

Dektak XT Profilometer

Standard Operating Procedure

Revision: 1.0 — Last Updated: Nov.23/2012, Revised by Nathanael Sieb

Overview

This document will provide a detailed operation procedure of the Bruker Dektak XT profilometer. Formal Training is required for all users prior to using the system.

Revision History

#	Revised by:	Date	Modification
1	Nathanael Sieb	10/13/11	Initial release
2	Nathanael Sieb	11/23/12	Added stress analysis section
3			
4			
5			

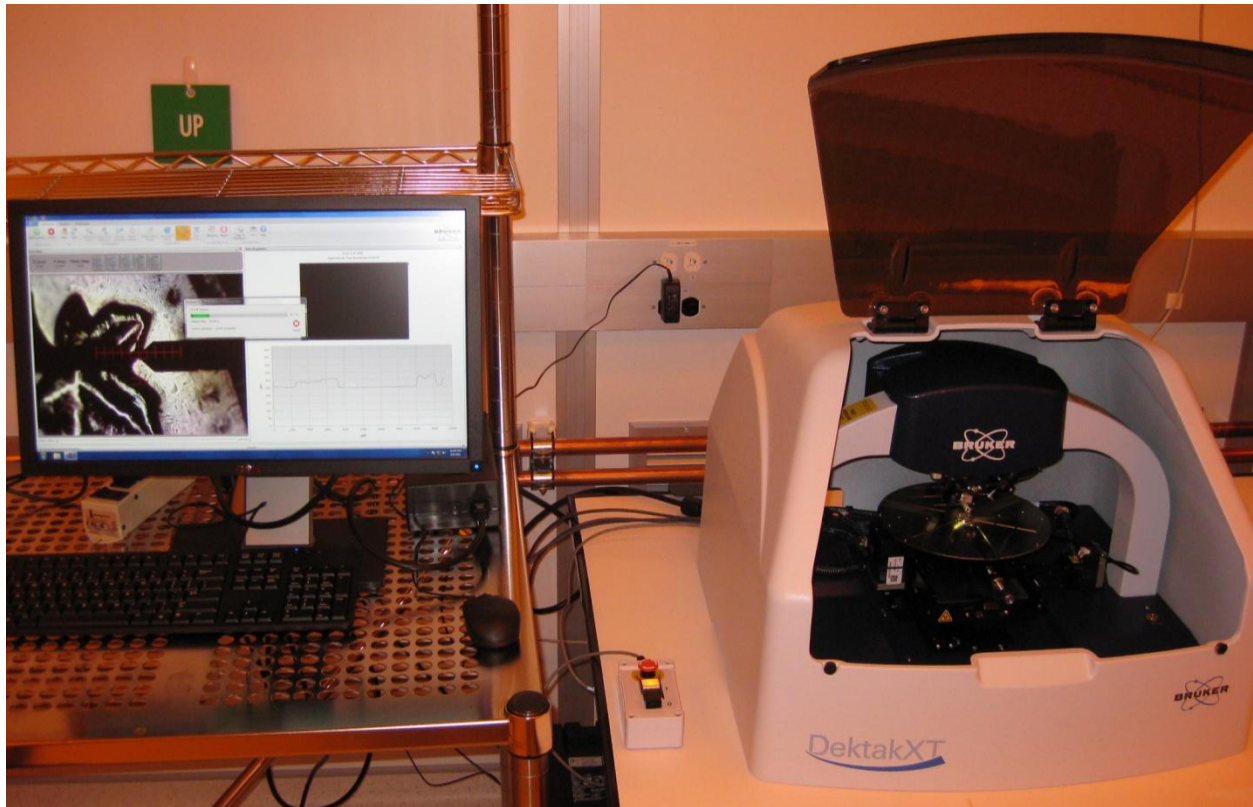
Document No. 4DSOP000X

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General Information

The Bruker Dektak XT profilometer is capable of measuring step-heights, film stress, roughness, and other parameters. This tool has sub-nm resolution with 5A repeatability. It is also possible to do 3D mapping with the Dektak profilometer.



Operation

1. System startup and sample loading

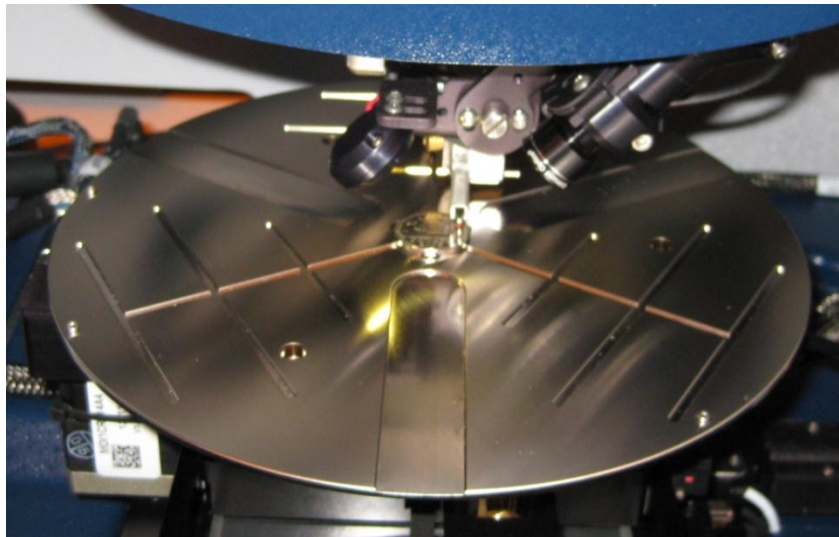
- Ensure system is powered on by looking at the controller to the right of the computer.



- Start the Vision 64 software. Initialize the drives when asked.



- Click Unload Sample. The stage will move to the front.
- Open the door and place sample on the stage. The system scans in the y-direction, so be sure the sample is oriented correctly.

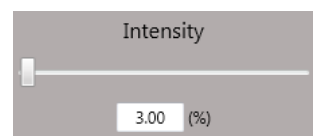


- Click Load Sample. The stage will move under the head.



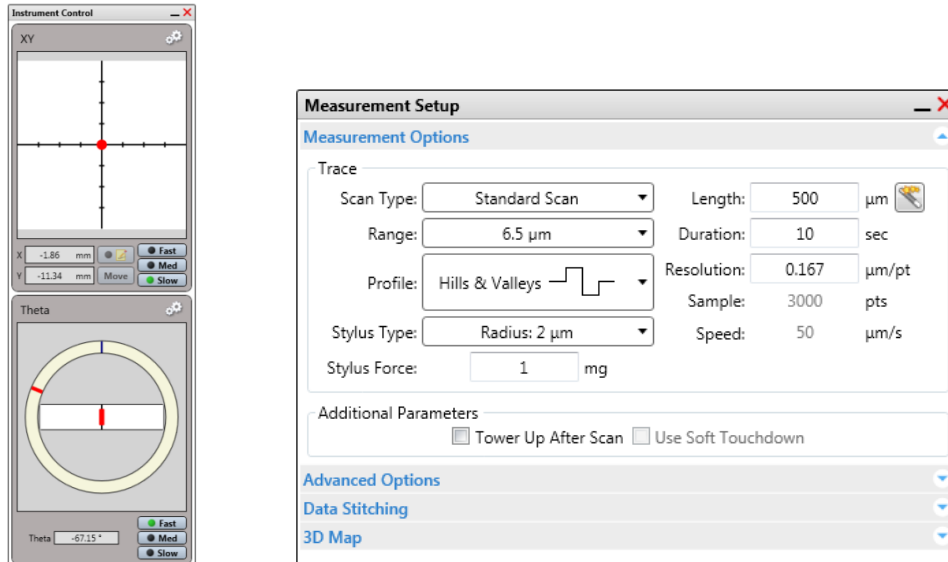
- If the sample is under the stylus, then press Tower Down and the stylus will be lowered on to the substrate.

- Adjust the illumination intensity as needed to see the sample.




2. Taking a scan

- Using the X-Y Stage Control and Theta Stage Control panels, move the sample to the start point of the desired scan. The system will scan upwards across the sample.

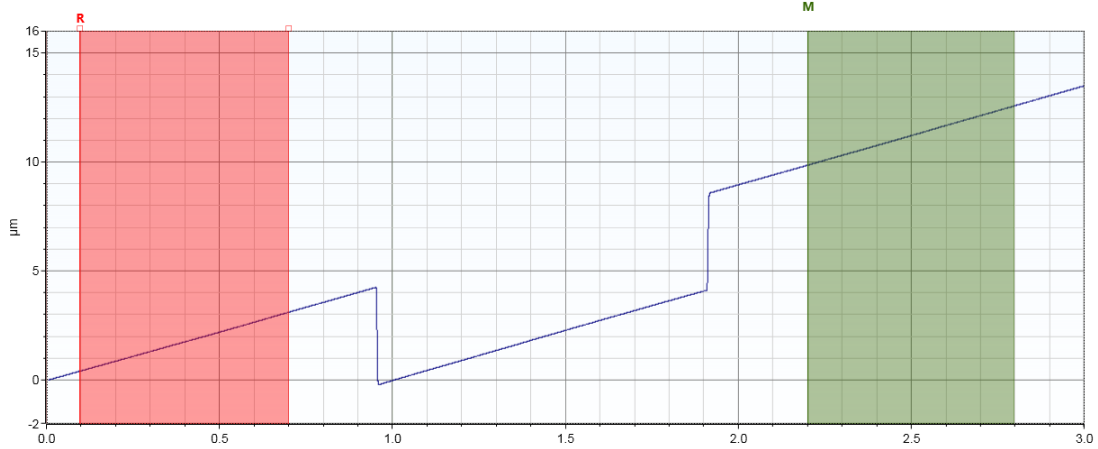


- Enter the scan parameters in the Measurement Setup window, including Range, Length, Duration, Force, and a 2.0 μm tip diameter.

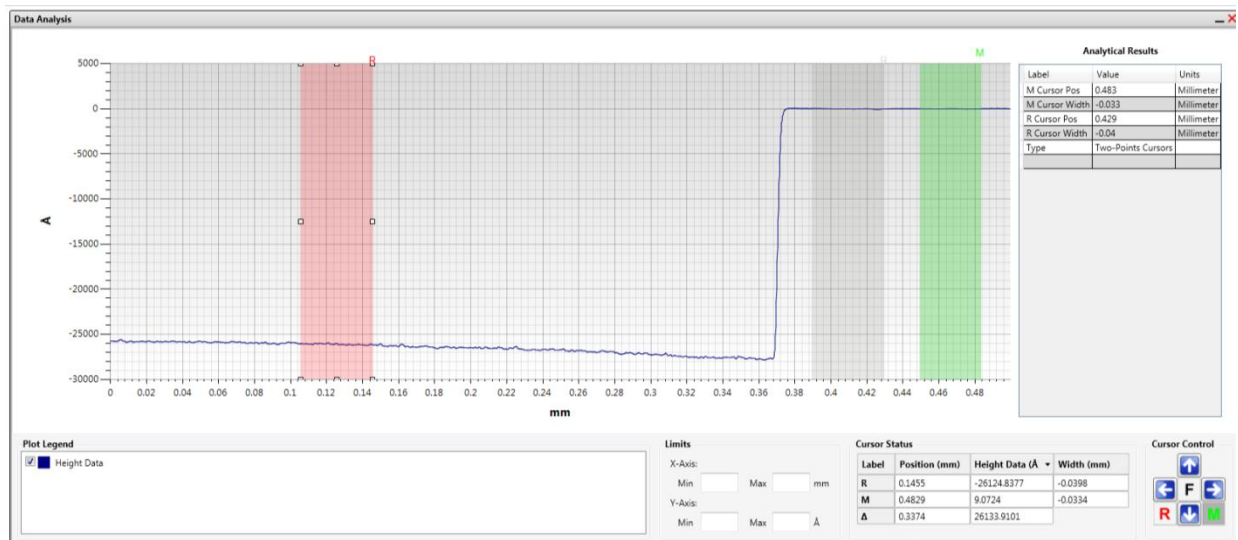
- Press Measurement  on the ribbon at the top of the software window to start the scan.
- After the measurement the Data Analysis window is displayed.

3. Data analysis

- Move the reference (R) and measurement (M) cursors to two areas of the scan at the same height. Expand the cursors to cover a larger area.




- Right-click on the plot and select Two-Point Linear Fit.
- Move the R cursor to a baseline location and the M cursor to a step height to acquire the desired measurements.

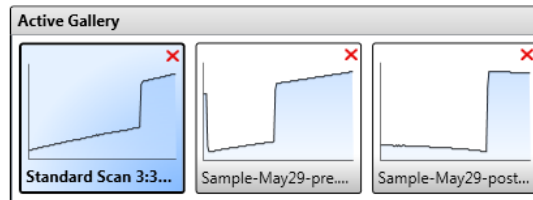


- Right-click on the Analytical Pane and select Append. There are several analytical options to choose from.

4. Data saving and export

- The Save button  allows one to save their file as a .opdx file.

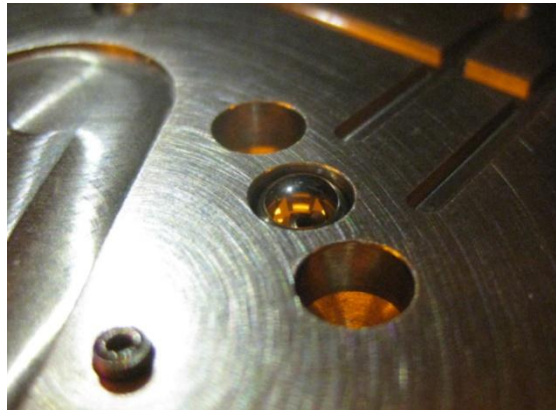
- The data can be exported by right-clicking on the plot and selecting Export.
- Multiple scans can be open at the same time and can be selected at the bottom of the Data analysis window.



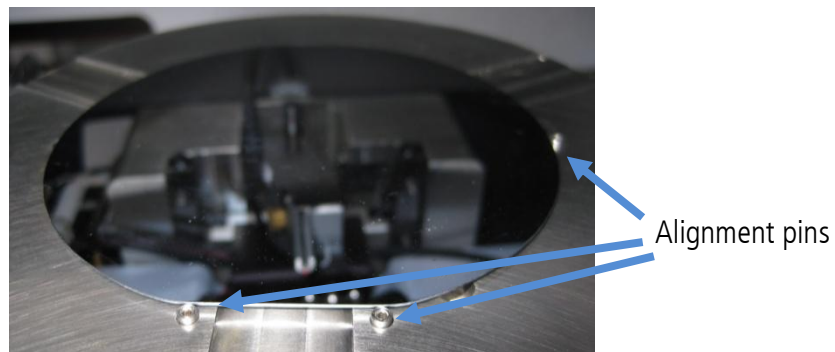
5. Other features

5.1 Stress Analysis

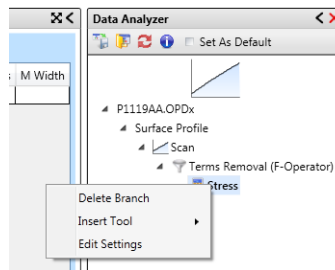
- Ensure that the steel balls are inserted in the proper slots on the stage.



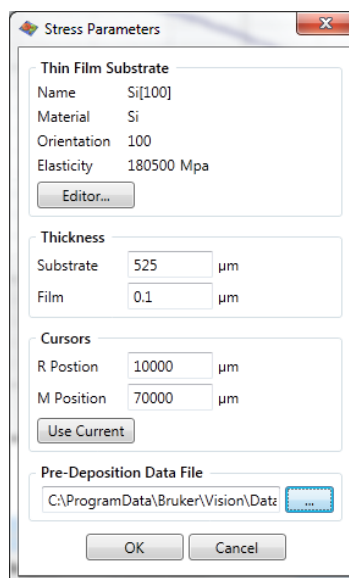
- Load the pre-deposition sample as described in section 1. The wafer and wafer flat must be aligned against the three pins on the stage.



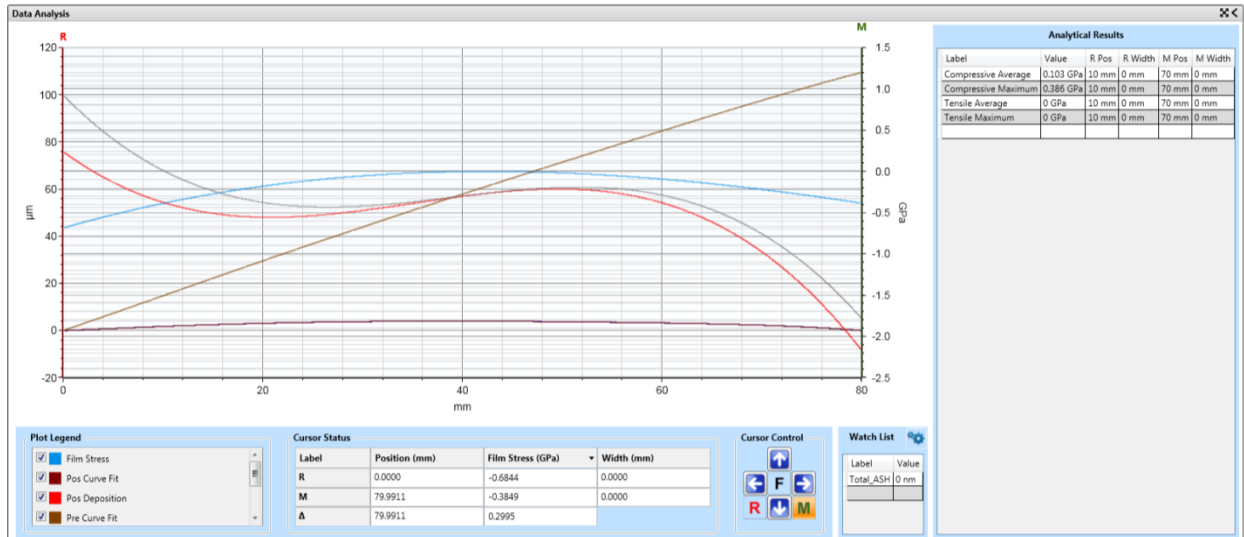
- Set-up a scan recipe as described in section 2 to scan across >80 % of the sample. Save the recipe or write down the settings in a notebook.
- Run the scan and save the pre-deposition scan file. There is no need to level the scan.
- Deposit the film on the wafer.
- Load the post-deposition sample on the stage in exactly the same orientation as the pre-deposition sample.
- Use the same scan recipe as the pre-deposition sample and scan the wafer.
- Save the post-deposition scan file. There is no need to level the scan.
- In the data-analysis screen, open the post-deposition scan file.
- In Analysis Toolbox, select Stress to add the branch to the Data Analyzer.
- In the Data Analyzer, right-click on Stress and select Edit Settings.



- Select the correct substrate and input the correct thicknesses information. Input the R and M cursor positions in micrometers. Select the pre-deposition scan file. Press OK.



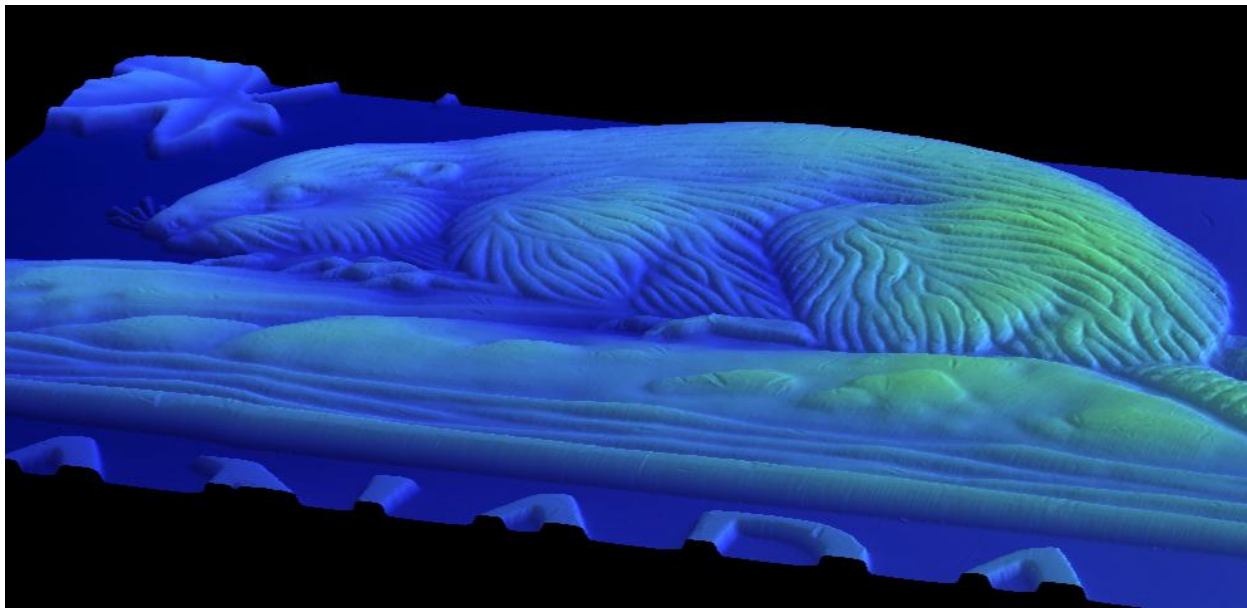
- The plot and data summary are displayed.



- The data table can be exported by right-clicking on the table and selecting Export Analytical Results.

5.2 3D Scanning

- Please discuss with the tool owner if you wish to use the 3D scanning capabilities of this tool.





References and Files

Bruker Dektak XT Manual and training notes.

Contact Information

Questions or comments in regard to this document should be directed towards Nathanael Sieb (sieb@4dlabs.ca) in 4D LABS at Simon Fraser University, Burnaby, BC, Canada.