

GENERAL PROCESS AND OPERATION SPECIFICATION

VEECO WYKO NT9100 Optical Profilometer

I. SCOPE

- a. The purpose of this document is to describe requirements and basic operating instructions for the VEECO NT9100 Optical Profilometer. This tool is intended for mapping surface contours without any contact to the sample.

II. SAFETY

- a. Be sure that you are trained and signed off to use this equipment per AggieFab policy.
- b. Read the safety sections of Chapter 1 in the User Manual.
- c. If you are unsure about any procedure or indication while operating this equipment, contact a staff member or trainer for assistance.

III. APPLICABLE DOCUMENTS, MATERIALS AND REQUIREMENTS

- a. For more information about the detailed operation of this tool refer to the WYKO NT9100 Surface Profiler user manual provided by AggieFab in paper copy.
- b. Appendix A: Dual Scan And Understanding Backscan
- c. Appendix B: Scan Filters

IV. OPERATION

- a. Turn the monitor on by beginning your iLab session. You may also have to manually power the monitor on after iLab begins.
- b. To ensure the machine is powered, press the green power button. This will sometimes be lit when powered, but the tool may still be powered even if the button is not lit.
- c. Open Vision 64 software
- d. Click “Measurement Options” located in the home bar. This will allow you to specify what type of measurement you want to take.
- e. Select the measurement type you need:
 - i. VSI: rough surfaces or step height differences greater than 135 nm.
 - ii. PSI: Extremely smooth surfaces like mirrors and optics. Roughness less than 30 nm and a height difference much less than 135 nm.
- f. Select the “Intensity” button in the bottom left of the Measurement Options screen.
 - i. Press the yellow axis button in the bottom right to open the z-axis bar.
 - ii. Use the green bar on the right side of the intensity screen to move the tool upwards.
 - iii. Change objective now, if necessary, to avoid possibly damaging your sample.
 - iv. When there is enough space, place your sample under the lens on the tool platform.
- g. Select VSI/PSI options on the Measurement Options screen:
 - i. Higher speed leads to lower resolution
 - ii. Backscan: The tool focus will move upward this distance and begin scanning from there. See Appendix A for better understanding of this process.
 - iii. Length: This is the length the tool will scan after completing the back scan.

- iv. Modulation threshold determines signal to noise ratio. Lower modulation threshold is used for rougher surfaces.
 - 1. 3% for very rough VSI surfaces, 10% for smooth VSI surfaces
 - 2. 15% for rough PSI surfaces, 35% for smooth PSI surfaces
- h. Return to the Intensity screen and use the green bar to slowly lower the z-axis until the sample is in focus.
- i. Continue slowly altering the z-axis until you can see fringes on your sample.
- j. Use the Tip and Tilt knobs to change the fringes to be either vertical or horizontal.
- k. Continue using these knobs to decrease the number of fringes down to a maximum of 3 fringes.
- l. On the intensity screen, increase the intensity by moving the slide bar towards the right. Keep doing this until just before red pixels start appearing.
 - i. Red pixels are a sign of saturation and will not be scanned during the measurement. So increased light makes the scanning more accurate, but be sure to avoid saturation.
- m. Close the measurement Options screen.
- n. Click the “New” button in the home bar to begin a new scan.
 - i. If your sample has different level surfaces, you should be able to see fringes appear on each level to ensure the machine was able to focus on that feature.
- o. The contour map screen will appear when measurement is complete.
 - i. In the home bar, you can also select the 2D Analysis Plot, 3D Interactive Display, and the 3D Plot.
 - ii. You can right click on any of these graphs to change graph attributes and options.
- p. When finished with the tool, close the software and finish your iLab session.
 - i. DO NOT turn off the machine or log out, ONLY close the software

- V. SIGNATURES AND REVISION HISTORY
 - a. Author of this document: Mitchell Roselius
 - b. Author Title or Role: Student Technician
 - c. Date: 8 April 2019
 - d. Revision: Original Issue

Approvals:

Technical Manager Signature: _____

Date: _____

Revision History:

Revision	Author	Date
Original Issue	Mitchell Roselius	8 April 2019
Rev A		
Rev B		
Rev C		
Rev D		
Rev E		

Figures

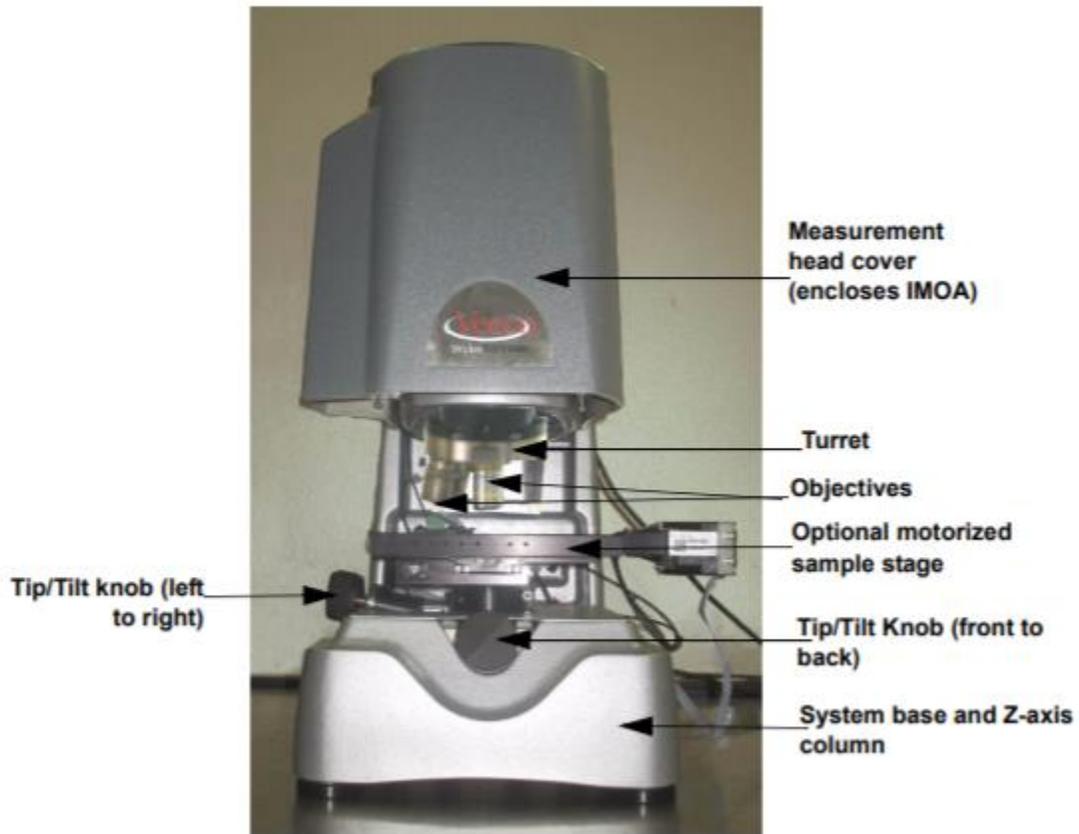


Figure 1: VEECO tool and the components



Figure 2: Power On/Off Switch Panel (The tool can still be on without the “On button” being lit)

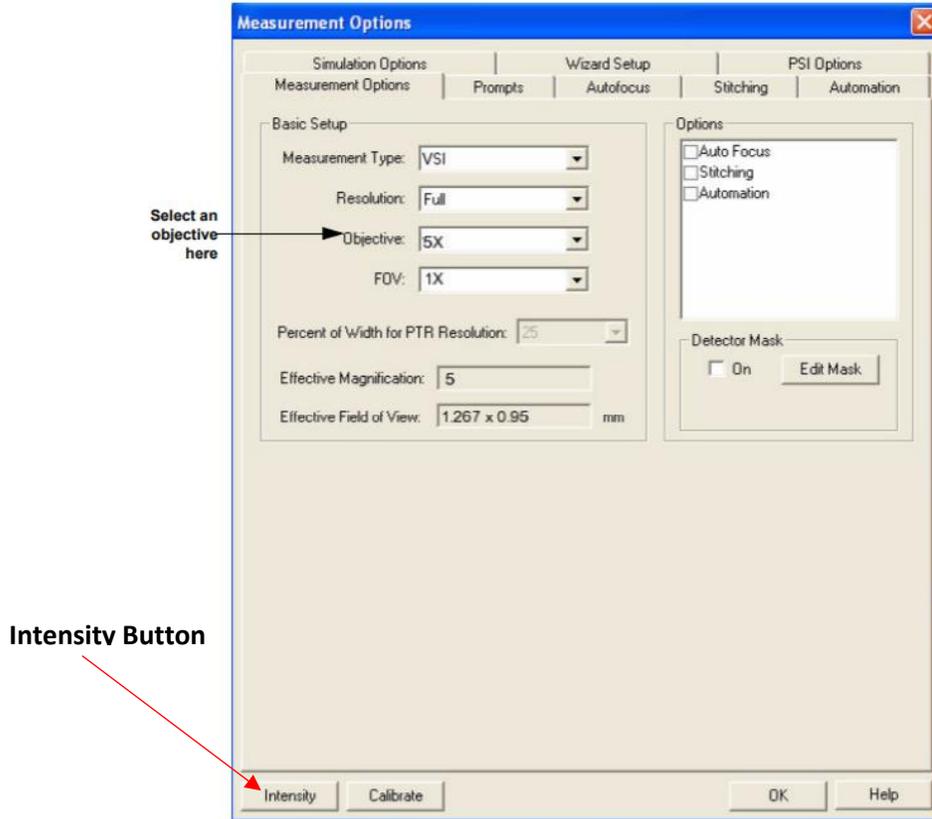


Figure 3: Measurement Options Screen

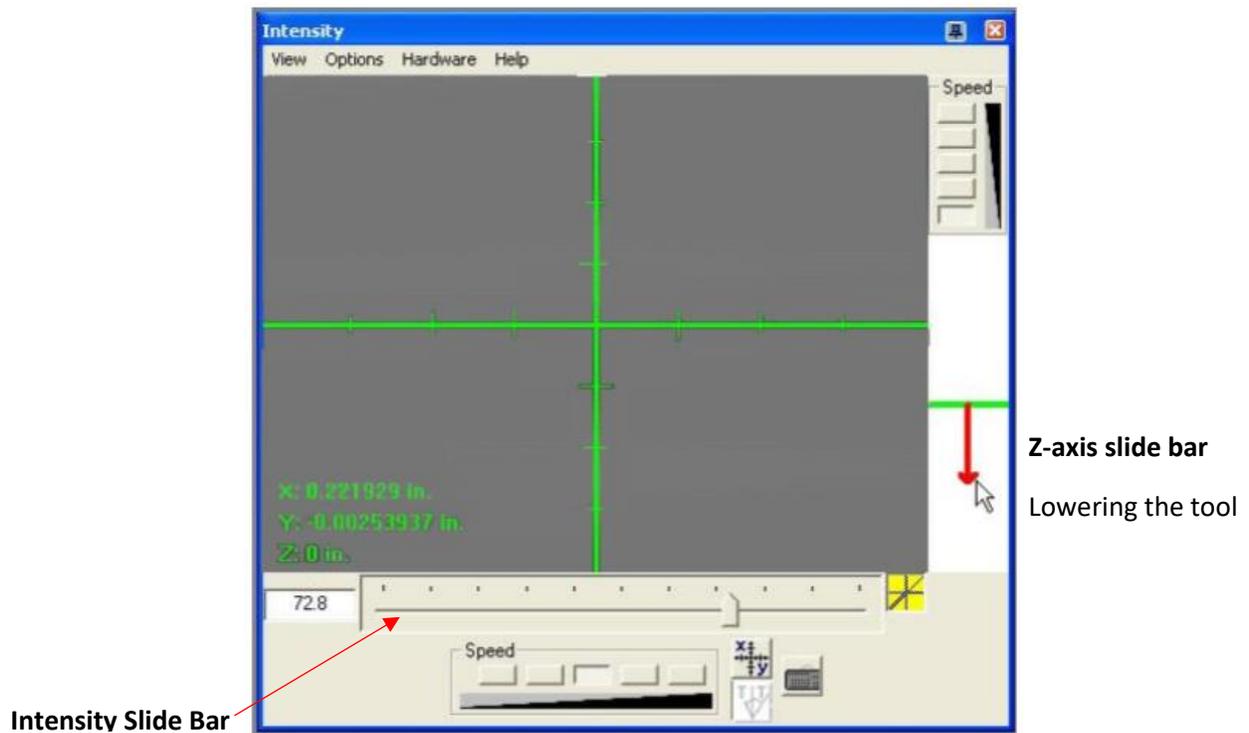


Figure 4: Intensity Screen

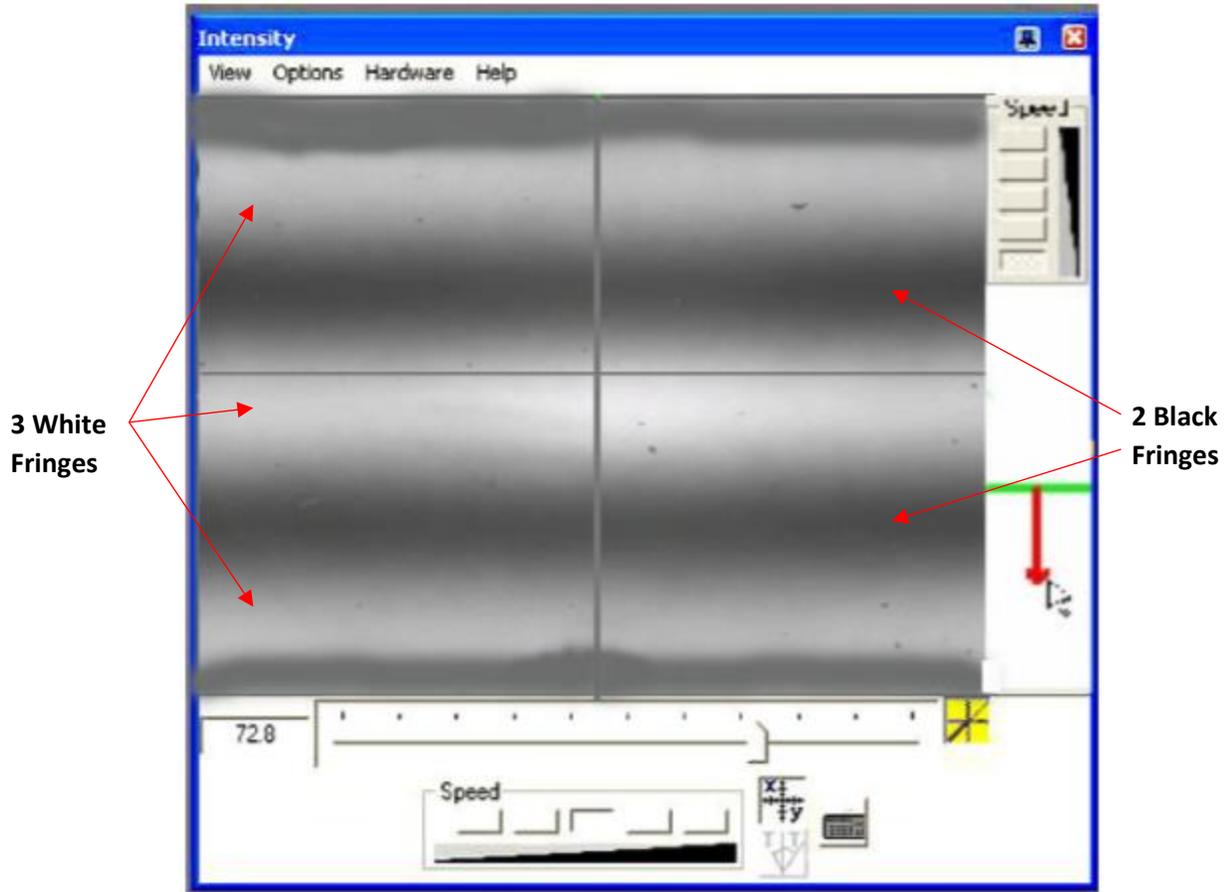
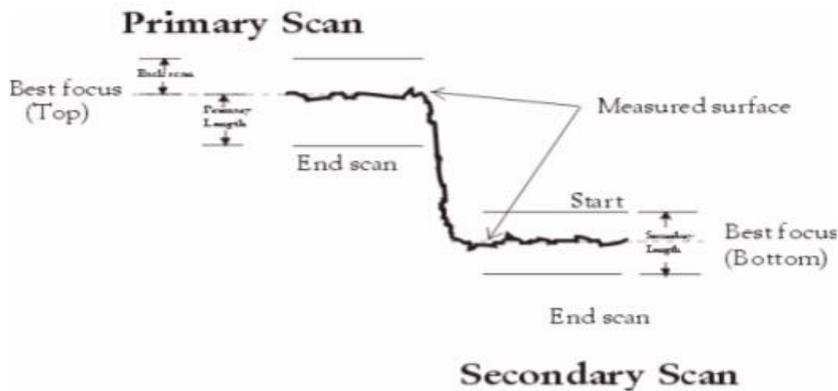


Figure 5: Approximately 3 fringes

Appendix A – Dual Scan And Understanding Backscan

1. VSI scanning has the option for dual scanning. This means the tool will begin a scan, move a certain distance without scanning, and begin scanning again. This is mostly used for scanning samples where the middle measurement is unneeded.
2. For regular scans, the primary scan is identical, but the secondary scan is not used.
3. The backscan is used to ensure there are no features that are unscanned. If a backscan is 10 μm and the primary length is 15 μm , the total scan length will be 25 μm .



Appendix B – Scan Filters

1. VSI filter: Uses a combination of green and white LED light. Highest intensity filter, but narrowest fringe envelope. This is suitable for most VSI measurements.
2. PSI High Mag: 40-nm bandpass green LED near 535 nm. Larger fringe envelope, but less light intensity. Normally used for PSI measurements, but can be used on VSI measurements that are greater than 3x speed.
3. PSI Low Mag: 10-nm bandpass green LED near 535 nm. Largest fringe envelope, but the lowest light intensity. Use for extremely rough or nonreflective surfaces.