

TriboImage™

Complete Time-Resolved Nanoscale Reciprocating Wear

TriboImage enables multiple cycle wear testing under complete feedback control to enhance testing at the frontier of tribological research. **TriboImage** brings a complete package for cutting edge friction and wear testing and includes features such as multiple cycle analysis, load or displacement control in 2 dimensions and friction mapping.

TriboImage works by sliding a nanoindentation tip in a reciprocating motion while measuring force and displacement in both the X and Z axis. The linear wear pattern reproduces the reciprocating motion typical of many practical applications and is comparable in deformation mechanics to pin-on-disc wear experiments.

With the addition of application specific probe tips, the full **TriboImage** package is an exciting addition to your Hysitron system.

Load Function Creator

To enable simple test set-up, the multiple scratch load function creator allows thousands of cycles to be programmed with one click of a button (figure 2). The test can be set up in load or displacement control. The latter is useful for multi-layered films and thin coatings.

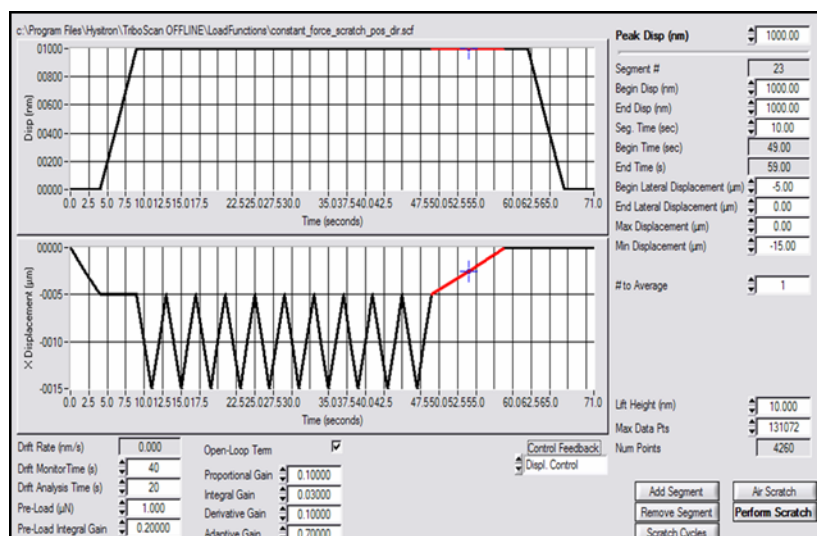


Figure 2. Load function creator window showing ability to create multiple-cycle test methods at controlled load or displacement.



Figure 1. 8 µm SPM image of residual wear track left after reciprocating wear test on DLC film.

The track length, wear speed and direction are all defined in the load function window and can be saved as a method to enable the same test to be run on multiple samples.

Both open loop and feedback control experiments can be programmed into the load function with the option of lift heights and pre-load settings for soft, adhesive or pressure sensitive materials.

3D Plotting Capability

The unique 3D plotting window (figure 3) enables instant visualization of the variation of friction over time and is a simple and quick way to plot thousands of data points within one image.

Friction or displacement are two of the many mapping options which can be plotted against segment number or experimental time.

Unique Friction Image Mapping

The software package included with **TriboImage** enables plotting of the friction coefficient of both forward and reverse directions as well as selection for plotting individual segments. The color scale plotting feature enables visualization of any changes in results across the track length or through sample depth. With the capability of individual segment analysis and sub-region plotting, both of which can be displayed as a pop-up 2D graph (figure 3), results and trends can be quickly identified and exported.

The unique capability of the **TriboImage** system is the ability to measure wear accurately and quantitatively with the displacement control function. This technique removes the need for residual wear material collection and weighing, and allows instant wear depths and wear rates to be calculated.

HIGHLIGHTS

- Instant visualization of changes in friction through the sample structure
- Rapid set-up of experiments involving thousands of cycles
- Full automation capability
- Complete control over load and/or displacement programming
- Multiple probes available based on application
- Friction image mapping capability
- Flexible analysis of sub-regions or segments
- Isolation of forward and reverse direction analysis

APPLICATIONS

- Metal on metal wear
- Lubricant efficiency in solid-solid contact
- Multilayered thin films on substrate
- DLC coatings and other wear resistant thin films.
- Tribo-films

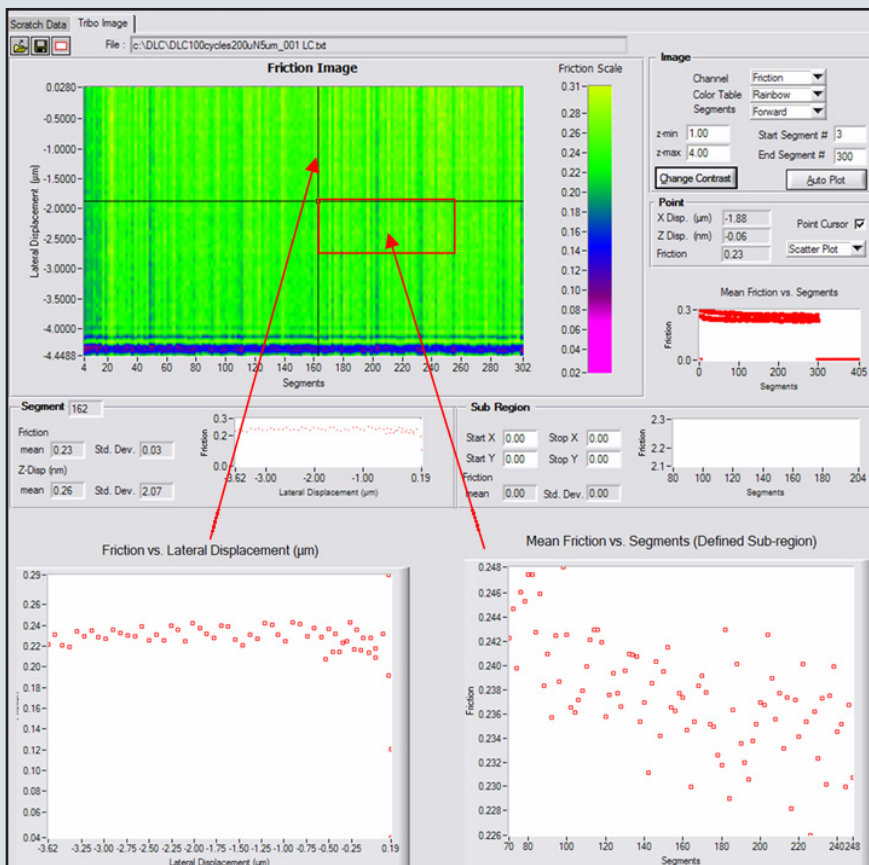


Figure 3. 3D plotting window enables visualization of results with a color coding option. Mean friction over all data points is instantly given in 2D graph format for both scanning directions. Sub-region and linear analysis pop-up plots show quantitative values for instant data analysis and are created using a simple click, point or drag option. Quantitative values are given on the screen for each analysis mode.