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[Measurement of Wear Flatness Widths of Stylus Pin]

Cerchar Abrasiveness Index Tester

■ Characteristics (ASTM D7625-22 Design)

- A set of equipment for measuring the wear index of rock core specimens
- CERCHAR abrasiveness tester is equipped with a loading frame for applying a 70 N load and fixing the stylus pin, as well as a cross table with a digital indicator for securing the specimen and enabling horizontal movement (left–right / front–back)
- Digital wear measurement device includes a cross table with micrometers for precise left–right and front–back movement of the stylus pin, and a USB data transmission cable for image observation of pin wear (viewable on the user's computer or laptop)
- Stylus pin grinder is a sharpening device used for reconditioning the stylus pin

■ Specification

Model		RCAT - 1
Machine Space	mm	330(W) x 500(D) x 600(H)
Working Table Size	mm	500(W) x 600(D) X 600(H)
Tool Power & Stylus Pin Load		220V, 2P & 70N
Scratch distance precision	mm	0.01
Table Center Length	mm	500
Steel Stylus Hardness		Rockwell Hardness HRC 55
Maximum specimen diameter & height	mm	75 & 150
Steel Stylus pin & Cross table	mm	10 & 0.01*75mm
Digital micrometer	mm	0-25,2ea
Microscope magnification		25-50
Collet chuck	mm	10
Position indicator pitch		3

■ Parts

- Steel Stylus Pin: 10 mm, 50 ea

<Options>
A computer or laptop for image observation of stylus pin


<Steel Stylus Pin>


Observation of Stylus Pin on a Laptop>

◈ The above product may be modified for upgrade without any prior notices. ◈

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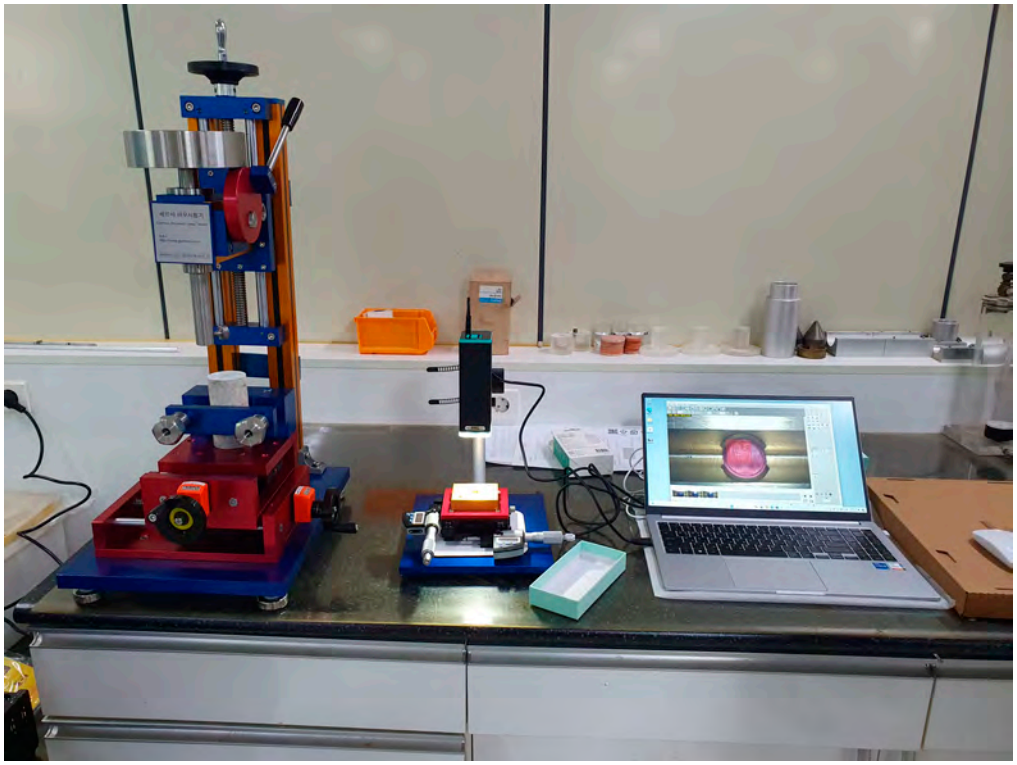
[Measurement of Wear Flatness Widths of Stylus Pin]

☞ This manual describes the method for measuring the wear flatness widths of a stylus pin abraded using the West CERCHAR test, employing a microscope.

☞ To measure the wear flatness widths, a microscope set supplied by GemTec and a laptop (or computer) (optional) must be prepared.



〈 West CERCHAR and Microscope & Notebook connected together by USB cable 〉

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[Measurement of Wear Flatness Widths of Stylus Pin]

◈ Preparations before Measuring Wear Flatness Width

◈ Measurement of Wear Flatness Width

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[Measurement of Wear Flatness Widths of Stylus Pin]

◈ Preparations Before Measuring Wear Flatness Width

I. Installation of Driving Software

Install the drive software for microscopic use on a laptop (or computer).

- http://www.vitiny.com/en: Software downloads.

a. For instructions on the microscope components and installation method, refer to the "UM22 User's Guide" prepared by Vitiny.

(File: UM22_Users_Guide_V1_EN.pdf)

b. For detailed instructions on operation after software installation, refer to the "UM Viewer - Microscope AP Operation Manual" prepared by Vitiny.

(File: UMViewer_Users_Manual_V3_7_EN.pdf)

※ When the related software is installed, the following icon is installed on the desktop of the laptop (or computer):

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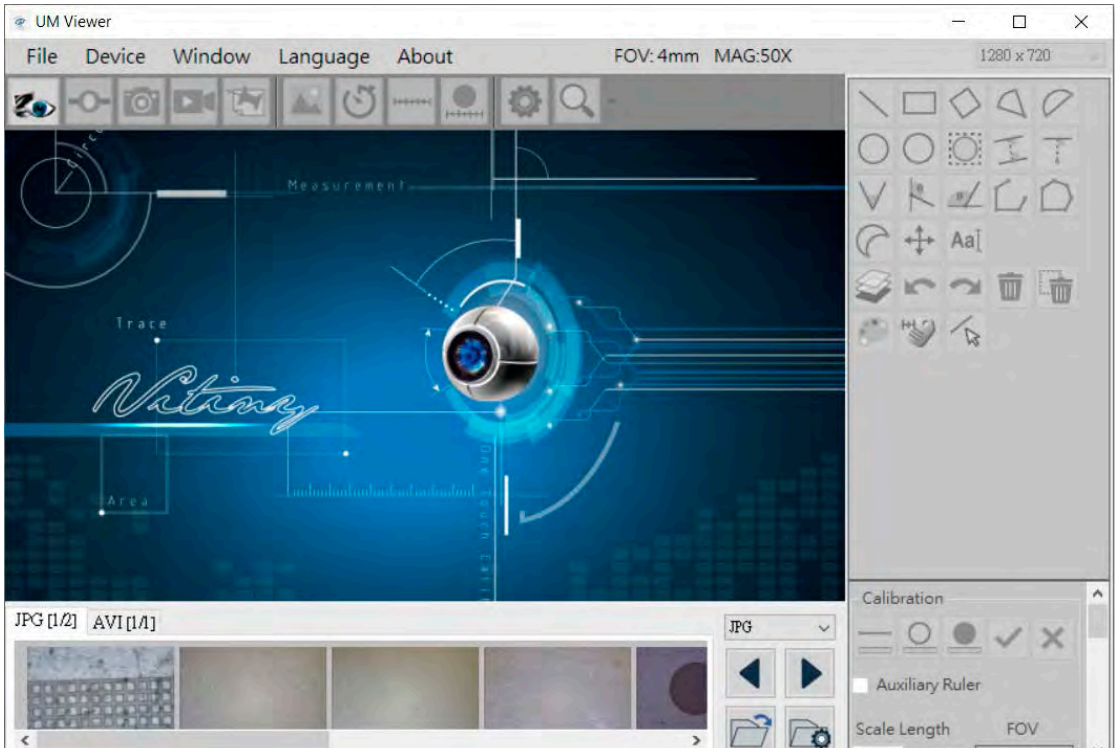
[Measurement of Wear Flatness Widths of Stylus Pin]

II. Execution of driving software

※ After connecting Microscope and Notebook with a USB cable, click the icon above to see the following screen. Since the basic language is English, in order to change to another language such as Korean, the corresponding buttons are clicked according to the description below:

Application Program Interface Introduction



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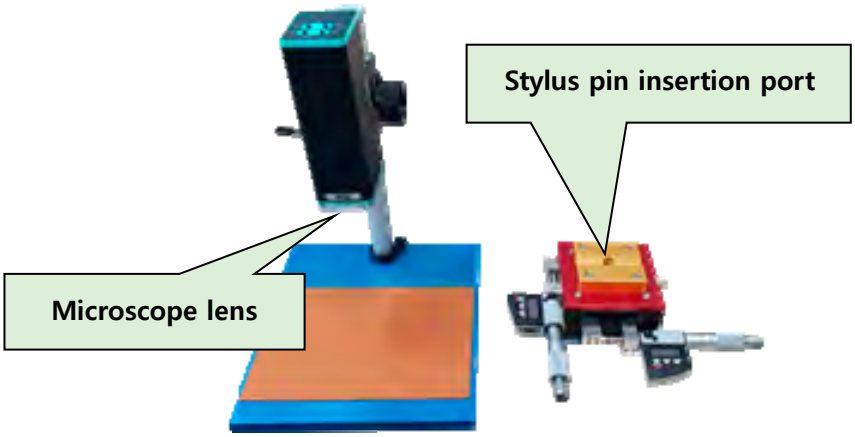
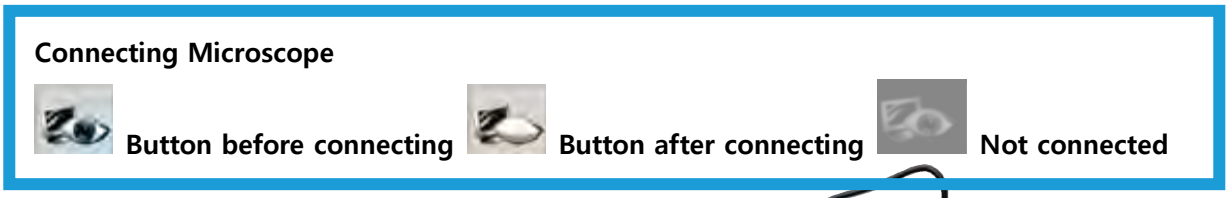
[Measurement of Wear Flatness Widths of Stylus Pin]

III. Connecting a Laptop (or Computer) to a Microscope

1. Place the crossover table with micrometers attached on the workbench, with the center of the stylus pin insertion port just below the microscope lens.



2. As shown in the figure below, connect the laptop (or computer) and the microscope using the supplied USB cable. Then insert the stylus pin scratched by the West CERCHAR into the stylus pin holder, with the scratched surface facing upward.
Once the USB cable is connected, the microscope illumination turns on, allowing the specimen (stylus pin) to be clearly visible. In addition, the "Connect" button on the screen changes as shown below.



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[Measurement of Wear Flatness Widths of Stylus Pin]

IV. Focusing the Microscope

1. Adjustment of Microscope Lens Height (along the microscope support shaft)

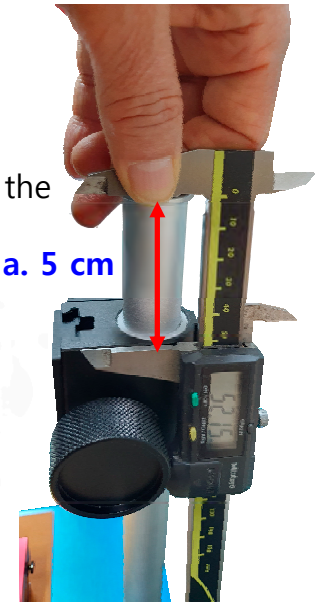
Before performing fine focusing on the stylus pin, adjust the height (**a**) of the microscope lens along the support shaft using knob(s) P so that the lens is positioned at an optimal distance from the tip of the inserted stylus pin. This helps reduce the time required for fine focusing. While observing the screen of the laptop (or computer), fix the microscope at a position (**b**) where the stylus pin appears clearly. (Refer to the upper view of the stylus pin shown on the next page.)

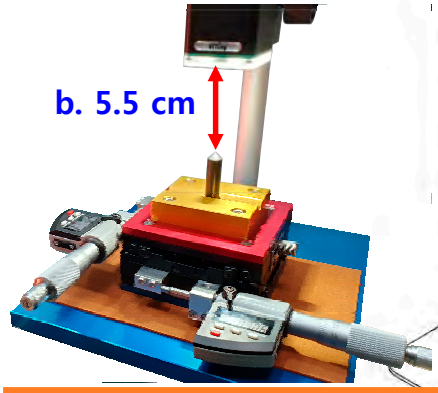
a. Fixing the focal distance

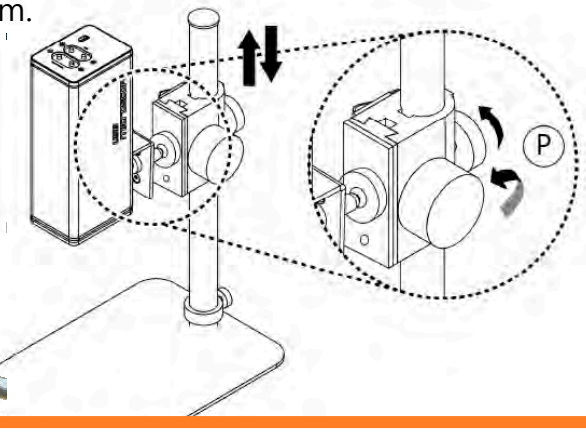
Based on experience, for a clearly focused distance (in the case of a newly scratched stylus pin), a distance of approximately 5 cm (**a**) from the top end of the support shaft to the upper end of the holder appears to be appropriate, as shown in the photo on the right. While supporting the microscope body with one hand, slightly loosen knob P located at the rear with the other hand. Then move the microscope up and down to find the clearest position, and tighten the knob to secure it.

b. Fixing the sensor position

Turn the sensor position fixing knob P on the right to the left or right to make fine adjustments. The sensor position fixation seems appropriate when the distance (**b**) from the tip of the stylus pin to the lens is approximately 5.5 cm.







(File 'UM22_Users_Guide_V1_EN')

Microscope focus
There are two ways to focus. First, choose focus distance to adjust the microscope height, then zoom in/out on the software or microscope until clear. Second, first to choose the image sensor position then adjusts the microscope height. Distance: distance from lens to object. Sensor position: Image sensor position.
(1) Fix focus distance
Use knob (P) to adjust the distance from lens to object.
When the distance is closer, the magnification is higher. Either use Distance control mode in the software or buttons on the microscope to focus.
(2) Fix sensor position
Choose the desired distance or FOV from the drop down list in the software.
When the sensor position is fixed, adjust the stand knob (P) to focus.

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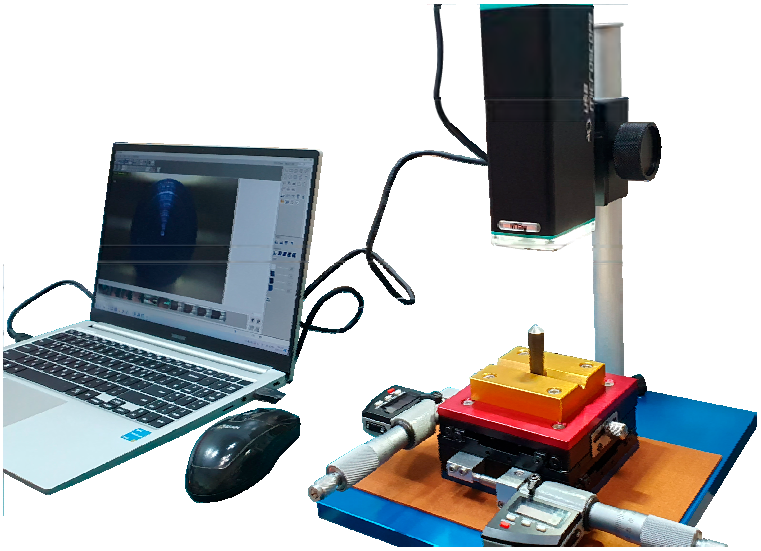
[Measurement of Wear Flatness Widths of Stylus Pin]

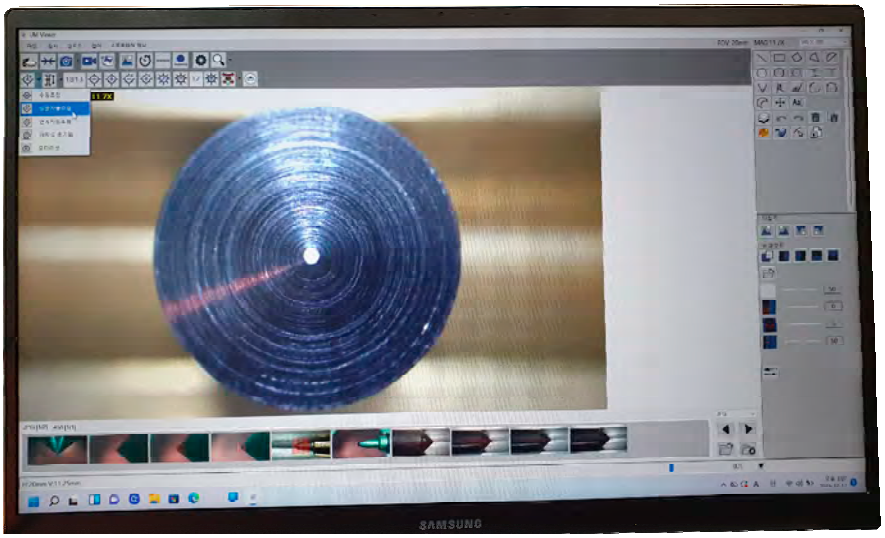
[Through the procedure described in Section 1 above, the upper view of the stylus pin can be observed on the laptop screen.]



2. Use the microscope's "Single Auto Focus" mode to make the shape of the stylus pin more clearly visible. In addition, use the micrometers to position the image at the center of the screen.

1.2 Main Function Button (Fig 1-4)

Among the buttons shown above, press button  to activate the Device Control Mode, as shown in the screen below. Then press button  and select the "Single Auto Focus" mode.



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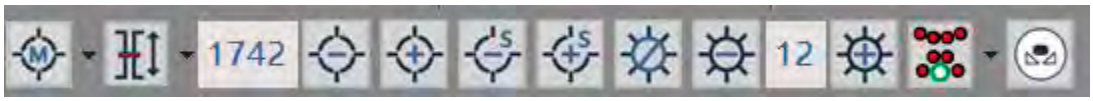
3. Brightening the Stylus Pin and Its Surroundings (if necessary)

Among the two screens shown on the previous page (page 8), if the image appears dark as in the upper screen, it can be brightened as shown in the lower screen by pressing button  to activate the menu (the menus displayed under the "Main Function Buttons"; see the figure below). Then press button  (Auto White Balance) to execute the adjustment.

2.1.3 Device Control Mode (Fig 3-5-1)



V. Calibration for precise measurements

1. To obtain accurate measurement results, use the Auto-Calibration Tool, which automatically corrects the scale (graduation) and distortion of the image/measurement axes.

In order to measure length, distance, diameter, etc. with a digital microscope, calibration is essential to convert screen pixels into actual length (mm). This calibration is performed using the Auto-Calibration Tool.

1.2 Main Function Button (Fig 1-4)

Among the buttons above, press button  to display the calibration menu at the bottom of the auxiliary program, as shown on the screens on the next page. From this menu, click button  to perform the auto-calibration.

After pressing the button, a red dotted outline is automatically displayed around the stylus pin a few moments later. If the stylus pin is not accurately positioned within the red dotted outline, turn the micrometer, which allows fine adjustment, to align the red dotted outline with the contour of the stylus pin. Unlike manual calibration, there is no need for the user to manually select the boundary, making it possible to detect the circular shape with very high precision.

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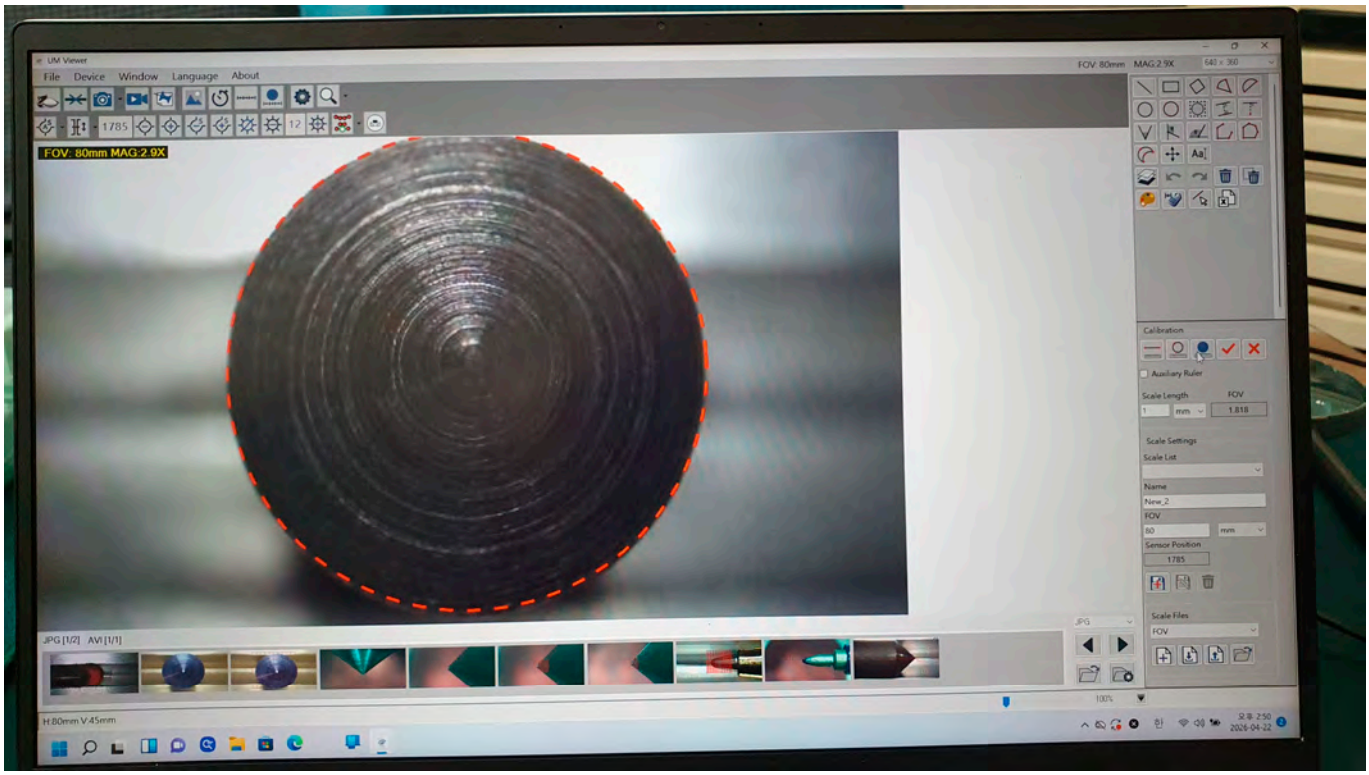
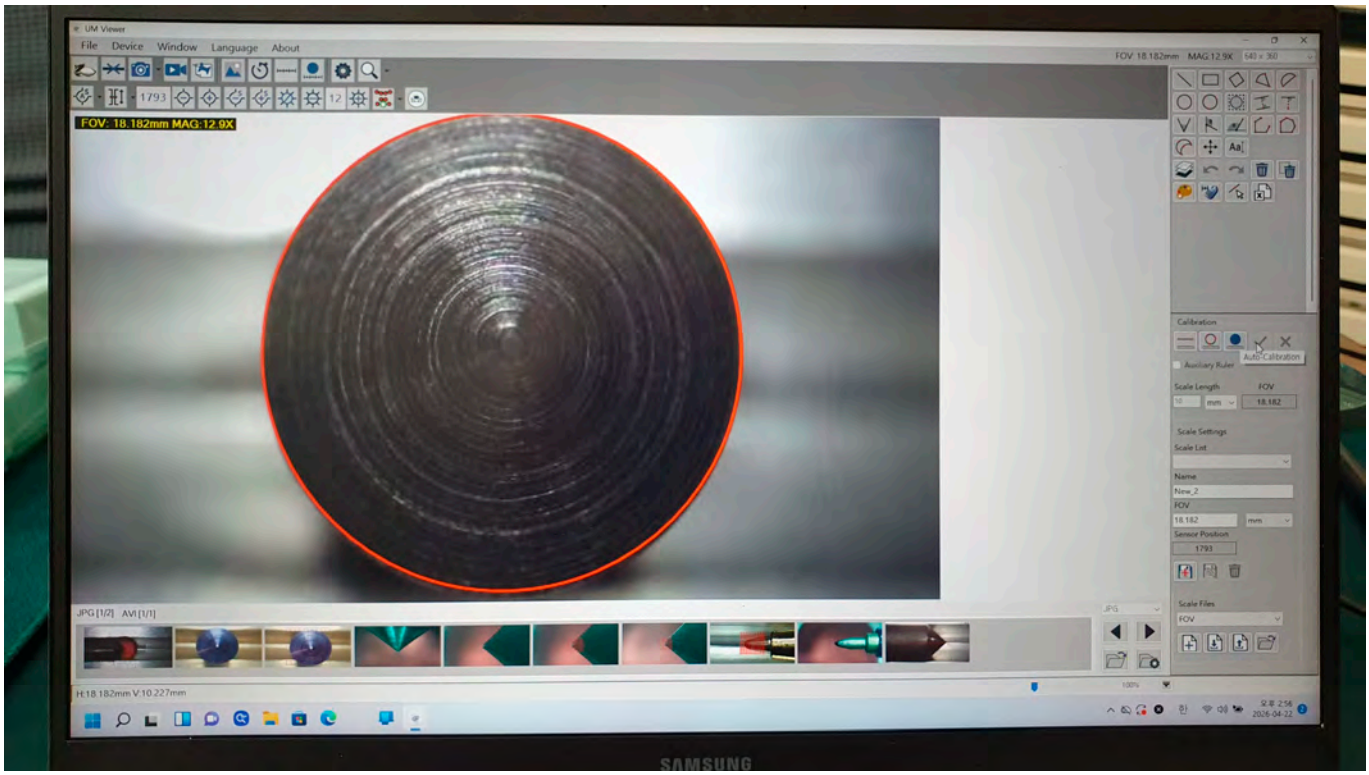
[Measurement of Wear Flatness Widths of Stylus Pin]



Once the alignment process is completed, press the confirmation button as shown in the figure below, and the dotted line will change to a solid line. This indicates that the calibration has been completed.



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[Measurement of Wear Flatness Widths of Stylus Pin]

VI. Work to minimize the occurrence of errors in measurement

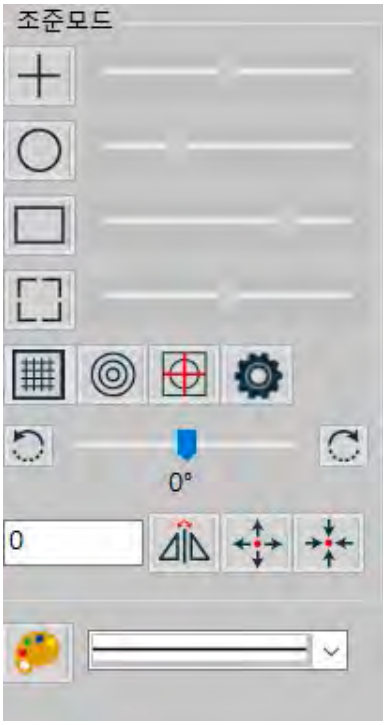
1. Matching the Diameter of the Stylus Pin (Actual Dimension) with the Grid Size to Eliminate Measurement Error

To eliminate measurement errors, match the actual diameter of the stylus pin displayed on the screen with the size of the grid (auxiliary lines).

1.2 Main Function Button (Fig 1-4)

Create grid auxiliary lines to verify that the planar diameter of the stylus pin shown on the screen (Ø 10 mm) matches the overall width of the grid (10 mm from left to right) generated by the measurement aid tool.

When button  in the main function buttons is pressed, a small window called "Aiming Mode" appears at the bottom right of the screen. Among the buttons in this window, press button  (Grid Auxiliary Lines / Crosshair Ruler).



However, as shown in the screen below, the grid appears across the entire screen, which may make viewing inconvenient. Therefore, press button  (Auxiliary Line Settings) to open the auxiliary line settings window.

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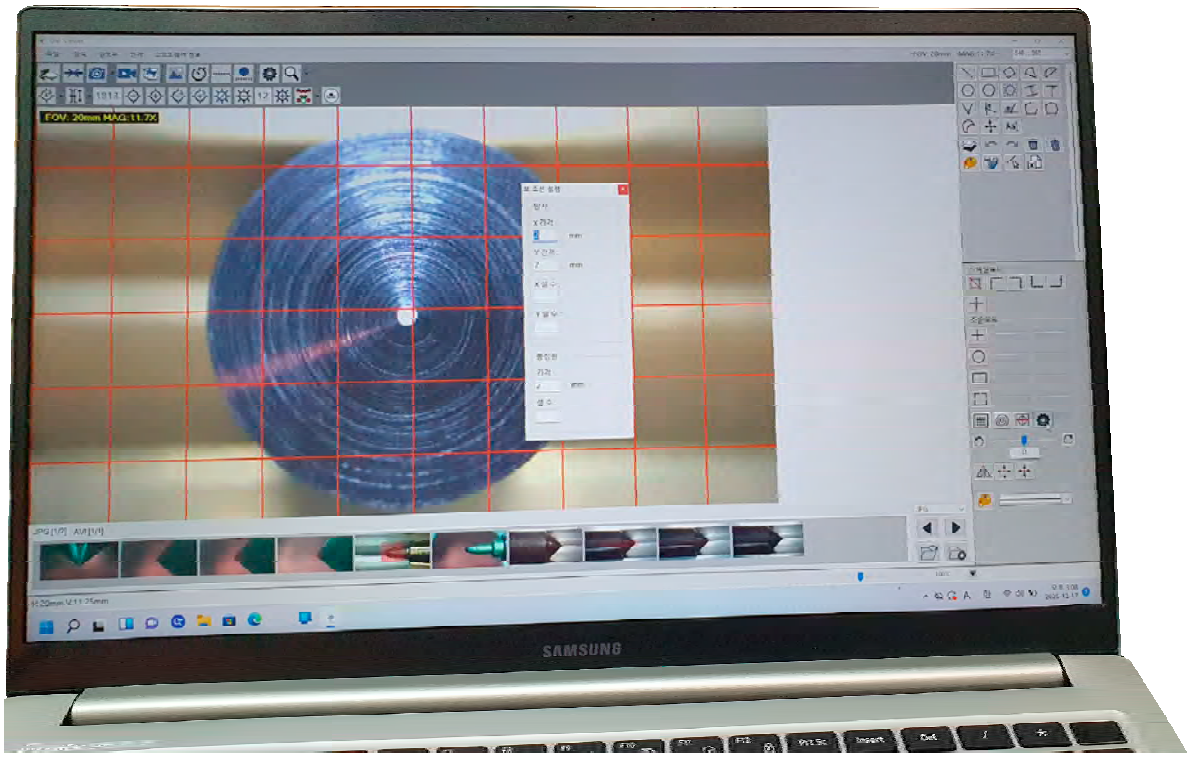
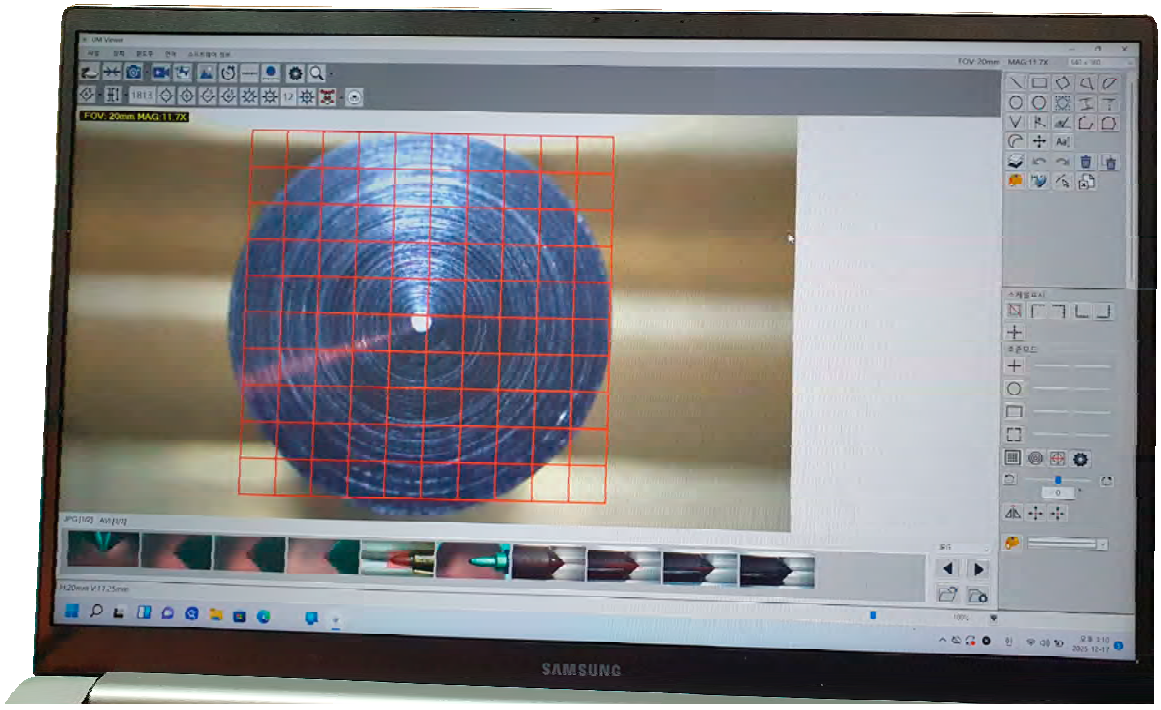
[Measurement of Wear Flatness Widths of Stylus Pin]



Set the X spacing and Y spacing of the grid to 1 mm, and set the number of X cells and Y cells to 10, respectively. Then press the Enter key. The display will change as shown below. If the sizes do not match, adjust them so that the planar diameter of the stylus pin (Ø 10 mm) corresponds to the total width of the grid auxiliary lines (10 mm from left to right), as described below.



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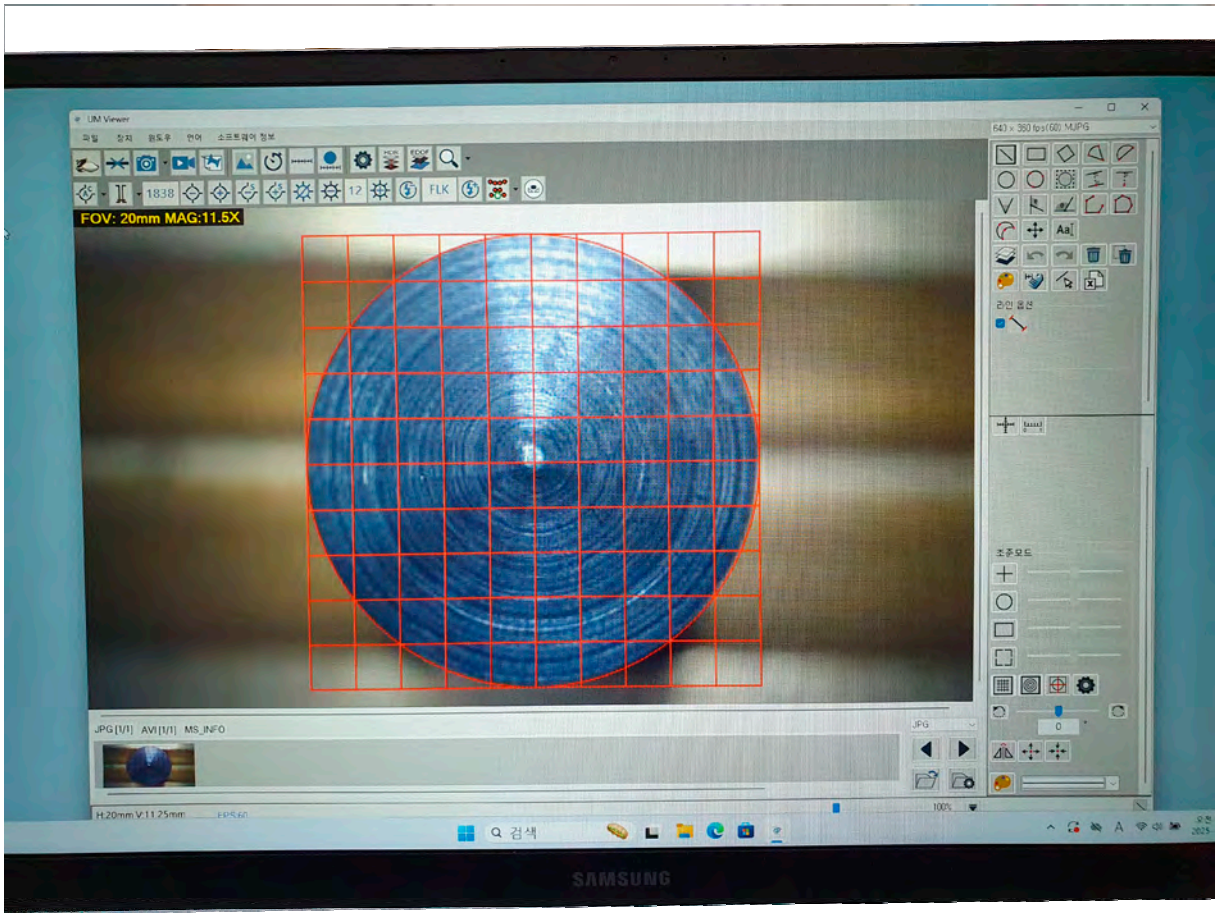
[Measurement of Wear Flatness Widths of Stylus Pin]



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[Measurement of Wear Flatness Widths of Stylus Pin]

◈ Measurement of Wear Flatness Width

Measurement of the wear flat width is carried out after matching the planar diameter of the stylus pin (Ø 10 mm) with the total width of the grid auxiliary lines (10 mm from left to right), using one of the following two methods:

1. Use the micrometers to move one of the grid auxiliary lines from one end of the worn surface to the other end, and then read the displacement value indicated on the micrometers.

2. Use button  (distance measurement between two straight lines) in the auxiliary program to measure the distance from one end of the worn surface to the other, and read the value displayed on the screen.

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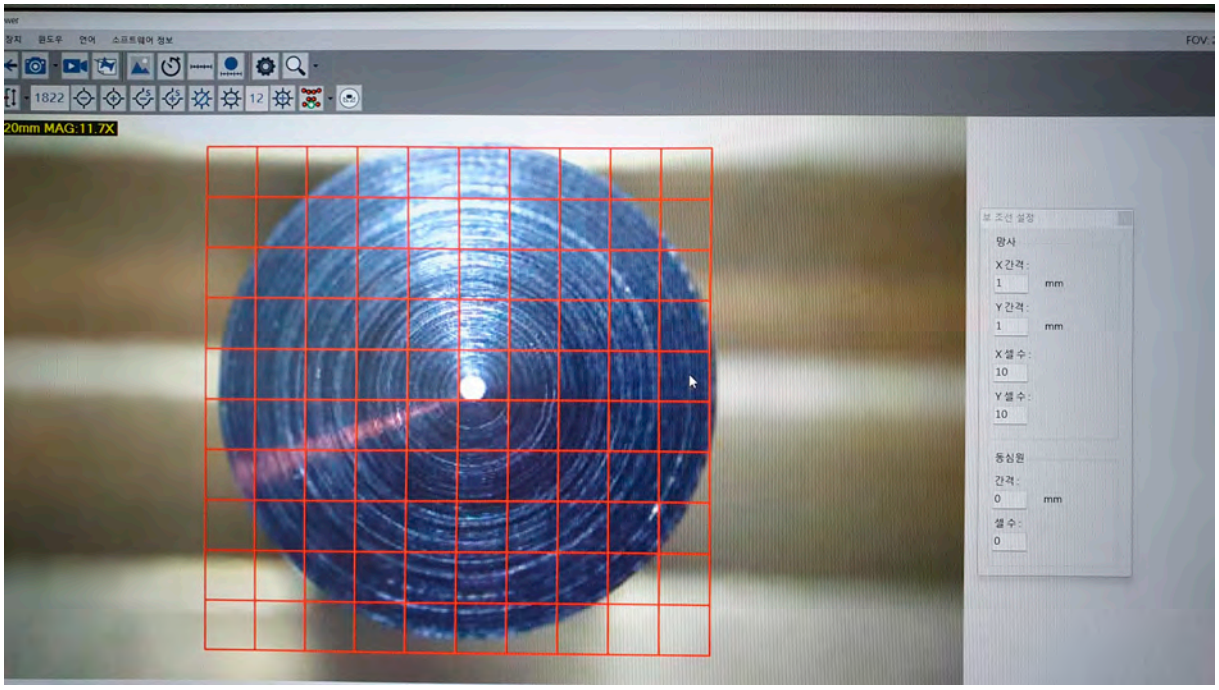
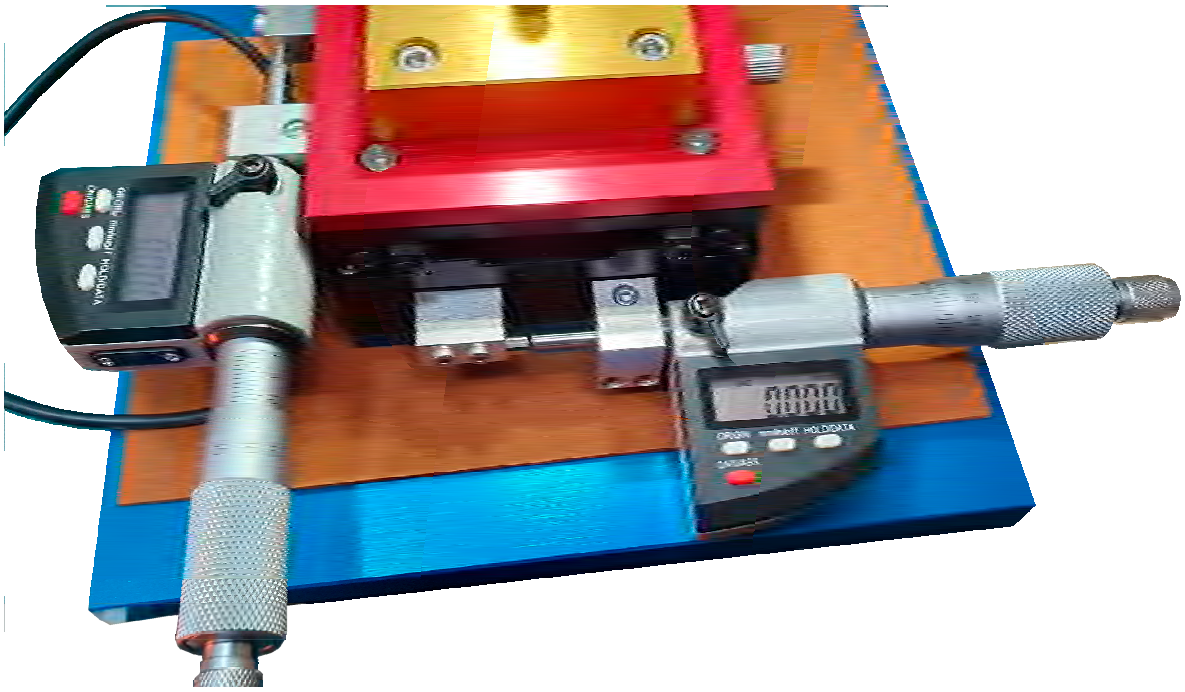
[Measurement of Wear Flatness Widths of Stylus Pin]

I. Using Micrometer

1. Using the micrometers, align two grid auxiliary lines (or one line) with the two ends (or one end) of the worn surface to be measured.



2. Press the red buttons on the micrometers to reset the displayed values to zero (zero point).



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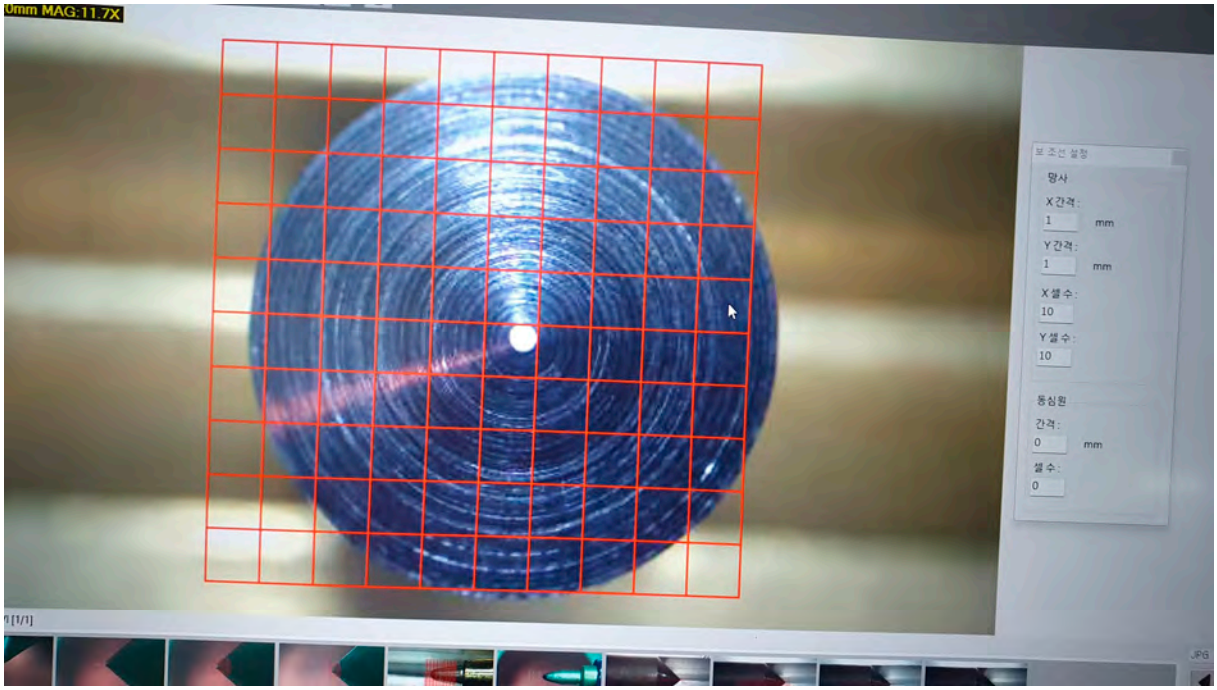
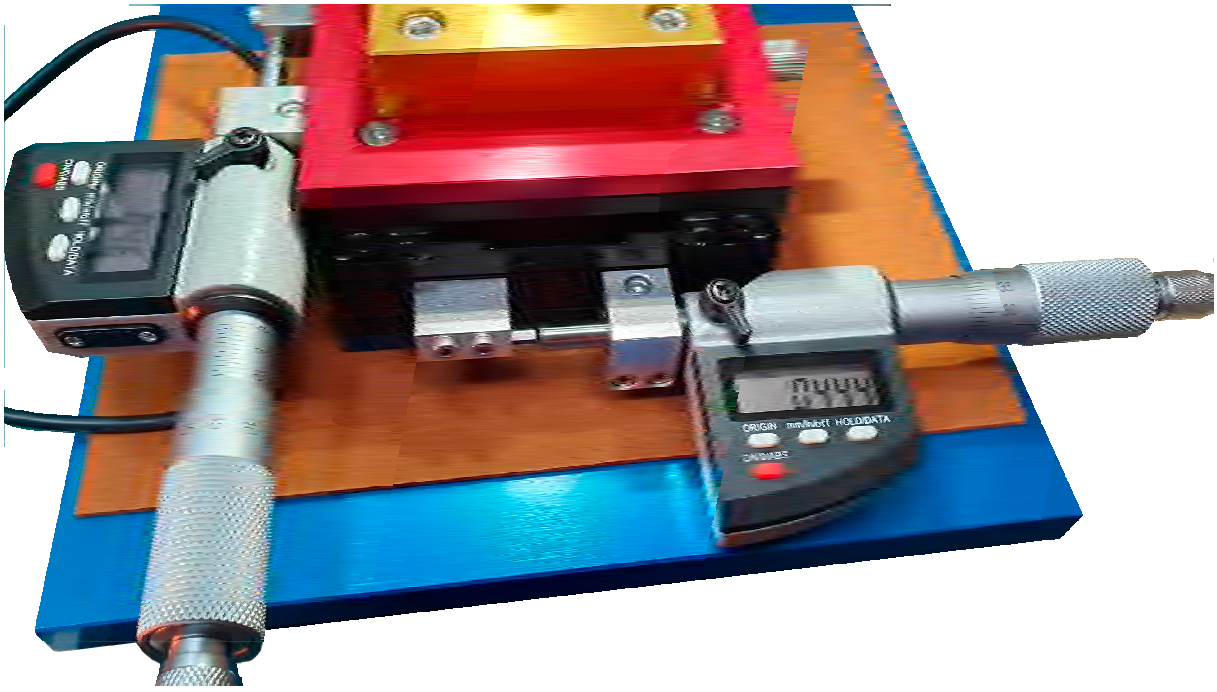
[Measurement of Wear Flatness Widths of Stylus Pin]

3. Using the micrometers, move the previously aligned grid line(s) to the opposite end(s) of the worn surface to be measured.



4. Read the values displayed on the micrometers.



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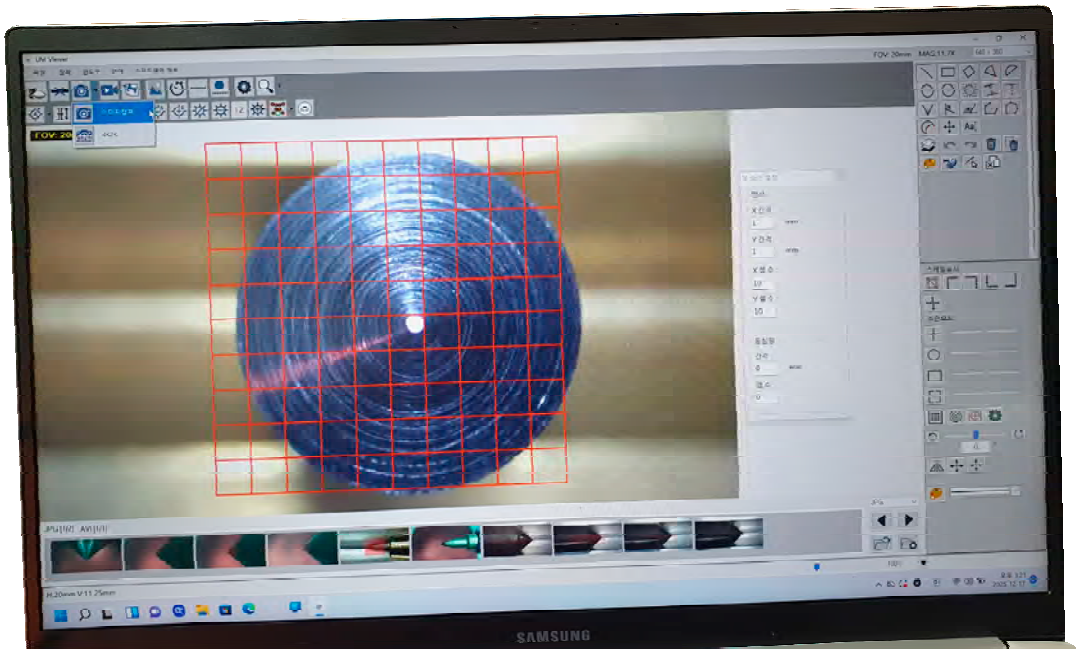
[Measurement of Wear Flatness Widths of Stylus Pin]

5. Saving the Current Screen

Press the Snapshot button  among the main function buttons to save the current working screen as a JPG or PNG file in the default image folder.

1.2 Main Function Button (Fig 1-4)

To adjust the resolution and image quality of the saved picture, press the Settings button  and configure the desired options.



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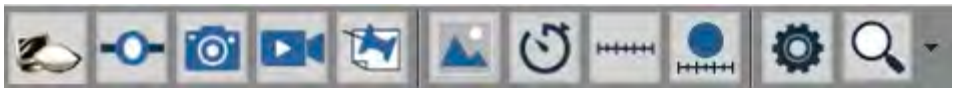
[Measurement of Wear Flatness Widths of Stylus Pin]

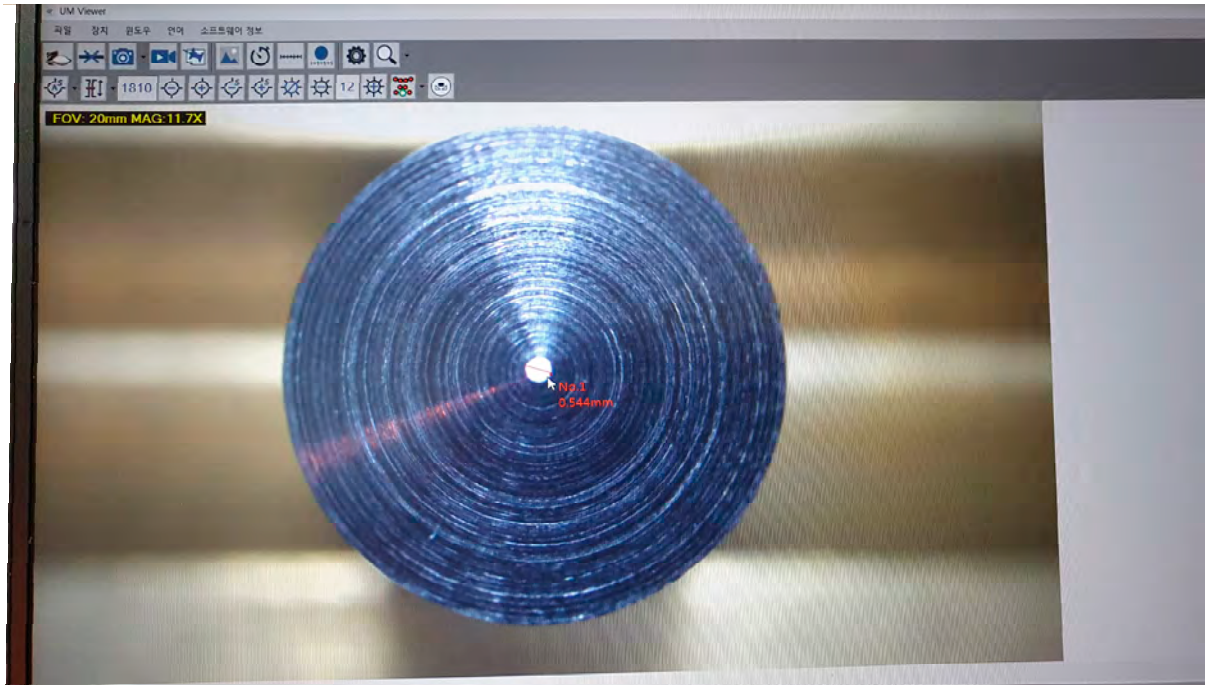
II. Using the (Measurement of Distance between Lines) Function in the Sub-program

1.2 Main Function Button (Fig 1-4)



Among the main function buttons shown above, press button  . Then, from the auxiliary programs activated on the right side of the screen, select button  within the Measurement Tools group. This allows measurement of the linear distance between two lines, which can be used to directly determine the width of the wear flatness.

1. Select two points that are farthest apart on the screen, and click them using the arrow icon. The measured value will be displayed on the screen as shown.



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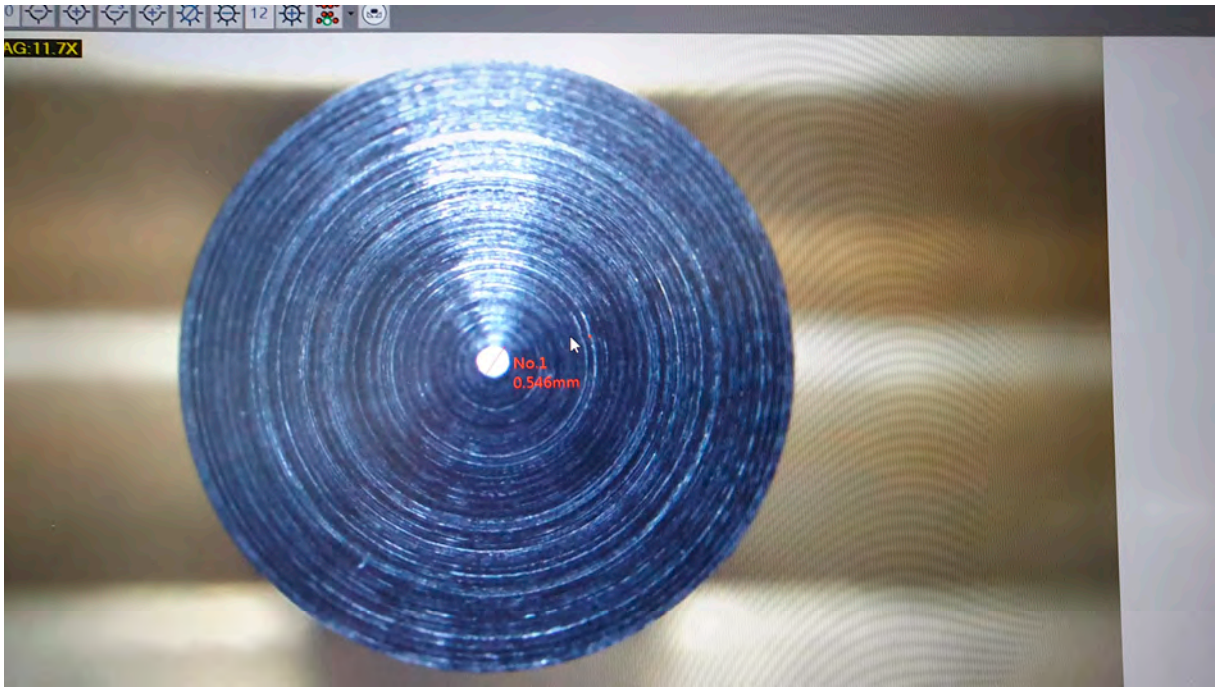
[Measurement of Wear Flatness Widths of Stylus Pin]

2. As in Section 1, select two points that are connected perpendicularly to the previously measured line on the screen. Then click the two points using the arrow icon, and the measured value will be displayed as shown.



3. Saving the Working Screen

If necessary, save the current working screen as described in Section 5 of "▶ Using Micrometer".

〈 End 〉