

Corning Tech Notes

Rotational Stitching: Fast, accurate flatness measurements for large rings

In the world of flatness measurements, the Tropel® FlatMaster® system, manufactured by Corning Tropel, is an industry leader in accuracy, throughput, and ease of operation. FlatMaster systems are commonly used for measuring the flatness of semiconductor wafers, photomasks, hard drive disks and a host of industrial components.

The Problem:

There exist seal rings with diameters in the hundreds of millimeters and a flatness tolerance anywhere from submicron to tens of micron ranges. Used in many industries, in pumps, compressors, turbines, and agitators, under a wide range of pressure and temperature conditions, the need for quality is obvious; so how do we *insure* quality?

The Old Solution:

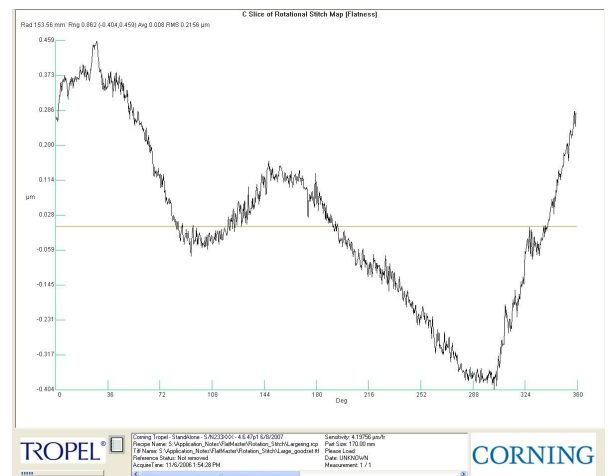
Conventional profilometry of these surfaces require a trained operator capable of setting up and aligning the stylus of the profilometer.

After that tedious, usually manual process, the stylus could take tens of minutes to complete the measurement of the part, which even then would only deliver a flatness profile along a two-dimensional cross-section.

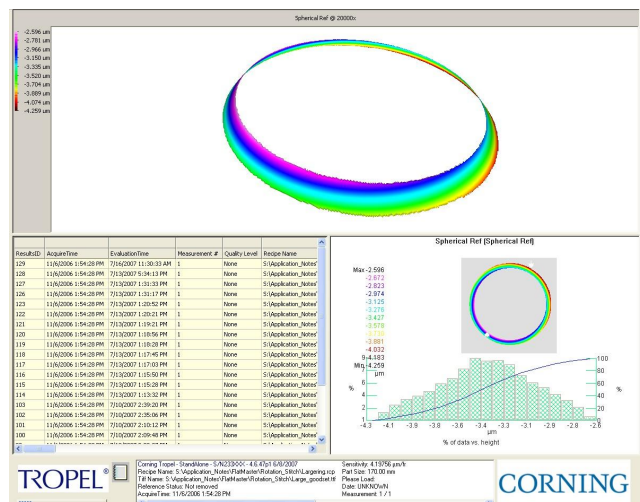
Our New Solution

There was no way to quickly and accurately assess the flatness of these unusually large diameter parts—*until now*.

For seal rings with a diameter between 200 mm and 590 mm, with a width of up to 170 mm, Tropel has developed an elegant way of measuring the surfaces of these large, flat rings, and with higher speed, better reliability, and more precision than conventional stylus profilometers.



Typical Profilometer Data



Typical FlatMaster Data

The key to delivering complete surface metrology for such large parts is our new rotational stitching algorithms. By taking multiple images of the part and merging them, we can create a single image of the complete surface.

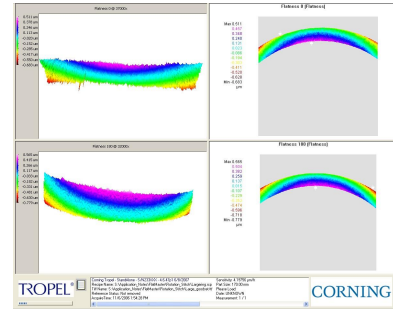
This allows you unprecedented feedback about just what your surfaces look like—valuable information that will reveal more about process impact and cause of failure than was ever possible with profilometry.

The FlatMaster 500 is a fully automated interferometry system—the operator has only to load the part onto the fixture and hit “Measure” and the FlatMaster will return the flatness of the whole surface in tens of seconds, using an intuitive full-color user interface. Powerful software provides a full relief map of the part—it’s easy to control the data presentation to isolate whatever it is you need to know—any maybe you’ll see something new!

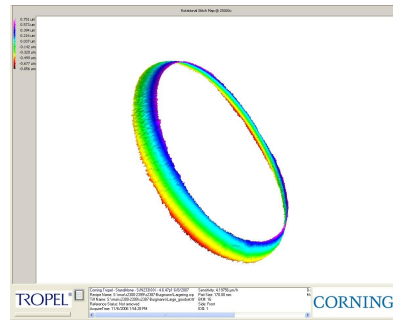
The fixture is as easy as the software. The three-point mounting block easily holds the ring in place with only gravity; the safe low-velocity set up requires no bolts. The sloped surface means the ring levels itself and reaches its nominal alignment automatically!

For customers with their own fixturing methods, a FlatMaster 200 configured with our radial stitching software can deliver the same measurement capability, across an even wider spectrum of parts — a diameter up to one meter, and a width as great as 340 mm.

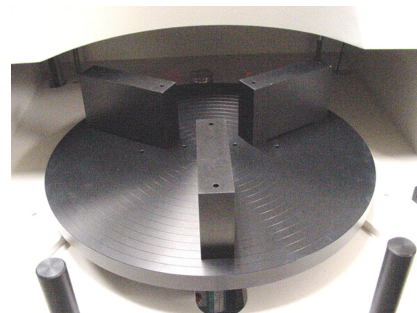
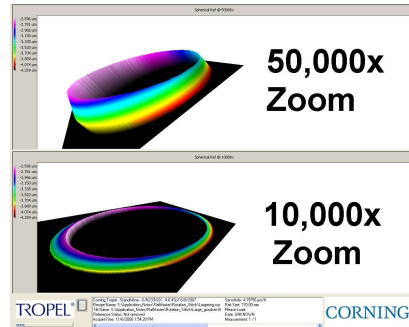
Contact Corning Tropel today to see if we have a solution for you!



Two of eight Pre-stitched Images



The Stitched Image of the Ring



FlatMaster 500 Fixture for Large Rings

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