KEYENCE

96M16510

3D Surface Profiler

Quick Start Guide

- Comparative Measurement -

KEYENCE CORPORATION

Introduction

Thank you for your purchase of the VK-X3000 Series 3D Surface Profiler.
First, we will introduce basic operation.
You can understand basic operation using a common object such as a coin.

This manual describes comparative measurement and CAD comparative measurement (optional) of 3D images obtained by the VK-X3000.

The comparative measurement tool allows for direct comparison of 2 profile lines from different samples.
The CAD comparative measurement tool allows for direct comparison between 3D CAD data and 3D data gathered by the VK-X3000.

Contents

Chapter 1

Before Starting Operation

1-1 Understanding the Operation Flow

The operation flow of the VK-X3000 Series is as follows.

Step 1: New data acquisition → Obtain a 3D image by measuring a sample
Step 2: Measurement preprocessing → Remove the tilt and noise of the obtained 3D image
Step 3: Use the measurement function → Measure preprocessed data using various functions
Step 4: Export measurement result → Output a measurement result to a report or Excel

This manual describes Step 3 and Step 4.

Step 1

New data acquisition

Step 2

Measurement preprocessing

Step 3

Comparative position alignment

Setting measurement line

Setting measurement interval

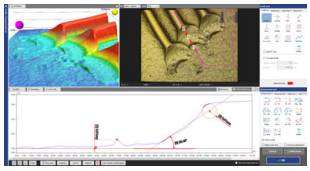
Step 4

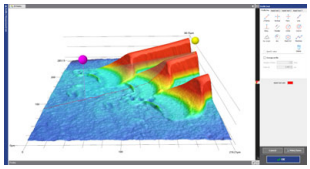
Exporting measurement result

● **New data acquisition**
Measure an object and obtain a 3D image including color information.
For details, see "Quick Start Guide: Gathering New Data using Focus Variation/White Light Interferometer", and "Quick Start Guide: Gathering New Data using Laser Confocal".

● **Measurement preprocessing**
For details, see "Quick Start Guide: Image Processing".

● **Using the measurement function**
Perform various measurements from an obtained 3D image.
- Cross section shape measurement
- Roughness measurement
- Comparison of two types of data
- Film thickness measurement



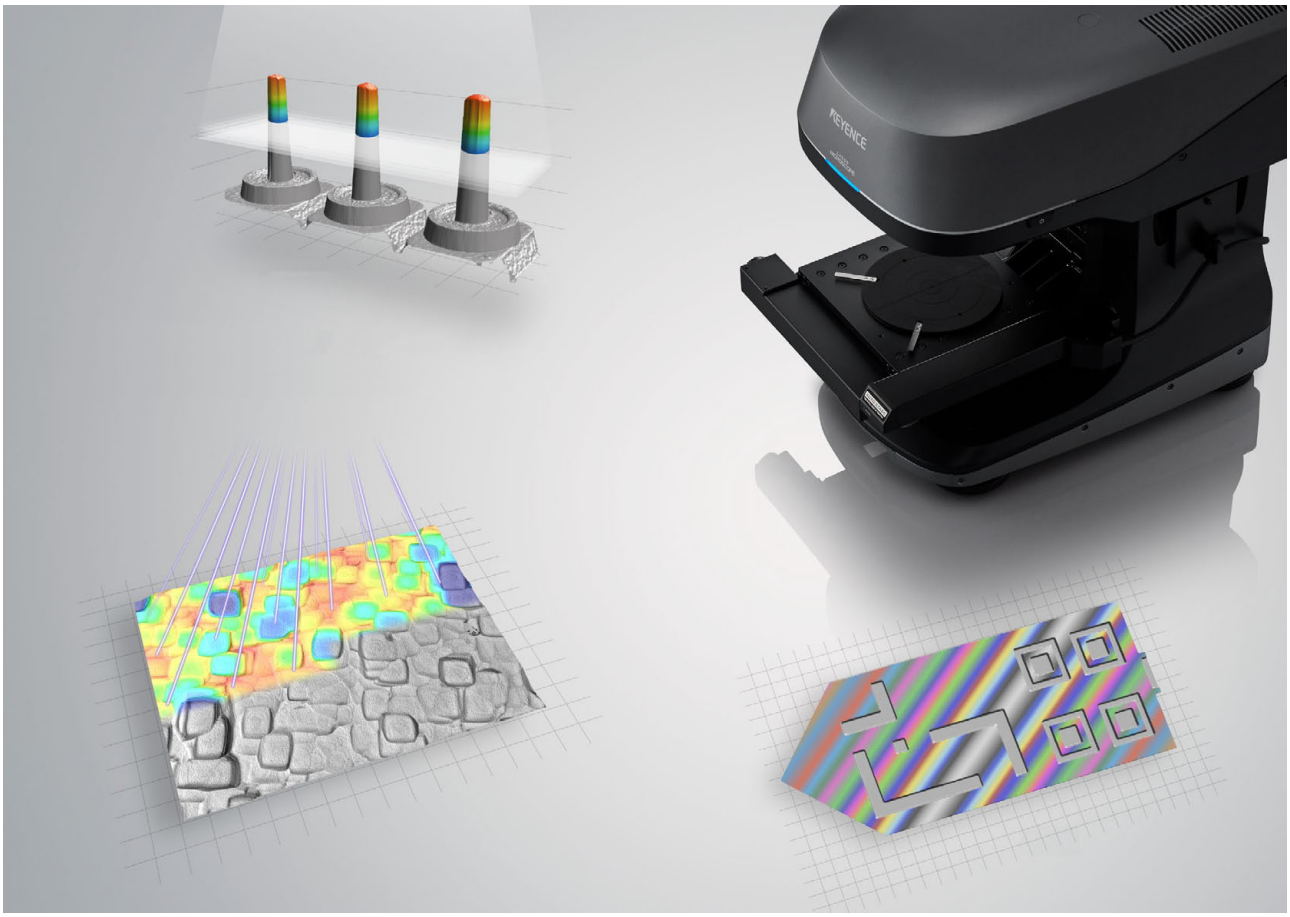


● **Comparative position alignment**
To perform the comparative measurement, it is required to align the reference data with the data to be measured. In the VK-X3000 Series, the position alignment function is called "Comparative position alignment".

● **Measurement of differences**
Measure the difference on a point or in an area to the result of comparison.

Chapter 2

Conducting the Comparative Measurement for the Cross Section

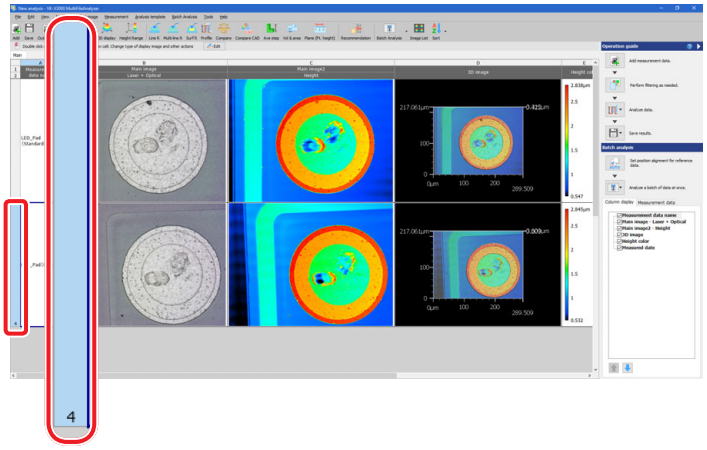


2-1 Performing Comparative Position Alignment

To perform comparative measurement, align the comparative positions of two data.
In this case, open two 3D data sets in advance.

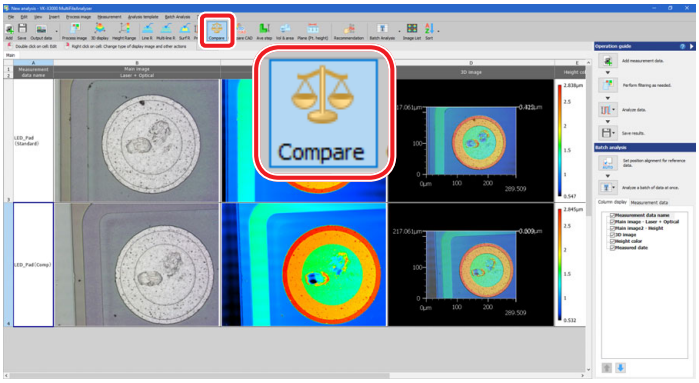
1. Select an image for comparison.

Click on the row of the 3D scan you wish to compare. Select a file other than the reference file.



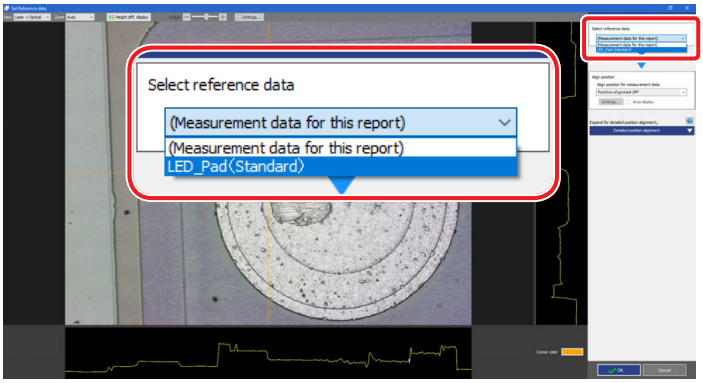
2. Select the comparative measurement.

Click the [Compare] button on the toolbar. Alternatively, select [Comparative measurement] from the [Measurement] menu.



3. Select an image to be used for the position alignment.

Select measurement data of the reference image in the [Select reference data] box on the top right of the screen.

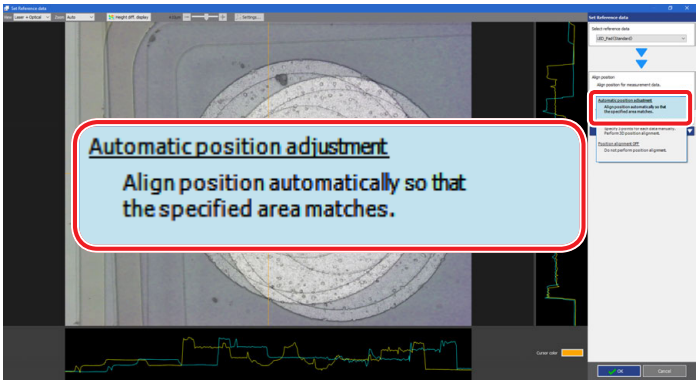


4. Cancel the auto position alignment for all areas.

In this case, click the [No] button in the confimation dialog box of the auto position alignment.

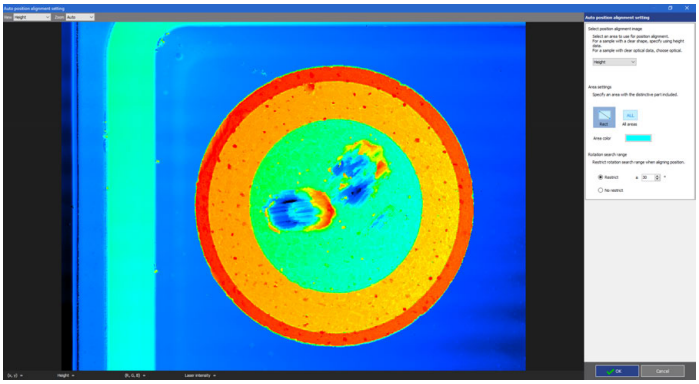
5. Select the auto position alignment.

Select [Automatic position adjustment] in the [Align position] box to perform the auto position alignment with specifying the range.



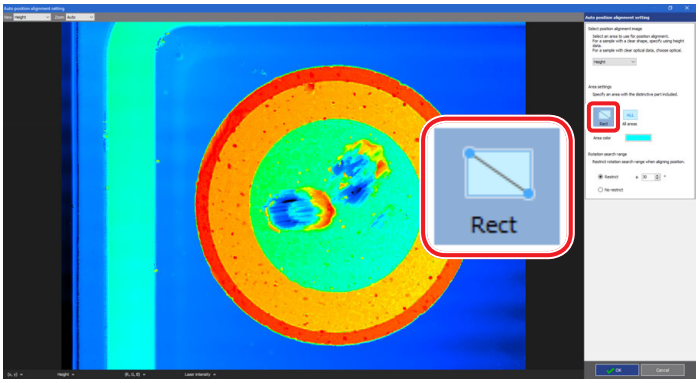
6. Confirm that the screen switches to the auto position alignment settings.

As shown in below, it switches to the [Auto position alignment setting] window.



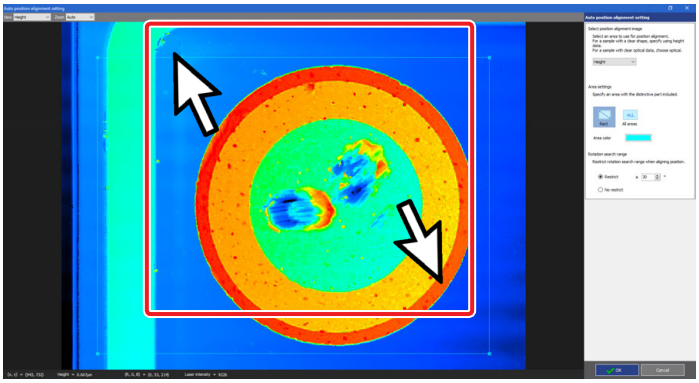
7. Specify [Rect].

Specify [Rect] on the top right of the screen.



8. Select the range you want to select in the measurement data screen.

Click the top left (start point) of the range you want to select, move the cursor, and click the bottom right (end point) in the measurement data screen.



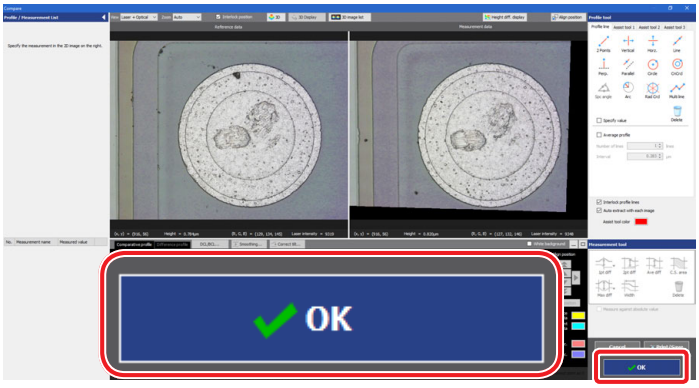
9. **Click the [OK] button of the [Auto position alignment setting] window.**

The [Auto position alignment setting] window closes, and the [Set Reference data] window appears.

Pattern matching aligns automatically the reference image with the comparison image.

10. **Click the [OK] button.**

The comparative measurement window appears.



2-2 Setting Measurement Line

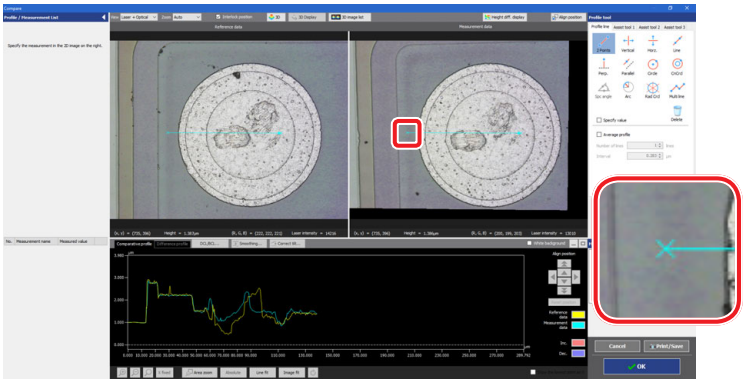
The position to be measured is called “Measurement line” for the VK-X3000 Series.
First of all, let us create a measurement line.

1. Select the profile tool.

Set the measurement line using the 12 types of profile tools that appear on the top right of the screen.
In this case, select 2 points function.

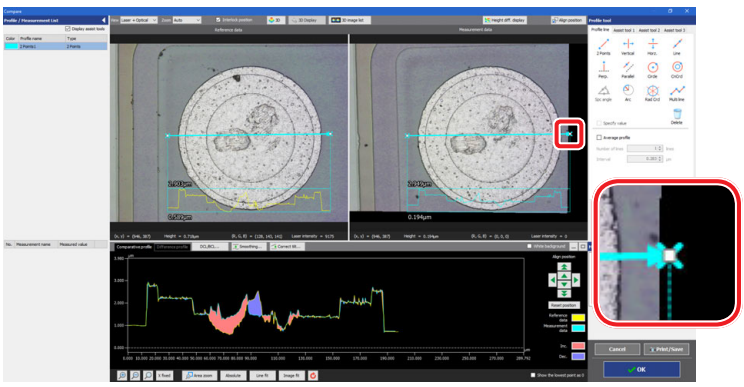
2. Draw a line by clicking the part where you want to cut the section on the reference screen. Click a desired start point.

On the top left of the screen, place the cursor over the area where you want to create a cross section profile, then click it.
The measurement line is displayed as well on the same coordinate in the top right of the screen.

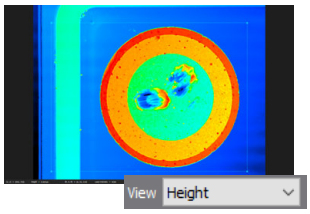


3. Click a desired end point.

In the lower half of the screen, the cross section profile at the specified place appears.



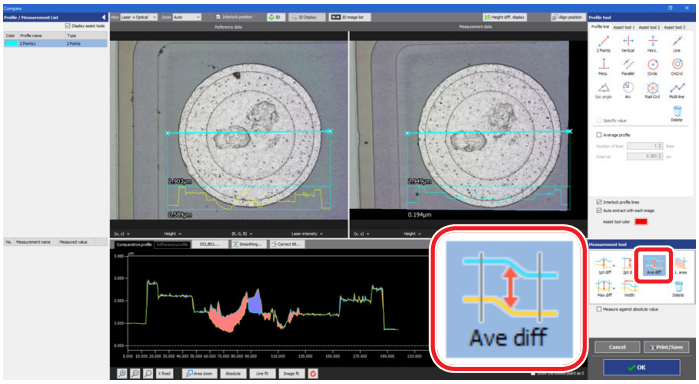
● **Display**
The display can be switched among [Laser + Optical], [Optical], [Laser], [Height], and [C-DIC]. When [Height] is selected, an image is displayed with the minimum point in blue and the maximum point in red, by viewing the 3D data in the orientation determined by the reference plane settings.



The comparative measurement for the cross section can set measurement intervals on the profile displayed on the profile display area, and obtain the difference of the measurement values for each measurement interval.

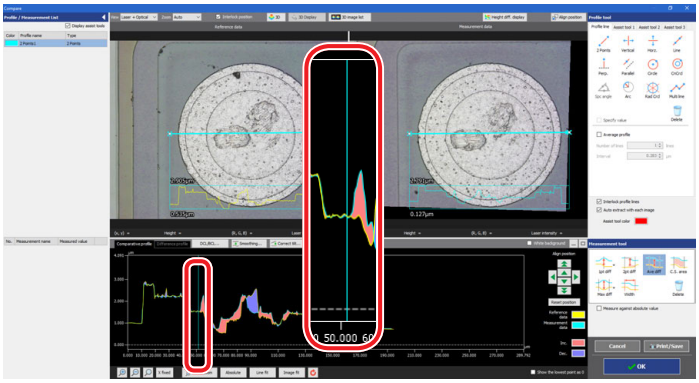
1. Select the measurement tool.

Perform measurement using the 6 types of measurement tools that appear on the bottom right of the screen.
In this case, click the [Ave diff] button.



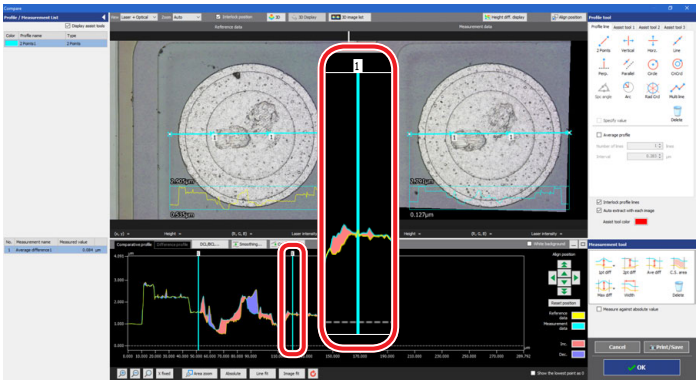
2. Specify the start point of the measurement interval.

Place the cursor over the position you want to specify.



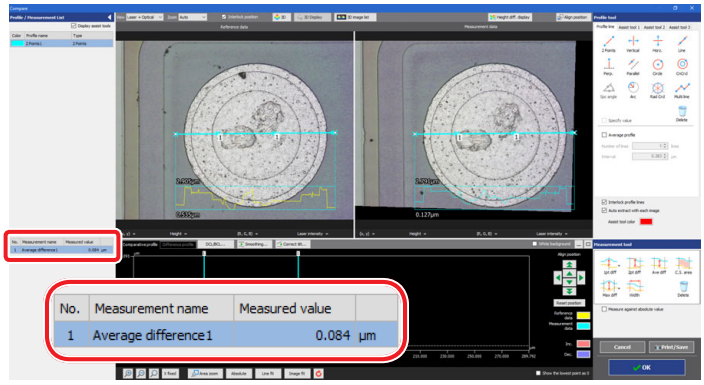
3. Specify the end point of the measurement interval.

Specifying the position in the same way sets a measurement interval.



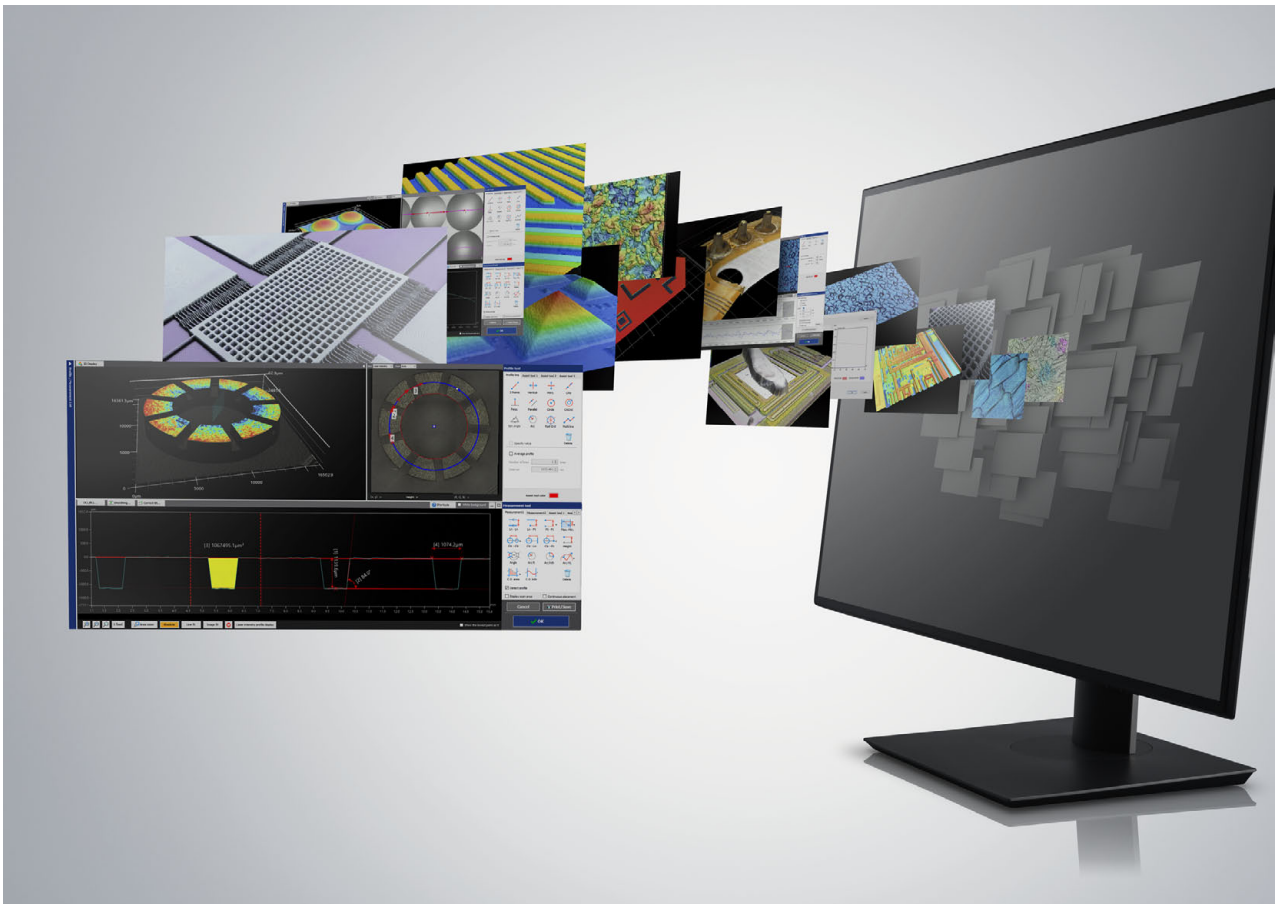
4. Confirm the measurement interval.

The measurement results of [Average difference] appears.



Chapter 3

Comparison to CAD Data

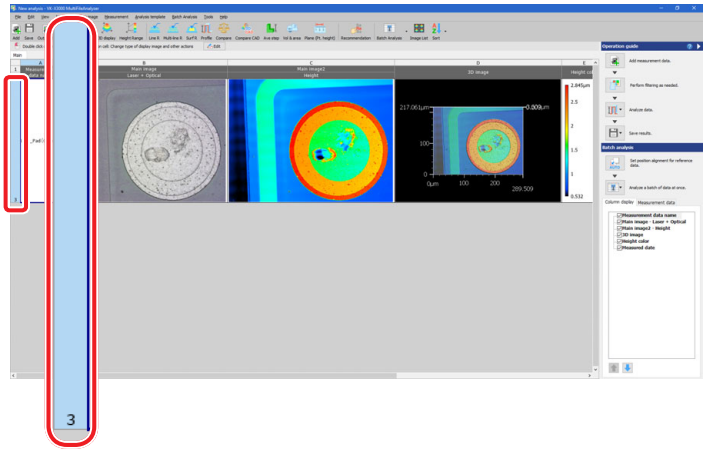


3-1 Performing Comparative Measurement to CAD Data

To perform comparative measurement to 3D-CAD data (STL file etc.), align the comparative positions of two data.

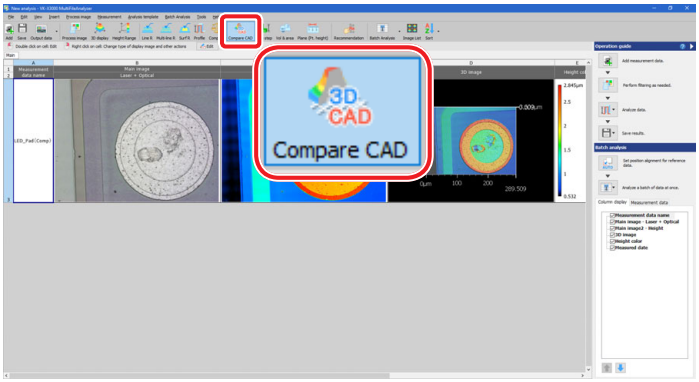
1. Select an image for comparison.

Click the column number of measurement data you want to compare.



2. Select the CAD comparative measurement.

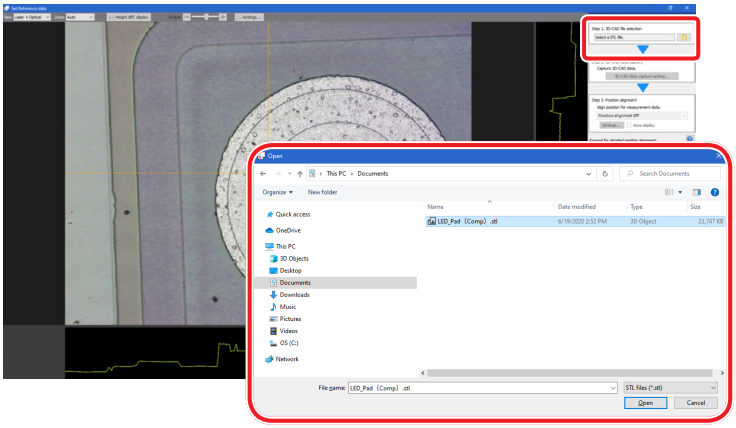
Click the [Compare CAD] button on the toolbar. Alternatively, select [3D-CAD compare measurement] from the [Measurement] menu.



The CAD comparative measurement is an optional function.
To use this function, it is required to enable the CAD comparative measurement module (VK-H3CA).

3. Select a 3D-CAD data (STL file) to be used for the position alignment.

Select an STL file set as a comparison target from the [Step 1. 3D-CAD file selection] box on the top right of the screen.

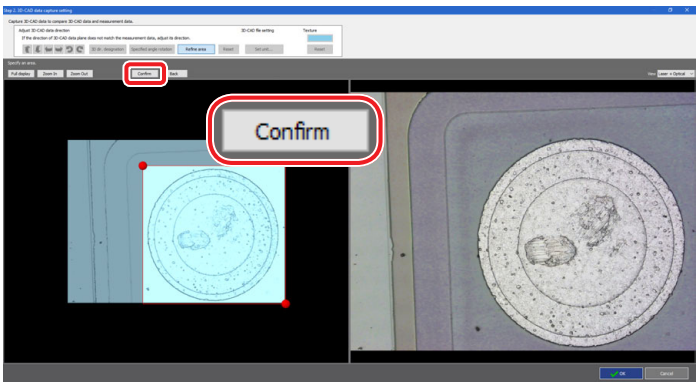


The [3D-CAD data capture setting] window appears.

- **[Adjust 3D-CAD data direction] tool**
  Changes the CAD data direction.
- **[3D-CAD file setting] tool**
  Click the [Set unit] button to set the unit for CAD data.
- **[Texture] tool**
  When the texture is displayed, the display color of CAD data can be set.
  To return to the previous color, click the [Reset] button.

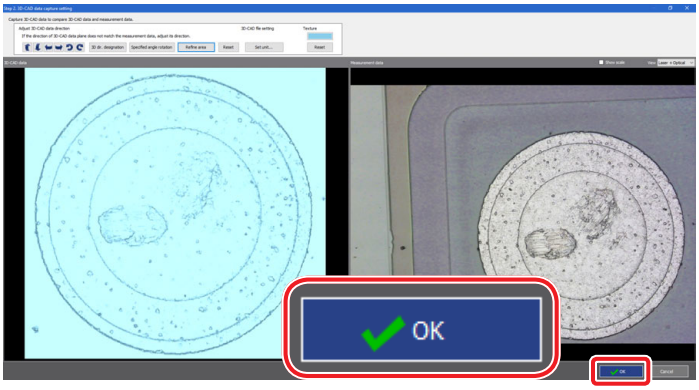
4. Use different tools to adjust the direction of the 3D-CAD data so that it matches the measurement data.

In this case, refine the display area of the CAD data depending on the measurement data, by clicking the [Refine area] button. Click the [Confirm] button.



5. When all adjustments end, click the [OK] button.

The position of the 3D-CAD data and measurement data is refined, and the [Auto position alignment setting] dialog box appears.

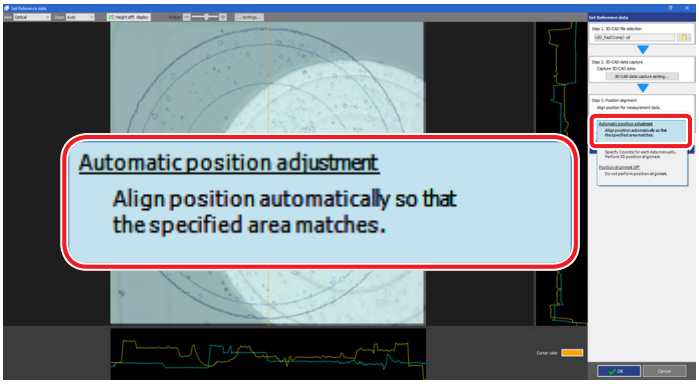


6. Cancel the auto position alignment.

In this case, click the [No] button in the confirmation dialog box of the auto position alignment.

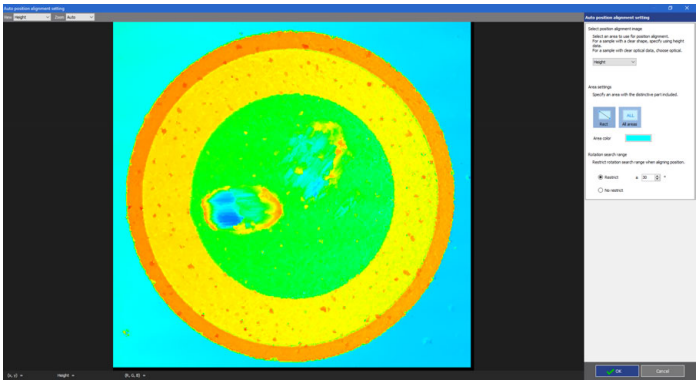
7. Select the auto position alignment.

Select [Automatic position adjustment] in the [Position alignment] box to perform the auto position alignment with specifying the range.



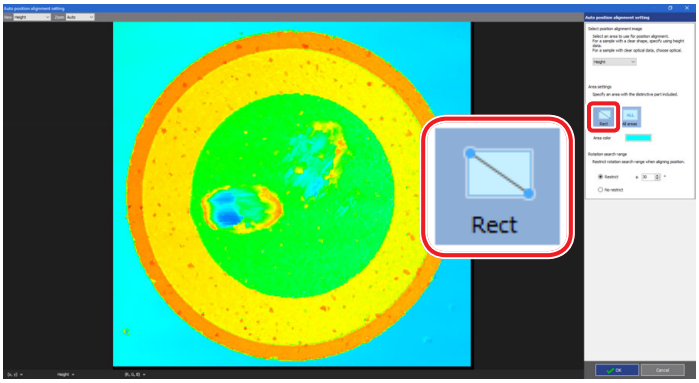
8. Confirm that the screen switches to the auto position alignment settings.

As shown in below, it switches to the [Auto position alignment setting] window.



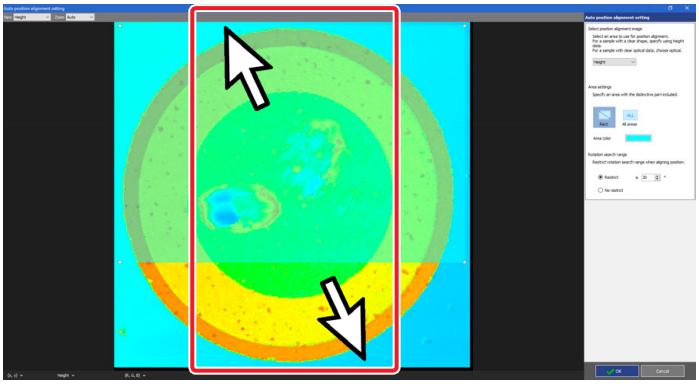
9. Specify [Rect].

Specify [Rect] on the top right of the screen.



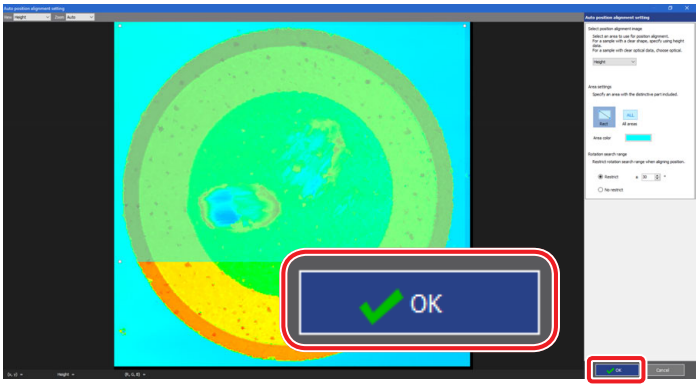
10. Select the range you want to select in the measurement data screen.

Click the top left (start point) of the range you want to select, move the cursor, and click the bottom right (end point) in the measurement data screen.



11. Click the [OK] button of the [Auto position alignment setting] window.

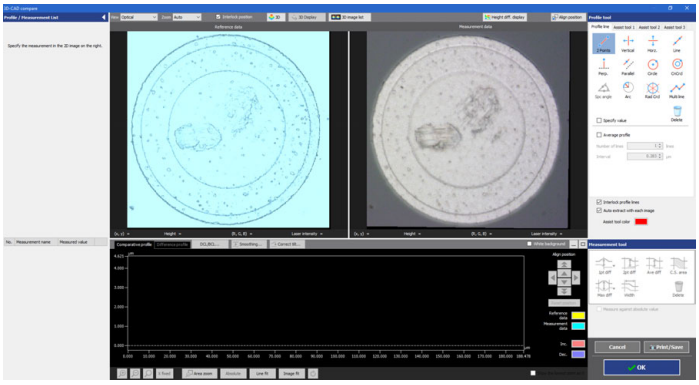
The [Auto position alignment setting] window closes, and the [Set Reference data] window appears.



Pattern matching aligns automatically the reference image with the comparison image.

12. Click the [OK] button.

The 3D-CAD comparative measurement window appears.



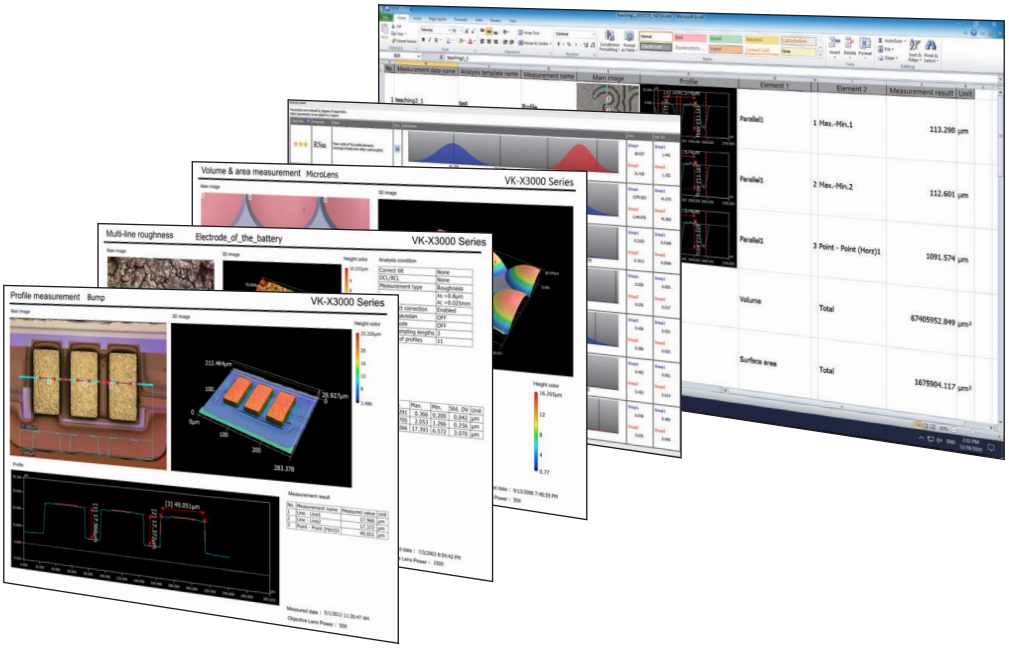
13. Set the measurement line and measurement segment, and measure the difference between the measurement data and 3D-CAD data.

- **Method of setting the measurement line and measurement interval**

  For more information, see "2-2 Setting Measurement Line", and "2-3 Setting Measurement Intervals".

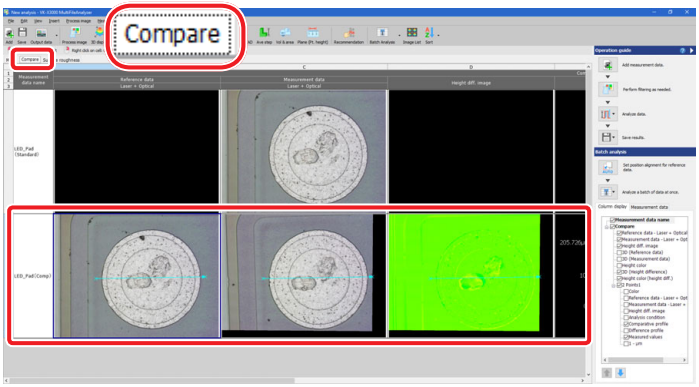
Chapter 4

Exporting Measurement Result



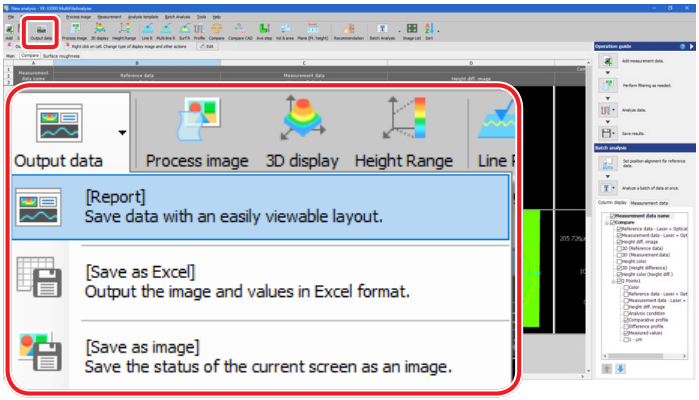
You can display a report of measurement results by the Multifile Analyzer Software in another window. For the report, its layout can be edited and file can be output.

1. Select the grid sheet including the measurement result you wish to display in report.

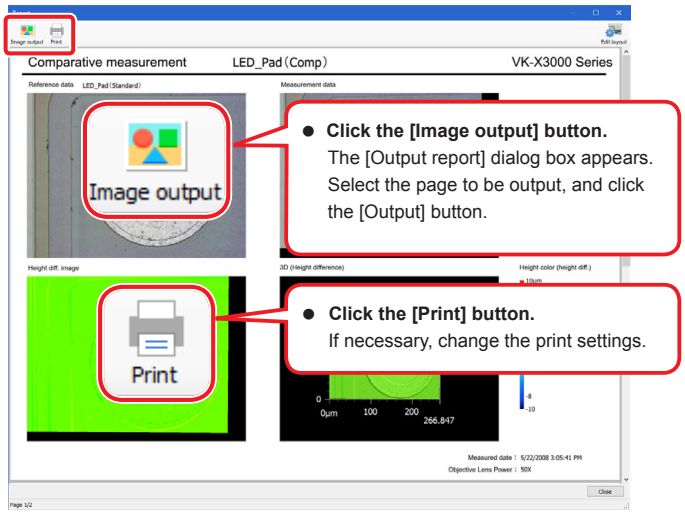


2. Select [Report] from the [Output data] button on the toolbar.

The report screen appears.



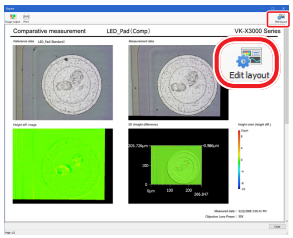
3. Save it as an image file by clicking the [Image output] button on the toolbar. Click the [Print] button to print.



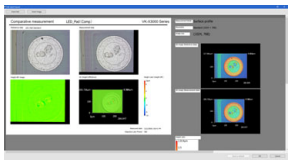
4. Click the [Close] button to close the screen.

● **Edit the report layout**

Clicking the [Edit layout] button displays the [Edit report layout] screen.



The report layout can be edited.



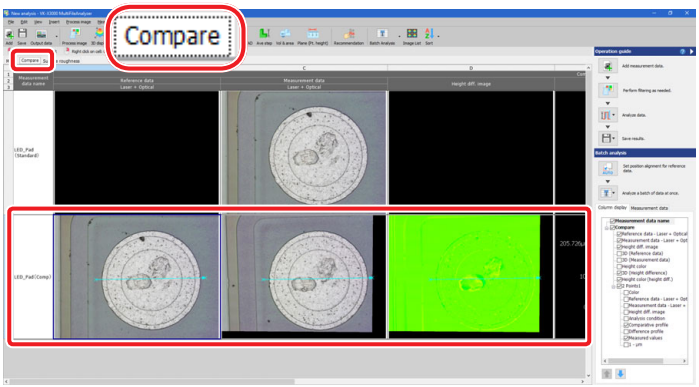
- Click the [Insert text] button to insert the text box.
- Select an image and right click it, a menu related to layout editing will appear.
- Click the [Insert image] button to insert the image.
- Click the [Back to default] button to return to default.

Exporting to Excel file

For the result measured by the Multifile Analyzer Software, the content of the grid view area is output to Excel file in unaltered form.

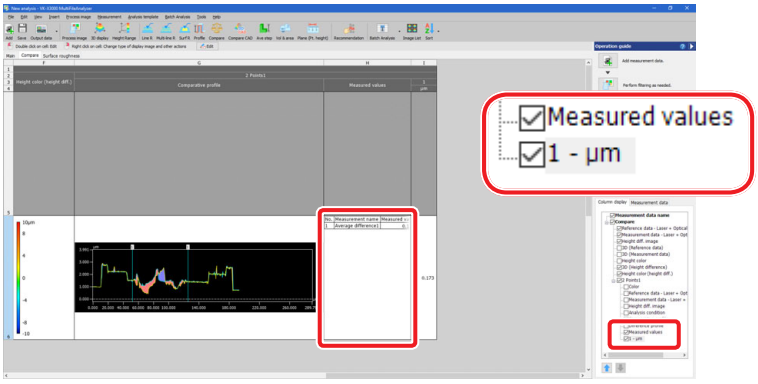
- The file is saved as an Excel workbook (*.xlsx). This extension is the standard file format for Excel 2007 and later.
- When you export to an Excel file, images, graphs, tables within cells and all other content of the grid sheet is output in unaltered form. Before performing the output, adjust the size of the grid sheet.

1. Select the grid sheet including the measurement result you wish to output in an Excel file.



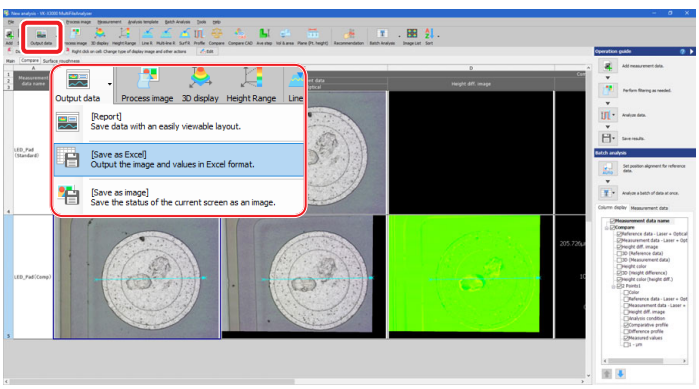
2. Select the measurement results you wish to output to cells in the Excel worksheet from the checkbox of the [Column display] tab.

Selecting the [Column display] tab adds the each result of the measurement items to each cell of the measurement results.



3. Select [Save Excel] from the [Output data] button on the toolbar.

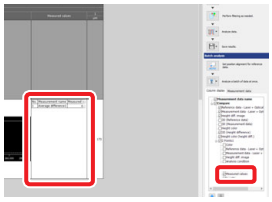
The [Save as Excel] dialog box appears.

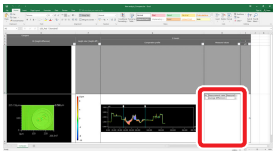


● **About the grid sheet layout and the cell of the Excel output**

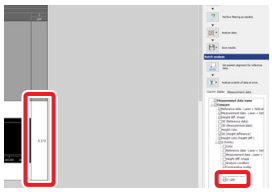
The layout of the grid sheet is applied on the Excel sheet as it is.

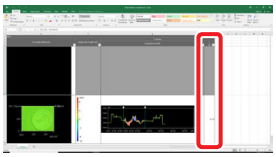
- The measurement results displayed in the [Measurement value list] checkbox of the [Column display] tab are output as images on the Excel sheet.



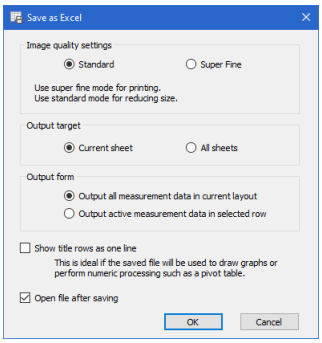


- The measurement results displayed individually in the [Column display] tab are output as numeric values to each cell on the Excel sheet.

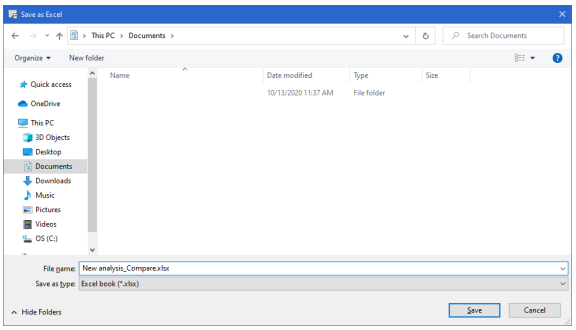




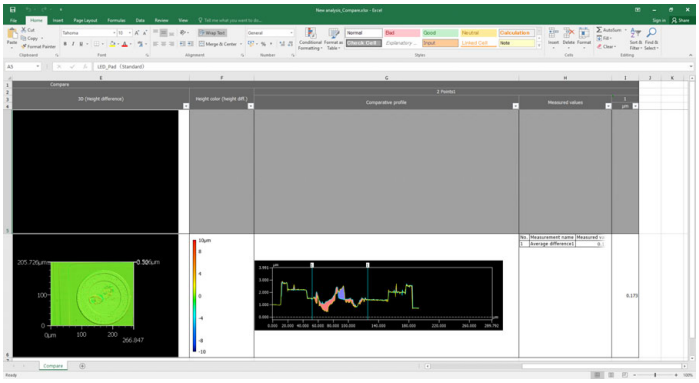
4. Change items as needed, and click [OK].



5. Select a destination folder in which to save the Excel file. Enter the file name, and click the [Save] button.



If Microsoft Office or Microsoft Excel is installed on your PC, the output file is displayed automatically.



Even if Microsoft Office or Microsoft Excel is not installed on your PC, the measurement results can be saved as an Excel format file.
In this case, use the output file with another PC.

- Microsoft Office, Microsoft Excel and Excel are registered trademarks of Microsoft Corporation.
- It is necessary to prepare Microsoft Office and Microsoft Excel separately when KEYENCE delivers the PC.

MEMO

Specifications are subject to change without notice.

KEYENCE CORPORATION

1-3-14, Higashi-Nakajima, Higashi-Yodogawa-ku, Osaka, 533-8555, Japan PHONE: +81-6-6379-2211

www.keyence.com/glb

AUSTRIA
Phone: +43 (0)2236 378266 0

BELGIUM
Phone: +32 (0)15 281 222

BRAZIL
Phone: +55-11-3045-4011

CANADA
Phone: +1-905-366-7655

CHINA
Phone: +86-21-3357-1001

CZECH REPUBLIC
Phone: +420 220 184 700

FRANCE
Phone: +33 1 56 37 78 00

GERMANY
Phone: +49-6102-3689-0

HONG KONG
Phone: +852-3104-1010

HUNGARY
Phone: +36 1 802 7360

INDIA
Phone: +91-44-4963-0900

INDONESIA
Phone: +62-21-2966-0120

ITALY
Phone: +39-02-6688220

KOREA
Phone: +82-31-789-4300

MALAYSIA
Phone: +60-3-7883-2211

MEXICO
Phone: +52-55-8850-0100

NETHERLANDS
Phone: +31 (0)40 206 6100

PHILIPPINES
Phone: +63-(0)2-8981-5000

POLAND
Phone: +48 71 368 61 60

ROMANIA
Phone: +40 (0)269 232 808

SINGAPORE
Phone: +65-6392-1011

SLOVAKIA
Phone: +421 (0)2 5939 6461

SLOVENIA
Phone: +386 (0)1 4701 666

SWITZERLAND
Phone: +41 (0)43 455 77 30

TAIWAN
Phone: +886-2-2721-8080

THAILAND
Phone: +66-2-369-2777

UK & IRELAND
Phone: +44 (0)1908-696-900

USA
Phone: +1-201-930-0100

VIETNAM
Phone: +84-24-3772-5555

A4WW1-MAN-2090

 16509GB 2021-1 96M16510 Printed in Japan

96M16510-1