

Veeco Dektak 6M Stylus Profilometer

Standard Operating Procedure

Faculty Supervisor: Prof. Robert White, Mechanical Engineering (x72210)

Safety Office: Peter Nowak x73246 (Just dial this directly on any campus phone.)

(617)627-3246 (From off-campus or from a cell phone)

Tufts Emergency Medical Services are at x66911.

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Warnings:

The stylus tip is very fragile and easy to break. Make sure you do not ever touch it by accident. Make sure you raise the tool tower before removing your sample so you don't hit the stylus tip.

Do not put anything wet or sticky in the profilometer. Make sure your photoresist has been baked! Make sure there isn't anything on the back of your wafer!

1.0 Material Requirements:

1.1 Equipment: substrate, wafer tweezers

1.2 Personal Protective Equipment: nitrile gloves, safety glasses

2.0 Procedure:

Turn on the tool:

1. Turn on the computer.
2. Turn on the Dektak at the back right of the tool, there is a toggle switch. The "1" is on, the "0" is off.
3. Log in to the computer. The username and password are written on the computer monitor.

Checking the vibration isolation table:

1. Check that the vibration isolation table bounces slowly if you press down on it lightly.
2. If the table does not feel soft, it is under-inflated and resting on the ground or it is over-inflated and pressed against the top of the stops.
3. To add air to the table:
 - a. Open the compressed air valve at the wall in the corner of the room (you will see the tube leading to the Dektak).
 - b. On the back of the vibe table, flip the switch corresponding to the leg you want to inflate (look under the vibe table, you will see three legs).
 - c. If you are standing to the side of the tool, the top switch operates the right leg, the middle switch operates the middle leg, and the bottom switch operates the left leg.
 - d. Briefly press the small blue button near the switches to put air into the legs as needed. You will see the table lift up. Do not over-inflate!
 - e. If you need to let air out of a leg, switch on the corresponding switch, unscrew the bicycle-tire-like cap, and press in on the bicycle-tire-like valve needle to let air out.
 - f. Remember to replace the cap.
 - g. Close the compressed air valve at the wall.
4. The vibe table will need to be re-adjusted every few days. When you are satisfied that the vibe table is soft and bouncy, move on to the next step.

Set up a sample:

1. Once you are logged in, double click the “Dektak 32” icon to start the program. It will take a minute for the program to find and configure the tool.
2. Load your sample onto the stage. Position it so that when the stylus moves down it will hit your sample.
3. At the top of the screen, there is a row of icons. Click the one that looks like a black square with arrows around it. This brings up the camera view.
4. Click the “tower down” icon. The tower will move down slowly. Make sure that the tower moves down onto your sample and the stylus tip hits your sample first. Do not move your sample while the stylus is in contact!!! Once the tip hits your sample, it should pop back up a few millimeters out of contact.
5. On the computer, adjust the illumination using the light and dark lightbulb icons until you can see your sample surface.
6. The crosshairs indicate where the scan will start from. It moves from left to right on the screen. This corresponds to a front to back scan on the sample (the left side of the screen image is the front of the sample).
7. Use the two microscope-like knobs under the stage on the right to move your sample around until the crosshairs are positioned where you want to start a scan.
8. Close the cabinet doors.

Making a measurement:

1. Click the “scan setup” icon. It looks like a single step graph.
2. Click on any of the hyperlinks next to any of the parameters. A dialogue box will pop up, allowing you to set scan length, scan duration, whether you expect hills/valleys/hills&valleys, and maximum scan range (this is height range, either 6.5 microns, 65 microns or 2 hundred-something microns). Choose all the parameters based on your sample.
3. You can also set the stylus down force in milligrams. Use a low down force (~ 3 mg?) for soft, deformable materials (like photoresists and polymers). Use a higher down force (~15 mg?) for hard materials (like silicon, silicon nitride, oxide, metal, etc).
4. Push the camera image icon to go back to the camera image.
5. If everything is all set, push the “scan” icon to start the scan.

Using a measurement:

1. When the scan is finished, the dataplot window will pop up.
2. First, drag the R and M cursors to two locations that you know should be level with each other. Click the “level” button to re-level the plot based on those two locations.
3. Now, you should be able to drag the R and M cursors around to look at relative heights. You can also do an “average step height” (ASH) measurement by increasing the size of each cursor band. The tool will average the heights in each band and give you the difference between those averages.
4. For more information on all the measurements available, see the Dektak 6M manual.
5. You can save the data to a file and email it to yourself if you want.
6. Go back to the camera screen, set up for your next measurement, and repeat.

Clean Up:

1. When you are all finished with your measurements, click the “tower up” button to raise the tower.
2. When the tower is out of the way, remove your sample. Be careful not to bump the stylus tip!
3. If no one else wants to use the tool, close the Dektak program, tell the computer to shut down, and turn off the Dektak at the switch on the back right of the tool.

If at any time you feel unsure about how to use the tool, please stop work and contact a qualified user or faculty advisor. Please don't forge ahead when you are unsure, you may end up damaging the tool.

Report all accidents or tool issues to Prof. White at x72210, r.white@tufts.edu.