UNIVERSITY OF NOTRE DAME

DEPARTMENT OF ELECTRICAL ENGINEERING

DEKTAKXT STYLUS PROFILER

USER MANUAL

1. Always verify that no features on the surface exceed the height of the stylus.
2. Stylus wear/damage can lead to inaccurate results and potential damage to the sample. The lowest force and largest radius will ensure longer stylus life.
3. When measuring taller/deeper features, use a slower scan speed to limit sudden forces on the stylus.
4. Sample heights must NOT exceed 50 mm(1.9 inches)!

Key parameters:

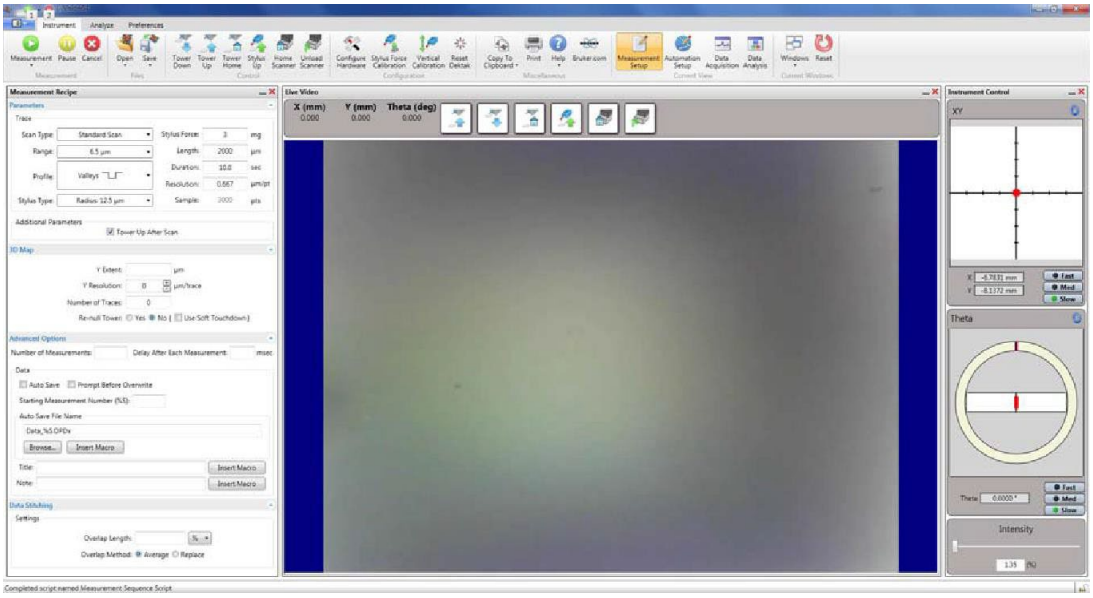
1. Scan length: ±50.8 mm (2 inches) of X-Y translation
2. Stage can accommodate small pieces up to 6” wafer size.
3. Duration (Scan speed)
4. Stylus Type (Fixed – 2µm)
5. Stylus Force: 1 - 15 mg (2-5mg recommended)
6. Profile type
7. Range

Software:

Bruker’s Vision64 software complements DektakXT’s innovative design by providing the most intuitive and streamlined visual user interface. The combination of intelligent architecture and customizable automation capabilities allow for fast and comprehensive data collection and analysis. Whether you’re using a recipe to perform routine analysis on single scans, or applying custom filters settings and calculations, DektakXT’s Data Analyzer displays current data while also revealing other possible analyses.

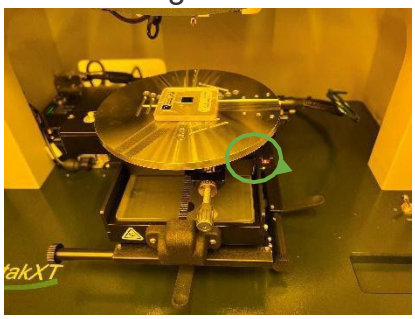
Standby Conditions:

1. The PC and the monitor should always be powered ON.
2. The Vision64 application is alive on the PC (If not Select **Start > Vision64** or click the Vision64 application button  on the desktop or taskbar) with the DektakXT live video Display as below.



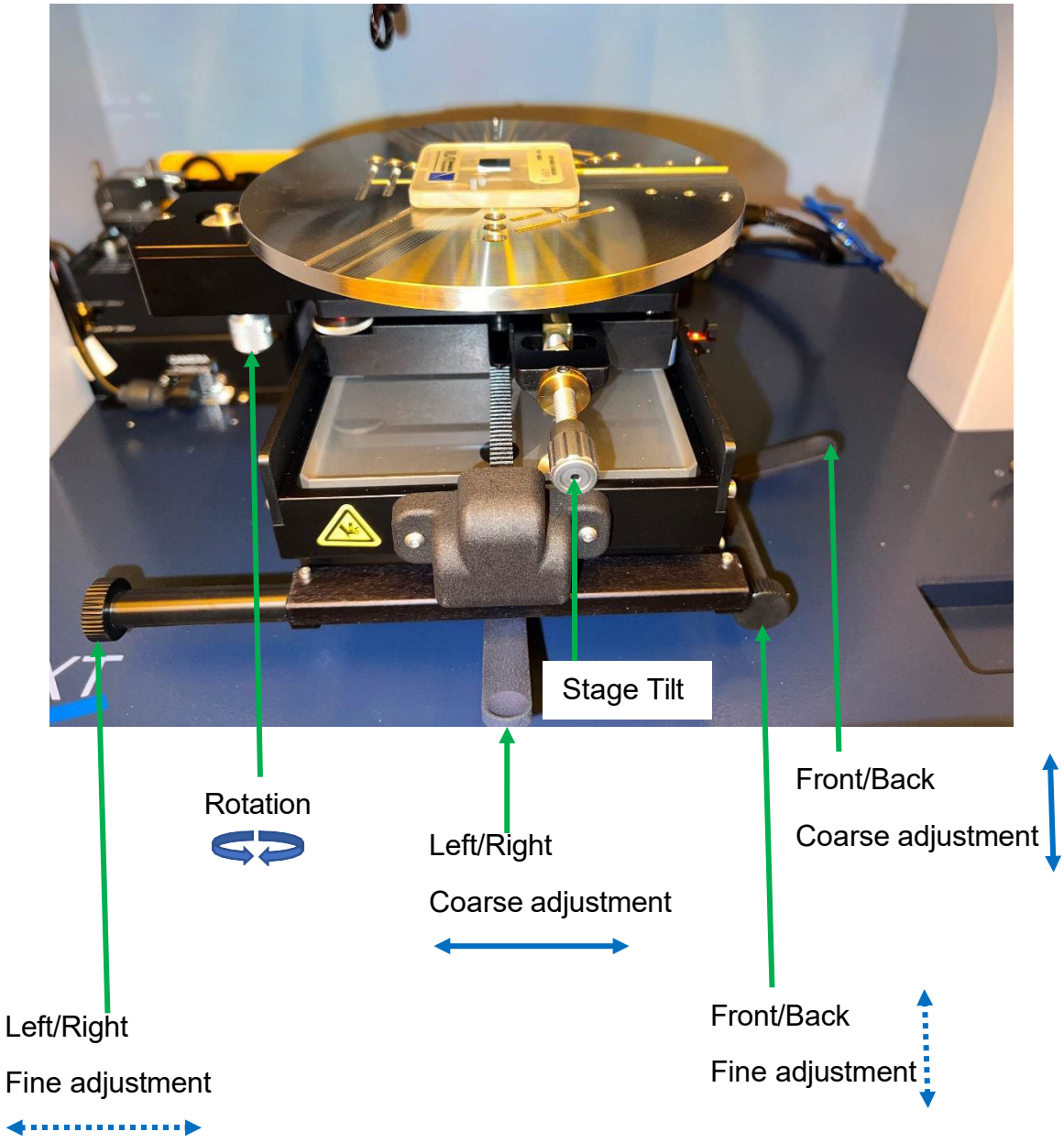
3. The white ON button on the EMO box illuminates as shown in the picture below.

4. The red LED lights on the scan stage limit switches illuminate as below.



5. Stylus is in the Tower Up position.
6. Scan stage is away from the home position (Unload position).

Manual Stage Position adjustments



Coarse Adjustments: (Use it only if the tower is in the up/home position)

Press and hold the lever gently and move left/right or front/back whichever is applicable.

Fine Adjustments:

Rotate the knob either clockwise/counterclockwise

Loading and Unloading Sample

WARNING

If the sample does not freely clear the stylus, click the "Tower Up" button to raise the stylus so that it is safely above the sample. Failure to do so can damage both the stylus and the sample.

Loading Sample:

1. Open the equipment acrylic door manually up.
2. Click the 

button on the toolbar above the live video display to move the scan stage forward towards you.
3. Place your sample on the center of the stage and click the 

button to move the scan stage backward to its home position.
4. Use the manual stage adjustment controls to fine-position the area of interest on the sample beneath the stylus by viewing the live video.

Unloading Sample:

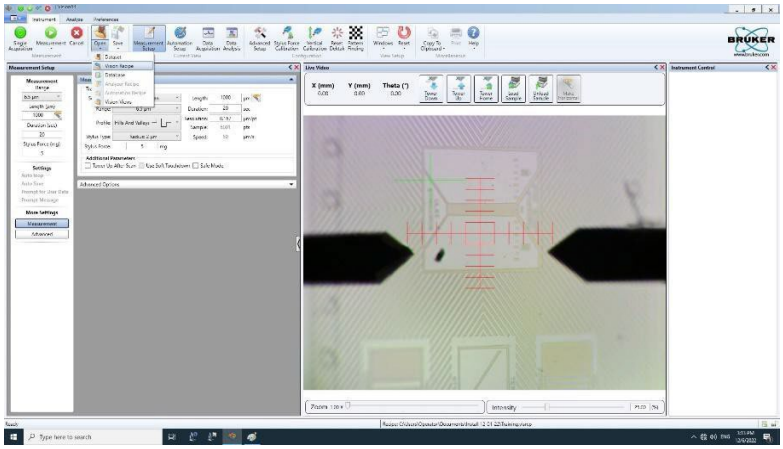
1. When a scan routine is complete, the stylus automatically lifts off the surface, if not click the 

button.
2. Once the sample is freely clear from the stylus, click the 

button to make the system move the sample positioning stage forward towards you.
3. Remove the sample carefully from the stage.
4. Close the equipment door gently.
5. Leave the system and PC ON.

Operating instructions:

1. Enable system in the iLab.
2. Open the equipment acrylic door cover manually up.
3. Verify the standby conditions as per page 3 of this user manual.
4. Open the recipe in the PC as per the picture below:
   “Open->Vision Recipe->Training.visrcp”



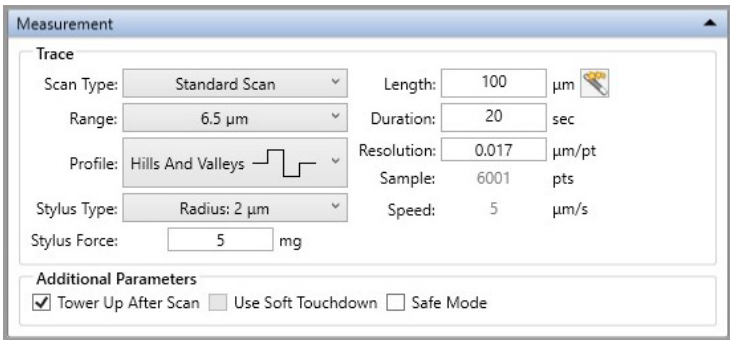
5. Click the 

tab on the bottom left side below “More Settings”
6. Adjust the necessary recipe parameters as per your sample’s profile.
   1. Scan Type: Standard Scan
   2. Range: value selected has to be larger than your stair height
   3. Profile: Hills / Valleys / Hills and Valleys

      a. **Hills:** Provides 90% of the measurement range above the horizontal grid line. This option is used primarily for measuring step heights.
      b. **Valleys:** Provides 90% of the measurement range below the zero horizontal grid line. This option is used primarily for measuring etch depths.
      c. **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.
      NOTE – When setting up ranges and scan profile types, always think about keeping the stylus trace from “topping out” or “bottoming out” in the Data Acquisition window.

   4. Stylus Type: Radius: 2 µm (Don’t Change this value)
   5. Stylus Force: 5 mg (1-15 mg selectable but use 5mg or lower value!)
   6. Length: Key in the scan length (50–55,000 µm) accordingly as per your sample’s need.

7. Duration: in conjunction with scan length, determines the horizontal resolution of a scan. For most applications, a 10–20s scan provides adequate resolution and throughput.



7. Click the 

button on the toolbar above the live video display to move the scan stage forward towards you.

8. Place your sample on the center of the stage and click the 

button to move the scan stage backward to the measurement position.
Note: The tip scan along the Y direction so place your feature within the scan path. This feature is different from the KLA Tencor P6 profiler.

9. At this point MAKE SURE when the stylus tip comes down it will be touching anywhere within your sample, if not adjust your sample position accordingly.

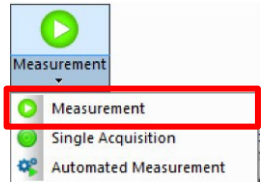
10. Press the 

button. The stylus will move down until it touches the sample and moves back up a little bit. At this point you should be able to view your sample pattern in the live video.

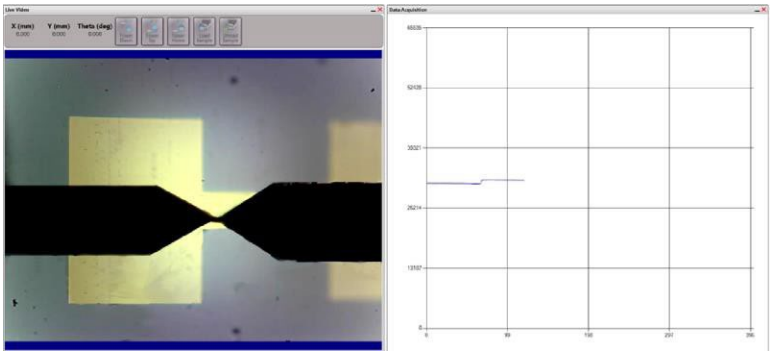
11. Use the manual stage adjustment controls to fine-position the area of interest on the sample beneath the stylus by viewing the live video. The center point of the red square is the starting point of your measurement location. From there it will travel backwards based on your scan length setting in the recipe.

12. Once you're ready to do the measurement click the 

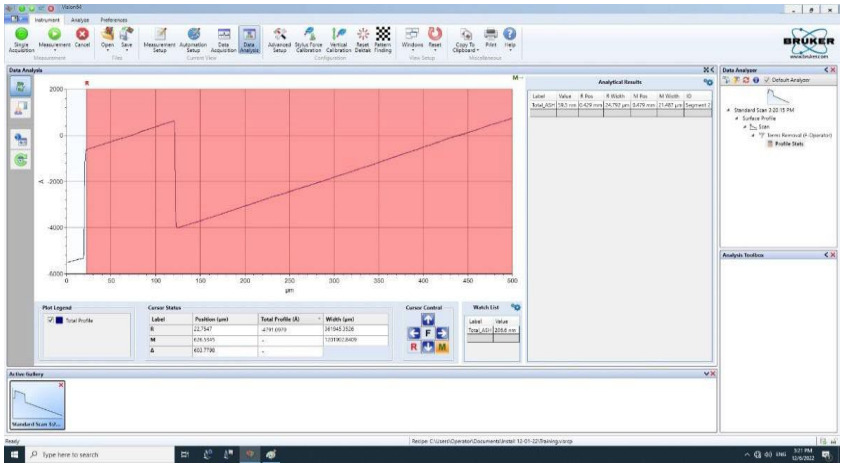
button and then select **"Measurement"** as below:



13. Observe the measurement in real-time in the **Data Acquisition** window. When the measurement begins, the tower assembly lowers and the stylus descends. You can see the stylus and its shadow in the live video as below:

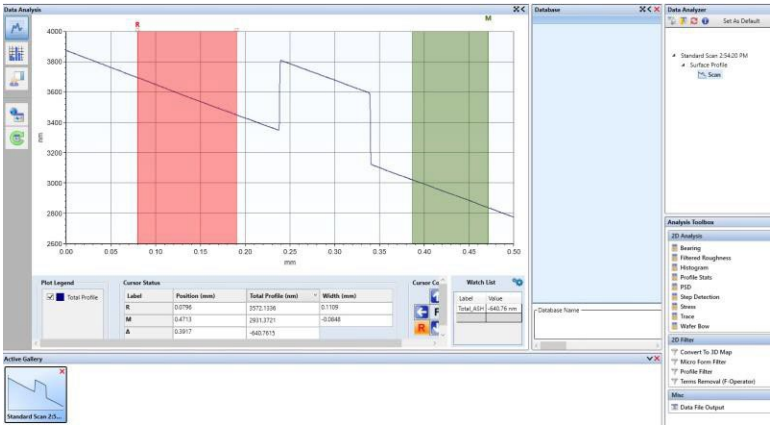


14. After the scan measurement is complete, your measurement output would be like the below picture.

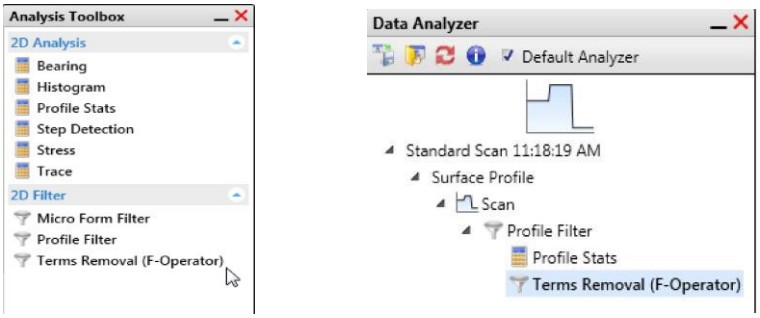


15. Then open the data analysis recipe by pressing “Open->Analyzer Recipe->Training.anrcp

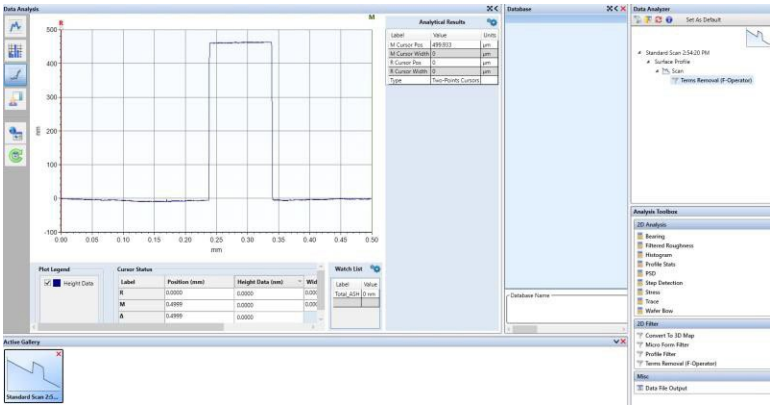
16. Set the cursor locations and bandwidths:
    1. The red reference (R) cursor and green measurement (M) cursor in the data analysis display define the portion of the profile trace on which to calculate analytical functions on the measurement results.
    2. To change the position of each cursor, click on it and then drag it with the mouse. To change the bandwidth of a cursor, click it to display small boxes that you can then drag.
    3. Locations/bandwidths of the R and M Cursors are shown in a box at the bottom of the Data Analysis window as below. To change these settings, type in new values and press **Enter.**



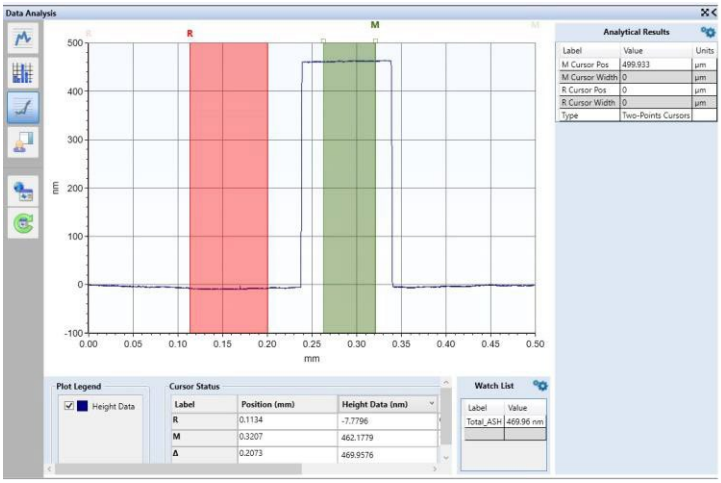
17. Apply Data Leveling:
    a. Position both R and M cursors within the baseline of the step, or they are both on the same platform (as shown in the picture above).
    b. Click **Terms Removal (F-Operator)** in the Analysis toolbox as per the picture below and it would be added to the Data Analyzer tree:



18. After applying the Terms Removal (leveling), the data would be as below.



19. Read the step height: Move R and M cursors on top of baseline and step feature respectively, and step height is listed in the watch list located bottom right of Data Analysis window as shown below:



20. When a scan routine is complete, the stylus automatically lifts off the surface, if not click the 

button.
21. Once the sample is freely clear from the stylus, click the 

button to make the system move to the sample positioning stage forward towards you.
22. Remove the sample carefully from the stage.
23. Close the equipment door gently.
24. Leave the equipment and PC ON.
25. Logout from iLab.

---------- End ----------

General Information:
For any feedbacks, problems, clarifications of procedures, or general information pertaining to this machine, please contact staff.

staff-ndnf-list@nd.edu
