

## Graphical User Interface (GUI) for measurement automation

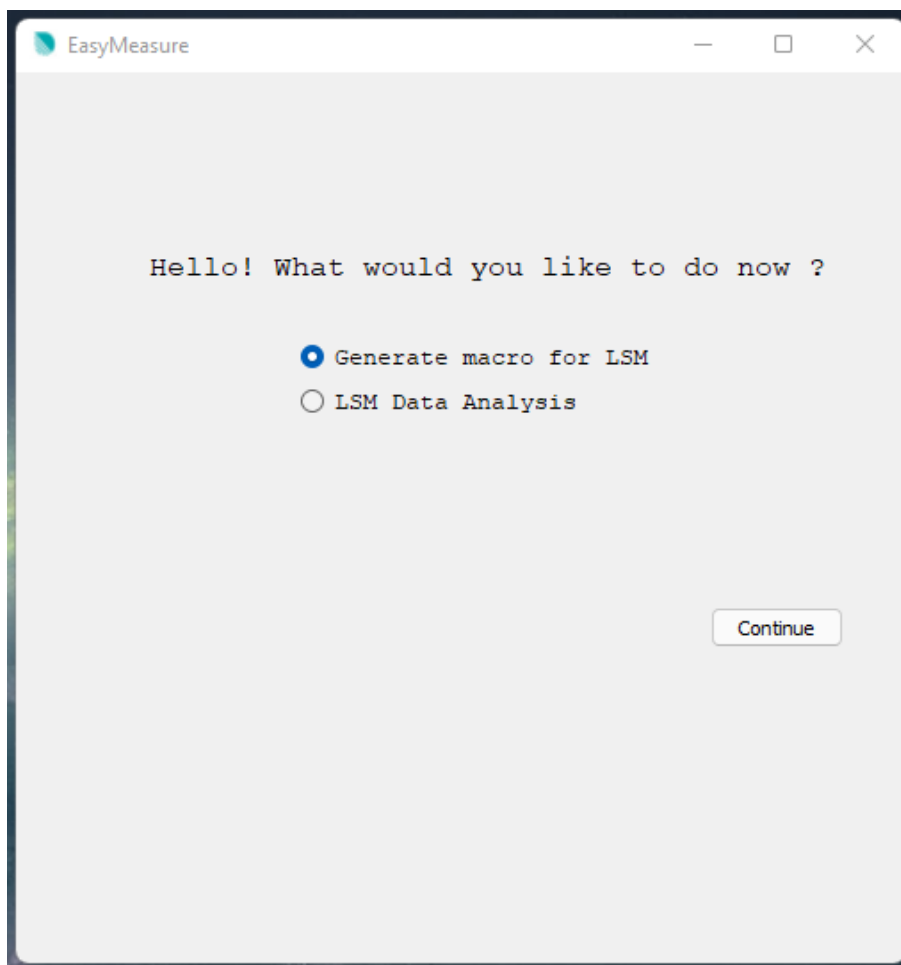
### Introduction

The GUI is designed to serve two purposes. For generating the macro to measure pattern marked in the specimen using Olympus Laser scanning microscope and to obtain required measurement values from the report generated by the Laser scanning microscope.

The application can be run by clicking on EasyMeasure.py file in the folder.

### Main Window

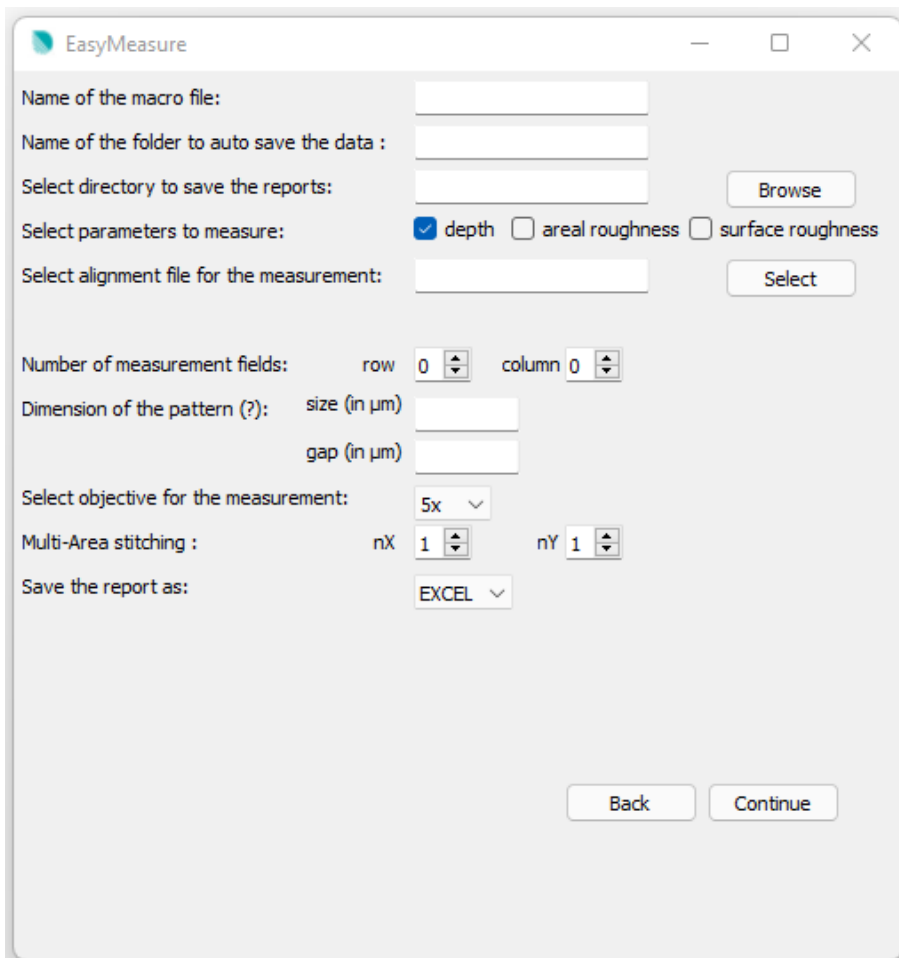
This is the main window provides two function for the measurement. One of the following task can be selected at a time, click on continue to the next page. Main window is shown in figure 1.



*Figure 1*

## Macro Generation:

Once you select “Generate macro for LSM”, you will be directed to new window with a form to be filled. This information is important for creation of the macro. All the information must be correct to generate and run the macro. Form to create macro is shown in figure 2.



EasyMeasure

Name of the macro file:

Name of the folder to auto save the data :

Select directory to save the reports:

Select parameters to measure: ☒ depth ☐ areal roughness ☐ surface roughness

Select alignment file for the measurement:

Number of measurement fields: row  column

Dimension of the pattern (?): size (in  $\mu\text{m}$ )   
gap (in  $\mu\text{m}$ )

Select objective for the measurement:

Multi-Area stitching : nX  nY

Save the report as:

*Figure 2*

## Form fields

1. **Name of the macro file:** Enter the name of the macro file here. Macro will be saved in this name with .mcr extension.
2. **Name of the folder to auto save the data:** A folder will be created in the system to save the data obtained from the observations from Laser Scanning Microscope.
3. **Select the directory to save the reports:** Browse button in the right can be used to select the directory to save the files or it can be entered manually.

4. **Select parameters to measure:** The required parameters can be ticked in this section to be measured while using macro. The parameters available are Depth, areal roughness and surface roughness. This can be extended in the future.
5. **Select alignment file:** alignment file is important to set coordinates for the measurement. An alignment file can be prepared from microscope file (refer OLUMPUS OLS5000 software manual). File can be selected using the browse button or entered manually.
6. **Number of measurement field:** number of measurement field can be entered as rows and columns. This can be useful when microscope can measure only a portion of the specimen. The figure3 shows a pattern that can be measured with 2 rows and 2 columns.
7. **Dimension of the pattern:** Dimension needs to be entered in order to loop the macro for the measurement. Refer figure3.
8. **Select objective for the measurement:** objective lens for the measurement can be selected from here. There is an option to select from 5x, 10x and 20x.
9. **Multi-area stitching:** multiple areas can be combined to a single measurement field using this option. Number of rows and columns to combine can be selected using nX and nY respectively. (refer OLUMPUS OLS5000 software manual)
10. **Save report:** Once the measurement is complete the reports can be saved as either PDF or EXCEL file.

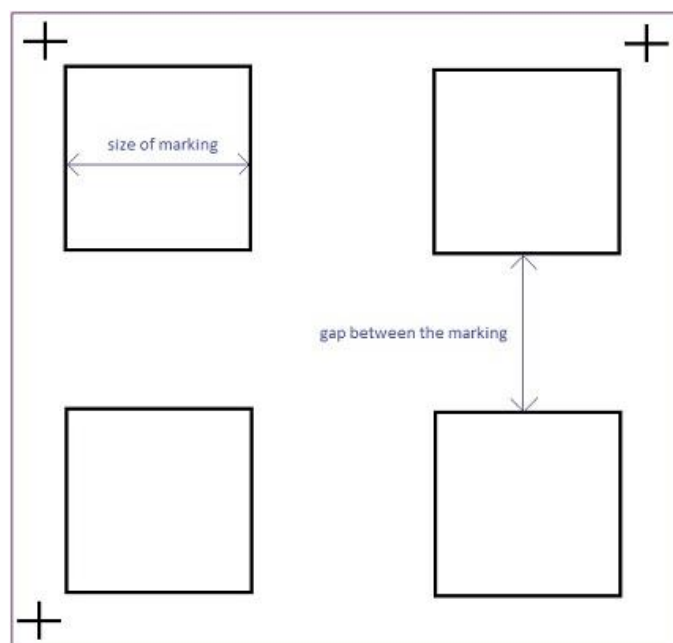
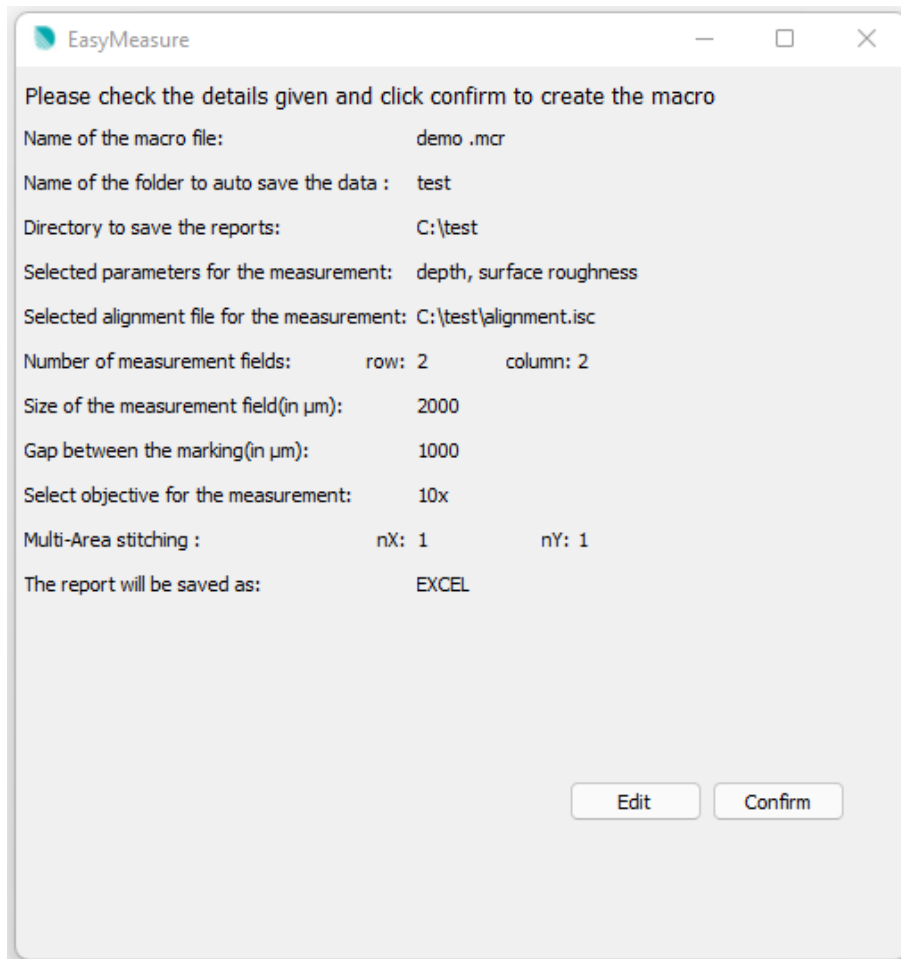


Figure 3

Clicking continue will take you to the confirmation page where you can check the details you entered and create macro. An example of the confirmation page is given below (figure 4).



*Figure4*

Click on confirm to create the macro. Here the "demo.mcr" will be created in the same file as the program run. Use this macro file in LSM software to automatically measure the pattern.

## Data acquisition

The excel report generated by the *microscope software* will contain multiple pages according to the selected parameters to measure. Figure 5 shows a report page showing profile depth measurement for a rectangular pattern. To see more excel reports refer to \sciebo\Aswin Nath\10\_LSM Automation\Data\_Excel\07.07.2021\_data\_excel .

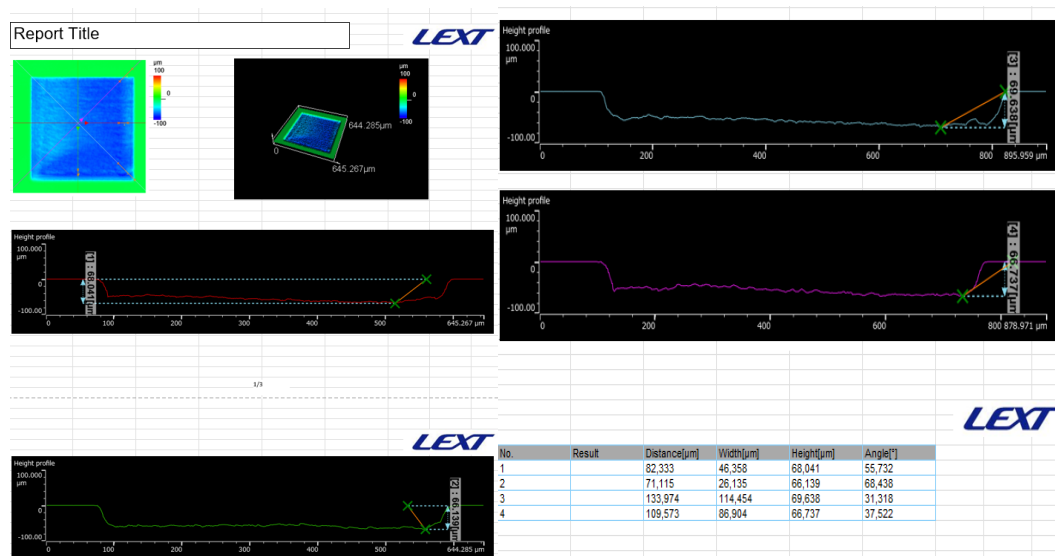
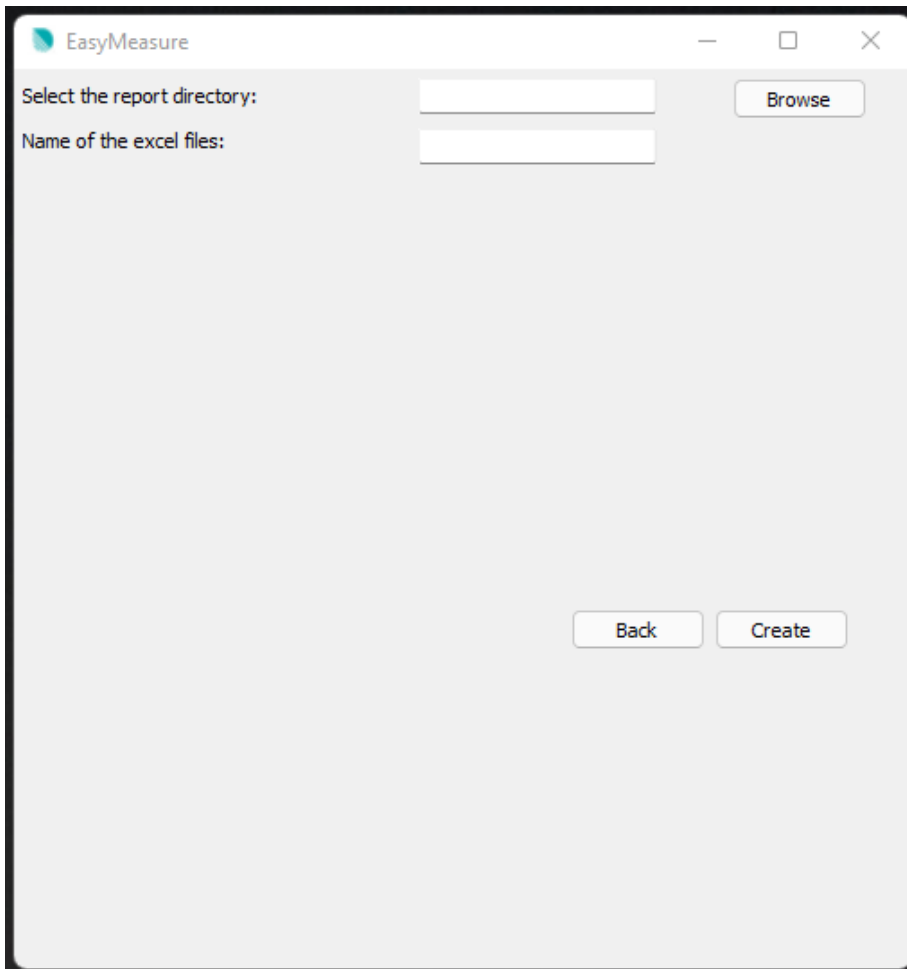


Figure 5

This part of the application is useful when the pattern contains thousands of data points and generating same number of reports. It becomes difficult to manually retrieve the required parameter value from the excel report.

Selecting “LSM data analysis” from main window and clicking continue will take you to this window(Figure 6).



EasyMeasure

Select the report directory:

Name of the excel files:

Figure 6

#### Form fields

1. **Select the report directory:** directory where all the excel reports generated by *microscope software* are saved. This can be entered manually or selected using browse button.
2. **Name of the excel file:** the application requires the name of the excel report to acquire the required data. Fill this field with only name excluding the number, for example if the excel files are named as 'test\_depth\_roughness\_0001', 'test\_depth\_roughness\_0002' and so on then the field must be filled with 'test\_depth\_roughness'.

Click on 'create' button to create another excel file with required data in the same directory where all reports are saved.