6.5 Module Measurement (interactive)

6.5.1 General

Interactive measurement are already possible with the basic version of ZEN lite (blue edition). But with the basic version you will only have a few graphic elements available for the measurements. The number of measurement parameters for each tool is also pre-defined and cannot be changed. This is also valid for the results display in the image evaluated. In the image for each measurement tool all parameters will be shown.

If these functions are not sufficient for your requests the module Interactive Measurements will offer many further measurement functions, parameters, and the choice to select which parameters should be shown in the image.

Basic Functions in ZEN lite Basic

For image acquisition, image processing and reports you will use the corresponding tabs in the Left Tool Area.

Control of Modules to be Activated

Under Tools select the function Modules Manager.
Interactive Measurements

6.5.2 Interactive Measurements in the ZEN lite Basic Version

To perform interactive measurements with ZEN lite Basic you first open a saved image or you acquire an image directly with the camera via the button Snap. The image will be displayed in the 2D View.

You perform the interactive measurements directly in the 2D View.

For this purpose you select under the display options the Graphics tab. Here you find 3 measurement tools at the right end of the top toolbar (Rectangle, Circle, Contour).

Modules for Activation

In the window Modules Manager you will find a list of available add-on modules for ZEN lite. In the basic version no modules are licensed, and therefore cannot be activated.
Further measurement tools for **ZEN lite Basic** you will find in the drop-down menu **Graphics** of the menu bar. Here you will additionally find the functions **Line** for distance measurements and **Points** (Events to number and **Marker** to mark the objects). You create a grey value **Profile** along a drawn line or via mean values across the height of a rectangle.

For our example measurement we used the **Contour**. You draw the contour freehand, or you click to points on the periphery. This will connect each last two points by a line. With every new input the last few points will be interpolated to a curve (**Contour Spline**).

Use **View** in the menu bar to adapt the display window to your needs. You also select the **Zoom** level for the image here. As an alternative on the keyboard you may use the function keys **F7** and **F8** for the zoom.
Interactive Measurements

**Note**: An enlarged image (Zoom) is very helpful for drawing the contours.

If you want to measure several objects with the same tool, activate the function **Keep tool**. In this case you do not have to re-select the measurement tool every time.

Now click to several edge points of the first object with the **left** mouse key. Click the **right** mouse key to finish the definition. For the contour you will always measure and display the **area** and the **mean intensity**.

Repeat the measurement for all objects in the field of view. Selecting the **Arrow** button on the **Graphics** tab you may activate each contour in order to delete or modify it. You delete the selected object either with the **Delete** button or with the **Delete** key of the keyboard (Del).
You will find all measured contours in the **table** of the **Graphic** tab. You may also select each object with a click to the corresponding object line. If you select the **Show all** mode for the display options, you will get the additional columns **ID**, **A** (annotations), and **M** (measurement values) in the table.

With a click to the button **ID** you will switch on or off all object numbers in the image. As an alternative you may switch on or off the numbering of individual objects via the **switch boxes** in each line of the **ID** column.

With activated **ID** you will find the corresponding object number labeled close to the left bottom object point.
Via column M you switch on or off the measurement values for the objects in the image.

In ZEN lite you cannot switch off the annotations via column A. Here you may only switch off the length value for the scale bar.

In our example we only display the object numbers (ID).

With a right mouse click to the line of the measurement tool you open a window to adapt the graphics. Select the function Format graphics to get access to the modification options. In the new window you may change the line thickness, the appearance, or the color. With a click to the button Set As New Default you will keep the changes also for future inputs.
In our example we labeled one object with a blue line. In order to label further objects in other regions of the zoomed image move the image frame using the sliders at the right and lower frame edge.

6.5.3 Evaluation of the Measurement Results

Having finished the labeling of all objects switch to the Measure view for further evaluations. Here you will see the image in the left part of the Center Display Area and additionally in the right part the measurement data as a table. Furthermore you will get the Measurement tab in the right part of the display options.

In the Measurement tab you will find several options for the presentation of the table. For further data evaluation click to the button Create Document.
The **data table** will be shown on a new display tab with separate options. In the left part of the options you will find multiple ways for the graphic presentation of the measurement values. In the right part you will find several tabs to adapt the presentation to your needs.

First select in the table the desired **column** by a click to the header button. Afterwards you have to select the data of this column in the right **Data Source** tab via the button **New Data Source**.

As a next step select in the left tab **General** the **Table-Chart-Layout**. In our example we selected graphic left and data table right.
The graphic will appear in the left part, as defined, as a **bar chart**. As an alternative you have the choice of XY, line, stacked bars (for synchronous display of multiple parameters), pie, or donut.

Example of a **Line chart**.

**Note:** By default the values will be shown in the range they are listed in the table. By a mouse click to the column name you will sort the lines by size (alternatively up or down).

In the **Data Source** tab you select the active data column in the table for the evaluation via the button **New Data Source**.

You also may select several columns to combine several data in one graphic. With the button **X-Values from** you define which of the selected data shall be used for the X-axis.
In the **Legend** tab you define the character type, character size, and the position of the diagram legend.

In the **Chart Settings** you adapt the diagram appearance to your needs (i.e. the line width).

In the **Error Bars** tab you add ranges for standard deviation or standard errors to the bars.

In the **Axis Style** view you adapt the diagram axes to your needs. For the settings first activate one axis in the diagram by a mouse click.
In the **Axis Scaling** tab you adapt the subdivision and appearance of the axis to your needs. Again you first have to activate the axis with a mouse click.

Example for a distribution with 2 selected columns in the data table. The area values were used for the X-axis and the mean intensity values for the Y-axis.
6.5.4 ZEN lite with Module Interactive Measurements

Prior to the use of the module **Interactive Measurements** check that the module is activated. For this select the function **Modules Manager** in the menu **Tools**.

In the window **Modules Manager** activate the control box **Measurement**.

After the selection of the module **Measurement** you will see in the **Left Tool Area** the **Analysis** tab. Please select this tab for the selection of the additional measurement functions.
6.5.5 Definition of the Measurement Parameters

Open the **Interactive Measurement** and click to the button **Define** to select the additional measurement functions. In the **Show all** mode you additionally have the options to sort all measurement parameters by **functional groups**, and to freely define the **sequence** of the parameters.

In the parameter selection you will find in the left column all **Available Elements**. In the middle column you will see the already **Selected Features**, and in the right column you will find all available **Features** for the elements selected left. Additional parameters select by a **double-click**, or via the button **+**. You change the sequence of each selected feature via the up- and down- **buttons**.
Interactive Measurements

The elements are sorted by groups. You will define **2D regions** by drawing areas.

**Single distances** you define by lines.
You measure **Multiple distances** by the definition of a base line and creating perpendicular distance lines.

In addition you may define **Angles**, **Events** and **Marker**.

In our example we defined for the **Contour** the parameters **Area**, **Mean Intensity**, **Diameter**, and the **ID**. In the column **Display** we only selected the **ID**. All 4 parameters will be measured, but only the ID will be used to label the objects.
6.5.6 Save the Measurement Parameter Definition

You may save the selection of elements for a later usage under a name of your choice via the button **Save as** in the option’s list.

After the selection of **Save as** enter the new name in the text field. Click to the **Save** icon to keep the name.
6.5.7 Perform the Measurement

You select the additional elements either from the Graphics menu in the menu bar, or you may add them to the lower selection bar in the Graphics tab via the button Customize.

Now mark the objects in the image. Only the parameter ID selected by definition will be labeled in the image.

6.5.8 Evaluation of the Measurement Data

Having finished the marking of objects click to the button Create Measurement Table in the field Interactive Measurement.
Interactive Measurements

The next evaluation steps are identical with the parameter evaluation from ZEN lite basic (see chapter 6.5.2).

Select a column from the Data Table and define this column as New Data Source on the Data Source tab. Afterwards select the Table Chart Layout in the General tab and select the Chart Type.