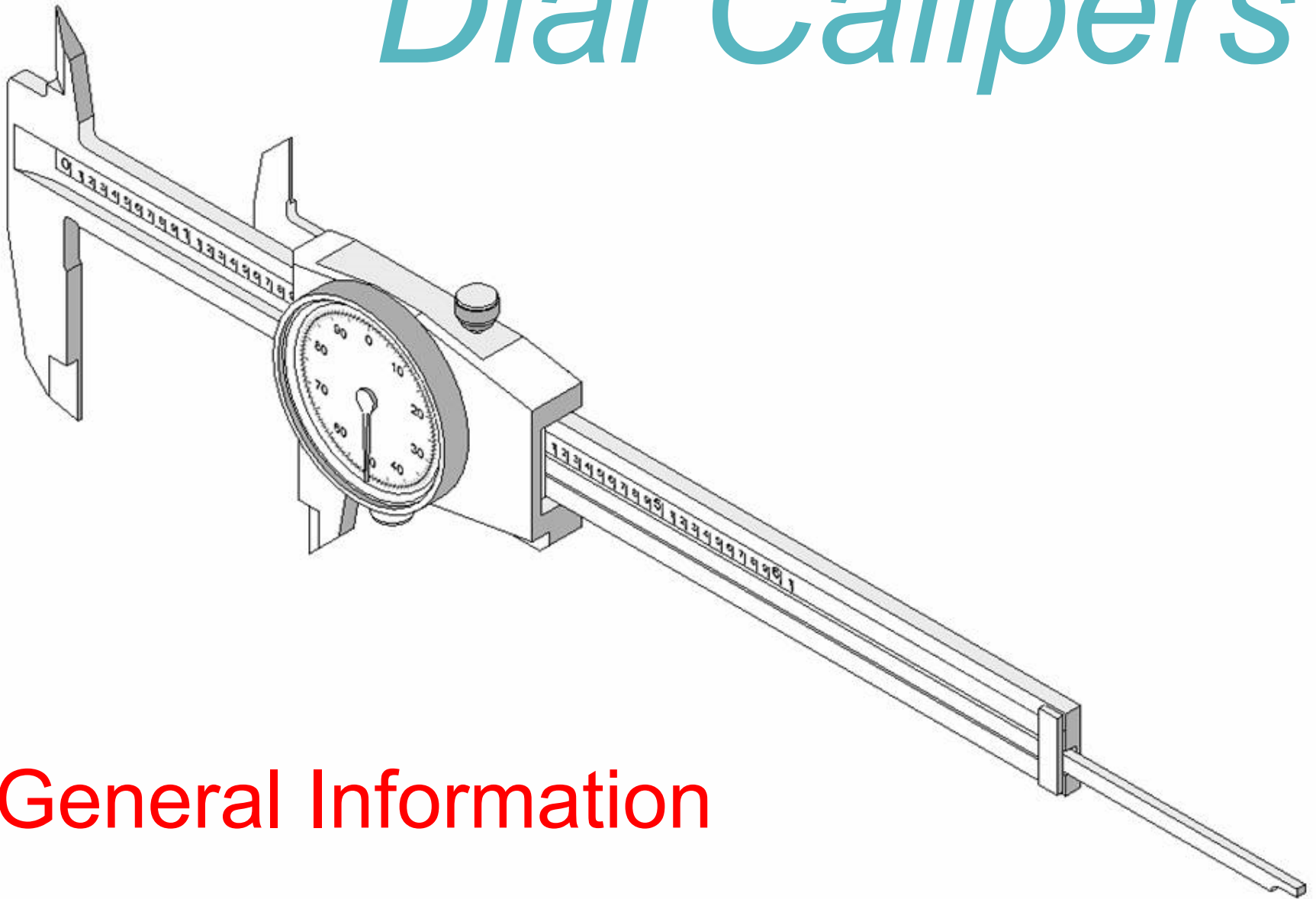## 9-12/ Engineering
Dial Caliper Measurement: [April 7, 2020]

Objective/Learning Target:

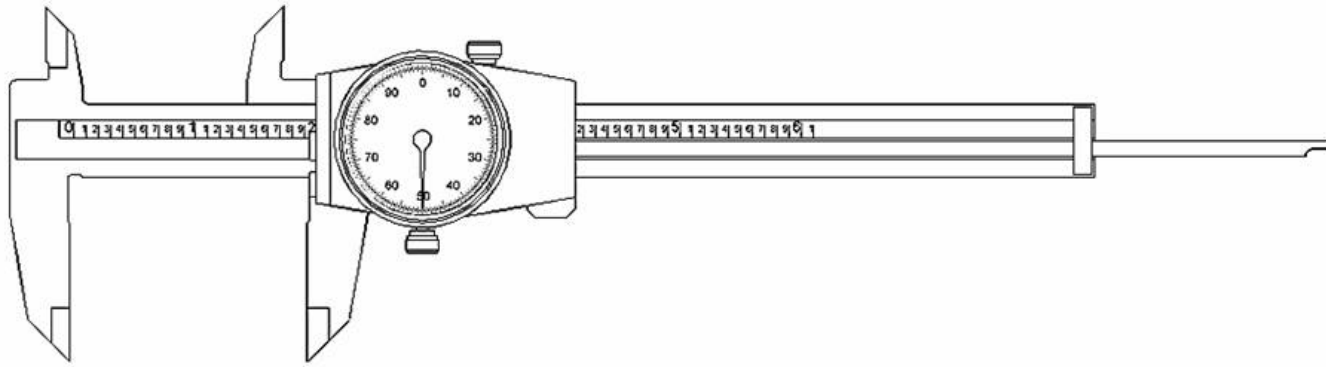- students will learn to measure inside and outside diameters to 1/1000 of an inch using a dial caliper.
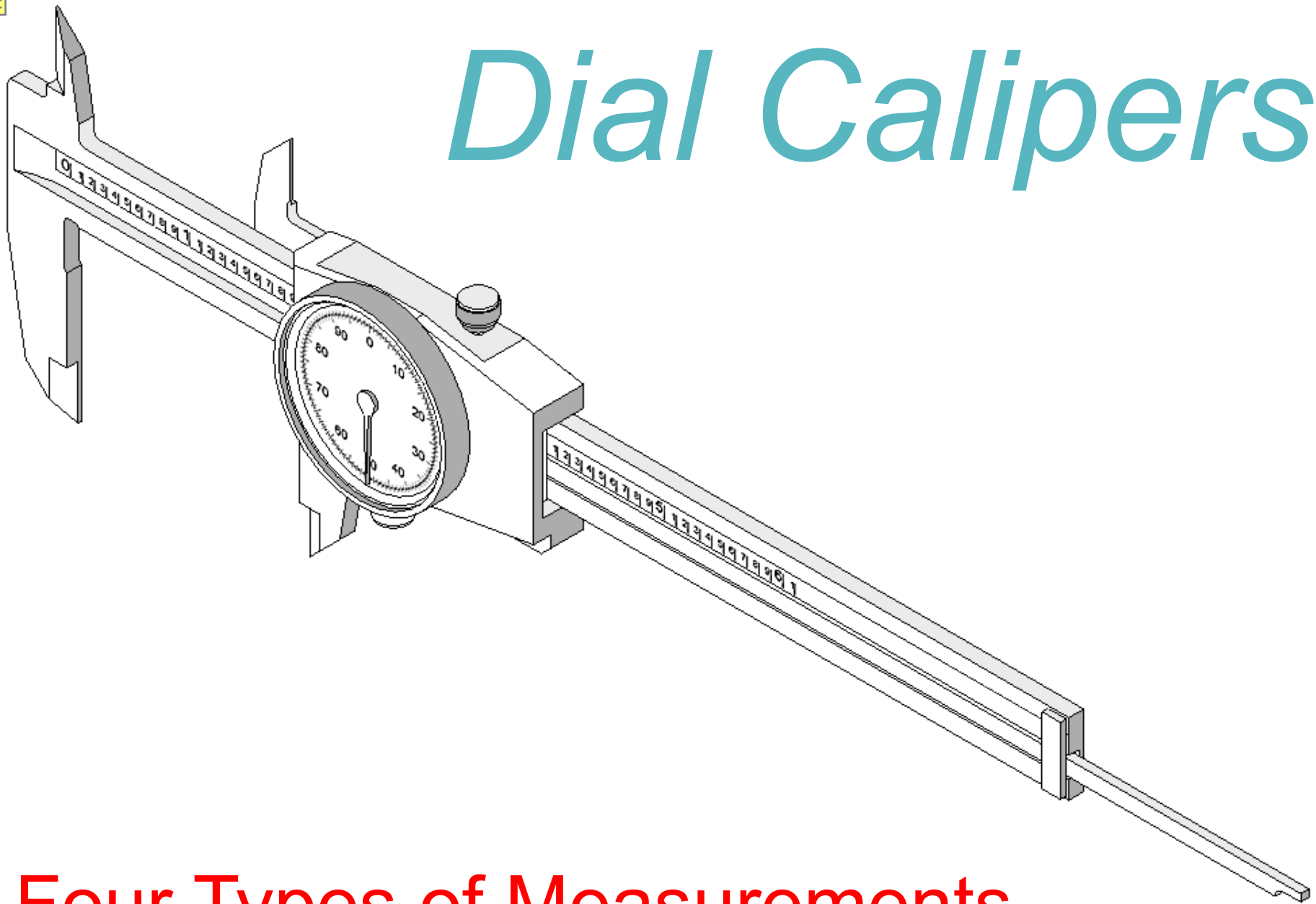
Dial Calipers

Dial Calipers
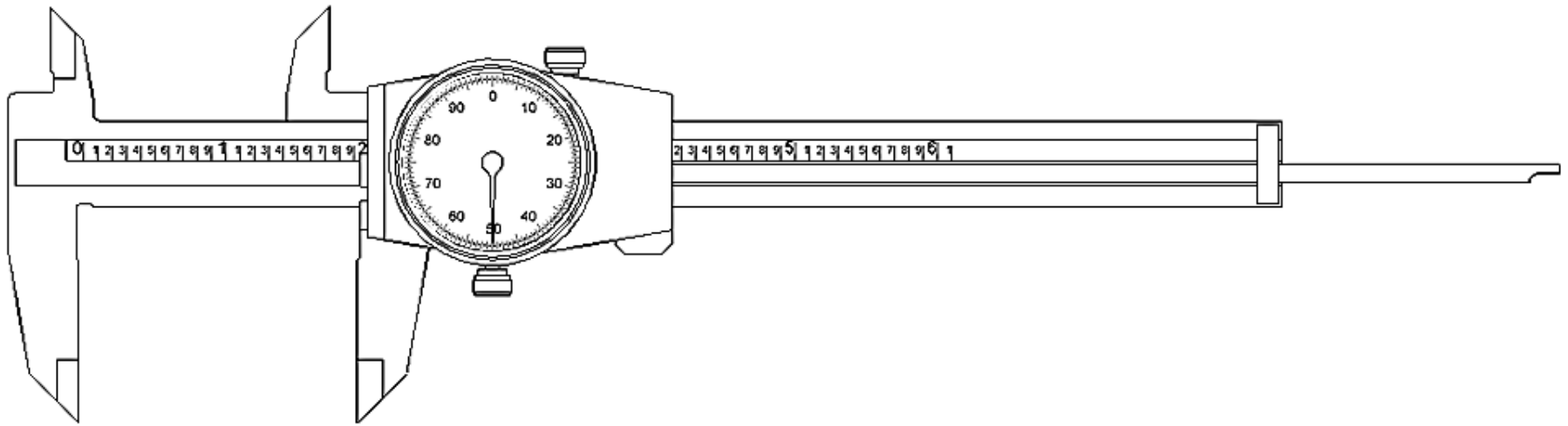
General Information

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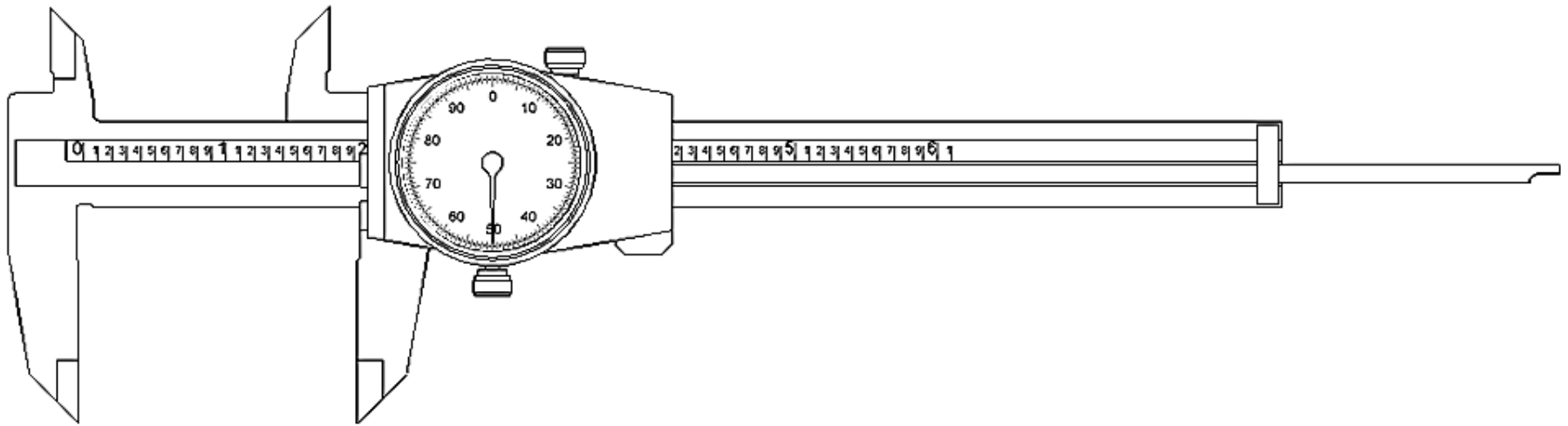
Dial Calipers

Four Types of Measurements

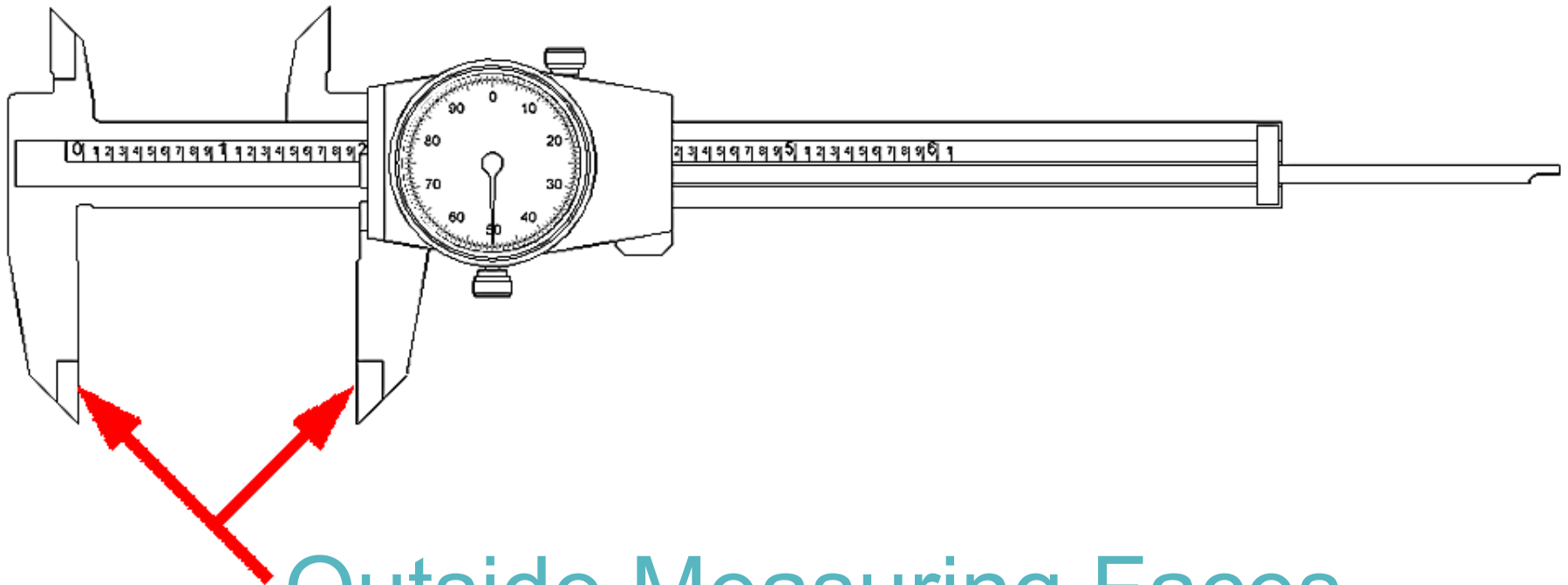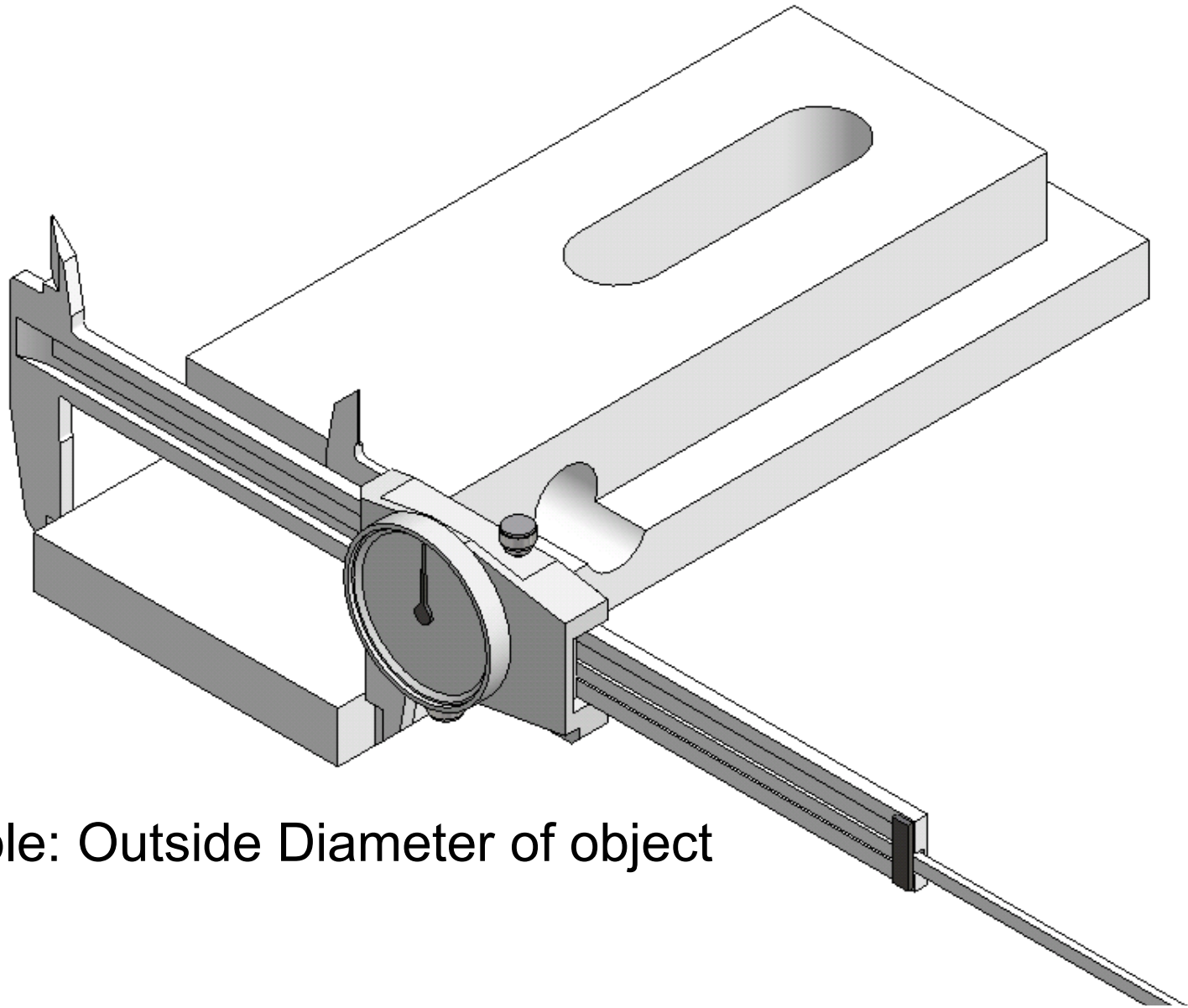Dial calipers are used to perform four common measurements on parts…

1. Outside Diameter or Object Thickness

2. Inside Diameter or Space Width
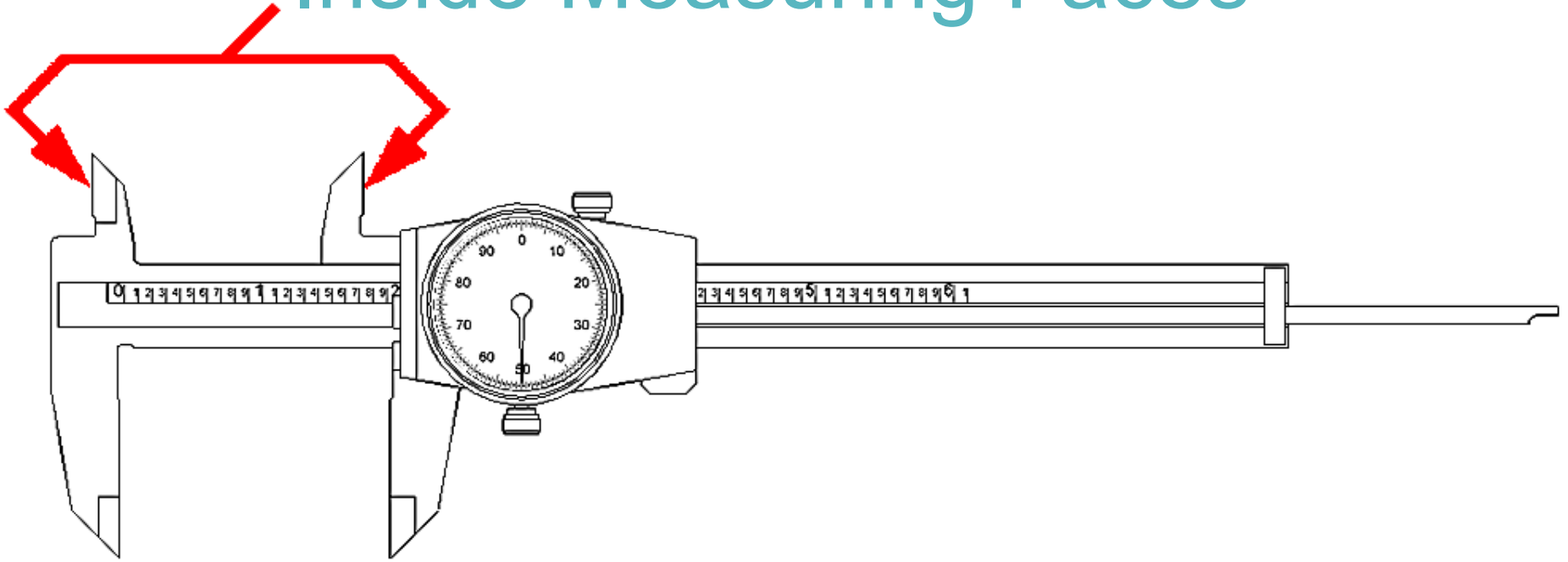
3. Step Distance

4. Hole Depth

Outside Measuring Faces

These are the faces between which outside length or diameter is measured.
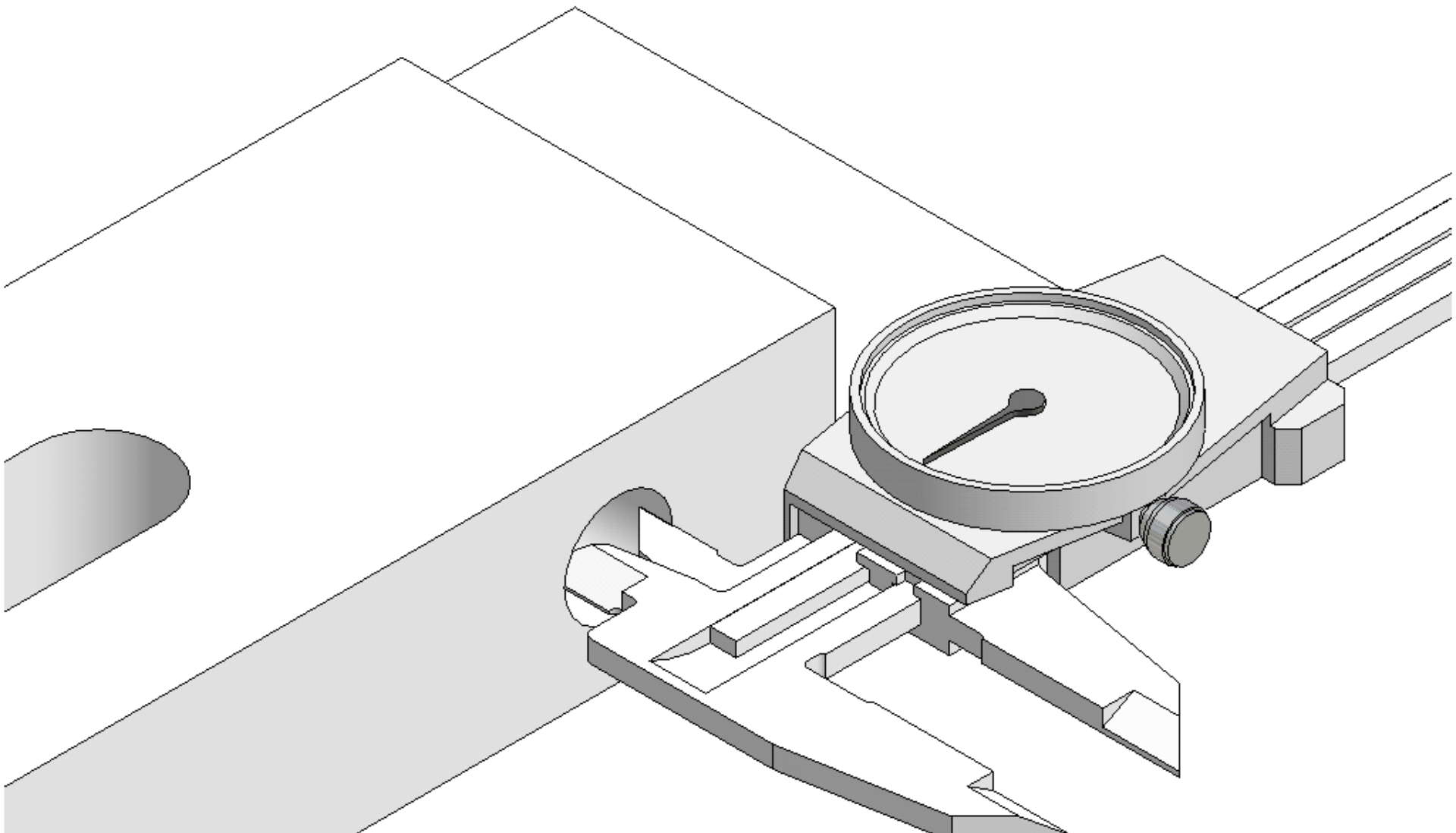
Example: Outside Diameter of object
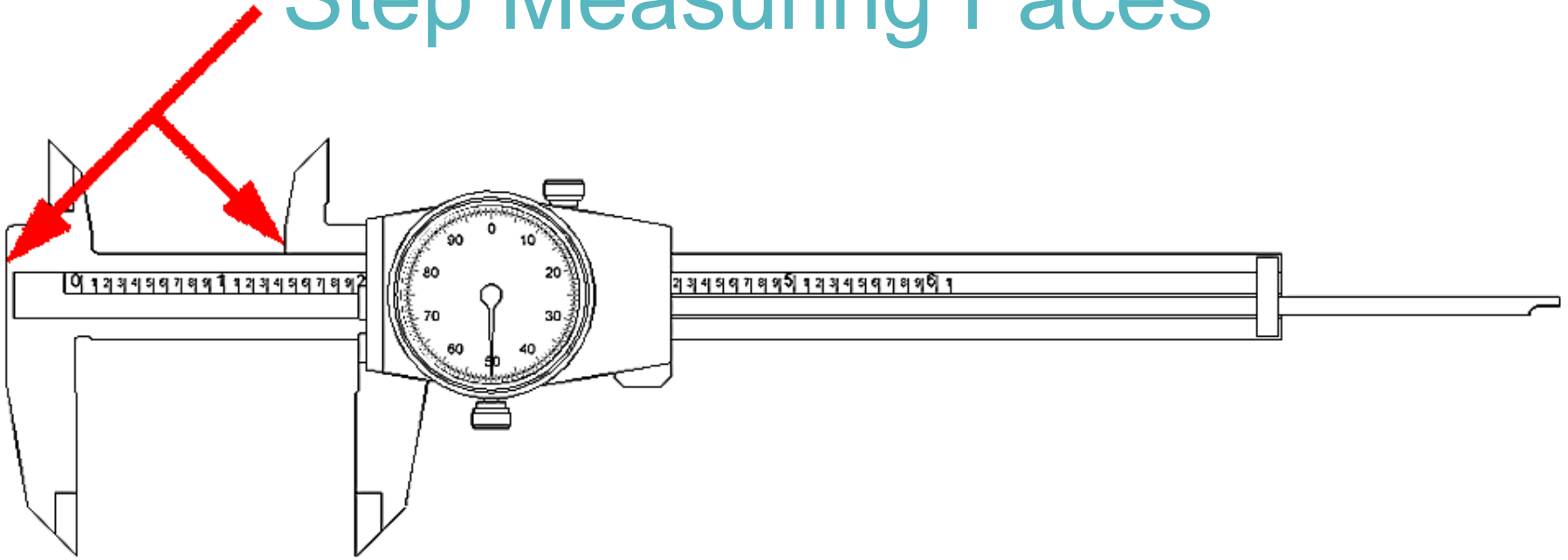
Inside Measuring Faces

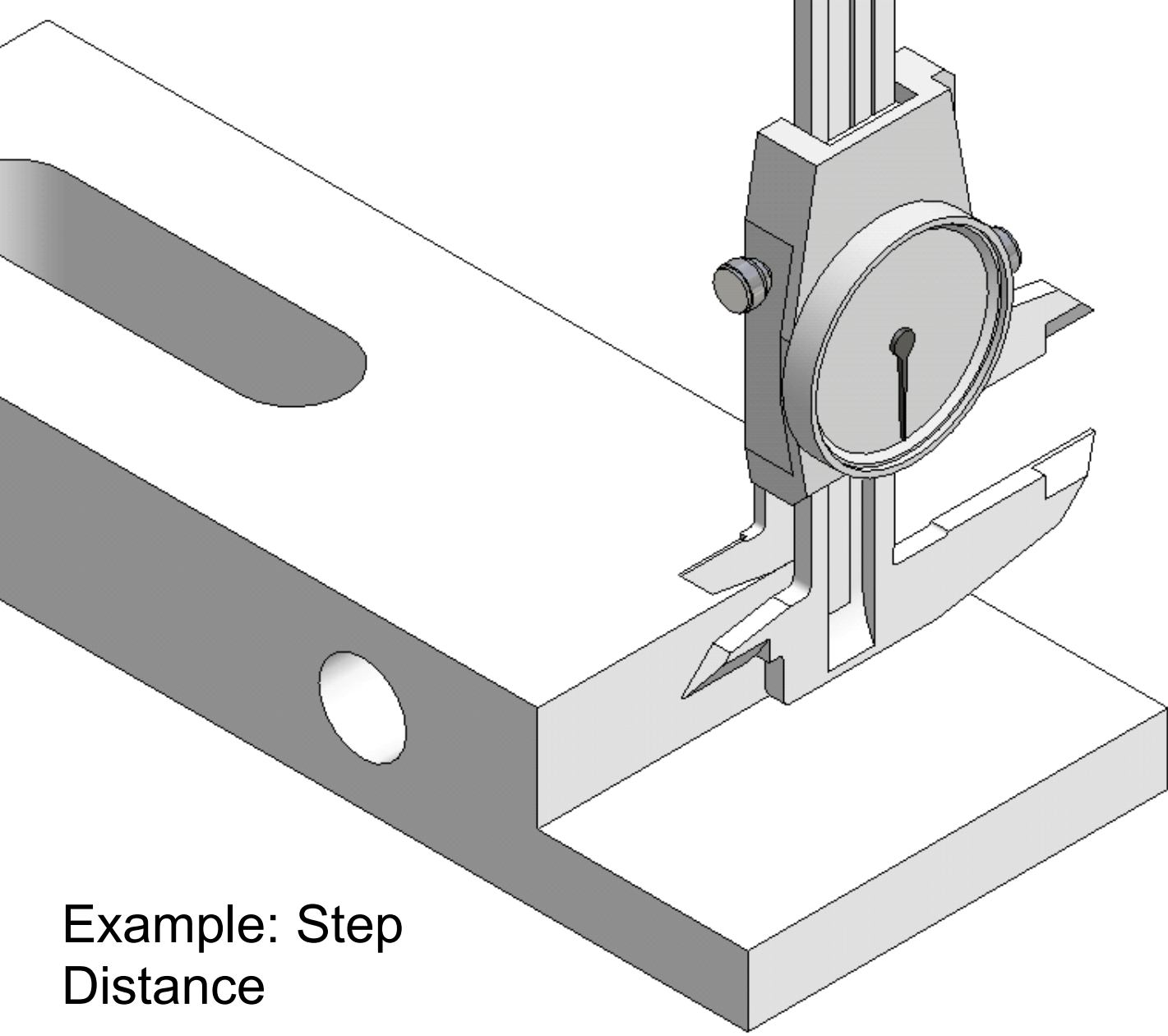These are the faces between which inside diameter or space width (i.e., slot width) is measured.

Example: Inside measuring
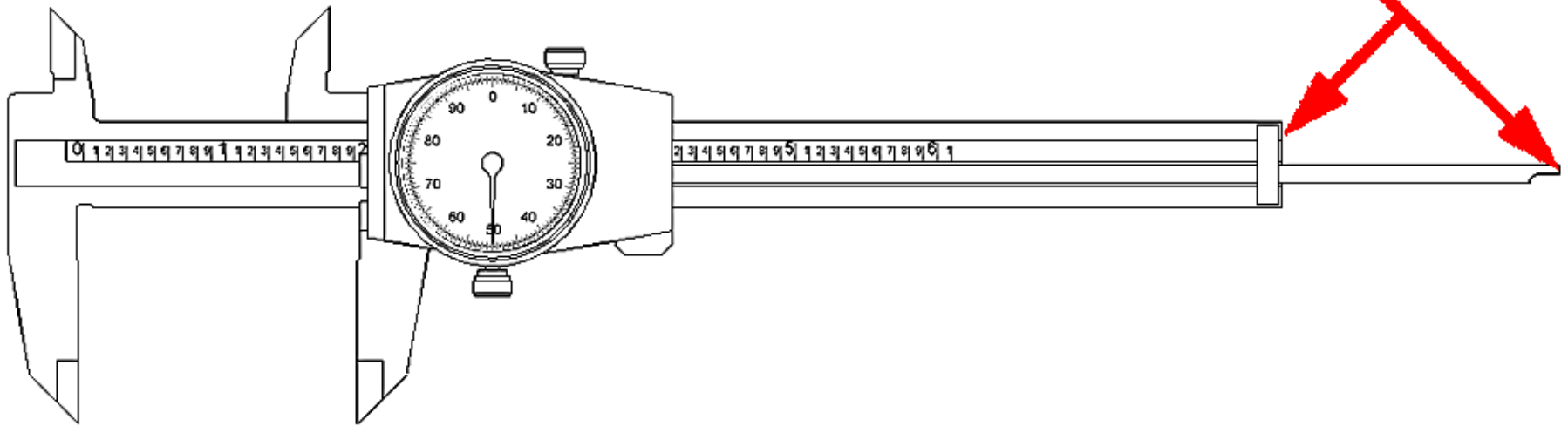
Step Measuring Faces

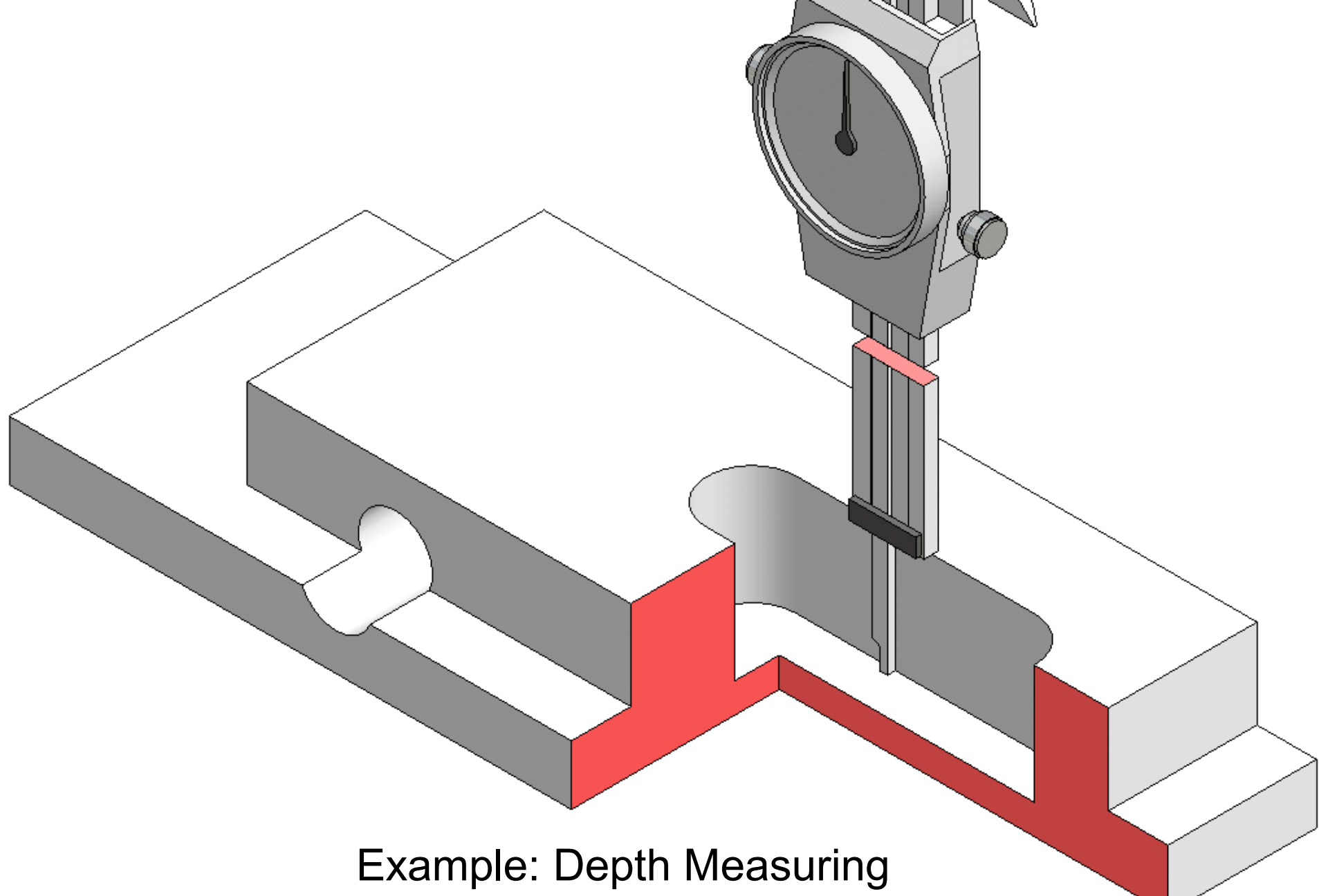These are the faces between which stepped parallel surface distance can be measured.

Example: Step
Distance

Depth Measuring Faces

These are the faces between which the depth of a hole can be measured.
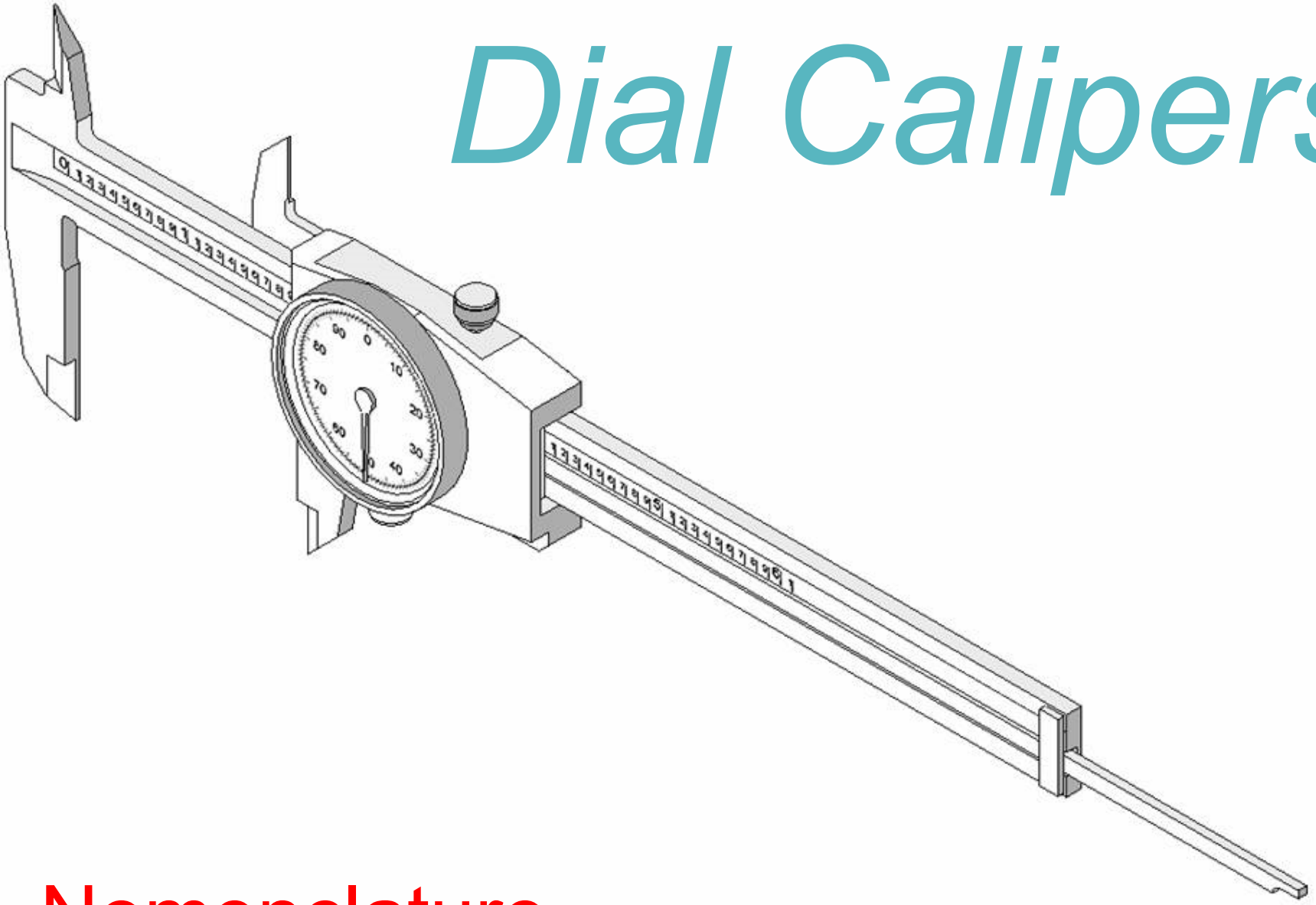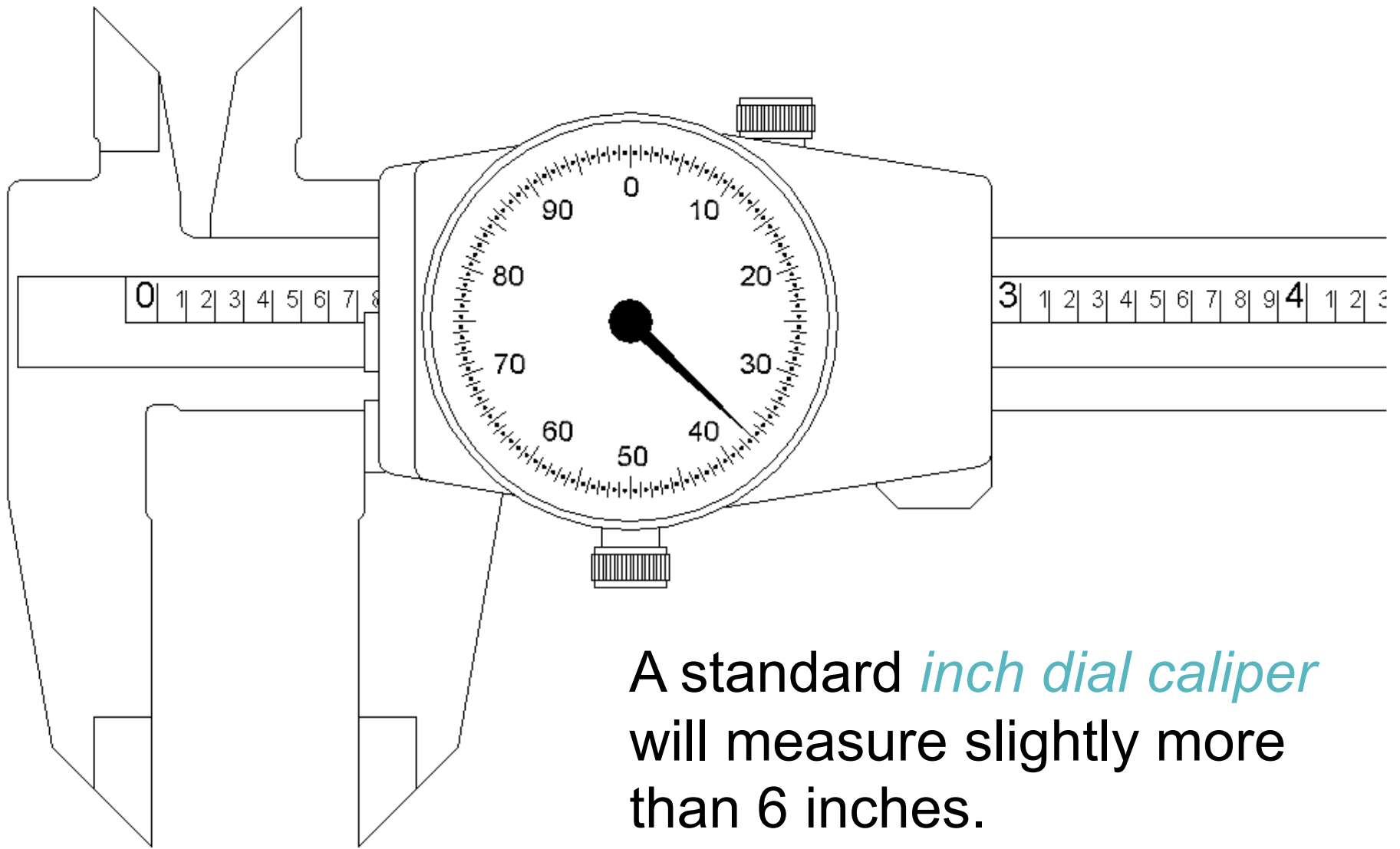
Example: Depth Measuring

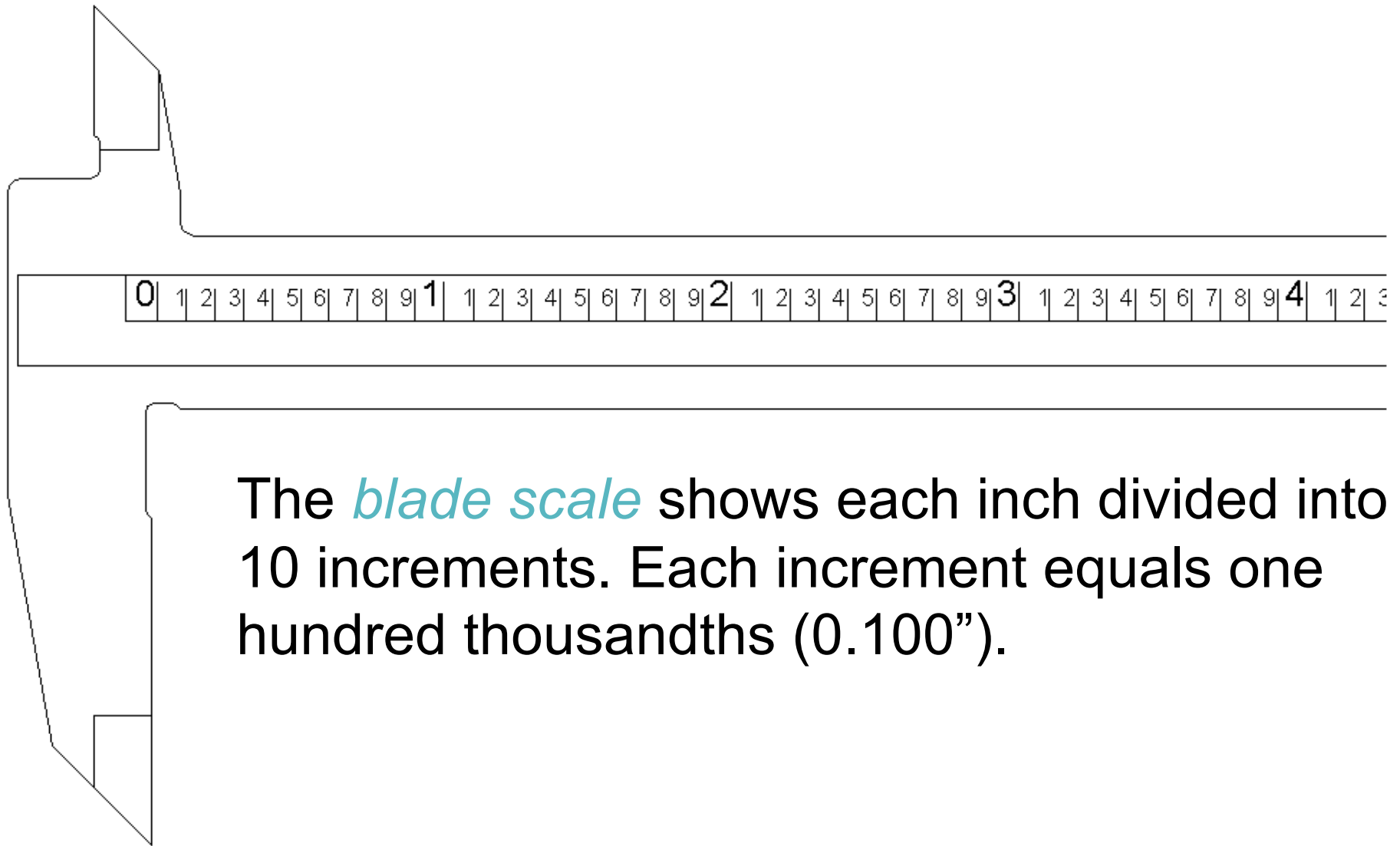*Note: Work piece is shown in section. Dial Caliper shortened for graphic purposes.*

Dial Calipers

Nomenclature

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

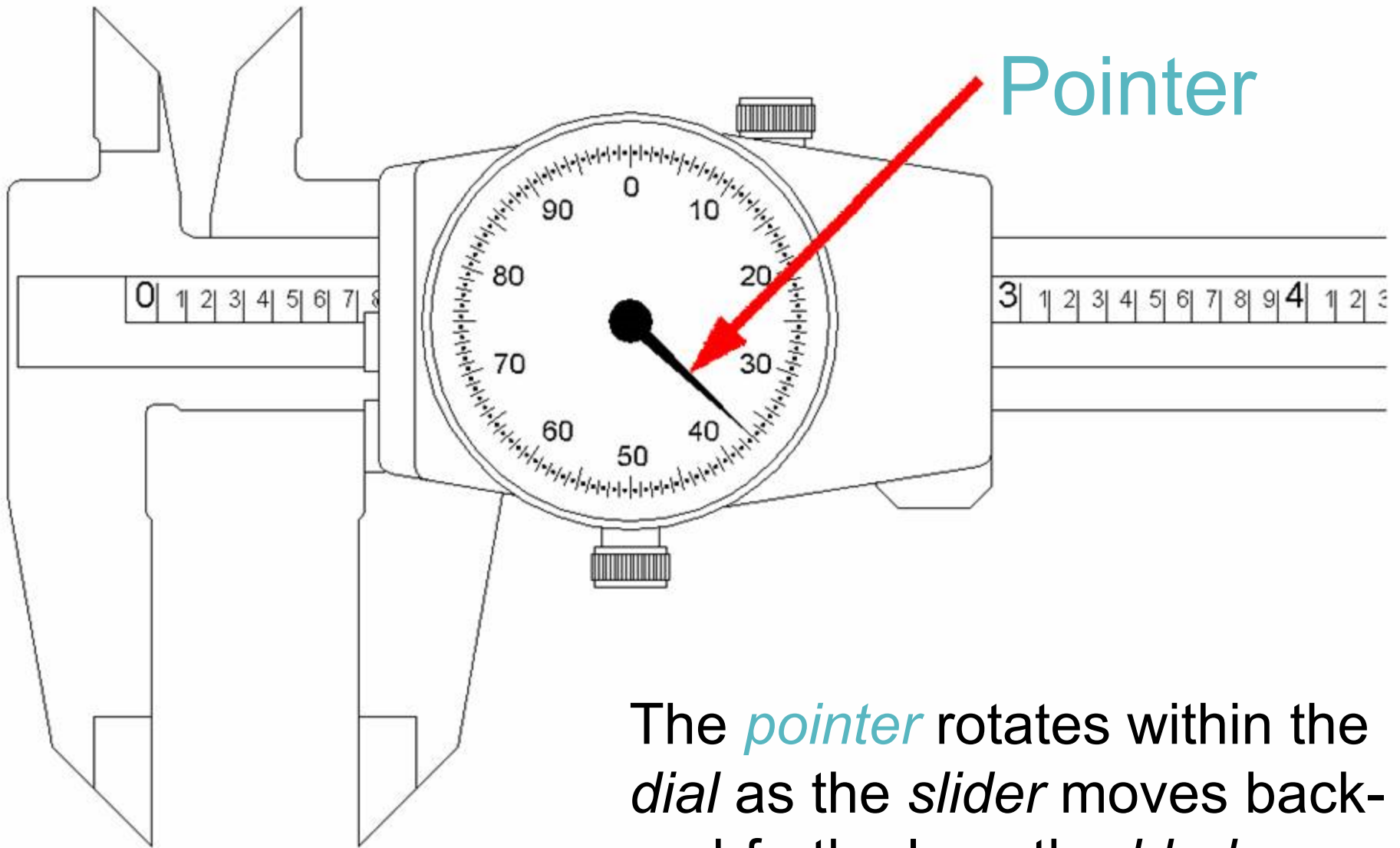| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | **1** | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | **2** | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | **3** | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | **4** | 1 | 2 | 3 |

The *blade scale* shows each inch divided into 10 increments. Each increment equals one hundred thousandths (0.100").

Slider

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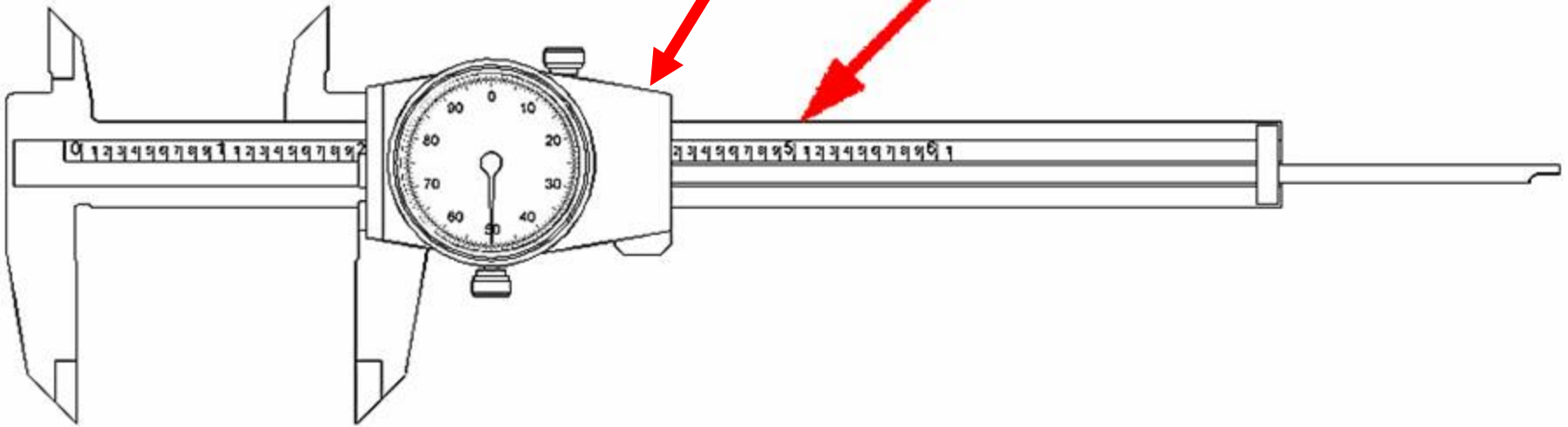
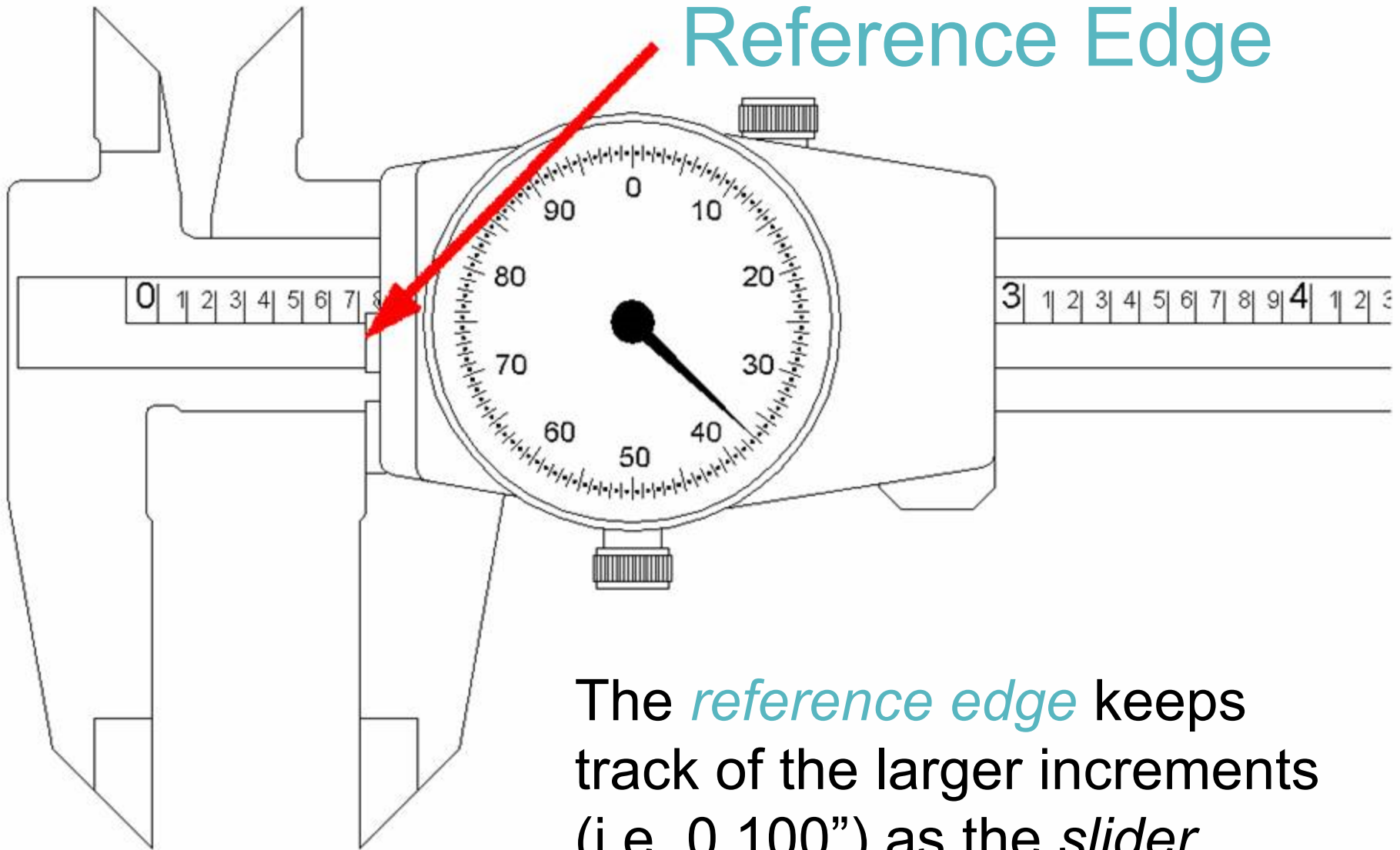The *blade* is the immovable portion of the dial caliper.

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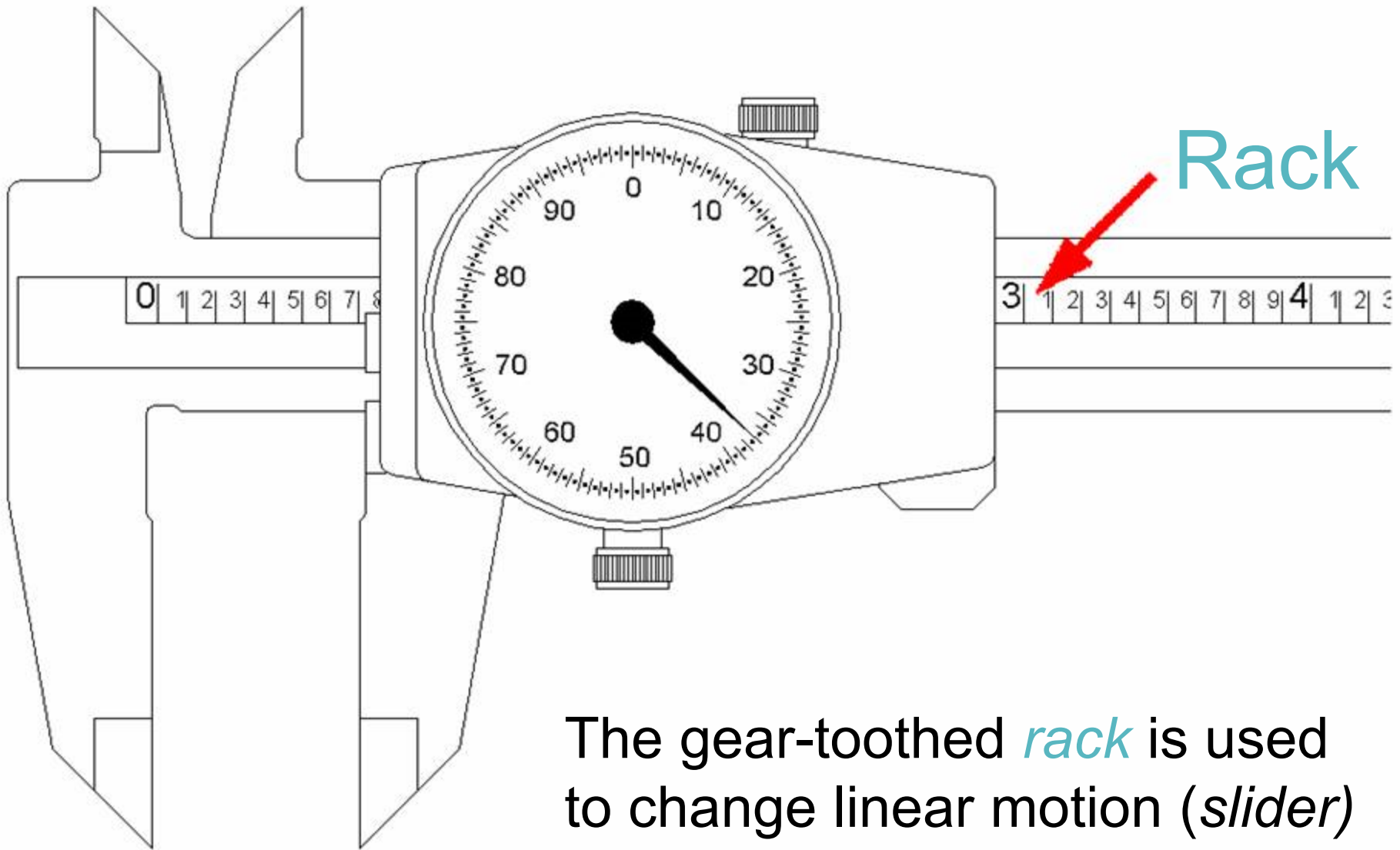
Pointer

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

Reference Edge

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

Rack

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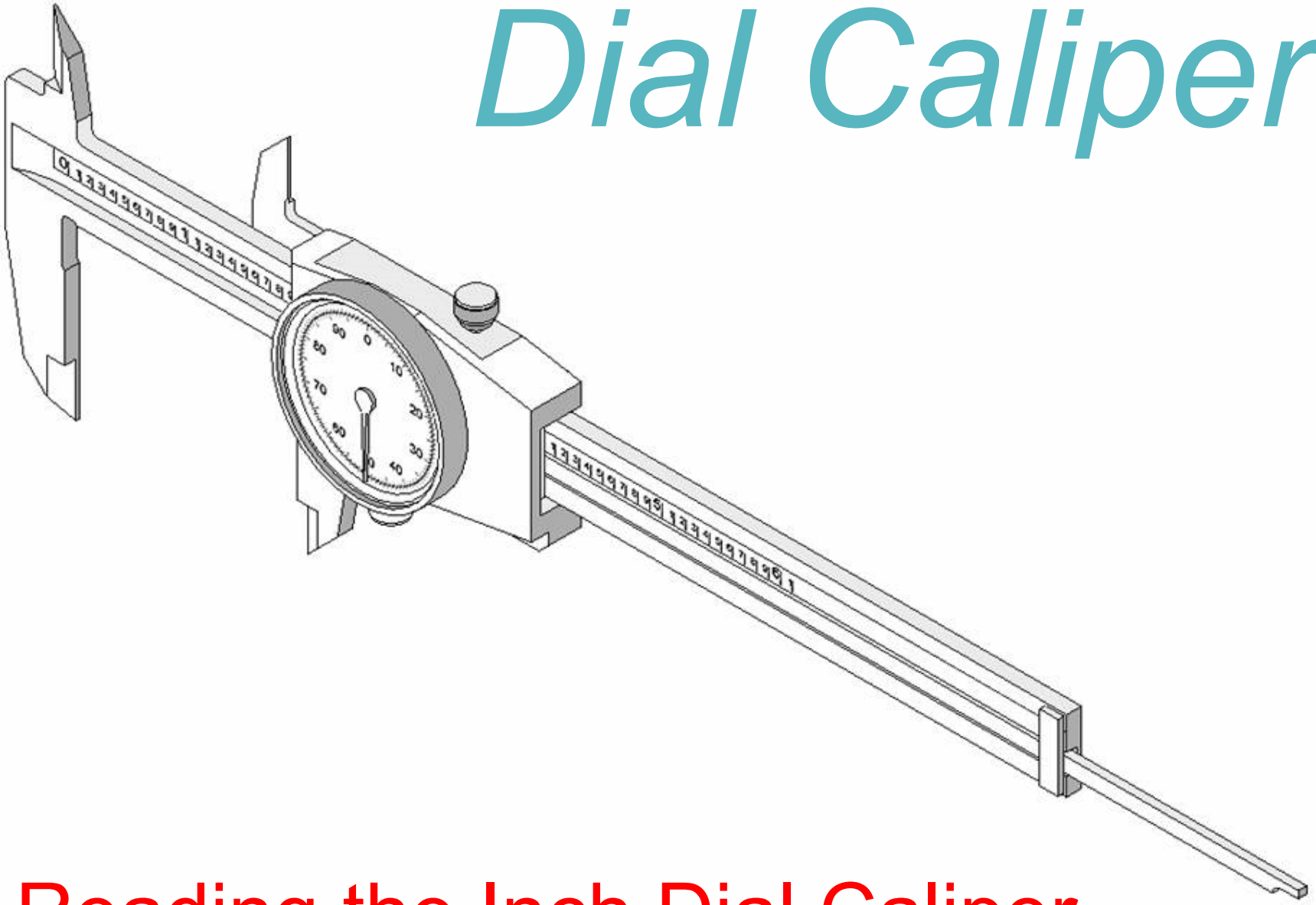
Watch The Videos:

both videos are very good, one if from a science background and the other is from a manufacturing background.
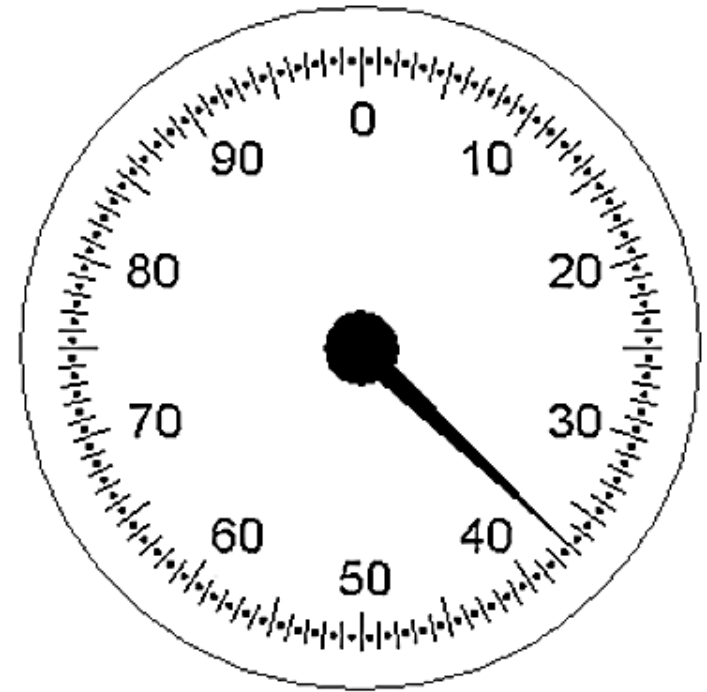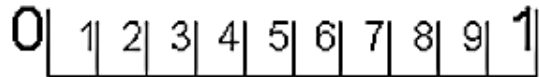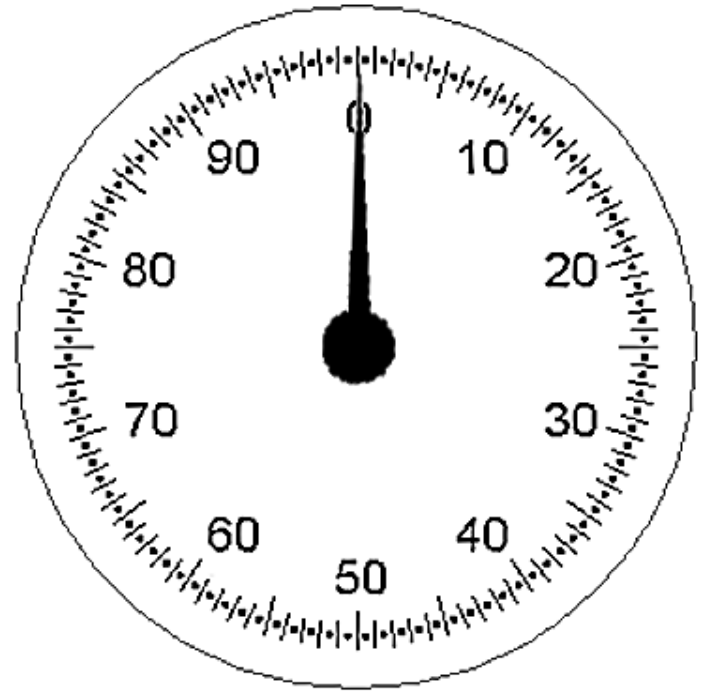
Dial Caliper Measuring
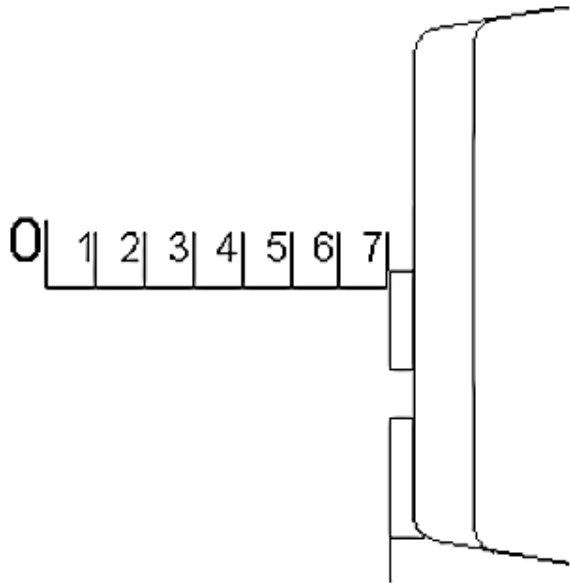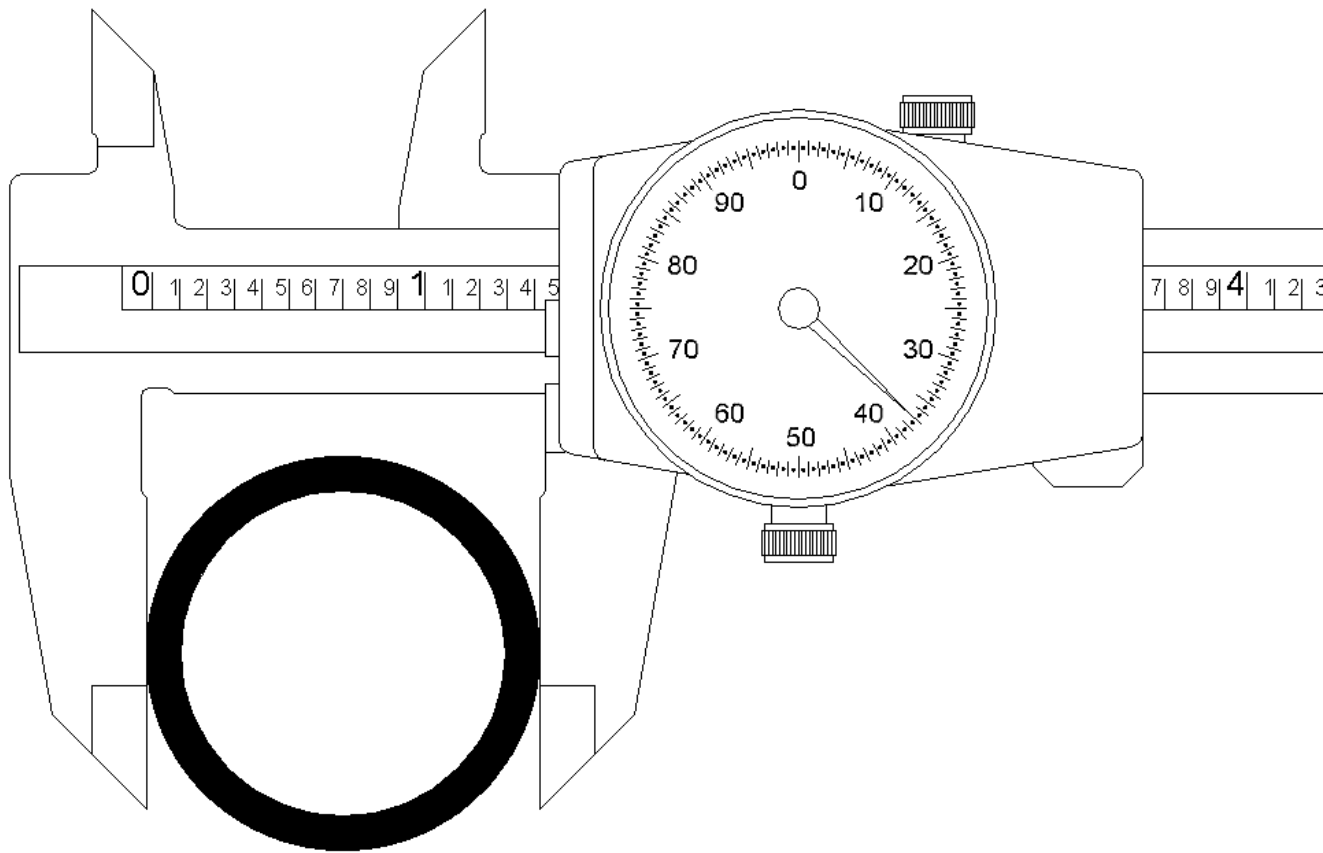
Dial Caliper Reading

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*.
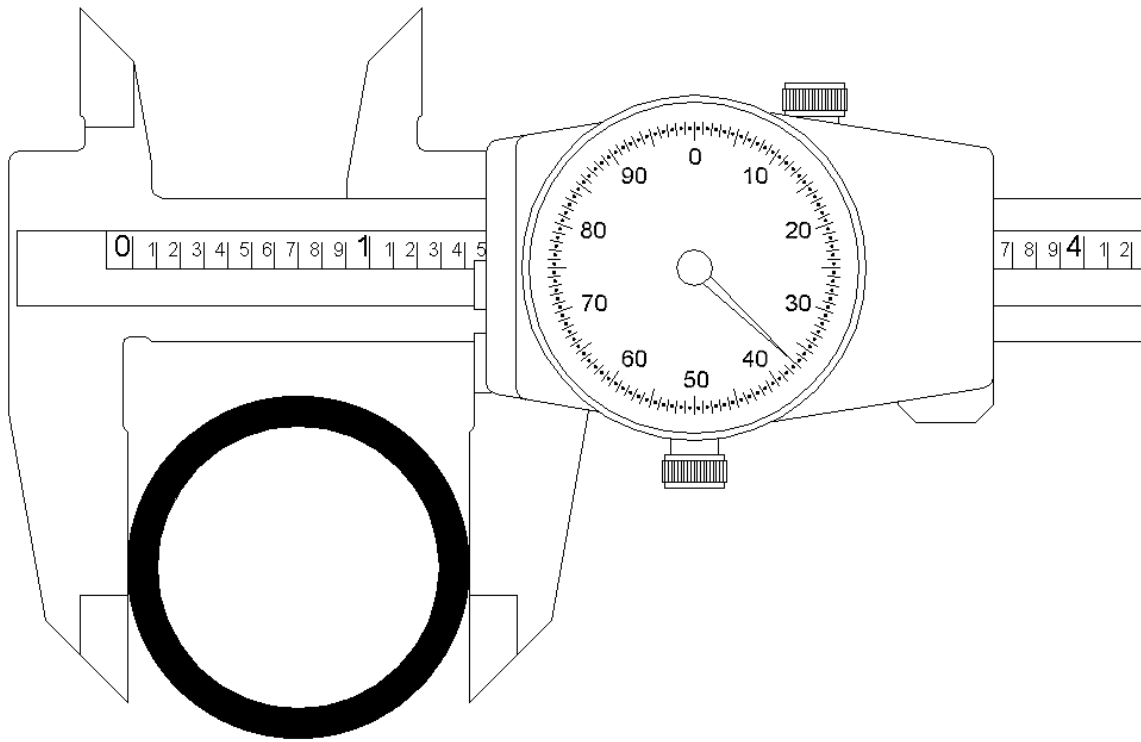
1.000"
0.400"

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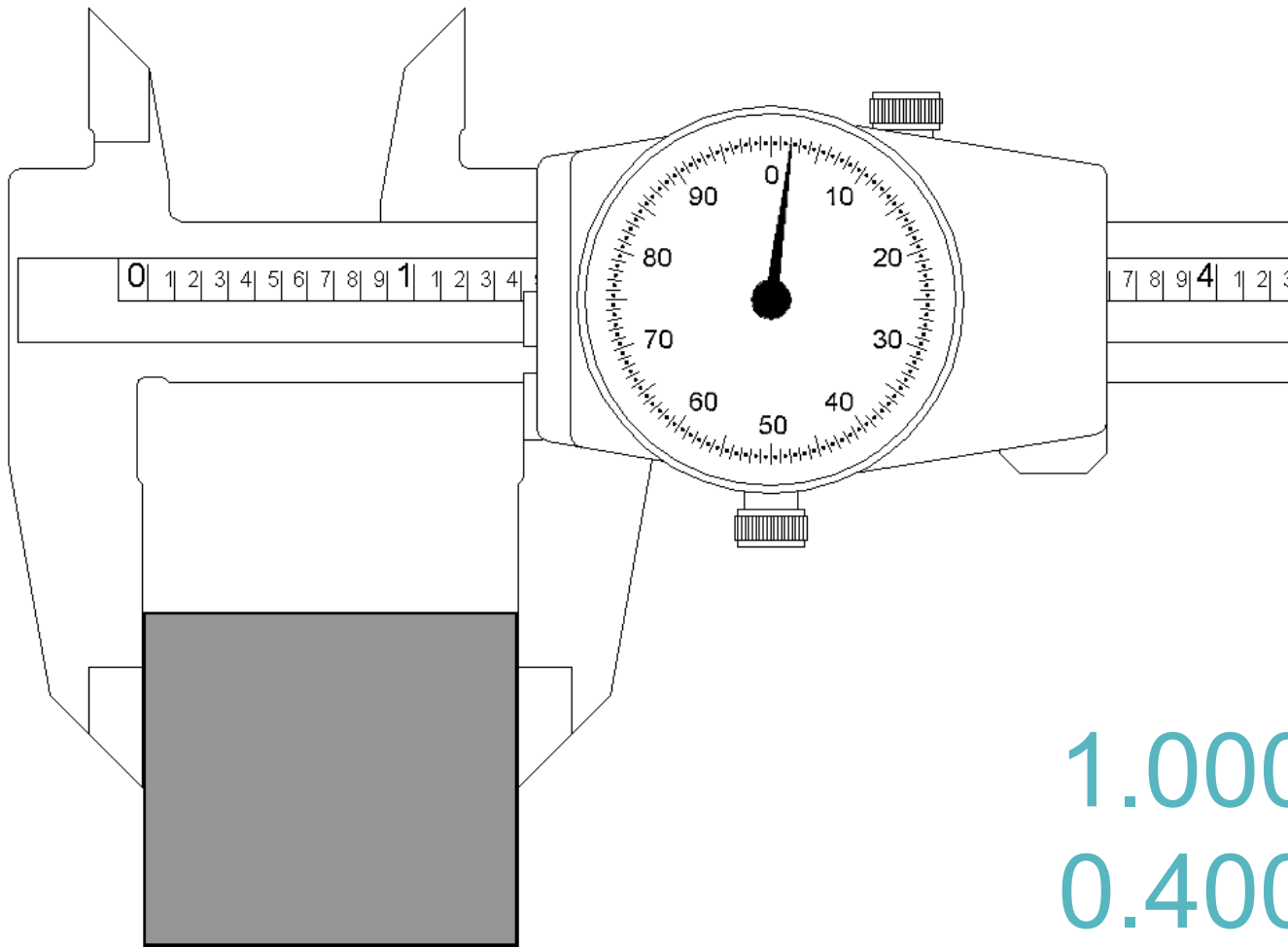So, the user makes a mental note…1 inch.

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".
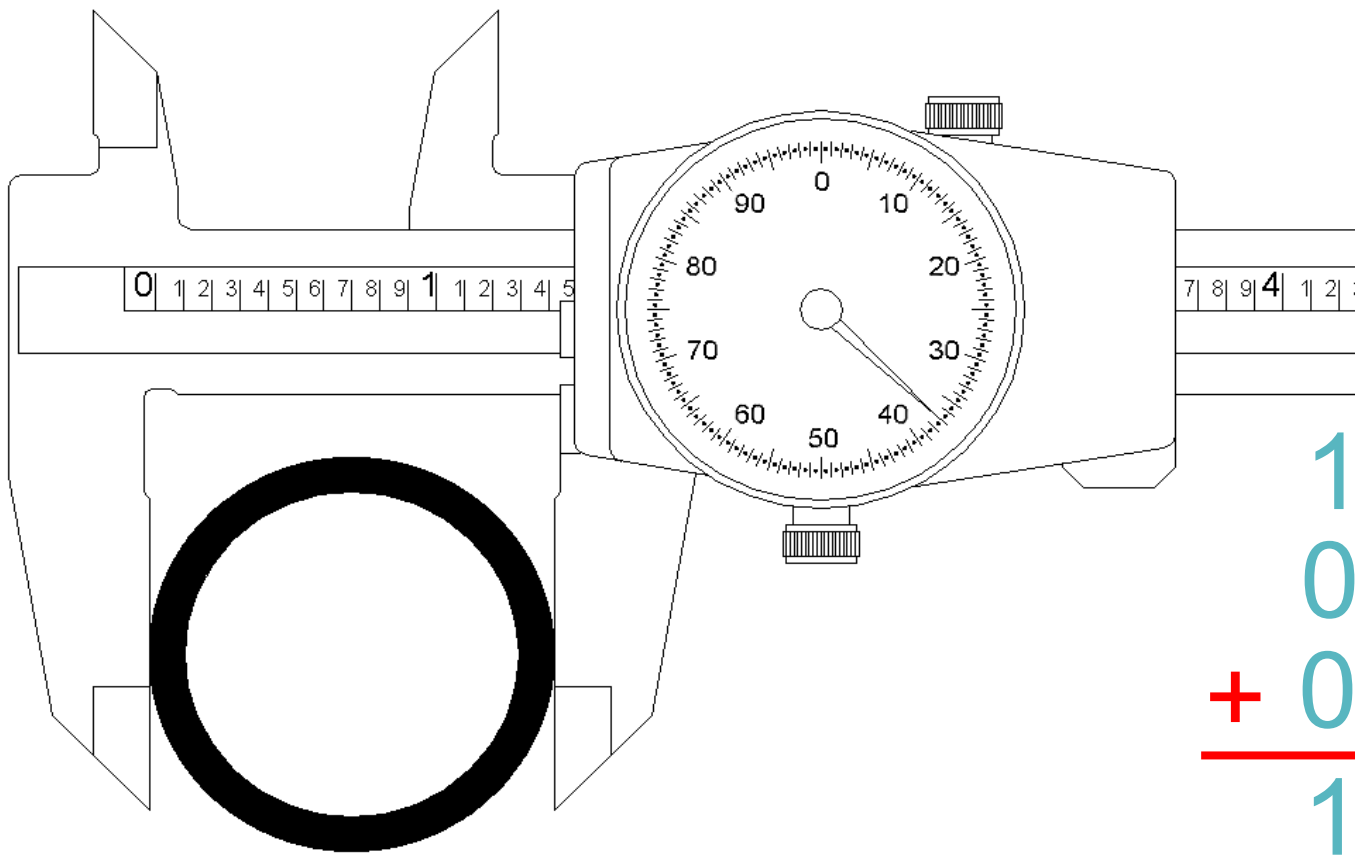
$$1.000"$$
$$0.400"$$
$$+\ 0.037"$$
$$1.437"$$

Next, the user looks at the *pointer* on the *dial* to see how many thousandths it is pointing to.
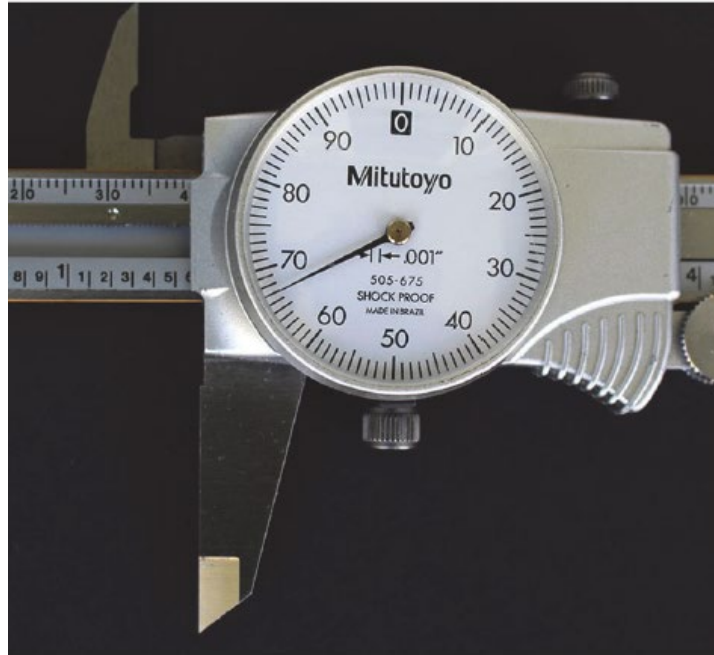
In this case, it is pointing to 37…or 0.037".

The user then adds the three values together…

How wide is the block?

1.000"
0.400"
+ 0.002"
———————
1.402"

Practice Time….

2) Reading #1 What is the reading of this Dial Caliper?
   a) 3.67"
   b) 1.567"
   c) 0
   d) 0.700"
   e) 1.600"
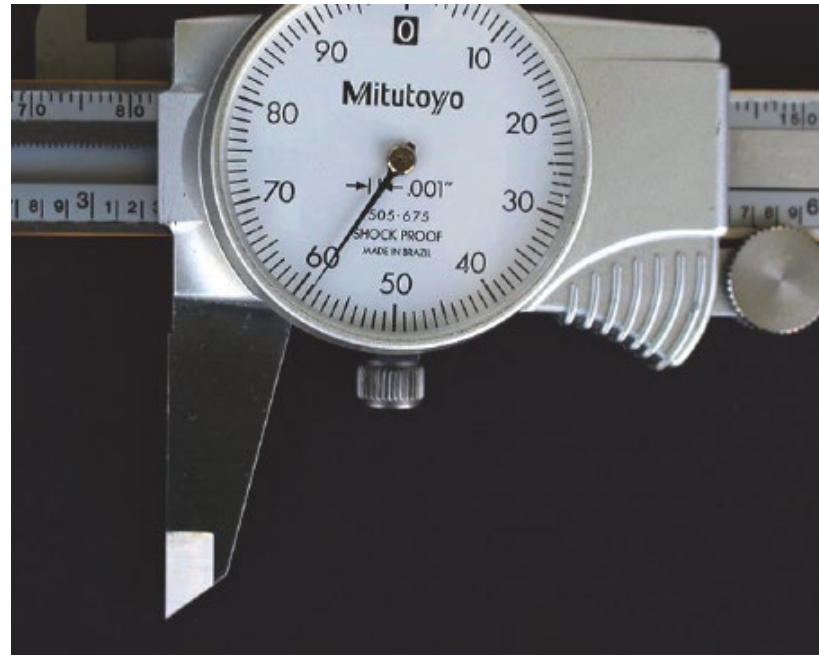
Practice Time….

3) Reading #2 What is the reading of this Dial Caliper?
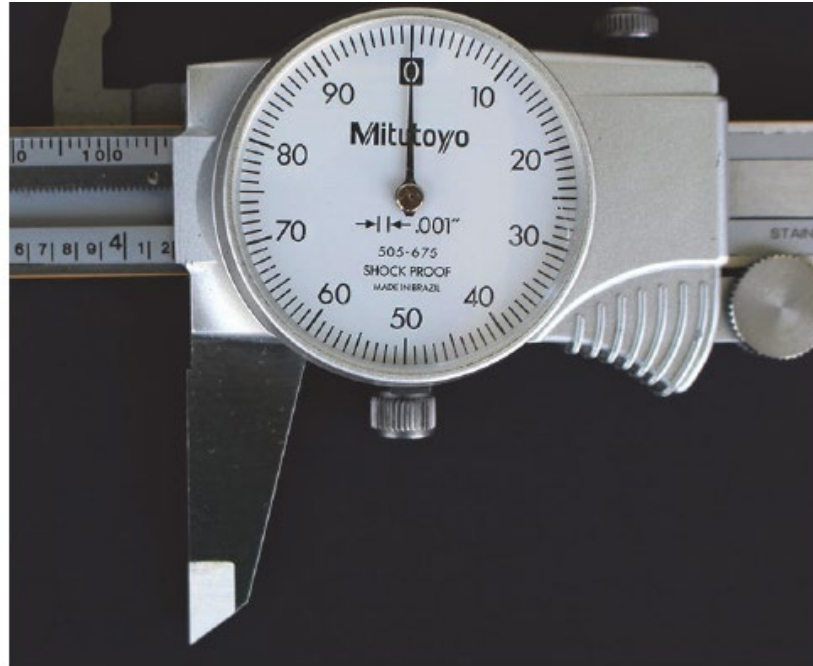   a) 3.0"
   b) 2.200"
   c) 2.940"
   d) 12.940"
   e) 2.194"

Practice Time….

Reading #3 What is the reading of this Dial Caliper?
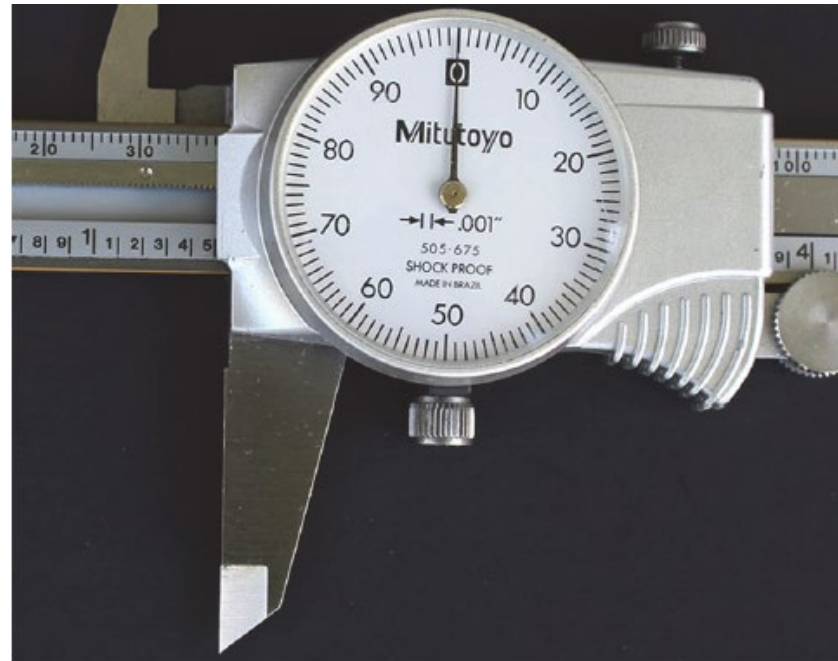a) 3.130"
b) 3.259"
c) 3.123"
d) 3.360"
e) 3.590"

Practice Time….

5) Reading #4 What is the reading of this Dial Caliper?
   a) 4.200"
   b) 4.000"
   c) 2.000"
   d) 4.12"
   e) 12.000"

Practice Time….

6) Reading #5   What is the reading of this Dial Caliper?
   a) 5.000"
   b) 1.000"
   c) 2.000"
   d) 4.12"
   e) 1.500"