Dynamic Track Definition and Measurement

Dynamic track is defined as the total mechanical angular variation from facet to facet perpendicular to the scanning direction. This effect is illustrated in figure 1. An optical beam illuminating a polygon with a dynamic track of 10 arc seconds will have a scan envelope from all the facets of 20 arc seconds perpendicular to the scan direction. This is caused by an angle doubling effect on reflection from the rotating mirror.

There are three significant contributors to dynamic track error. The first is the polygon itself which has a variation in the angle of each facet. The second contribution comes from the mounting of the polygon to the rotating shaft. If the polygon is not perfectly perpendicular to the rotating shaft then the facets will change their pointing in a sinusoidal manner with a period of one revolution. These first two contributions are fixed and repeatable. The third contribution is a random non-repeatable error caused by the bearing support system. Ball bearing and air bearing scanners have non-repeatable errors in the 1-3 arc second range.

The repeatable component of dynamic track (which tends to be larger) will show up in a laser writing system as a banding artifact. The line spacing will not be uniform and will repeat the pattern on each revolution of the polygon. This can be reduced through either dynamic or passive correction means.

Dynamic track is measured using a test setup as illustrated in figure 2. This test setup measures the reflected beam deviation and is converted to the mechanical angular variation.

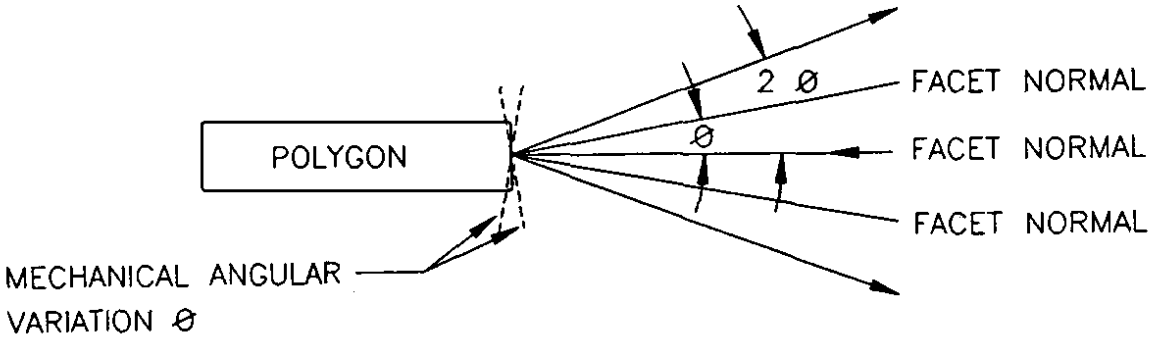

FIGURE 1

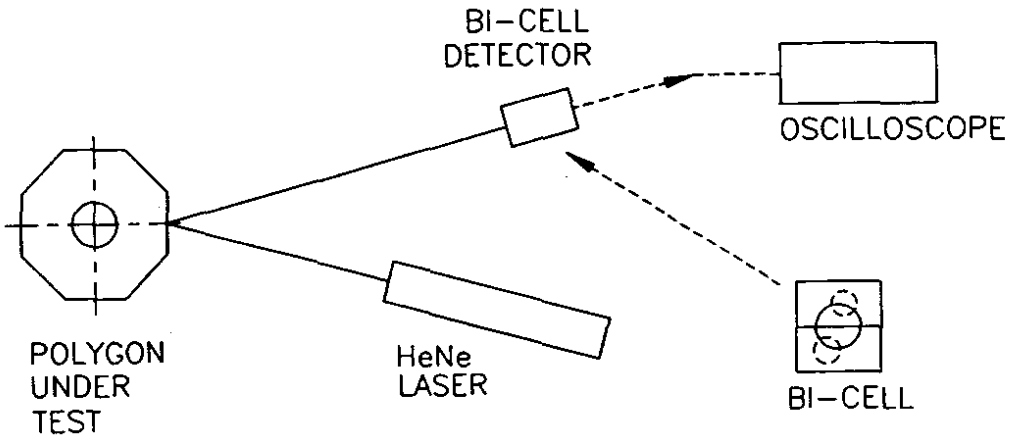

FIGURE 2