

DORSEY OPTICAL COMPARATORS

In the optical field, Dorsey is one of the few remaining domestically manufactured optical comparator product lines. Dorsey optical comparators demonstrate that attention to detail does matter and all are built on a foundation of stability and accuracy. Dorsey has tightened manufacturing tolerances to maintain uncompensated absolute inherent accuracy.

Below we've summarized some of the main items that should be taken into consideration when buying an optical comparator.

Step 1 – Which light path is best for your application, Vertical or Horizontal?

- **Horizontal** light path instruments have a beam of light traveling horizontally across a stage. This type of machine is ideal for large heavy parts and shafts to be held on V blocks or between centers. Typical applications include castings, transmission shafts, thread form measurement, and machined components.
- **Vertical** light path instruments have a beam of light traveling vertically. Parts being measured/inspected are placed on a plate of glass, which is on the system's XY stage, which the light beam travels through. Vertical comparators are ideal for flat parts like gaskets, O-rings, stamped parts, and electronics. Dorsey's line of vertical comparators feature quick release mechanisms on both axes, making measurements on our vertical machines much faster than on horizontal machines which feature quick release on only 1 axis.

Step 2 – What screen size and stage size best suits your application?

Screen sizes from 14" to 32" are available. Before choosing a screen size, determine how much of the part REALLY must be viewed at one time. When using a system it is not necessary to view the entire part to measure it. Calculations can be made by dividing the screen diameter by the lens magnification. For example, using a 10X lens on a 16" optical comparator would enable viewing 1.6" of the part on the screen ($16"/10=1.6$ "). Keep in mind it is good practice to keep within one inch of the screen margin when viewing an image with an overlay. Verify that the stage size, travel, and weight capacity will accommodate all of the parts that are intended to be measured or inspected. In general, screen sizes 16" and smaller are benchtop units with weight capacities up to 150 pounds.

Step 3 – What lens/lenses you will require?

Follow the chart below to decide what lens will match the tolerances required. A basic rule of thumb is that a typical attentive operator can repeatedly discriminate .004" on the comparator screen. Dividing the "discernible resolution" by the lens magnification determines the minimum resolution attainable for each lens.

LENS MAGNIFICATION	DISCERNABLE RESOLUTION
5X	.0008" (0.020mm)
10X	.0004" (0.010mm)
20X	.0002" (0.005mm)
25X	.00016" (0.004mm)

LENS MAGNIFICATION	DISCERNABLE RESOLUTION
31.25X	.0001" (0.003mm)
50X	.00008" (0.002mm)
62.5X	.00006" (0.0016mm)
100X	.00004" (0.001mm)

Step 4 – What type of readout/software will you require, or will you be using overlays?

If you will be using overlays only, our base models without scales are an ideal cost effective solution. It is good practice to keep within one inch of the screen margin when viewing an image with an overlay. If measurements are required, select a basic XY digital readout if only positions and distances results are necessary. However, if measurement of circles, angles, and parametric distance is required, then select a readout or M2 software with geometric capability. Repetitive part measurement may encourage the selection of a CNC capable readout. Automatic edge sensing should be considered to eliminate operator subjectivity and increase repeatability and accuracy. See pages 91-93.

Step 5 – What options or tooling will be required?

Repeatability and accuracy will suffer if the workpiece is not properly and securely held. Careful consideration should be given to tooling and to the surface on which you place your comparator. Review pages 94 and 95 for solutions.

For assistance in selecting and configuring the correct Dorsey Comparator to meet your measurement and inspection needs, please contact us at 845-454-3111.