DEKTAK XT

MECHANICAL PROFILOMETER

The DektakXT stylus surface profiler is an advanced thin and thick film step height measurement tool with the following characteristics:

- equipment compatible with 2", 4", 6" and 8'' wafers
- Selectable magnification, 1 to 4mm FOV
- Scan Length Range 55 mm with stitching option
- Vertical range 1 mm
- step-height repeatability of 5A
- N-Lite+ Low Force with 0.03 to 15mg
- 3D stress and 3D mapping

Performing a measurement

1. Open the software Vision64, then click "OK" for the XY initialization and then "OK" for the Theta initialization and wait for the general window (see figure I).
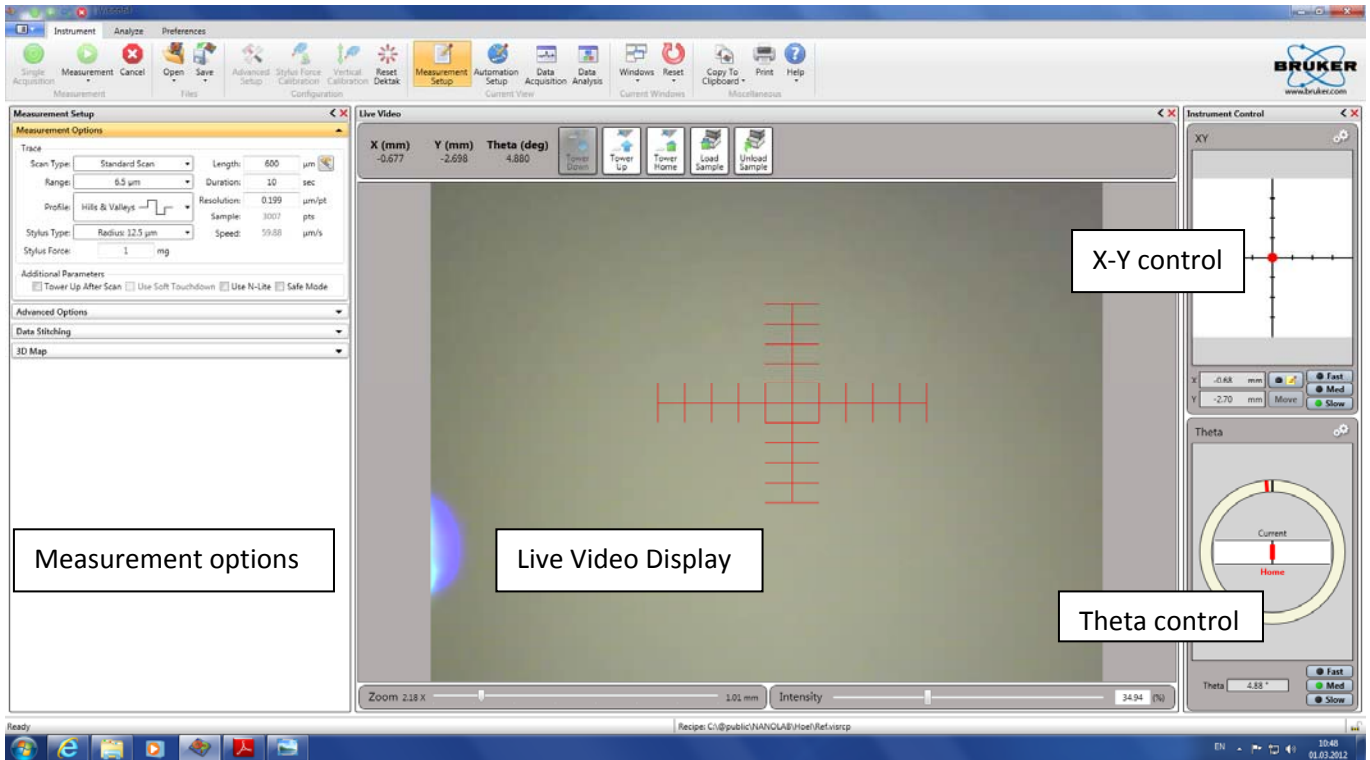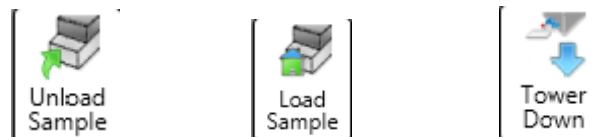

Figure I : DEKTAK home page

2. Click the **unload sample** button on the toolbar above the live Video Display to move the scan stage forward, then place the sample on the fixture and put the Vacuum on.

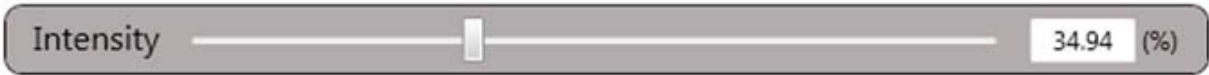<p align="center"><strong style="color:red">NEVER touch the stylus, this may cause damages!</p>


3. Click the **Load Sample** button to move the scan stage backward its home position.

4. Click the **Tower down** button

5. Adjust the illumination level of the video image by moving the slider on the Intensity Bar at the bottom of the right pane of the Live Video Display.

6. Adjust the focus level of the video image by moving the slider on the focus Bar at the bottom of the left pane of the Live Video Display.
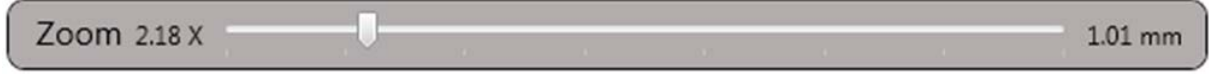

7. Before starting the measurement, you must place the area of interest on the sample under the stylus by adjusting the position of the motorized XY sample-positioning stage by keeping clicking on the X-Y control panel and moving the mouse. You must also oriented the sample under the stylus by adjusting the position of the motorized theta sample-positioning by keeping clicking on the theta control panel and moving the mouse. In both cases, the speeds are available.

NB: The measurement is done from the bottom to the top when you look at the video.
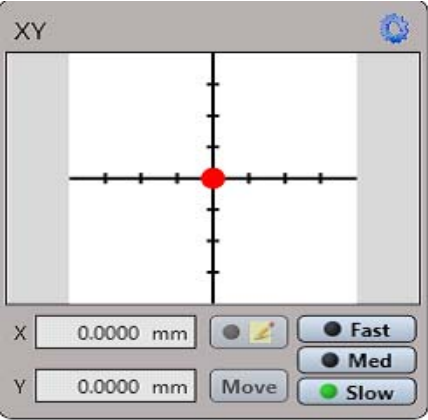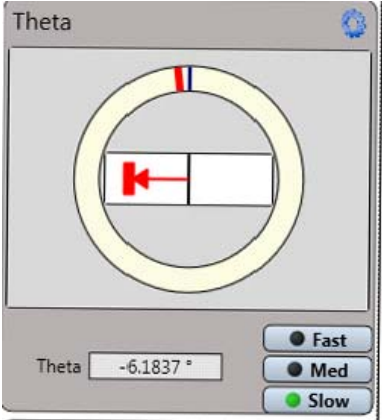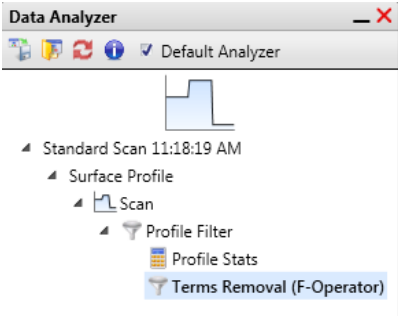

X-Y stage control   Theta stage control
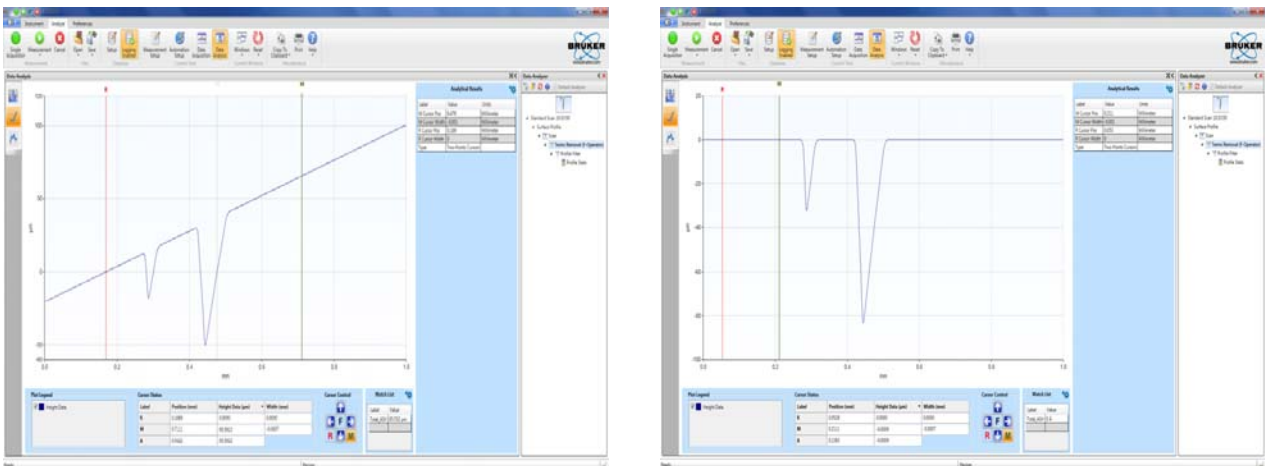
8. Click on **measurement Setup** and define the measurement parameters

9. Click on **single acquisition** for the measurement

10. At the end of the measurement, the Data Analysis window appears.

11. To do a levelling, activate **Terms Removal (F-Operator)** in the Data Analyzer window on the right.

Then place the two cursors (R and M), click right, and click **Level Two Point Linear.**

When you proceed to a height measurement, place the cursors (R & M) on the two points you want to measure:
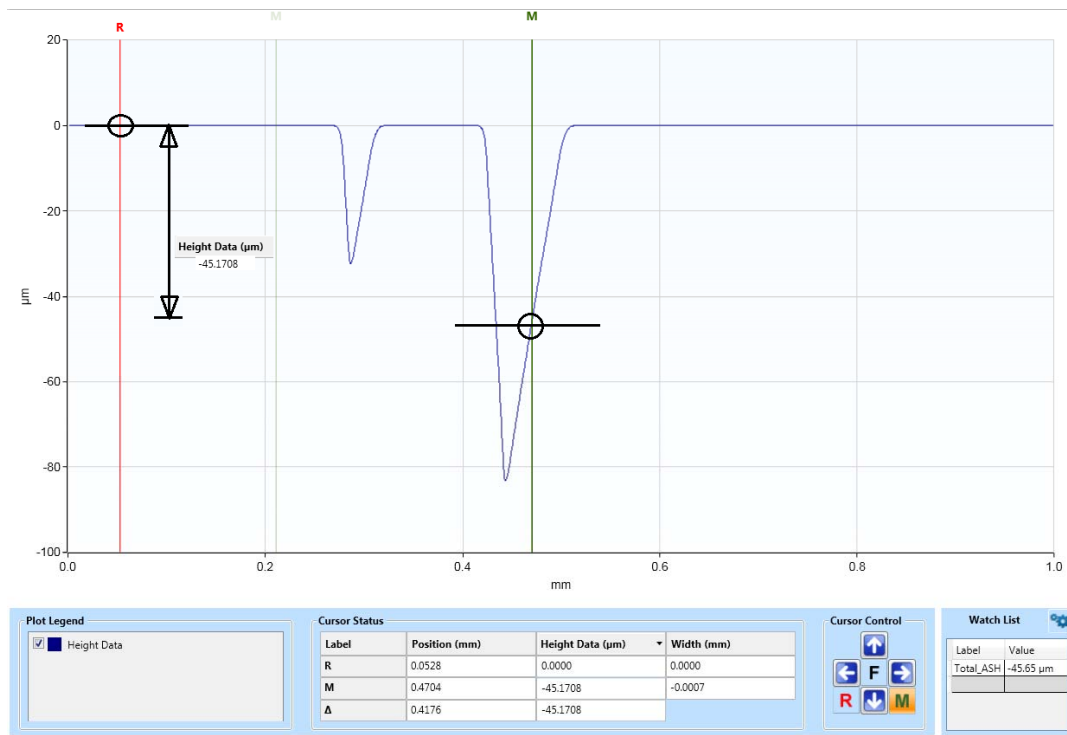
12. To quit the equipment, click on the icon "**Measurement setup**", click **Tower Home** button**,** then **unload sample** button.

13. Exit the program **Vision 64**.

Settings on the Measurement Options Tab

Scan Type: Select from the following:
• **Standard Scan:** A normal scan type in which the scan is performed across the surface of a sample. Because the tower is nulled before each scan, each successive scan has its own reference point.
• **Static Tower Scan:** A special scan type in which the scan is performed across the surface of a sample, but the tower is nulled before only the first scan. Each successive scan therefore uses the same initial reference point.
• **Static Scan:** A special scan type in which the scan is performed at the same point. (The scan stage does not move.) The tower is nulled before the scan. This scan type is primarily used for determining the noise and drift of the system.
• **Map Scan:** If your system includes the 3D Mapping Option, select this scan type to measure, analyze, and view surface contour data in three dimensions (X, Y, and Z).

Range: Enter a value that indicates vertical resolution of the scan. When measuring extremely fine geometries, the 6.5 um range provides a vertical bit resolution of 0.1 nm. For general applications, the 1.0 nm vertical resolution of the 65.5 um range is usually adequate. When measuring thick films or very rough or curved samples, select the 524 um range with 8.0 nm resolution.

Profile: Select from the following:
• **Valleys:** Provides 90% of the measurement range below the zero horizontal grid line. This option is used primarily for measuring etch depths.
• **Hills and Valleys:** Provides 50% of the measurement range above the zero horizontal grid line
and 50% below. This option is used in most applications, especially if the surface characteristics
of the sample are not well known, or if the sample is out of level.
• **Hills:** Provides 90% of the measurement range above the horizontal grid line. This option is used primarily for measuring step heights.

Stylus Type: Select the currently installed stylus type from the drop-down list.

Stylus Force: Enter a value between 1 mg and 15 mg.

Length: Enter a scan length between 50 um and 55,000 um (55 mm) for a non-stitched measurement.

Duration: Enter amount of time it will take to complete a given scan. Scan duration, in conjunction with scan length, determines the horizontal resolution of a scan. For most applications, a 10 – 20 second scan provides adequate resolution and throughput.

Resolution: Enter the horizontal resolution for the scan length and scan duration. The scan resolution is expressed in um/sample, indicating the horizontal distance between data points.

Sample: Indicates the number of data points that the system should take on the sample during a measurement.

Speed: Indicates the scan speed in units of um/s.

Tower Up After Scan: Select this check box to make the DektakXT stylus profiler automatically raise the tower ti a safe position after each scan.

Use Soft Touchdown: If your system includes the 3D Mapping Option, select this check box to make the DektakXT stylus profiler increment the stylus force up to the specified value. This causes the stylus to descend more slowly, thus minimizing the possibility of scratching the sample.

JUST IF NEEDED

Reticule Alignment: To align the reticule, click right on the screen, select reticule, select align, then follow the instructions: left click in the center, at the junction of the reticule and the wafer.
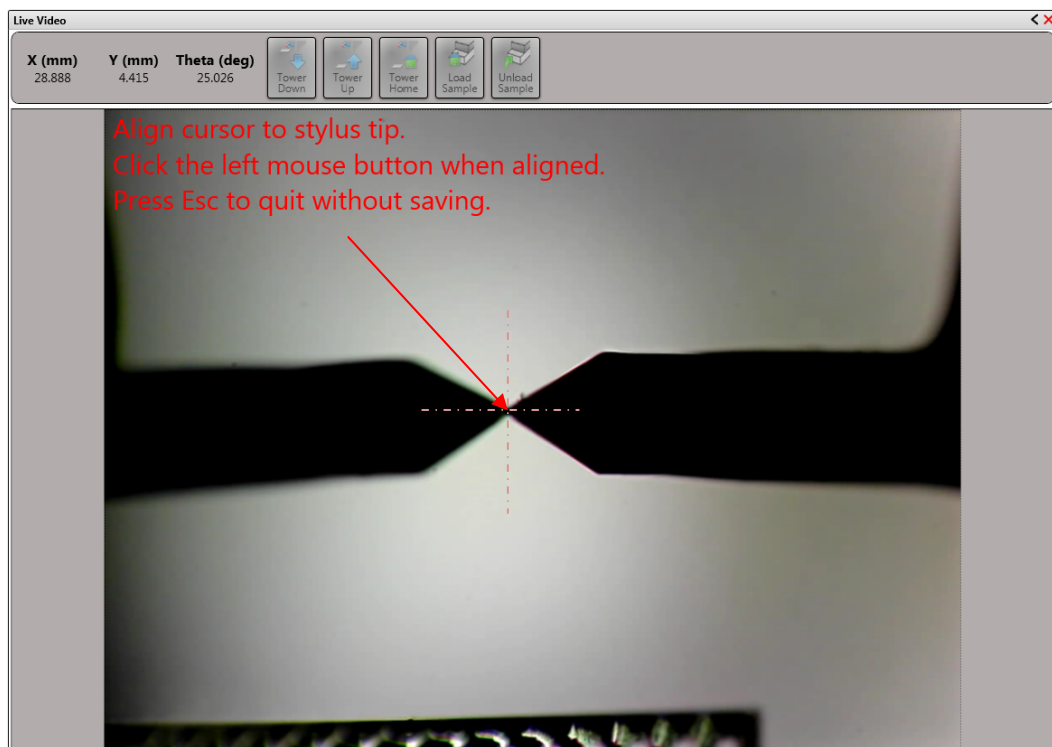
To resume: performing a measurement

- Load your sample

- Move the stylus down in contact with the sample, the move it to its Up position.

- Adjust the **Intensity** and **Focus** if necessary

- Adjust the position of the X-Y and Theta stage until you find the location of interest on your sample

- Fine-position the location of interest in the center of the Live Video Display

- On the **Measurement Options tab** of the **Measurement Setup window**, select **Standard Scan**

- Modify settings in the Measurement Setup window.

- Click the **Measurement** button on the Ribbon and then select **Measurement**

- At the end of the measurement, the Data Analysis window appears.

- To do a levelling, activate **Terms Removal (F-Operator)** in the Data Analyzer window on the right. Then place the two cursors (R and M), click right, and click **Level Two Point Linear**

- To quit the equipment, click on the icon "**Measurement setup**", click **Stylus Home position,** then **unload wafer**

- Exit the program **Vision 64**