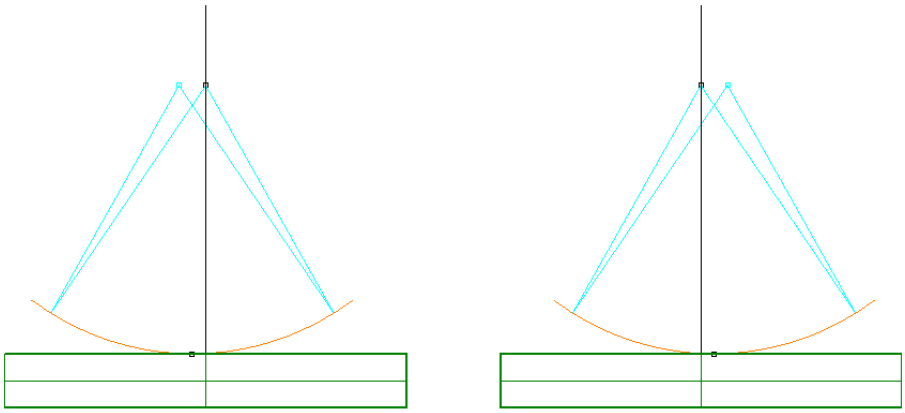
Centering with the PSM

Centering with the Point Source Microscope (PSM) is a perfect application. When a spot of light from the objective focus is reflected back from a concave surface sitting on a rotary table, it will sweep out a circle on the video screen as the table is rotated unless the center of curvature of the surface lies precisely on the axis of rotation of the table. The picture below illustrates this.



In the picture, the point source of light lies on the axis of the rotary table but the vertex of the surface does not. The reflected spot will be twice as far away from the axis as the vertex of the surface. When the rotary table has been turned 180° as in the picture to the right, the reflected spot has moved to the other side of the axis of the table. A combination of the doubling effect of reflection and the doubling effect of a 180° rotation gives the method great sensitivity. Since a PSM can easily measure to a fraction of a μm, it is easy to center even better.

Note that the point source of light does not have to lie precisely on the axis of the table. It just has to be centered well enough that light makes it back in the objective as the table rotates. In this case, the decenter spot will still rotate but not about the center of the screen. This does not matter. If the spot rotates at all in synchronism with the rotary table the surface is not centered.

Notice, too, that the larger the diameter of the circle the spot sweeps out, the larger the decenter of the surface. Thus it is relatively easy to gradually bring a surface to better and better centration.