

BETAFLEX Xpress / BETAFLEX PRO

preliminary user manual

Introduction	3
Safety Instructions	3
Warning.....	3
General safety rules	3
Unpack the Device.....	4
Installation.....	5
Install the camera driver	5
Install the BETAFLEX PRO driver	6
Install the BETAFLEX software	7
Run the application	7
Select your language and unit of measure settings	9
Calibrate the Device.....	9
Main menu	11
Select the Plate Type	12
Automatic measurement	13
Measure with pre-set screen ruling	15
Manual measurement	16
Stochastic screens.....	17
Quick FM screen measurement:	19
Skip a proposed dot group and view the next proposal.....	20
Manual selection of a dot group	20
Add single objects to the FM result	21
Remove one single object from the FM result	22
Line width measurement.....	22
Magnifier Tool	24
BETAFLEX Statistics	24
BETAFLEX Image Comparison	26
Stain Density measurement	28
Print BETAFLEX Reports.....	29
Reflection mode measurement	30
Dot Shape measurement	31
Dot Structure Index Reference handling:.....	31
Compare shape images of dots:	32
Create a dot cross section	32
Measure Print.....	33
Multi color analyses.....	34
Analysis results	36
Dot area (%)	36
Screen Ruling (Lines/cm, Lines/Inch)	36
Dot diameter (µm, mil)	36

Dot surface area (μm^2 , mil^2).....	36
Dot Perimeter.....	36
Edge factor	37
Dot void factor.....	37

Introduction

Congratulations! You have just acquired the portable BETAFLEX Flexo Plate Reader from Beta Industries. This device is the optimum tool to control transparent Flexo plates of all types in the trade shop and press room in a fast and intuitive manner. All standard plate control functions such as dot area, screen ruling, dot surface area, dot diameter, dot perimeter, and dot edge factor can be measured. In addition the width of positive and negative lines on the flexo plate can be measured with high accuracy. The BETAFLEX software supports conventional (AM) screening and stochastic (FM) screening in a wide range of screen rulings and spot sizes.

Important: *This manual describes the current version of the BETAFLEX hardware and software. Future enhancements or modifications are reserved.*

Safety Instructions

Warning

For safety reasons it is absolutely necessary to read through the user's guide and all of the instructions it contains.

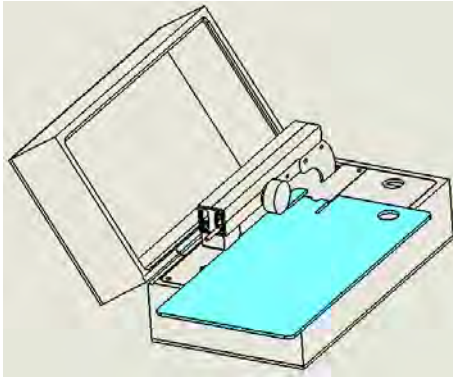
General safety rules

If the safety recommendations and instructions in this User Guide are not complied with, measurement errors or data loss or physical injury or property damage may result

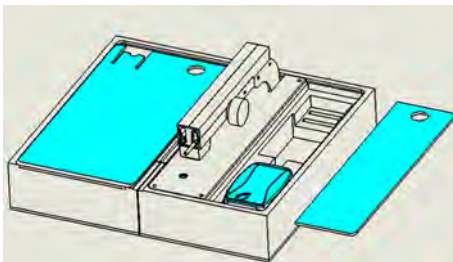
- The BETAFLEX is not intrinsically safe. Therefore the device cannot be used in an environment with explosive vapors where there is a risk of spark ignition.
- BETAFLEX may not be used in an area with strong electromagnetic fields.
- Use the BETAFLEX in ambient temperatures between 10°C (50°F) and 40°C (104°F), and do not expose the BETAFLEX to direct sun light.
- Neither the BETAFLEX Sensor nor the BETAFLEX transmission light box should ever be opened as there are no user-serviceable parts. Doing so voids the guarantee. Contact your authorized dealer if repairs are necessary.
- To avoid incorrect handling, the BETAFLEX should only be used by trained personnel
- The BETAFLEX should only be used on dry measurement objects.
- The BETAFLEX should be protected against chemicals, corrosive vapors, strong mechanical vibrations and impacts.
- Use original PERET spare parts and accessories only.

- Use the original packaging exclusively when transporting.
- The BETAFLEX casing can be cleaned with a dry cloth.

Unpack the Device

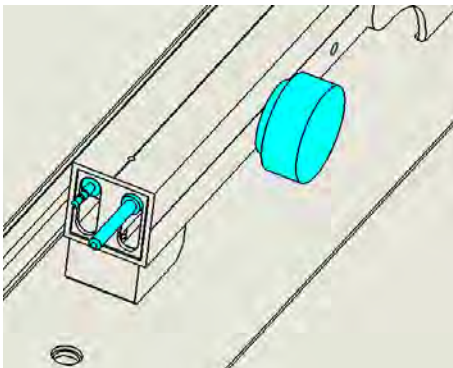


Open the device box and remove the large Plexiglas cover by sliding it to the front.

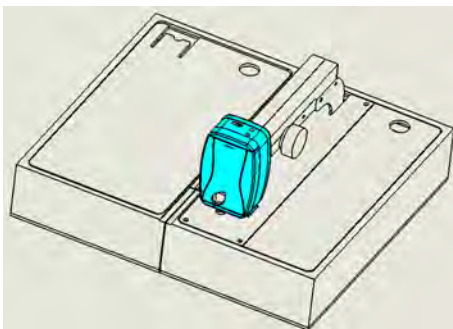


Put the large Plexiglas cover into the cover of the device box as outlined in the image to the left. Now remove the small Plexiglas cover on the right side and take out the sensor, the software, the manual and the calibration target

Put the small Plexiglas cover back to its original Position



Make sure the Sensor connector is in the raised position by rotating the wheel clockwise on the right side of the support arm.



Connect the Sensor to the support arm by inserting the longer pin first and sliding it straight on until the shorter connector makes firm contact.

The device now is ready to operate.

Installation

Start your Computer and wait until all boot processes have terminated and your computer is ready to operate.

Now plug the BETAFLEX USB Memory Stick into a free USB Port and wait until Windows has recognized and registered the USB Stick as a Mass storage Device

Install the camera driver

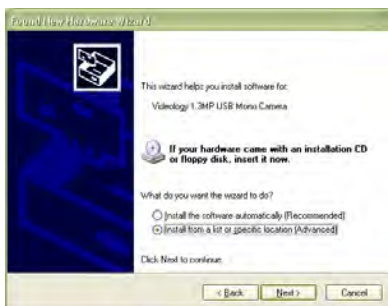
For the driver installation administrator rights on your computer are required.

The BETAFLEX Xpress is equipped with a single USB connector, while the BETAFLEX PRO has two USB connectors.

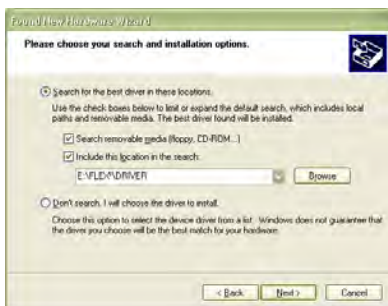
Connect the USB connector of the BETAFLEX Sensor or in case of BETAFLEX PRO the **black** USB connector to a free USB2.0 port of your computer



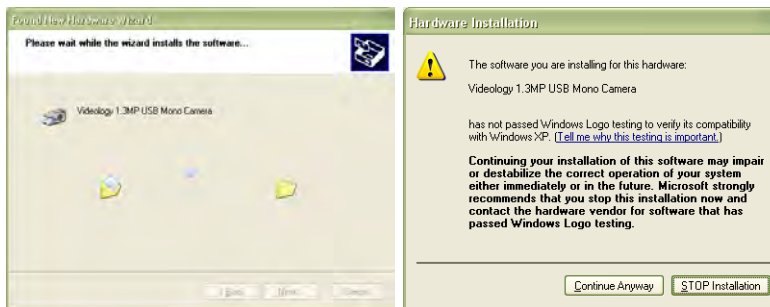
Select '**Not at this time**' and click next



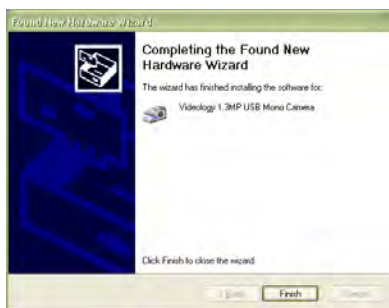
Select '**Install from a list or specific Location**' and click next



Browse to and select the \DRIVER subdirectory of the BETAFLEX USB Stick. Click next



Confirm with '**continue anyway**' and wait until the driver installation has completed successfully.



If the driver Installation fails for any reason, unplug the BETAFLEX device from the USB Port and run the `wipcam.exe` utility in the `\DRIVER` directory of the BETAFLEX USB Memory Stick. This utility will clean up your PC and make it ready for re-installation of the driver. Before re-installing the driver you need to reboot your PC.

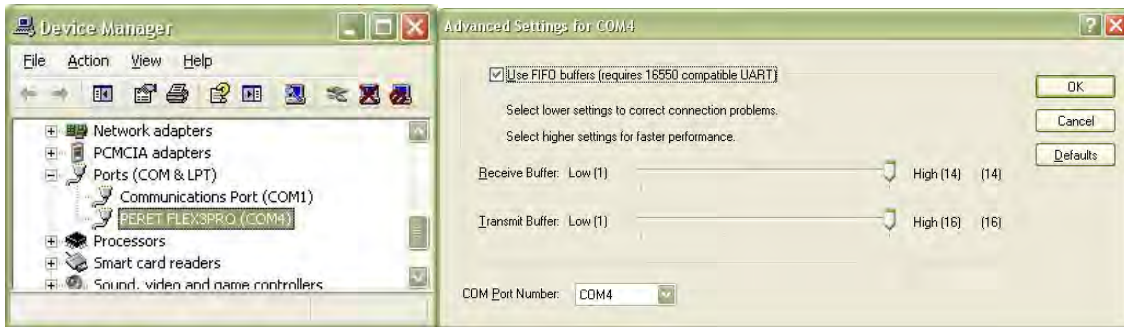
Install the BETAFLEX PRO driver

If you have a BETAFLEX PRO device now connect the gray USB connector to a free USB port. Follow the steps as described above. The directory holding the BETAFLEX PRO driver is located in `\DRIVER\FLEX3PRO` subdirectory. In case you have already installed the software on your hard disk, you can find the driver also in the subdirectory of your installation directory f.e.
`C:\PERET\FLEX3PRO\DRIVER\FLEX3PRO`

The FLEX3PRO Driver does support COM1 to COM9. In case your Windows operating System has assigned a COM port higher than that, assign a proper COM port as follows:

- Click the Start button and then click Control Panel.
- Double-click the System icon.
- On the Device Manager tab, double-click Ports (COM & LPT).

- Double-click the communications port, BETAFLEX PRO. This opens the Communications Port Properties window.
- Click the Port Settings tab
- Click Advanced
- Select a COM port between COM1 and COM9



Install the BETAFLEX software

The USB Memory stick contains a setup utility '**setup FLEX3.exe**' or '**setup FLEX3PRO.exe**', which can be executed to install the BETAFLEX Software on your PC. In addition there is a fully running installation available on the USB stick folder '**RUN DEMO**' including sample images that will run independently of installing the software. This can be helpful for training and demonstration purposes.

Run the application

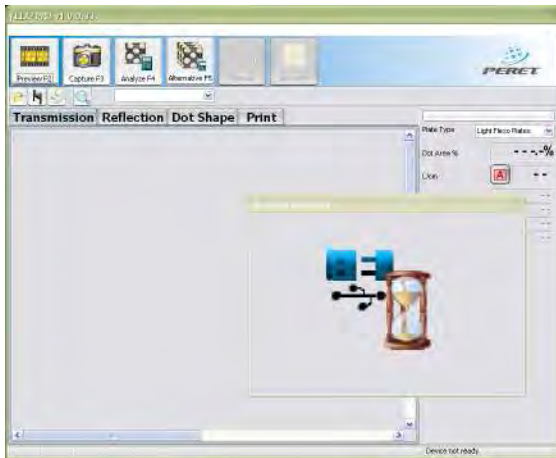
Execute the FLEX3.exe / FLEX3PRO.exe or click the BETAFLEX Icon / BETAFLEX PRO on your desktop, or run the BETAFLEX from the Windows Start Menu



If no camera is connected, then the following message will appear:

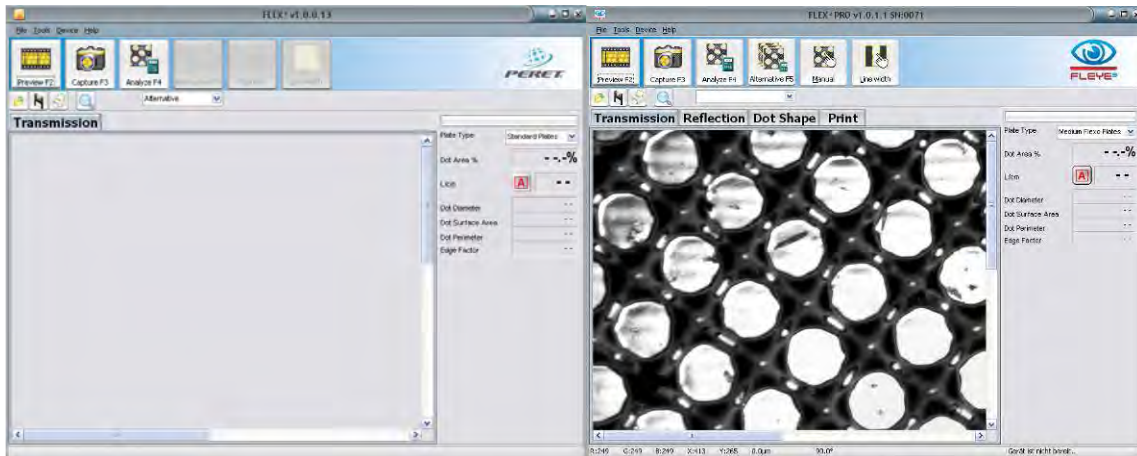


The first time you are running the BETAFLEX PRO software the software will automatically scan for the Device. This can take a few minutes. Please do not interrupt this process.



The actual COM port number is stored permanently in the FLEX3PRO.INI file and recalled the next time you're starting the software.

Click OK to start the BETAFLEX application software



The BETAFLEX software will offer the transmission page only while the BETAFLEX PRO software will also offer 'Reflection', 'Dot Shape' and 'Print' Pages.

If a camera is connected then the software will automatically display the live image in transmission mode. On the right end of the status line there is displayed the device status.

Select your language and unit of measure settings

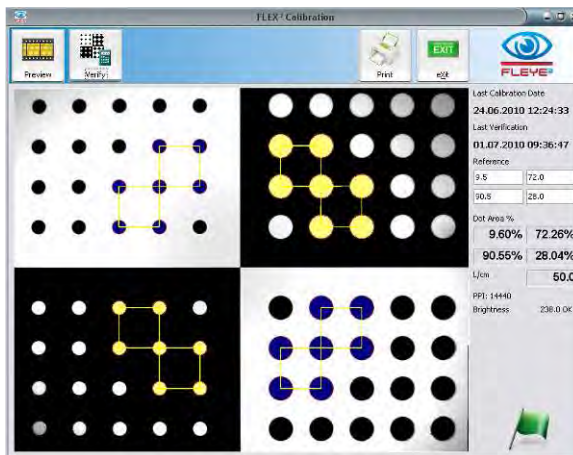
Select File/Settings from the main menu to open the Settings window:



Calibrate the Device

After installing the application software and hardware and before using the BETAFLEX device for the first time it is strongly recommended that you run the calibration process once.

Select Tools/Calibrate from the main menu to start the calibration process. The Calibration window will open. Click the Preview Icon to preview the live image of the BETAFLEX camera. Center and rotate the image of the calibration target as shown below.



A horizontal and vertical red line guide the correct positioning of the calibration target. It is important that the image captured matches the expected image in order to ensure a valid calibration of the system.

Reference values are printed on the calibration target. If the actual reference values displayed differ from the values on your target then type the reference values in the same order as printed into the reference edit fields on the upper right area of the window.



Click the Verify Icon to capture and analyze the image. The image will be analyzed and the actual measured dot areas of the 4 patches will be displayed. The screen ruling will be displayed as well.

The measured dot area values are compared with the reference values and a Calibration Quality Index is calculated.



a green flag icon is displayed, if the index is ≤ 1



a warning icon is displayed, if the index is ≤ 2



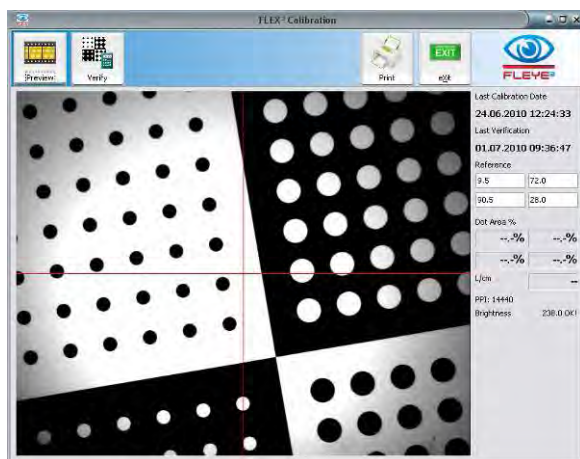
a fail icon is displayed, if the index is > 2 . Check the right positioning of the target and clean the target in this case and restart the calibration process.

On the right top the last calibration (factory calibration) date is displayed next to the last on-site calibration (Verification). The dates are stored permanently as well as the reference values. The next time the calibration process is run the values are re-loaded automatically. The measured PPI (Pixel per Inch) setting is also displayed.

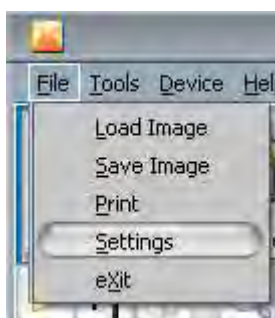
This ensures the highest accuracy of screen rulings and linear measurements.


A report of the current calibration process can be printed.


If the captured image does not match the expected calibration target image because it has been incorrectly aligned, or any other sample is used, then no result will be displayed and no calibration will be performed. This feature prevents accidental corruption of the calibration system values.




Main menu

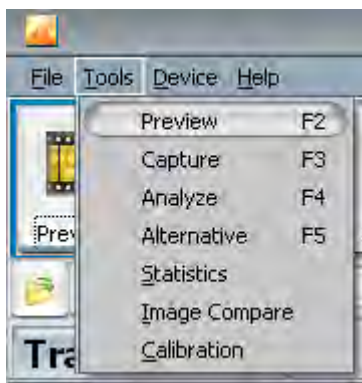


Select **Load Image** or click the File Open Icon  to load a previously saved image into the main window. This image can then be analyzed or printed.

Select **Save Image** or click the Save Icon  to save the captured image to a file in Windows bitmap format (.bmp). The original image which was captured by the BETAFLEX camera is saved without any additional analysis information.

Select **JPG Format** to save the analysis Window for documentation. JPG Images are only for documentation purpose can not be reloaded for analysis.

Select **Print** or click the Print Icon  to open the print window. There are several different types of reports available. Use **Settings** to change the language or unit of measure.



Select **Preview (F2)** from the main menu or click the Preview Icon of the main tool bar to preview the live image of the BETAFLEX camera



Select **Capture (F3)** from the main menu or click the Capture Icon of the main tool bar to capture the displayed image

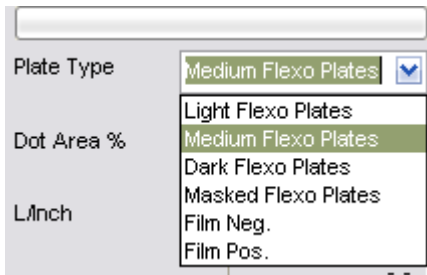
The menu Items Analyze, Alternative, Statistics, and Image Compare will be explained in detail in the following chapters.

- **Analyze** calculates the Dot Area of the captured image and offers a series of possible results
- **Alternative** can be used to step through the alternative result proposals
- **Statistics** can be used to collect subsequent measurement data, calculate Mean, Range, and Standard Deviation, and display a graph
- **Image Compare** is used to compare native images for example;
 - Plate Type A with Plate Type B
 - Ablation Mask with Finished Plate
 - Plate made in one facility with a Plate made in another facility
 - Remade Plate with image of original Plate



The Device Menu gives direct access to the Video Driver and BETAFLEX sensor. This can be used to diagnose problems or to change the shutter speed and gain for very special applications. Use this function with care. Making measurements with non-factory settings can lead to misinterpretation of the measurement result. A restart of the software always resets the parameters back to the factory settings.

Select the Plate Type



There is a drop down list with plate types to the right of the application window. Select Medium Flexo Plates setting for almost all Plates. Select Dark Plates only if the captured image is extremely dark. Select Light Flexo Plates for plate types that are showing an overexposed image with Medium Flexo Plate setting. For other samples such as Film or Ablation Mask, select

the proper setting.



A little white star tells you that the selected Plate Type results in excessively bright images and another plate type could be used to get more accurate results (medium or light in this case).



A little black star indicates that the selected Plate Type creates an excessively dark image and another plate type could be used to get more accurate results (medium or dark in this case).



A little green star tells you, that the selected Plate Type works fine for your plate.

Inside the installation directory you will find 3 text files named as follows:

PLATETYPE0.TXT for light flexo plates

PLATETYPE1.TXT for medium flexo plates

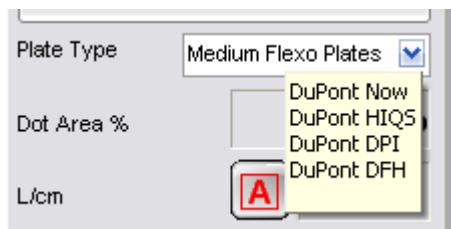
PLATETYPE2.TXT for dark flexo plates.

After the installation these files will contain only a head line with comment. Add lines with plate names to create a help text for the proper plate type.

Move the mouse pointer over the plate type to display the content of the text file assigned to the proper plate file. Use this function to remember, which plate you're going to measure with witch plate type.

Example File content:

```
PLATETYPE1.txt : Medium Flexo Plates
DuPont Now
DuPont HIQS
DuPont DPI
DuPont DFH
```

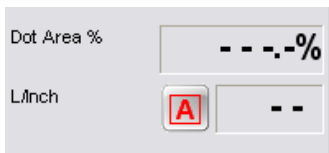


Example help information displayed based on above text file content.

Click on the little green star to open and edit the help file.

Automatic measurement

The BETAFLEX software supports an automatic dot-finding algorithm and screen ruling measurement. Select Preview to display a live image of the sample. Once the patch is in the correct position click Capture to capture an image. Click Analyze to analyze the image and to display the most probable result.



Verify that the screen ruling is set to Auto Detection. An 'A' character is displayed next to the screen ruling result field when Auto Detection is active.

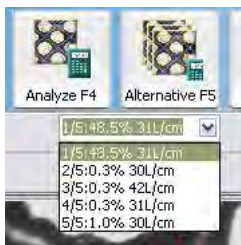
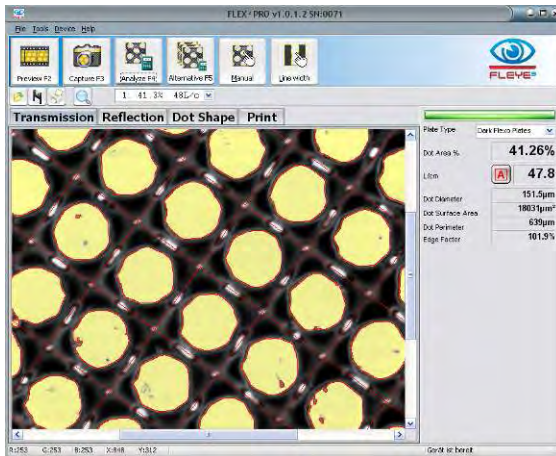
If a different symbol is displayed click on the symbol until the 'A' is displayed.



This symbol is displayed whenever a fixed screen ruling is used to calculate the dot area %.

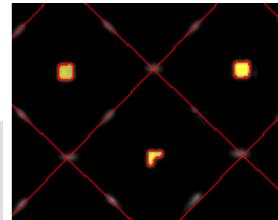
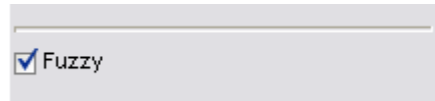
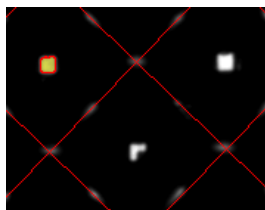


This symbol is displayed whenever stochastic screening analysis is selected. In the case of stochastic screening no screen ruling is calculated.



The Analyze function typically calculates more than one possible result. By clicking the Alternative Icon you can step through the different result proposals. The proposals are listed in the drop down list below the Alternative Icon and can also be selected directly.

The algorithm collects dots that are similar in size, shape, brightness, and other criteria. You can make the sorting criteria less restrictive by selecting Fuzzy.



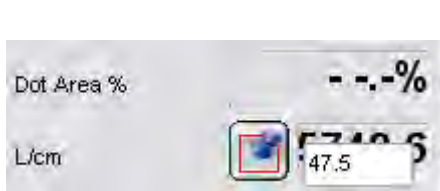
Restrictive sorting on the left side, fuzzy sorting on the right side image.


The measurement results are displayed in the data panel on the right:

- Dot Area % shows the halftone dot area coverage in percentage
- L/cm or L/Inch displays the screen ruling
- Dot Diameter is calculated as the diameter of a perfect circle with the same area as the average area of all detected dots, expressed in microns or thousandths of an inch (mils) depending on the unit of measure selected
- Dot Surface Area displays the average surface area of all detected dots in square microns or square mils
- Dot Perimeter is the average edge length of all detected dots in microns or mils.
- Edge factor is the relationship between the measured edge length (perimeter) of the sample plate and the edge length of a circle of the same surface area drawn with an image resolution of 10 microns per pixel (CtP output resolution 2540LPI). Large dots can result in an Edge Factor value below 100%. This can happen because the TIFF is never perfectly round, while the finishing process of the plate usually smoothes the dot shape.

Measure with pre-set screen ruling

Sometimes the screen ruling is known and can be used to reduce variations in measurement results due to locally different dot distances on the plate.




Click the  Automatic Screening Icon to switch to the fixed screen ruling mode. An edit window will open. Enter the screen ruling value and press the ENTER key on the keyboard.

All subsequent calculations will now use this screen ruling. The fixed screen ruling is active until the screen ruling mode is set to FM or to Auto. After a restart of the software Auto Screen ruling is always active.

The preset of screen ruling enables the cursor size function in the secondary tool bar.



Click the  cursor size icon to enter a fixed dot area percentage value between 1% and 54%. An edit window will open. Enter the value as displayed.



Press enter to confirm the dot area % value. The dot area % result will be displayed at the right side. When moving the cursor over the image then a circle will show the theoretical size of a 30.5% dot inside the fixed screen ruling of 118.2 Lines per Inch in this example.

Manual measurement

Sometimes the automatic measurement will fail or will pick too many or too few dots to perform a valid calculation. In this case the manual measurement system can be used.

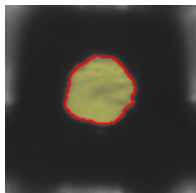
The starting process is the same –

- Preview
- Capture
- Analyze

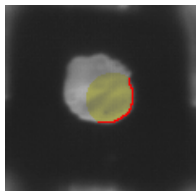


Now click the Manual Icon. The manual dot selection mode will start. The little hand will turn yellow to show that the selection mode is active.

Move the mouse cursor to the center of the dot that should be added to the manual calculation and click the left mouse button.



The selected dot will become highlighted. Continue to select additional dots until all proper dots are selected. At the absolute minimum, three dots directly in line should be selected

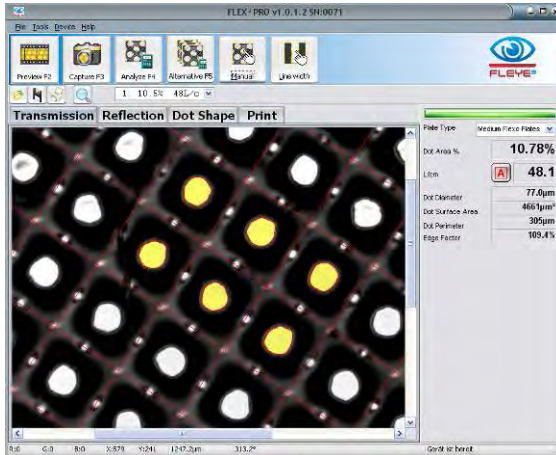


If a dot has been selected in error, click inside the highlighted area again to un-select the dot.

The manual dot detection algorithm is looking for a maximum dot dimension, assuming that you clicked on the dot somewhere near its center. If you click inside a dot too close to the edge, an incorrect result will be obtained, as shown here.

In this case un-select the dot by clicking inside the highlighted area of the dot. Do not try to select the remaining part of the dot by clicking inside the non-highlighted area. This would lead to an additional dot, composed only of the added area. The measurement result will be invalid in this case.

After the Dots are selected, click the Manual Icon again. The result will be calculated and displayed.



At least 3 dots adjacent to each other must be selected to obtain a correct result when using the Automatic or Fixed screen ruling function. Selecting more than three adjacent dots slightly improves the repeatability of the result by averaging more dot locations.

Stochastic screens

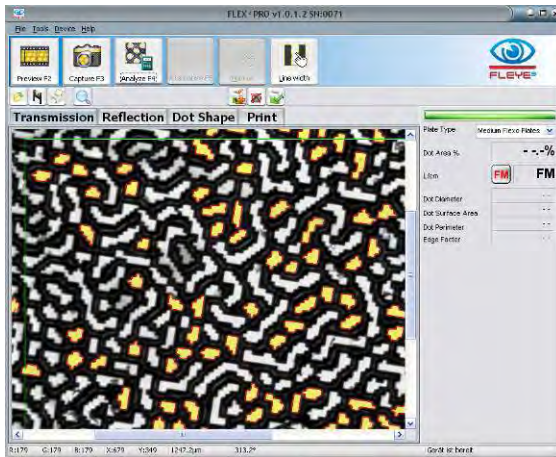
Stochastic screening does not have any regularity in dot location or dot shape. Therefore the system can not determine whether a bright area of the transmission image is part of the printing area, or if it is part of the relief structure.

The BETAFLEX software relies on operator input to achieve a repeatable and accurate result. In order to measure stochastic screening or hybrid screens, follow the procedure outlined below.

Set the software into FM Mode by clicking the screen ruling mode icon until it shows FM.



Select Preview to produce a live image of the sample. Once the patch is in the correct position click Capture to capture an image. Click Analyze to analyze the image and to display a preliminary result.



In FM mode there are three tools available on the secondary tool bar:



The Add Dots Icon adds all selected dots to the global FM result



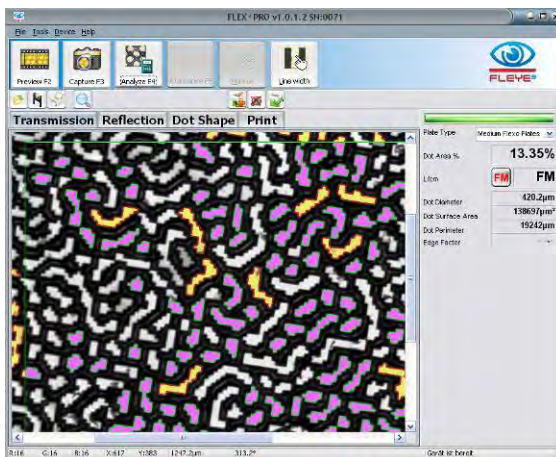
Dot Remove Icon removes one single dot from the global FM result or skips a dot group



Consolidate Analyses Result will calculate and display the final result.

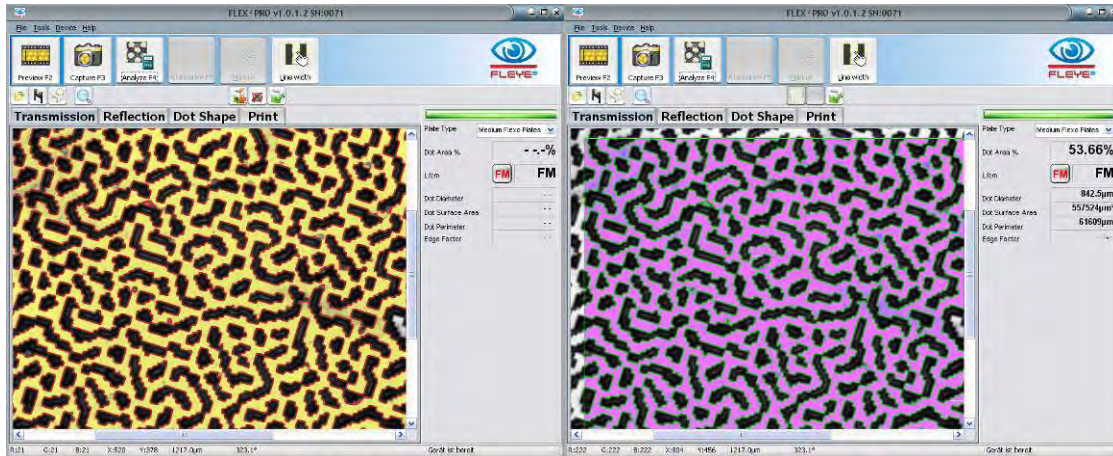
If the proposed result is part of the printing area in case of a highlight patch or part of the non-printing area in the case of shadow patch, then add the selected dots by clicking the Add Dots Icon.

The first result is now displayed.

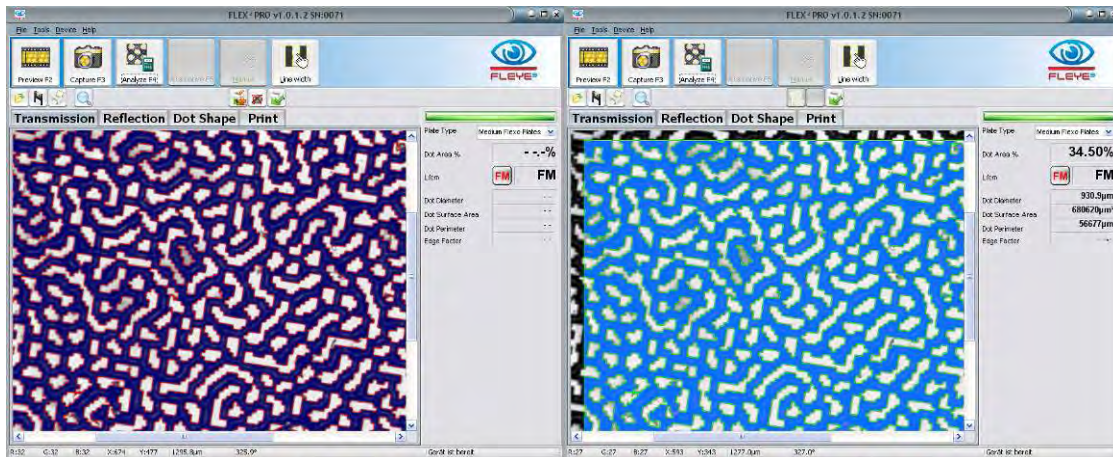


Quick FM screen measurement:

If almost all surface regions (white) are connected to each other, than move the mouse pointer over the surface region and press the left mouse button down. The surface region will now be selected. Click the Add Dots Icon to add the surface region to the result.



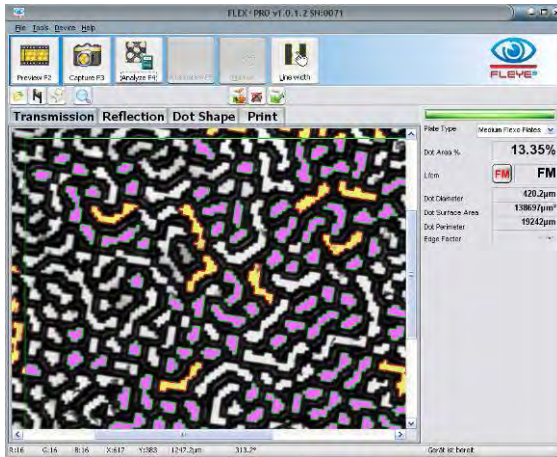
If almost all shoulder regions (black) are connected to each other and no large floor regions (white) are visible, than move the mouse pointer over the shoulder region and click the left mouse button. The shoulder regions now will show selected. Click the Add Dots Icon to add the shoulder regions to the result



In order to maximize inter-instrument agreement between BETAFLEX devices and to improve the absolute accuracy, the BETAFLEX software always picks printing area elements within a constant area of 1.3mm x 0.8mm when in FM Mode.

This area is bounded by a green rectangle. All printing areas inside the rectangle displayed with a light blue tint are part of the FM measurement result. Dots

displayed in yellow are the next **potential** group of dots that may be added to the FM result **if appropriate**.



If additional dot groups are available, the BETAFLEX software automatically prepares a new proposal of the FM result after a dot group has been added. The dots of the new proposal are displayed with a yellow tint.

Click the ADD Icon again to add these dots to the overall result. The Add Icon will be disabled when no more dot groups are available.

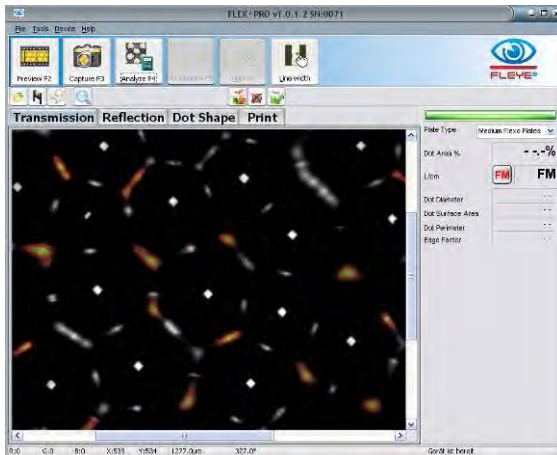


After a few clicks all dots and

regions are added and the FM result can be calculated by clicking the Consolidate Icon.

Skip a proposed dot group and view the next proposal

The relief structure of flexo plates creates images with bright areas corresponding to all areas that are parallel to the base. These areas may include the printing portion of the dots as well as the floor of the plate. BETAFLEX can not independently determine which areas are the dots to be measured. As a result, a proposal may contain portions of the floor that should not be added to the overall FM result:

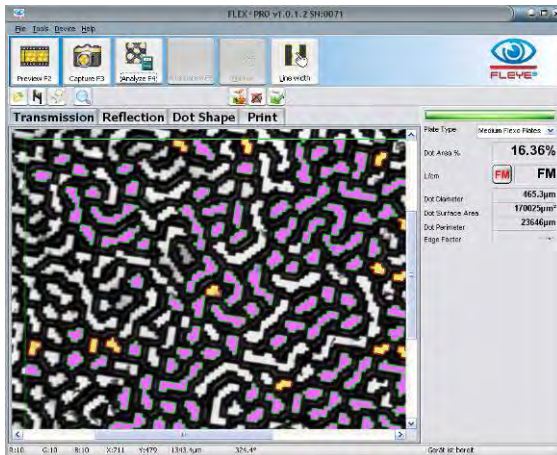


In this case skip to the next proposal by clicking the Dot Remove Icon. The proposal will be removed from the list of proposals.

The next proposal, if any, will be displayed automatically.

Manual selection of a dot group

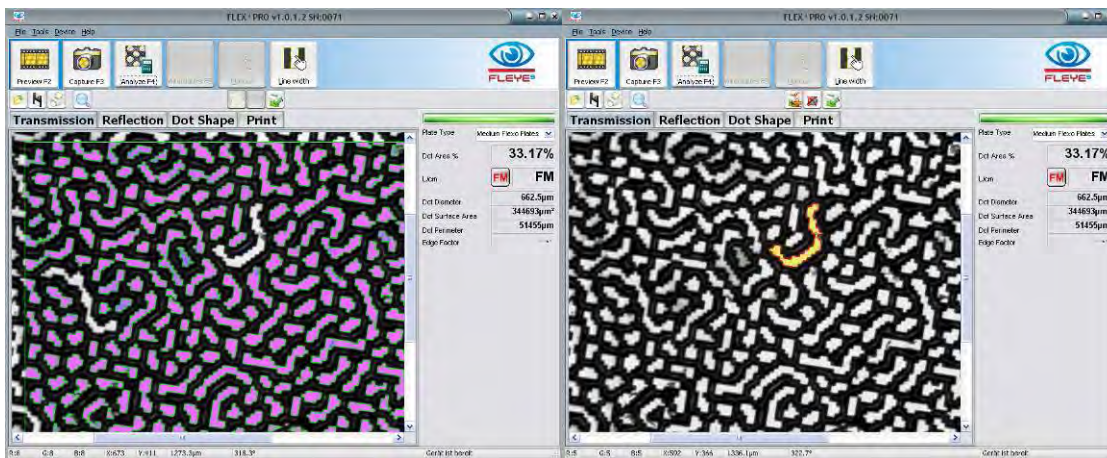
Move the mouse pointer over an object you would like to add to the overall FM result. Press the **right** mouse button down. All dots that are members of the same dot group will be highlighted



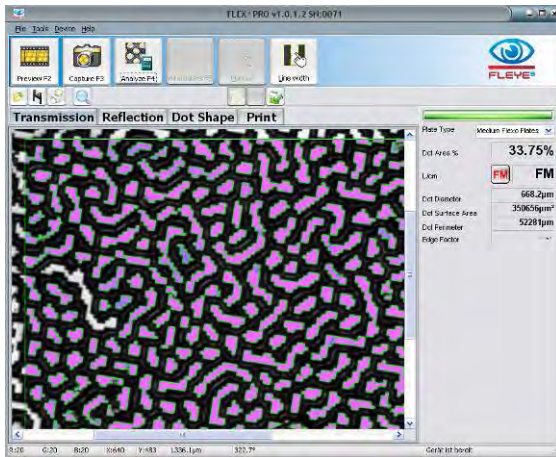
Click the ADD Icon to add the selected dots to the overall FM result.

Add single objects to the FM result

In some cases there will be still single objects left un-selected, because they are unique and are not automatically recognized as members of any dot group. In this case select the object by moving the mouse pointer into the printing area of the object, press the **shift** key of the keyboard and click the **left** mouse button.

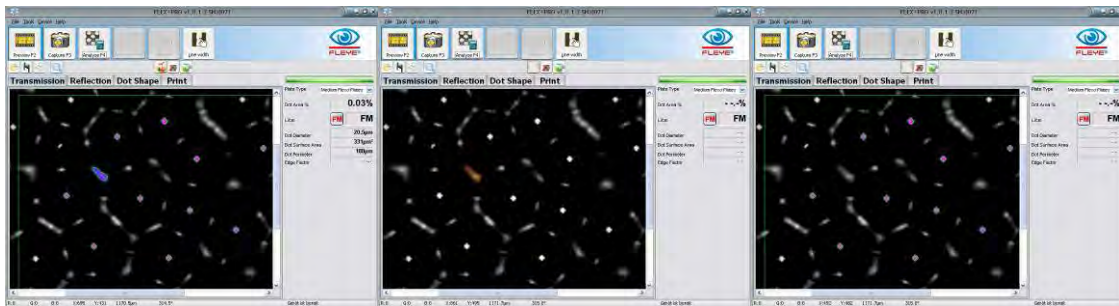


The object is now selected and can be added to the overall result. Proceed in the same way with any other objects to obtain the final result



Remove one single object from the FM result

It may happen that a bright area corresponding to the floor of the plate was erroneously added to the overall FM result and needs to be removed. In this case place the cursor over the object, press and hold the **shift** key on your keyboard, and click the **left** mouse button to select the object:



Click the Dot Remove Icon to remove the object from the overall result.

Line width measurement

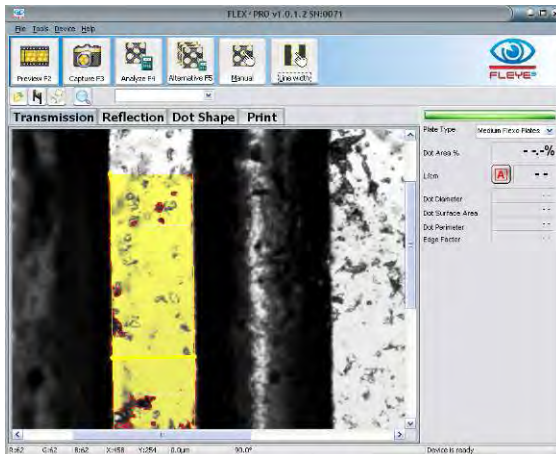
The BETAFLEX software supports a high-precision line width measurement function. The line width measurement calculates the average width of a positive or negative line along a length of exactly 1mm. To measure the width of a line, follow the procedure outlined in the following steps:

- Click Preview to preview a live image.
- Position the Flexo Plate with the line to be measured oriented vertically
- Click Capture



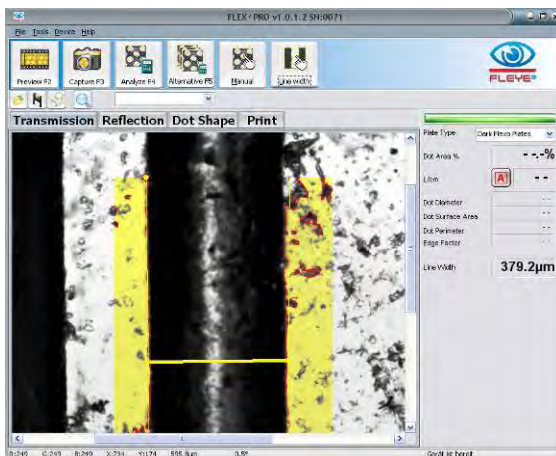
Click the Line Width Icon. The little hand will turn yellow to indicate that the line width measurement mode is active.

In the case of a positive line width measurement, click in the middle of the positive line. The line width function will automatically find the edges of the positive line and fill the corresponding space with a yellow tint. A bold yellow line is placed perpendicularly across the element being measured.



In the case of a negative line width measurement follow the steps outlined below.

- Move the cursor to the area left of the negative line
- Press and hold the left mouse button down
- Drag the mouse across the negative line to the area right of the line
- Release the left mouse button. The line width function will automatically find the edges of the negative line. The area outside the line will be marked with a yellow tint. A bold yellow line is placed perpendicularly across the element being measured.



After each line width measurement the line width mode may be re-selected.

Magnifier Tool

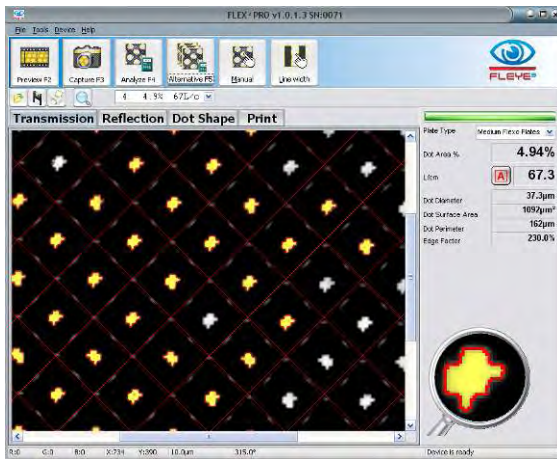
Sometimes it is helpful to be able to see the image in greater detail. The BETAFLEX software offers a magnifier next to the Print Icon on the secondary icon bar.



Click the Magnifier Tool Icon to activate the detail viewer.

- Hardware resolution (preview, and main window)
- zoom x2 – Dot Shape preview and Dot Shape main Window
- Zoom x4 – Transmission, Reflection, Print Window

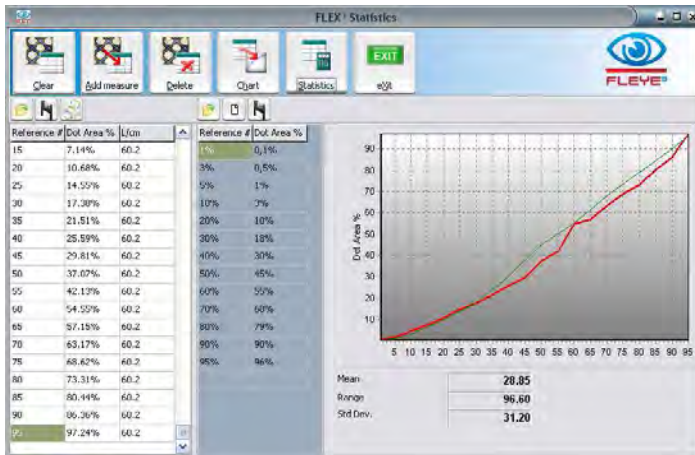
As you move the mouse over the image a 2x magnified view will appear inside the magnifier glass.



Click the Magnifier Tool Icon again to stop the magnification process.

BETAFLEX Statistics

Select the Tools/Statistics Item from the main menu. The BETAFLEX Statistics window will open.



On the left there is a table containing the basic data for statistical analyses.



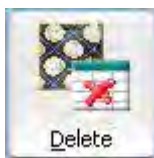
Select Clear to remove all data from the table at the left.



Click ADD measure to add the current measurement to the table. Adding a measurement will set the 'Reference' Column to edit mode. Enter the reference value of the patch and press ENTER on your keyboard. The Statistics window will always stay on top. You can continue to make measurements in the main Window and add these measurement results to the statistics data table. The reference value can be modified by a double click inside the proper cell. Edit the value and press ENTER to confirm the new value.

The function keys of your keyboard can be used to quickly collect measurement data without using the mouse to switch between windows:

- Press F2 to start preview
- Bring the patch in position move the Sensor head down
- Press F4 to capture and analyze
- If necessary press F5 to select next alternative
- Press F6 to add the actual measurement data to the statistic table
- Enter the reference number and press ENTER on your keyboard



Click Delete to delete the selected line or selected lines. Multiple line selection is possible.



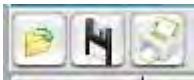
Click **Chart** to draw a graph using the data of the selected lines. If only one line is selected then the entire table will be used.



Click **Statistics** to calculate the Mean, Range, and Standard Deviation of the measurements in the table.

- All measurements in the table are used in the calculation if none, one, or all lines are selected

- Only selected measurements are used in the calculation if two or more lines are selected by clicking and dragging across the lines or Shift+click at the first and last selected line.



The table data can be saved and re-loaded at a later time. Use the File Open Icon, the File Save Icon, and the Print Icon.

Any previously stored curve can be used as a reference for future.



In the middle there is a table containing the Reference Curve data. Re-load the reference curve into the graph by clicking the File Open icon on top of the table. Click the empty Icon to empty the reference curve and type in a new reference curve. Click the save Icon to save the reference curve.

Statistic data is stored into a tab-delimited text file. You can open the file with many other applications like Spread Sheet programs for further analyses.

BETAFLEX Image Comparison

Select Tools/Image Compare from the main menu to open the BETAFLEX Image Comparison window.

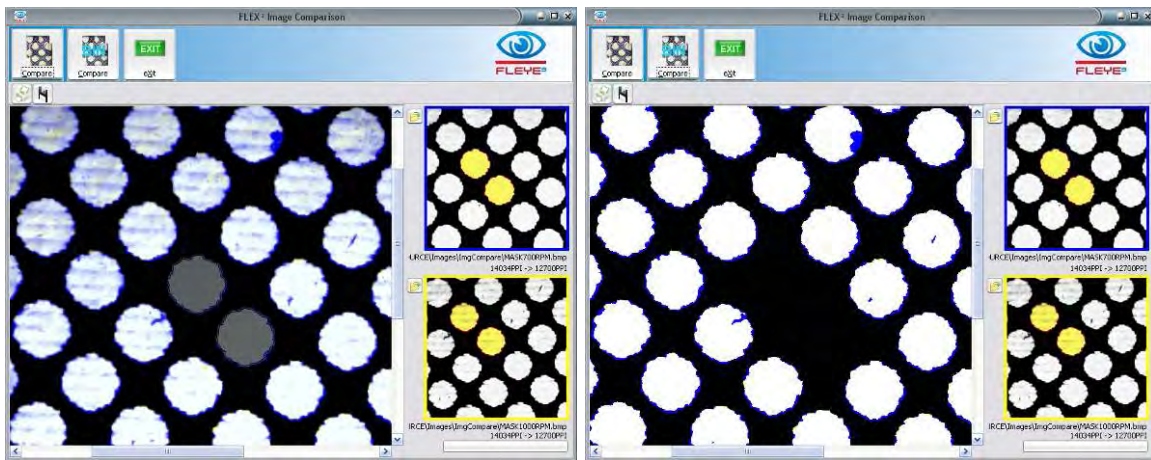
On the right there are two Image boxes, one with a blue frame, one with a yellow frame. Next to each box there is a File Open Icon. Click this icon to load a BETAFLEX image into each box.

Now select two dots adjacent to each other in each image by clicking on the dot centers. On shadow tints select two single holes per image. The four selected dots will be automatically overlaid during the image comparison process. Click the Compare Icon to overlay the two images.

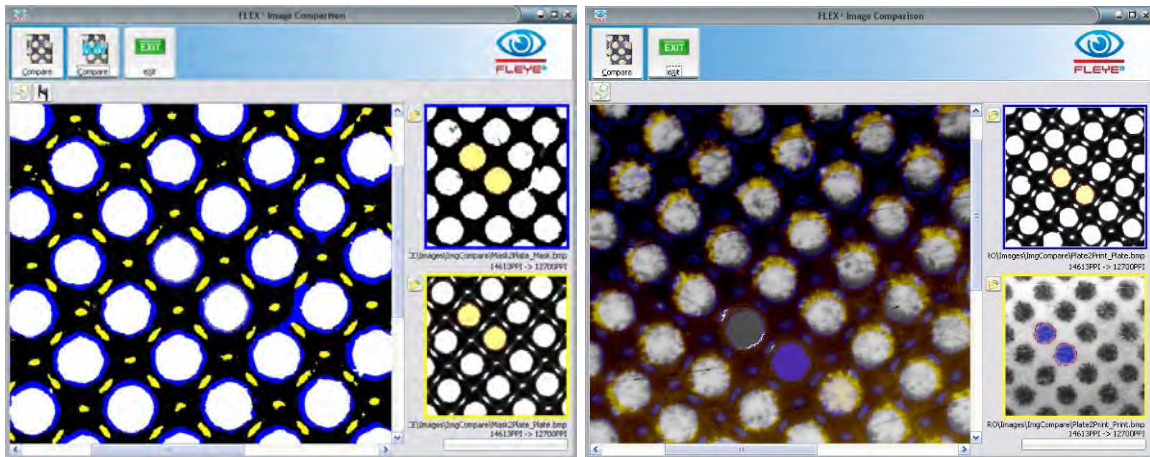
The BETAFLEX software automatically performs the following steps:

- Resize the images to exactly 12700PPI resolution. This makes it possible to compare images captured with two different BETAFLEX devices.
- Adjust Brightness and Contrast such as both images are showing a very similar gray scale.
- Automatically detect the orientation and position of the dots and rotate and move the 'yellow' image accordingly. Differences in screen rulings can be easily detected.
- Display the differences in yellow or blue color tint.

The two source images on the right are framed in blue and yellow respectively. If the overlap image shows yellow, then the yellow framed image has larger dots than the blue framed image. If the overlap image shows blue areas, then the blue framed source image has larger dots. Select BIN Compare to show the difference with high contrast.



Compare Mask with finished Plate to see the dot reduction or plate with print:



The blue areas surrounding the dots means that the blue image dots (ablation mask) are larger, showing the dot reduction between ablation mask and finished plate. Export the comparison image in JPG Format for documentation by clicking the save icon.

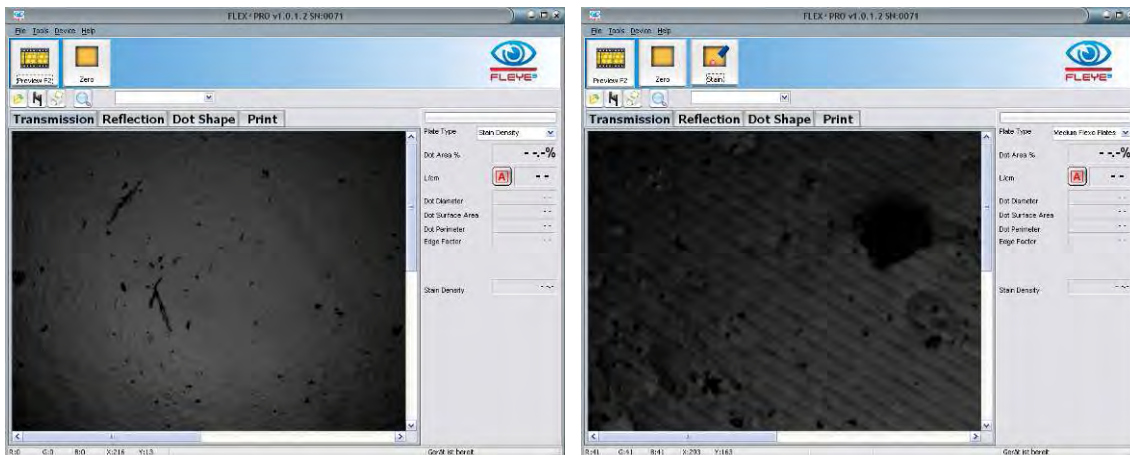
Stain Density measurement

Select the transmission page and select Stain Density from the Plate Type List.

The 'Zero' button on the Tool bar will be available. Now position the aperture on a tape-peeled region of the ablation mask. Move the sensor head down and click Zero.

Now position the aperture on a 100% patch of the ablation mask, move the sensor head down and click Stain.

The stain density is displayed next at the right side. The transmission densitometer function is linear up to a density of 1.00



Print BETAFLEX Reports

Select the Print Icon to print BETAFLEX reports:



The report can be configured to suit your individual needs. Select the information that you wish to be displayed on the report. You can load your company logo image in Windows bitmap format (*.bmp). This logo will then be used until you select a different logo.

You can add two header lines (for example your company name and address) and three footer lines (for example Customer, Plate type, Process parameters, Operator ...)

When you open the print report window the next time, the header and footer text will automatically be loaded.

Click the Print Icon to print the report

Example Report:

FLEX³ REPORT

Peret GmbH
Vahner See Weg 17, 39040 Vahm



Dot Area %	41.26%
L/cm	47.8
Dot Diameter	151.5µm
Dot Surface Area	18031µm ²
Dot Perimeter	639µm
Edge Factor	101.9%
Line Width	--

01.07.2010

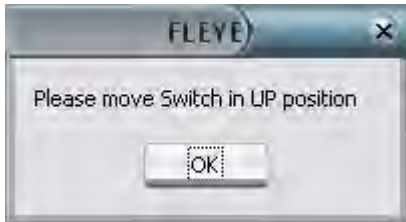
Sample Customer
Sample Order
Sample data

Reflection mode measurement

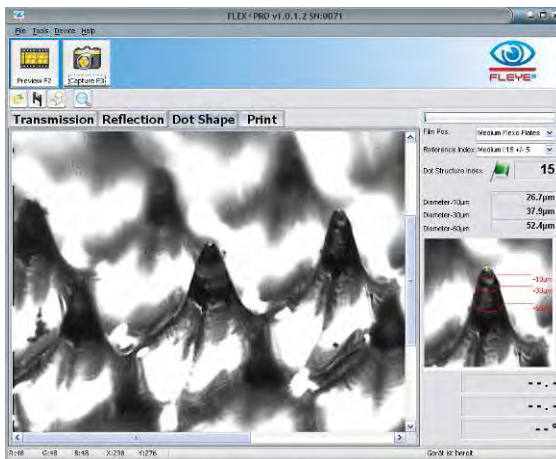
Opaque plates can be measured in reflection mode. The functions available are the same as for the transmission mode. Select the proper plate type before capturing an image.

Dot Shape measurement

Select the Dot Shape Page of the main Window. The device will ask you to toggle the switch in front of the Sensor head



Click preview to display a live image, click capture to capture the image




The dot diameter at different relief levels can be measured and a dot structure index is calculated and displayed.

$$\text{Index} := \text{Normalize} [(\text{Diameter_minus10} + \text{Diameter_minus30} + \text{Diameter_minus60}) * (\text{Diameter_minus60} - \text{Diameter_minus10}) / 50\text{microns}]$$

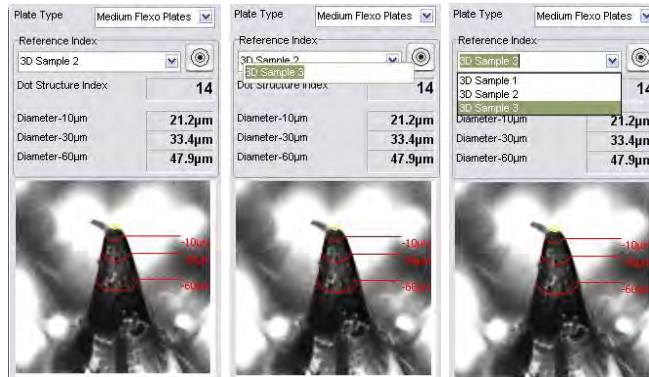
The Index is defined up to a Diameter_minus10 of 100µm. No Index is calculated on larger dots.

Dot Structure Index Reference handling:

The Dot Structure Reference database now is holding the Dot Structure Index, the diameters at 3 levels and the reference dot image as well. Once a reference

dot is measured, click the bull's eye icon next to the reference index list. . Insert the Plate name into the edit field that appears. Press ENTER to add the

actual dot as reference Select the reference from the reference list to re-load the reference numbers and the reference image

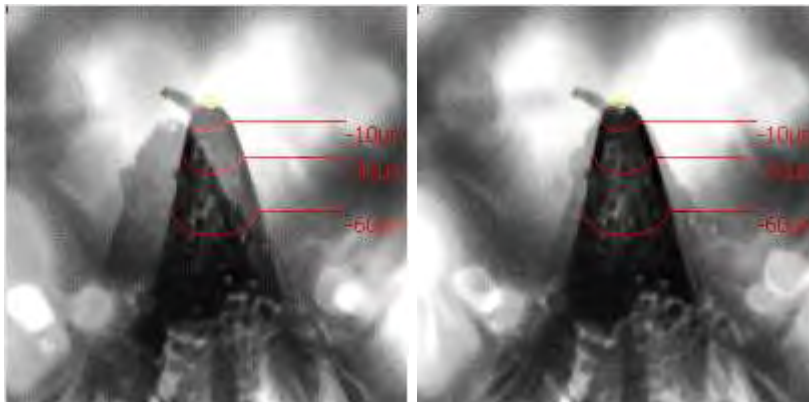


Click on Preview or Capture will always re-load the reference image and data. The green flag / warning / fail icon has been moved to the bottom of the image and will show up as follows:

- Green flag: $\text{abs}(\text{ref}-\text{act}) < 0.6 \cdot \sqrt{\text{ref}}$
- Warning: $\text{abs}(\text{ref}-\text{act}) \leq \sqrt{\text{ref}}$
- Fail: else

Compare shape images of dots:

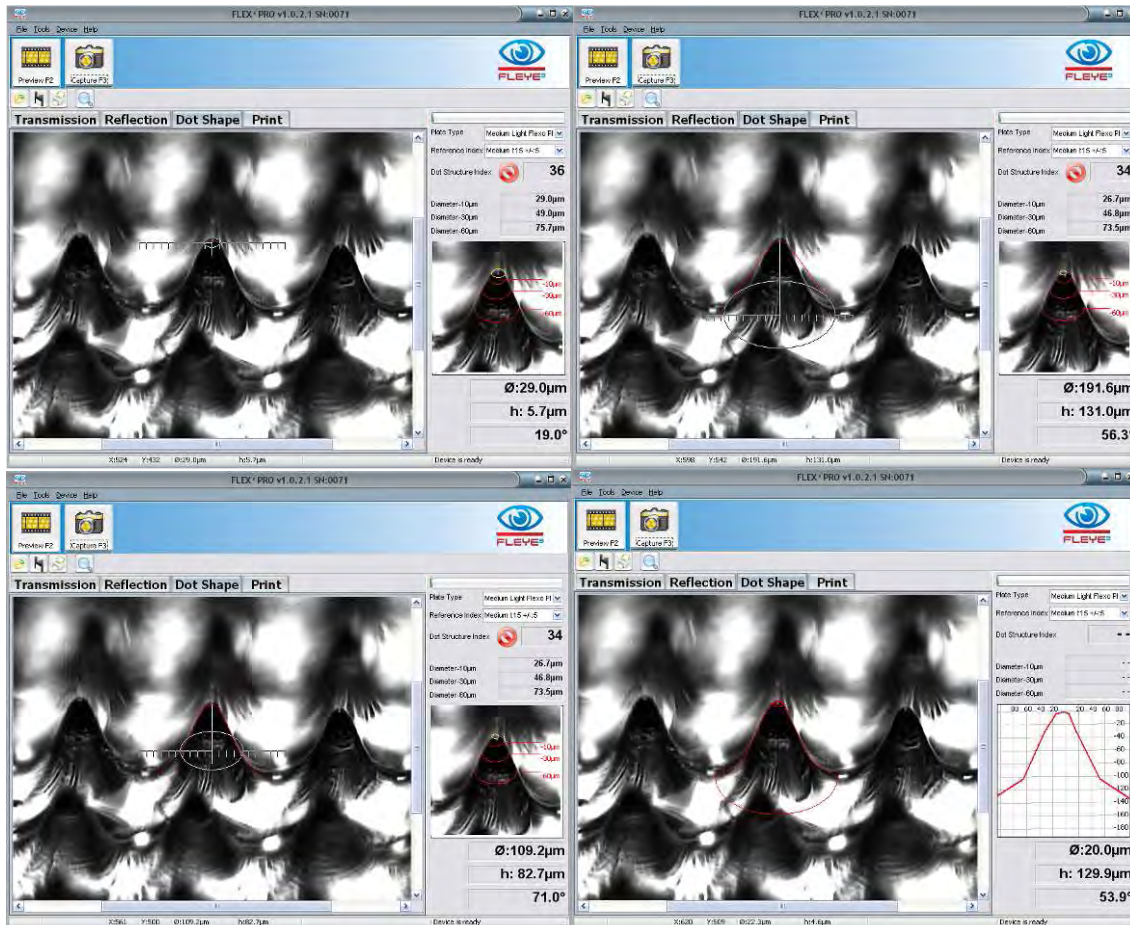
Load the reference image as described above. Now capture a 3D image of the actual plate that you want to compare to the reference dot. Press the CTRL key of your keyboard and keep it depressed while moving the mouse pointer to the top of the dot in the main window. A ghost image is displayed in the reference window. Keep moving the mouse until they are perfectly overlaid



Create a dot cross section

A dot cross section can be obtained on large dots as follows:

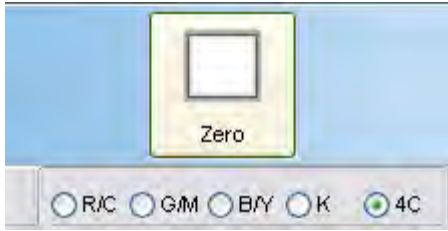
- Move the mouse button into the center of the dot surface and press the left mouse button. Keep the left mouse button depressed until the end of the selection process
- Move the mouse to the right, top, left or bottom and draw an ellipse that will approximate the dot on any possible relief level of the dot.
- Click the right mouse button to confirm the actual coordinates
- Continue to add such coordinates as required.
- Release the left mouse button.



When moving the mouse button across the window with left mouse button depressed, then there will be the diameter of the actual displayed ellipse, the height into the relief, and the angle between start point and actual mouse position.

Measure Print

Select the proper substrate type from the Plate Type List.



After the software installation, and before starting measurements it is necessary to zero the device on your substrate.

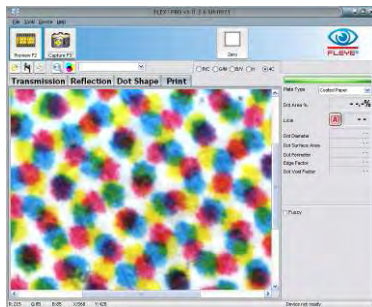
Position a white area of the substrate below the aperture, move the head down and click the Zero Icon. Zeroing takes a few seconds. The zero reference is stored and automatically reloaded when selecting the substrate type.

Select the color you are going to measure:

- R/C : measure a cyan (or blue-shade green) tint percentage patch with red illumination
- G/M: measure a magenta (or red, violet) tint percentage patch with green illumination
- B/Y: measure a yellow (warm green, orange) tint percentage patch with blue illumination
- K: measure a black tint percentage patch
- 4C: capture a multi color image

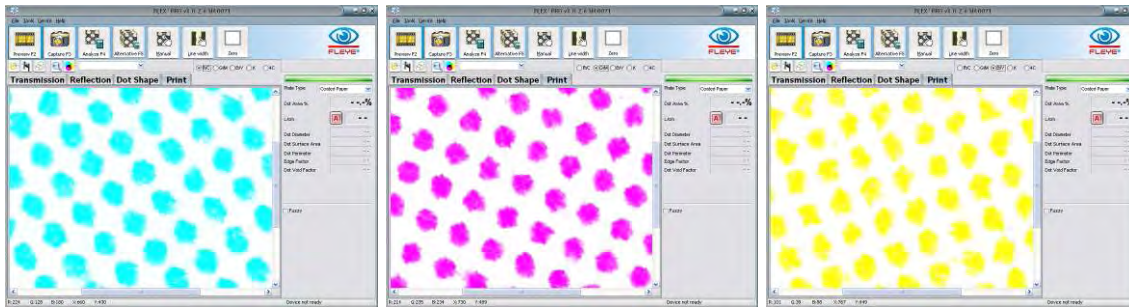
Preview, capture and analyze the image.

Multi color analyses



- Select the substrate type
- Zero on your substrate
- Select 4C from the color's list
- Position the head properly
- Capture an image

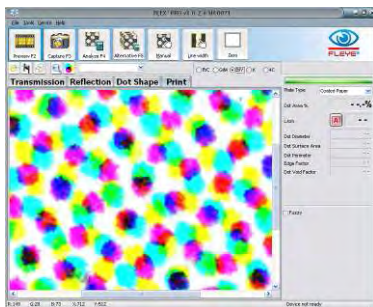
Now click on the color you want to see. The proper color will be separated and displayed:



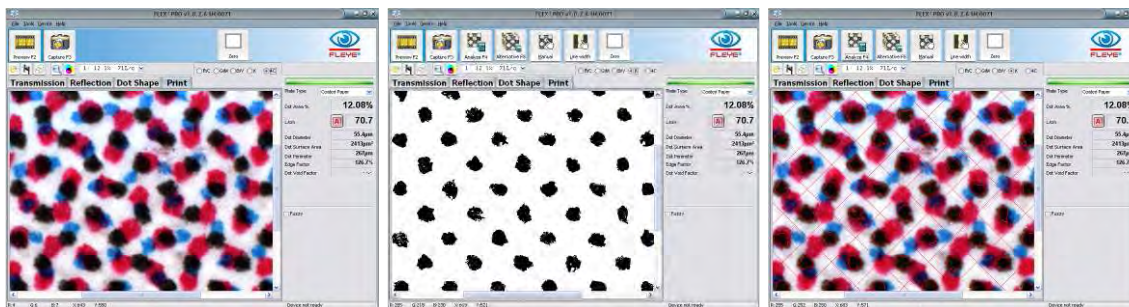
Click **'analyze'** to analyze the separated color.



Click the color contrast icon to display the multi color image with high color contrast.



Black color separation:



Analysis results

Dot area (%)

This is the measurement value most commonly used. It specifies the percentage ratio of the dot area to the cell area. The cell area is assumed to be square. The cell area is therefore given by the distance of the dot to its neighboring dots.

$$\text{Dot area (\%)} = (\text{Average_Dot_Area} / \text{Average_Cell_Area}) \times 100$$

Screen Ruling (Lines/cm, Lines/Inch)

The screen ruling is determined from the mean value of the dot distances. The cell width (pixel) is multiplied by the relevant factors PPcm (Pixel Per cm) or PPI (Pixel Per Inch).

$$\text{Screen ruling (lines/cm)} = (1 / \text{Average_Cell_Width}) \times \text{Pixel_Per_cm}$$

$$\text{Screen ruling (lines/inch)} = (1 / \text{Average_Cell_Width}) \times \text{Pixel_Per_Inch}$$

Dot diameter (μm, mil)

In RIP technology, different dot shapes are used. The Software calculates a virtual circle with the same area as the corresponding dot and uses this to calculate the diameter.

$$\text{Dot diameter (\mu m)} = 2 \times \sqrt{\text{Average_Dot_Area} / \pi} \times \text{Pixel_per_}\mu\text{m}$$

$$\text{Dot diameter (mil)} = 2 \times \sqrt{\text{Average_Dot_Area} / \pi} \times \text{Pixel_per_mil}$$

Dot surface area (μm², mil²)

The dot size reflects the effective dot area in the unit selected (μm², mil²). This measurement result is of interest for those applications where no fixed, defined cell is specified (e.g. Samba screening, Super Cell Technology).

$$\text{Dot size (\mu m}^2\text{)} = \text{Average_Dot_Area} \times \text{Pixel_per_}\mu\text{m}^2$$

$$\text{Dot size (mil}^2\text{)} = \text{Average_Dot_Area} \times \text{Pixel_per_mil}^2$$

Dot Perimeter

The dot perimeter is the average perimeter of all selected dots in μm or in mil.

Edge factor

The entire edge length is relevant for the dot growth of the final print. Many page effects in printing are affected by the edge factor. For this reason, controlling the edge factor is relevant for quality control in the printing industry.

The edge factor is an indicator for the edge length of the dot to the edge length of a round dot with the same area imaged at a resolution of 2540DPI

$$\text{Edge factor} = 100 \times (\text{Average_Dot_Edge_length} / \text{Dot_Edge_Length_2540})$$

Dot void factor

The dot void factor is a measurement value for the coverage of a dot with color. The low density areas inside the dots are measured and put into relation to the entire dot area applying the following formula:

$$\text{Dot void factor} = 100 \times \text{Average_DotVoid_Area} / \text{Average_Dot_Area}$$

