

FLEX³ / FLEX³PRO preliminary user manual v5.x

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Introduction

Congratulations! You have just acquired the portable Flexo Plate Reader FLEX³PRO manufactured by PERET GmbH. This device is the optimum tool to control transparent Flexo plates of all types or DLE elastomeric plates 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 FLEX³ 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 FLEX³PRO hardware and software. Future enhancements or modifications are reserved.*

Safety Instructions

Warning

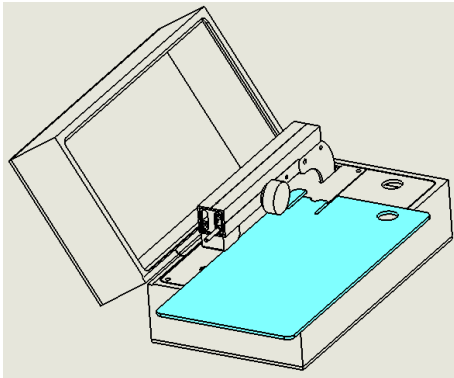
For safety reasons, it is absolutely necessary to read through the user's guide and all of the instructions it contains.

General safety rules

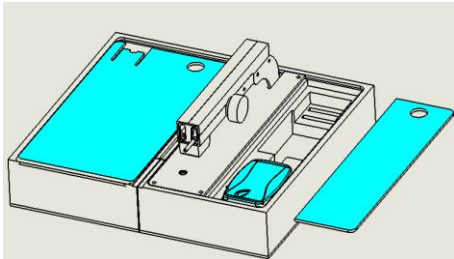
If the safety recommendations and instructions in this User Guide are not complied with, measurement errors or data loss or physical injury or property damage may result

- FLEX³ is not intrinsically safe. Therefore, the device cannot be used in an environment with explosive vapors where there is a risk of spark ignition.
- FLEX³ may not be used in an area with strong electromagnetic fields.
- Use the FLEX³ in ambient temperatures between 10°C (50° F) and 40°C (104°F), and do not expose the FLEX³ to direct sun light.
- Neither the FLEX³ Sensor nor the FLEX³ 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 FLEX³ should only be used by trained personnel
- The FLEX³ should only be used on dry measurement objects.
- The FLEX³ 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 FLEX³ casing can be cleaned with a dry cloth.

Unpack the Device

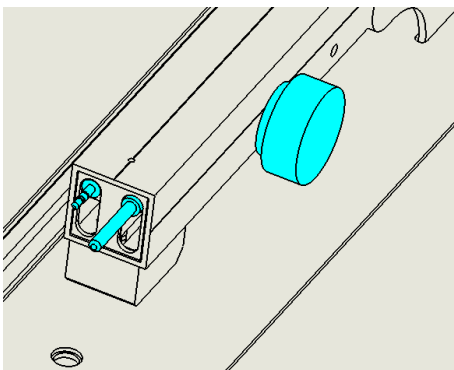


Open the device box and remove the large Plexiglas cover by sliding it to the front.

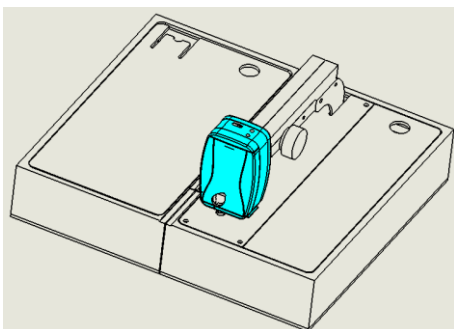


Put the large Plexiglas cover into the cover of the device box as outlined in the image to the left. Now remove the small Plexiglas cover on the right side and take out the sensor, the software, the manual and the calibration target

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

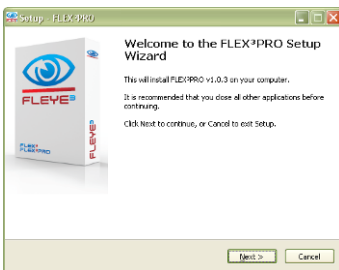
Start your Computer and wait until all boot processes have terminated and your computer is ready to operate. Verify that you have Windows Administrator File Permissions. **Do not plug the USB cables in at this time.**

Plug the FLEX³ USB Memory Stick into a free USB Port and wait until Windows has recognized and registered the USB Stick as a Mass storage Device.

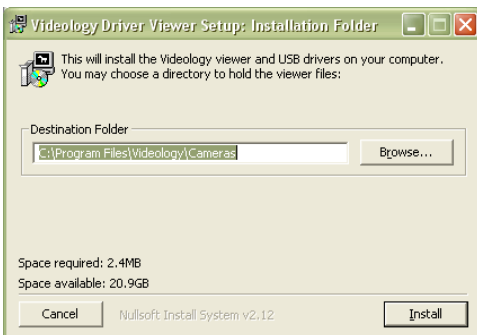
Install the FLEX³ software

The USB Memory stick contains a setup utility '**setup FLEX3.exe**' or '**setup FLEX3PRO.exe**', which can be run to install the FLEX³ Software on your PC.

Run the setup utility and follow the instructions.



Before termination the video driver installer will automatically be started. Click **INSTALL**.



Wait until the installation of the driver is finished.

Now connect the black USB cable to a free USB2.0 port. Windows will automatically detect the driver and assign it to the device.

Now connect the gray USB cable to a free USB port. Windows will automatically detect the VCP driver and assign a COM port to the device. The COM port has to be COM1 to COM8. If a COM port higher than that is assigned, follow the procedure described in chapter "Manual Installation of FLEX³PRO Driver".

There is a fully functional demo installation including sample images available in the USB stick folder '**RUN DEMO**'. It runs independently of installing the software or hardware and can be helpful for training and demonstration purposes.

Manually install the camera driver

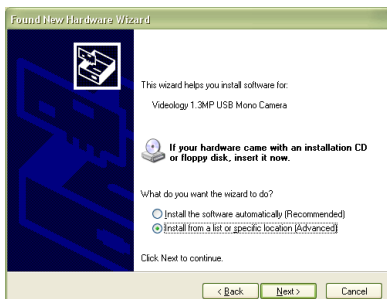
Administrator rights are required for the driver installation on your computer.

The FLEX³ is equipped with a single USB connector, while the FLEX³PRO has two USB connectors.

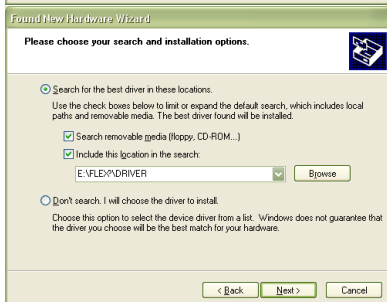
Connect the USB connector of the FLEX³ Sensor or in case of FLEX³PRO the **black** USB connector to a free USB2.0 port of your computer



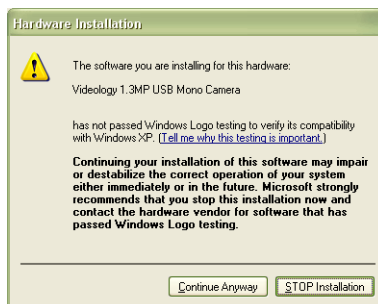
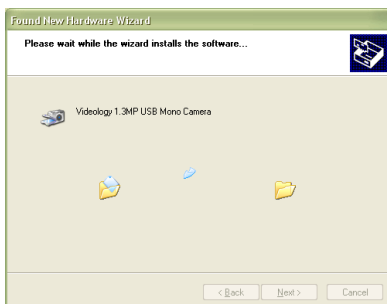
Select '**Not at this time**' and click next



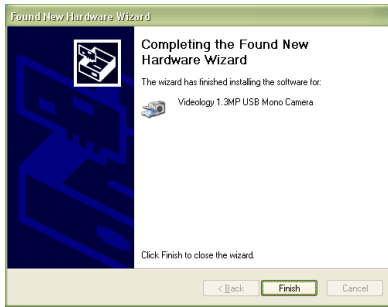
Select '**Install from a list or specific Location**' and click next



Browse to and select the \DRIVER subdirectory of the FLEX³ USB Stick. Click next



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



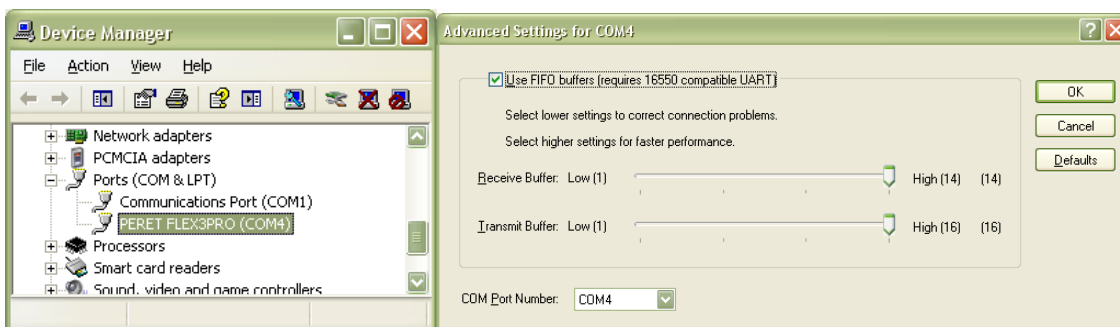
If the driver Installation fails for any reason, unplug the black cable of the FLEX³ device from the USB Port and run the wipcam.exe utility in the \DRIVER directory of the FLEX³ USB Memory Stick. This utility will clean up your PC and make it ready for re-installation of the driver. Before re-installing the driver you need to reboot your PC.

Manually install the FLEX³PRO driver

If you have a FLEX³PRO device now connect the gray USB connector to a free USB port. Follow the steps as described above. The directory holding the FLEX³PRO 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. For example; C:\PERET\FLEX3PRO\DRIVER\FLEX3PRO

The FLEX3PRO Driver supports COM1 to COM8. 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 on the Control Panel.
- Double-click the System icon.
- On the Device Manager tab, double-click Ports (COM & LPT).
- Double-click the communications port, FLEX³PRO. This opens the Communications Port Properties window.
- Click the Port Settings tab
- Click Advanced
- Select a COM port between COM1 and COM8



Manually install the RELIX digital indicator driver

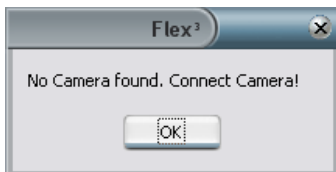
Connect the USB cable of the RELIX to a free USB port. Windows Update will automatically find the driver. In case the driver can not be installed automatically follow the steps as described above. The directory holding the RELIX driver is located in the \DRIVER\RELIX subdirectory of the USB Stick.

Run the application

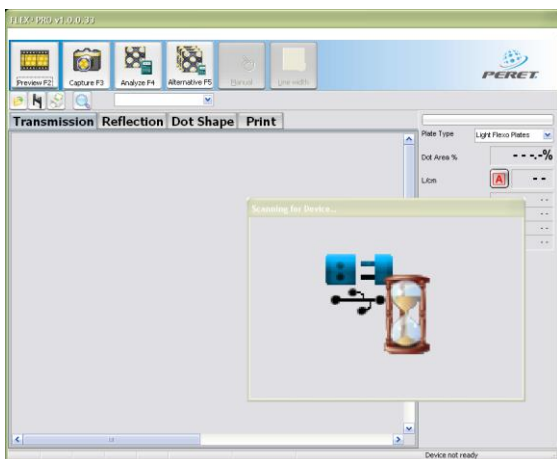
- Launch the FLEX3.exe or FLEX3PRO.exe or,
- Click the FLEX³ Icon or FLEX³PRO on your desktop or,
- Run the FLEX³ from the Windows Start Menu



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

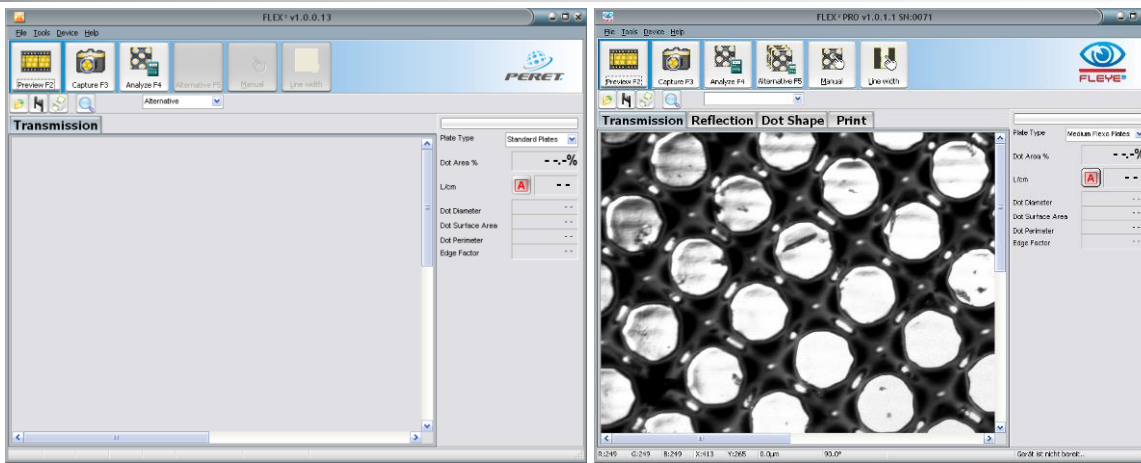


The first time you are running the FLEX³PRO software the software will automatically scan for the Device. This can take a few minutes. Please do not interrupt this process.



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

Click OK to start the FLEX³ application software.



The FLEX³ software will offer the transmission page only while the FLEX³PRO software will also offer 'Reflection', 'Dot Shape' and 'Print' Pages.

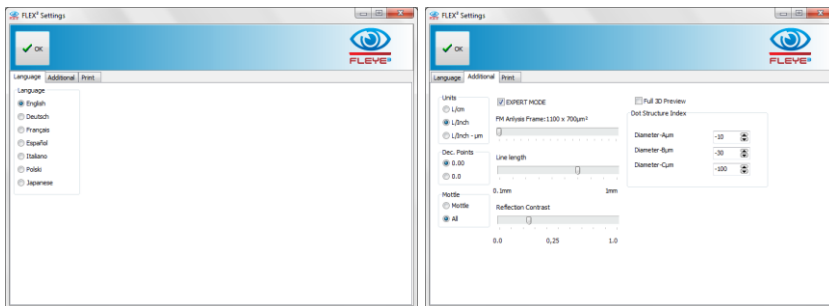
If a camera is connected then the software will automatically display the live image in transmission mode. The device status is displayed on the right end of the status line at the bottom of the frame.

Position the flexo plate below the sensor. Lower the Sensor head until it is in contact with the plate surface by rotating the black wheel on the right hand of the measurement lever. A sharp image will be displayed.

Configure the software according to your needs

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

- Select language



- Units
 - L/cm
 - L/Inch
 - L/Inch - µm

Select L/cm to get measurements in metric system, select L/Inch to get measurements in Inch and mils, select L/Inch-µm to get Lines per Inch and other measurements displayed in µm (microns).

- Dec. Points
 - 0.00
 - 0.0

Select the number of the decimal points you would like the dot area measurement to be displayed with.

- Mottle
 - Mottle
 - All

Select All if in addition to the standard Mottle value you would like to display also ISO Graininess and Coverage and to get the visual simulation after a mottle measurement.

- PRINT Mode White LED usage for <W>hite Mottle analysis

The white mottle can be measured in reflection using RGB Led's or using White LEDs. Select which measurement method you would like to be used.

FM Analysis Frame: 1100 x 700 μ m²



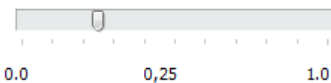
In FM Screening there is no real cell size available that could be used to calculate a dot area % value. Therefore the dot area % is calculated based on a fixed area of view by measuring the area of all printing dots and comparing it to the total area. Use FM Analysis Frame ruler to set the size of the FM area. Make sure you are always using the same area size within one measurement application.

Line length



Line width is measured as the average width of the line over a defined length. For high repeatability and accurate measures it is essential that the length of the line segment used to calculate the line width is constant. Set the length of line you would like to use by moving the ruler to the proper position.

Reflection Contrast



Plates that are measured in reflection mode often are showing low contrast. The Reflection Contrast ruler can be used to optimize the contrast for a plate type. The contrast setting is saved permanently such as the plate type will always be measured with the same setting.

Full 3D Preview

Select Full 3D Preview to show the full preview image. If Full 3D Preview is checked the refresh rate of the Preview will slow down.

Dot Structure Index

Diameter-A μ m	-10	⬆️
Diameter-B μ m	-30	⬆️
Diameter-C μ m	-100	⬆️

The dot structure Index is calculated based on three diameters of the dot at three different depth levels. You can set your own levels by modifying the proper values in the setting menu. Do not change these default values if you plan to communicate Dot Structure values to other users.

Default Window Size

The Software does save the most recent size and position of the main Window and will reload this setting at the next program start. In some cases, especially in dual screen applications this could lead to problems with the GDI32.DLL Driver of Windows. Select 'Default Windows Size' to force the application to start always in the left top corner with standard size.

STAIN Zero Brightness calibration

Select this Item to enhance the dynamic range of stain density measurements by auto calibrating the brightness during the zeroing process. This helps to measure Stain density on thick plates with low transmission.

EXPERT MODE

Select EXPERT Mode to get access to all EXPERT Mode Function.

If EXPERT MODE is checked some additional special functions for special applications are enabled.

Special functions include:

Fuzzy Max BR SMOOTH Surface

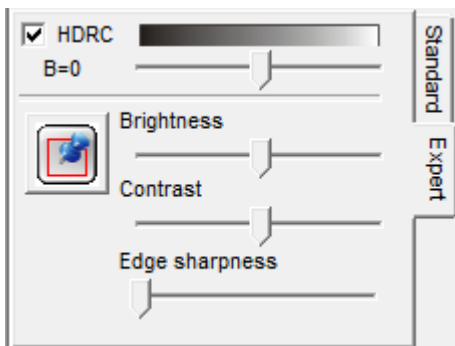
- Fuzzy to measure dots with higher variation in size in transmission mode
- Max BR to measure boost the brightness for grainy surfaces in transmission mode
- SMOOTH to apply a noise filter on grainy surfaces in transmission mode
- Surface to measure Dots with Surface Structure in transmission mode

Fuzzy Max BR SHARP

- Fuzzy to measure dots with higher variation in size in reflection mode
- Max BR to measure boost the brightness for grainy surfaces in reflection mode
- SHARP to apply a sharpness filter on smooth images showing few details in reflection mode



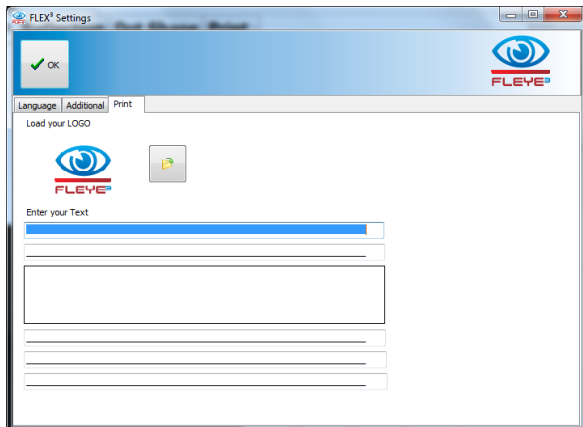
- Manual adjustment of LED Brightness in transmission and reflection mode
- Image Brightness/Contrast slider in transmission and reflection mode.



- HDRC (High Dynamic Range Capture) available in Dot Shape mode
- Manual adjustment of LED Brightness in in Dot Shape mode
- Image Brightness/Contrast slider in Dot Shape mode
- Edge sharpness slider in Dot Shape mode
-
- Line quality information displayed at line width measurement
- HD-Flexo contrast image display in transmission mode

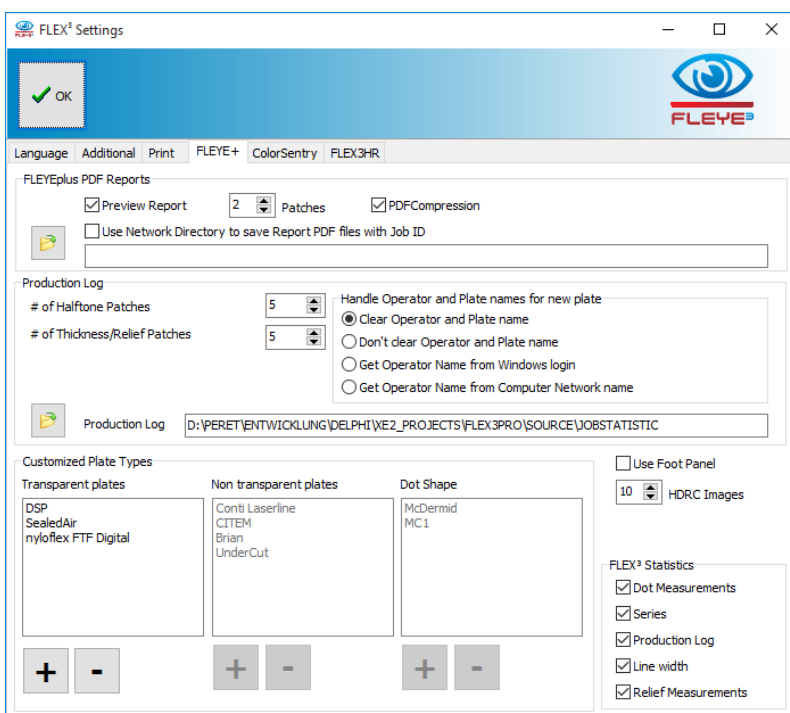
Changing the LED Brightness, the image brightness and contrast settings, the Density Threshold, Maxbr, Surface, Fuzzy, Sharp and Smooth will have an impact on measurement results!

It is recommended to leave the EXPERT MODE unchecked. These special functions are not needed in most cases. Manual adjustment of analysis parameters may lead to different measurement results.

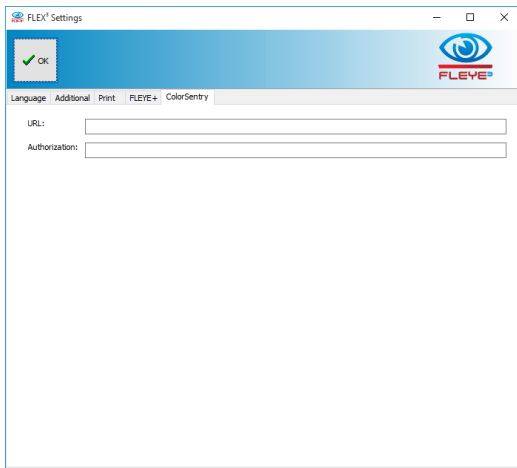


- Change default Print Layout Settings (head lines, foot lines, Logo) permanent.

In case the software module FLEYEplus is active there will be an additional page offering settings for the FLEYEplus report, the ProductionLog function. There will also be a possibility to configure customized plate types. For details see the FLEYEplus manual.



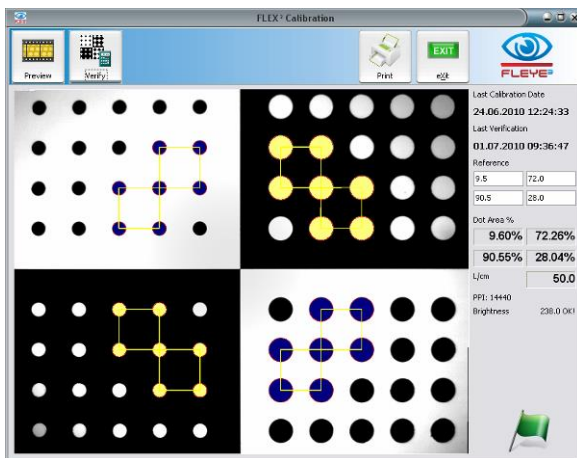
If the function Colorsentry is active there is available the colorsentry page. Enter the sever URL and the Authorisation key here



Calibrate the Device

After installing the application software and hardware and before using the FLEX³ 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 from the FLEX³ camera. Center and rotate the image of the calibration target as shown below.



A horizontal and vertical red line are superimposed on the image to 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 reference values displayed on screen 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. This might occur if a replacement target is issued.



Click the Verify Icon to capture and analyze the image. The image will be analyzed and the actual measured dot areas of the four 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



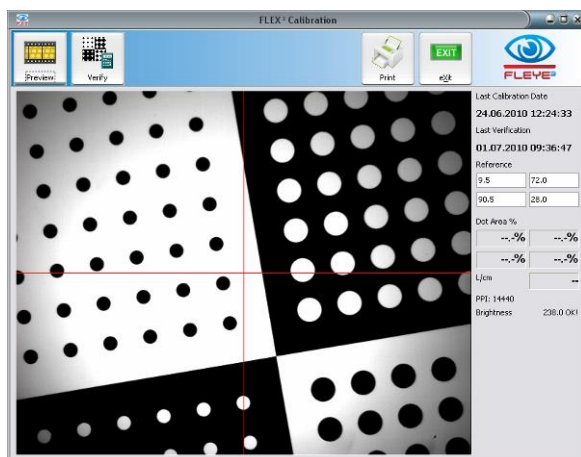
A fail icon is displayed if the index is > 2 . Check the positioning of the target and clean the target in this case and restart the calibration process.

In the top right corner of the calibration report 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.

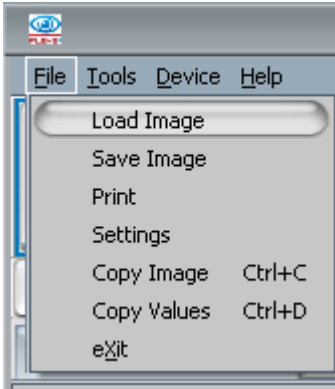
This ensures the highest accuracy of screen rulings and linear measurements.


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 or .png). The original image which was captured by the FLEX³ camera is saved in high resolution, suitable for re-analysis.

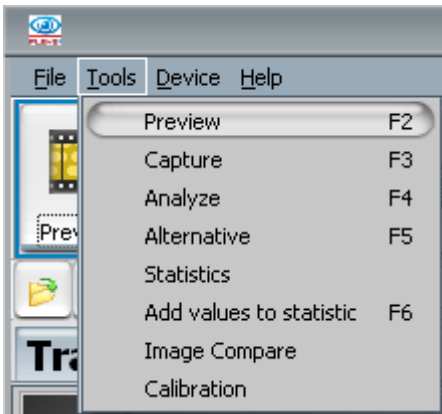
Select **JPG Format** to save the analysis Window for documentation. JPG Images are only for documentation purpose can not be reloaded for analysis. A data panel is added to the image with measurement results.

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 **Copy Image** or press CTRL+C to copy the actual displayed image into the Windows clipboard

Select **Copy Values** or press CTRL+D to copy the actual measurement values into the Windows clipboard.



Select **Preview (F2)** from the main menu or click the Preview Icon of the main tool bar to preview the live image of the FLEX³ camera



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

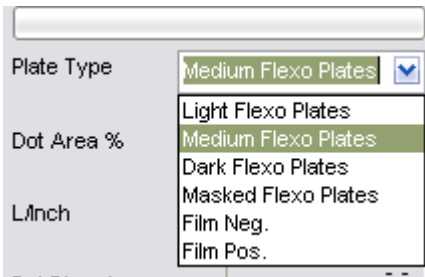
The menu items Analyze, Alternative, Statistics, and Image Compare will be explained in detail in the following chapters.

- **Analyze** calculates the Dot Area of the captured image and offers a series of possible results
- **Alternative** is used to step through the alternative result proposals
- **Statistics** is used to collect subsequent measurement data, calculate Mean, Range, and Standard Deviation, and display a graph
- **Add values to statistic** is used to copy the actual measurement values to the statistics.
- **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 FLEX³ 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 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 small white star indicates that the selected Plate Type resulted in an excessively bright image and another plate type should be used to obtain more accurate results (medium or light in this case).



A small black star indicates that the selected Plate Type resulted in an excessively dark image and another plate type should be used to obtain more accurate results (medium or dark in this case).



A small green star indicates that the selected Plate Type works fine for your plate.

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

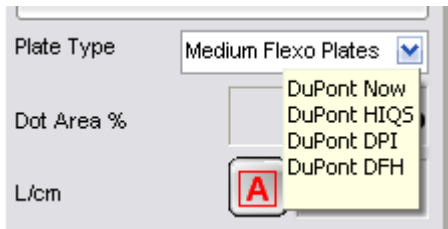
PLATETYPE0.TXT for light flexo plates
PLATETYPE1.TXT for medium flexo plates
PLATETYPE2.TXT for dark flexo plates.

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 which plate type.

Example File content:

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

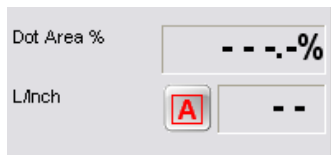



Example help information displayed based on above text file content.

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

Automatic measurement

The FLEX³ 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.



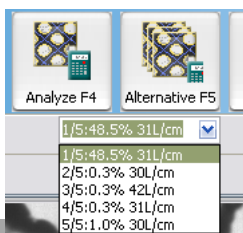
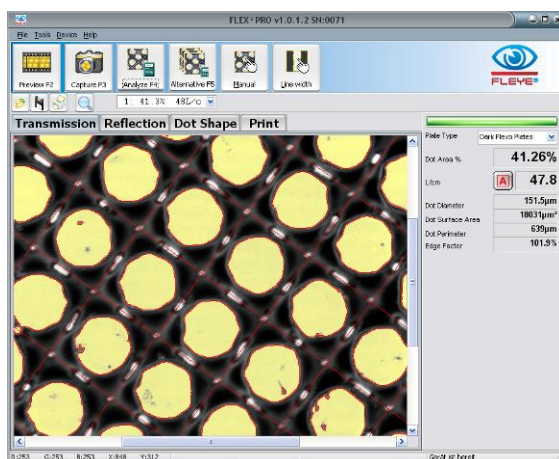
This symbol is displayed whenever a fixed screen ruling is used to calculate the dot area %.



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



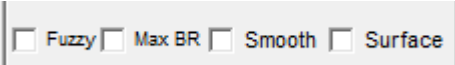
HD is a special FM mode function where only round areas are considered to be printing areas.



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.

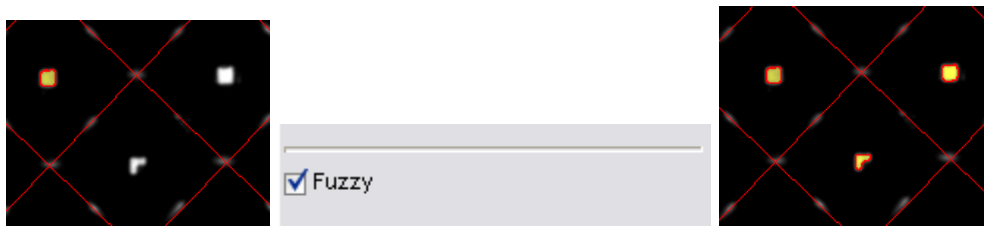
Configure the analysis algorithm

There are a couple of parameters that can be configured to optimize the dot detection and dot clustering.



Fuzzy Setting

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



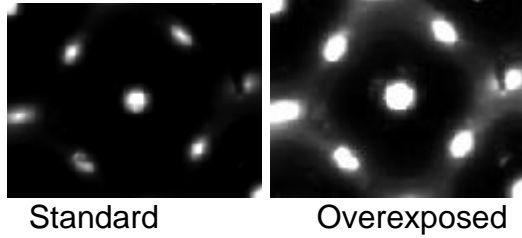
Restrictive sorting on the left side, fuzzy sorting on the right side image.

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.

Max BR Setting

This setting can be used to temporarily overexpose the image. Be aware, that measurements performed using this setting can not be compared to any other measurements taken with Max BR off.

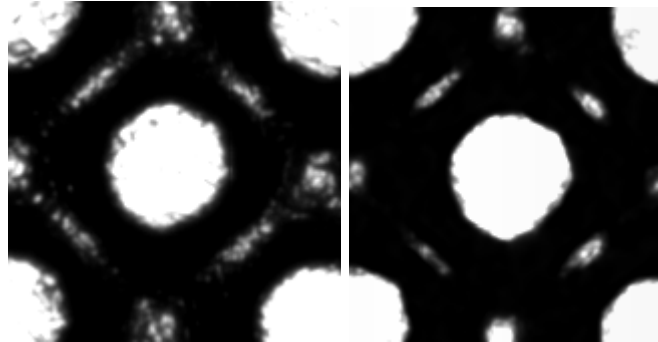


Standard

Overexposed

Smooth Setting

The smooth setting is applying an FFT noise filter to reduce surface noise and noise at the surface edge before performing the dot size analysis



No Filter

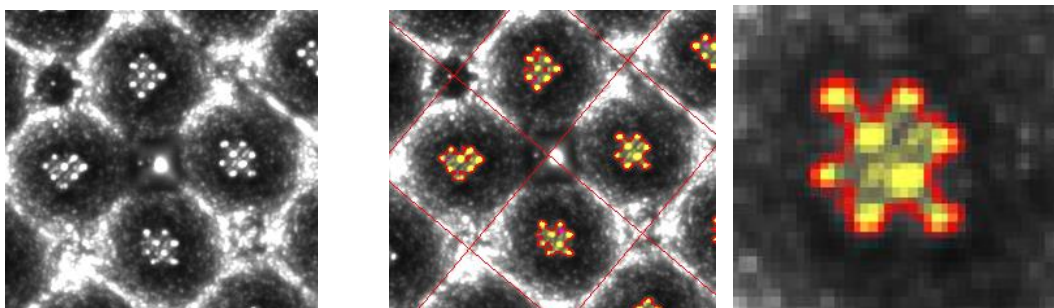
Noise filter

Surface Setting

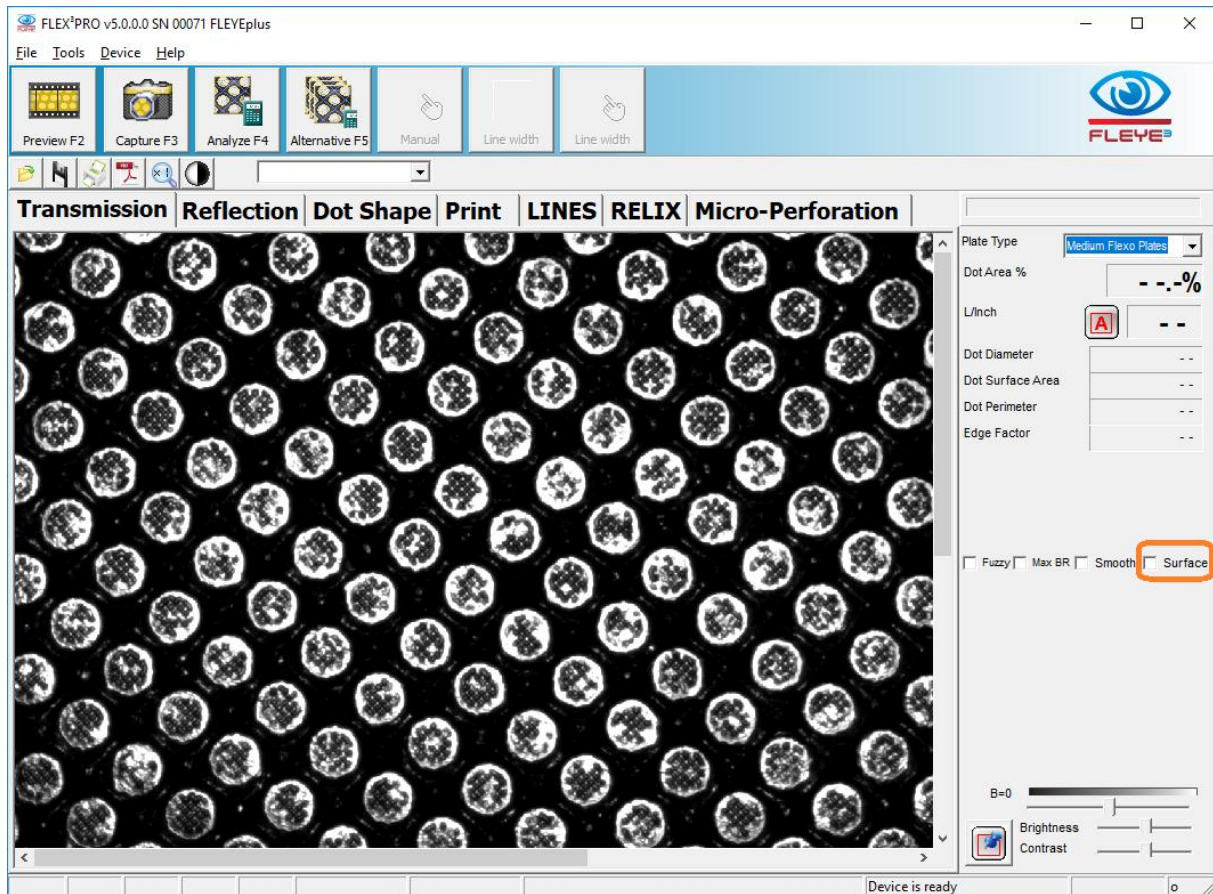
The new surface structure technologies are creating textures in the printing area of a dot. These can be seen as tiny lines or cells with gray inside the surface of a dot.

Version 4.x measures the dots with surface structures using the following approach: (1) slightly overexpose the plate such as the surface structure becomes almost invisible. (2) add black cells to the surface area if they are totally surrounded by a flat surface ring.

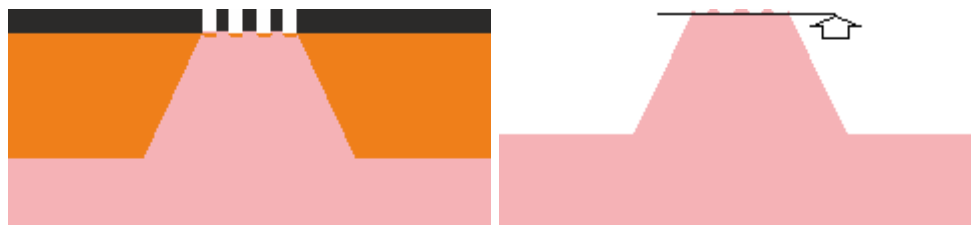
Version 5.x implements an improved algorithm that detects the surface structure lines and cells and includes the structures and the space between them as part of the printing dot area.



The dot area is the total area inside the OUTERMOST red boundary enclosing all spots as this is the area intended to transfer ink.

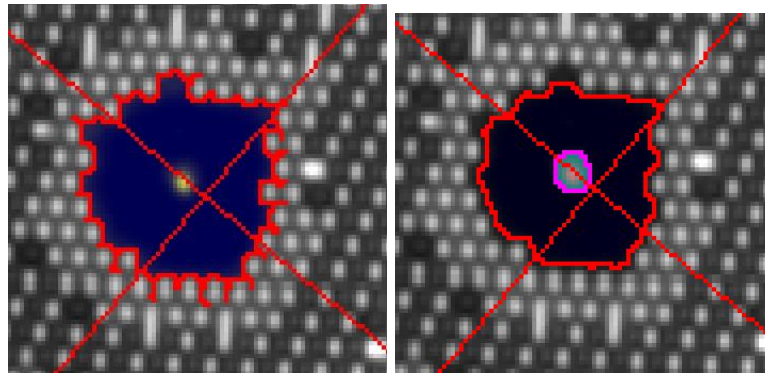


The expert mode gives access to the Surface Structure algorithm. If the Surface flag is checked, surface area is measured slightly below the maximum height of the dot such as all micro cells and micro lines on the interior of the dot are included in the measurement result.



The Surface flag is saved with the customized plate types in the FLEYEplus page of the Settings Window.

Because the dot surface area is structured, there are shoulders inside the dot surface and also on the dot circumference edge. This shoulder is added to the printing 'Dot Area %' such that a measurement with Surface Structure ON will result in higher percentages compared to a measurement with Surface Structure OFF.



Standard

Surface

The examples above are showing an extreme situation. The standard algorithm excludes the initial shoulder portion of the dot from the printing area, resulting in a printing surface (gray area) edge with lot of structure. The image on the right is the edge of the printing area (gray area) that will most probably transfer ink. The rule designating the “edge of the dot is marked...” is unchanged.

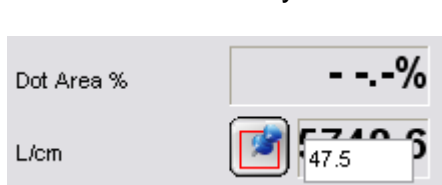
Add/remove a not- yet-selected dot


Add a not yet selected dot to the overall result by clicking into the dot with the left mouse button + CTRL key.

Remove a selected dot from the overall result by clicking into the dot with the left mouse button + SHIFT key.

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.




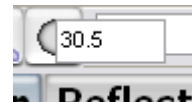
Click the  Automatic Screening Icon to switch to the fixed screen ruling mode. An edit window will open. Enter the screen ruling value and press the ENTER key on the keyboard.

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 below.



Press the Enter key to confirm the dot area % value. will be displayed in the main data panel on the right side. over the image, a circle will show the theoretical size of a 30.5% dot for the current the fixed screen ruling of 47.5 L/cm. Left click to attach an image of the

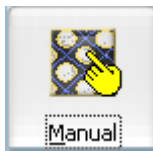
The dot area % result
When moving the cursor
The dot area % result
When moving the cursor
over the image, a circle will show the theoretical size of a 30.5% dot for the current the fixed screen ruling of 47.5 L/cm. Left click to attach an image of the cursor to the captured image..

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.

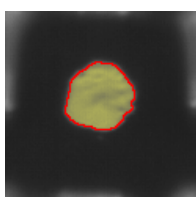
The starting process is the same –

- Preview
- Capture
- Analyze

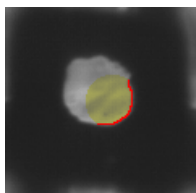


Now click the Manual Icon. The manual dot selection mode will start. The little hand will turn yellow to show that the selection mode is active. All other icons are grayed out until the Manual Icon is clicked again to finish the measurement.

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.

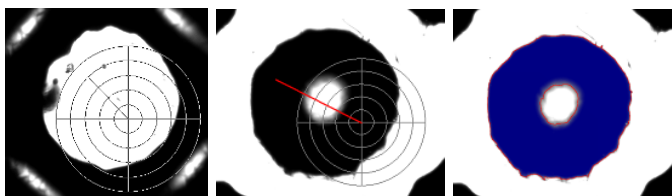


If a dot has been selected in error, click inside the highlighted area again to un-select the dot.

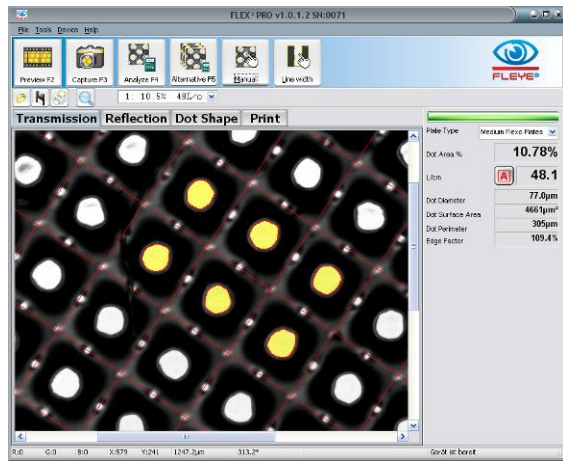
The manual dot detection algorithm is looking for a maximum dot dimension, assuming that you clicked on the dot somewhere near its center. If you click inside a dot too close to the edge, an incorrect result will be obtained, as shown here.

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.

In some cases it might be difficult to pick the center of the dot. In this case draw a line inside the dot to select the dot.



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

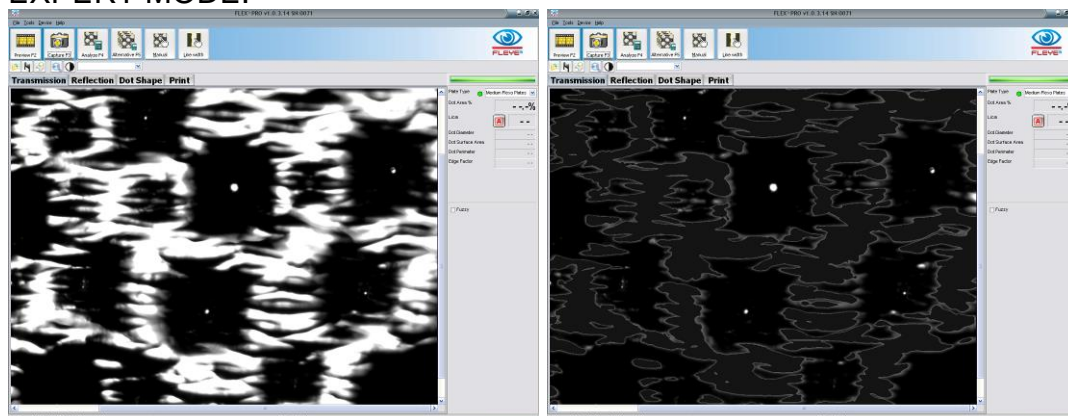


At least 3 dots adjacent to each other must be selected to obtain a correct result when using the Automatic or Fixed screen ruling function. Selecting more than three adjacent dots improves the repeatability of the result by averaging more dot locations.

HD-Flexo contrast image



The contrast symbol can be clicked to switch the display mode. Non uniform regions will be blacked out to easy the dot selection on HD-Flexo samples. This function is available only in EXPERT MODE.

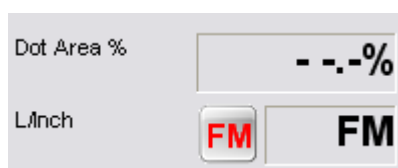


Stochastic screens

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

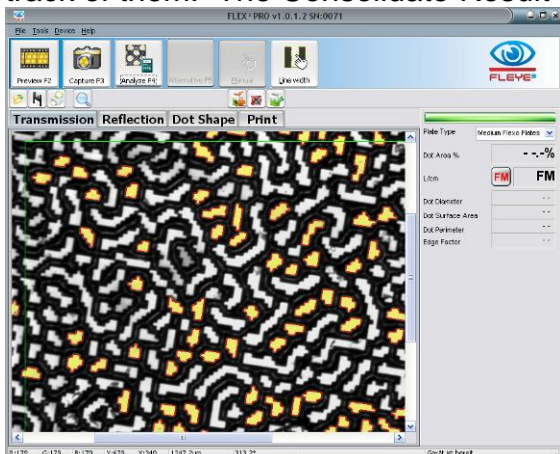
The FLEX³ software relies on operator input³ to achieve a repeatable and accurate result. In order to measure flexible stochastic screening or hybrid screens, follow the procedure outlined below.

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.

Stochastic screen analysis uses both automatic feature detection and user input. Automatic detection creates a display of “proposals”, areas that the system believes to be printing portions of the plate. The user may accept or reject any number of these objects while the system keeps track of them. The Consolidate Result Icon calculates the final dot area of selected objects.



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



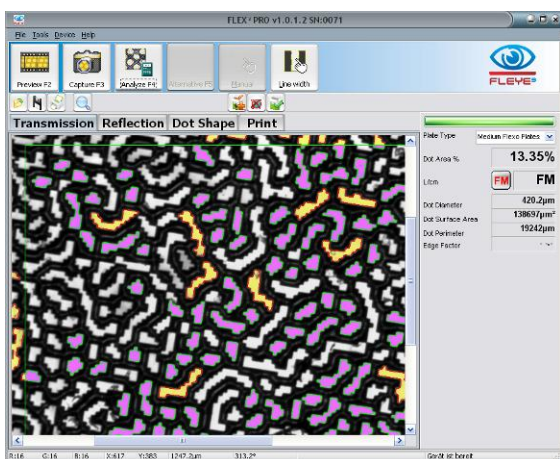
Dot Remove Icon removes one single dot from the global FM result or skips a dot group



Consolidate Result will calculate and display the final result.

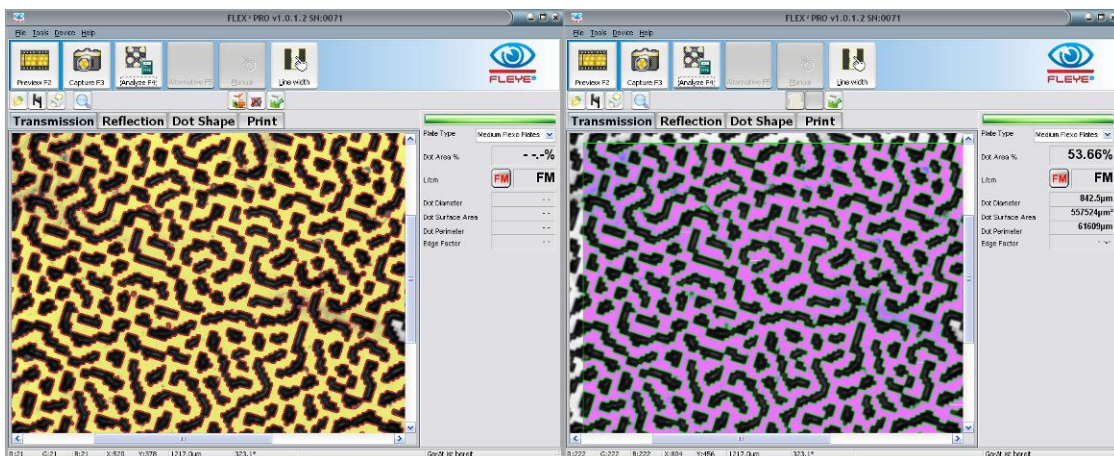
If the proposed result is part of the printing area in case of a highlight patch or part of the non-printing area in the case of shadow patch, then add the selected dots by clicking the Add Dots Icon.

The first result is now displayed.

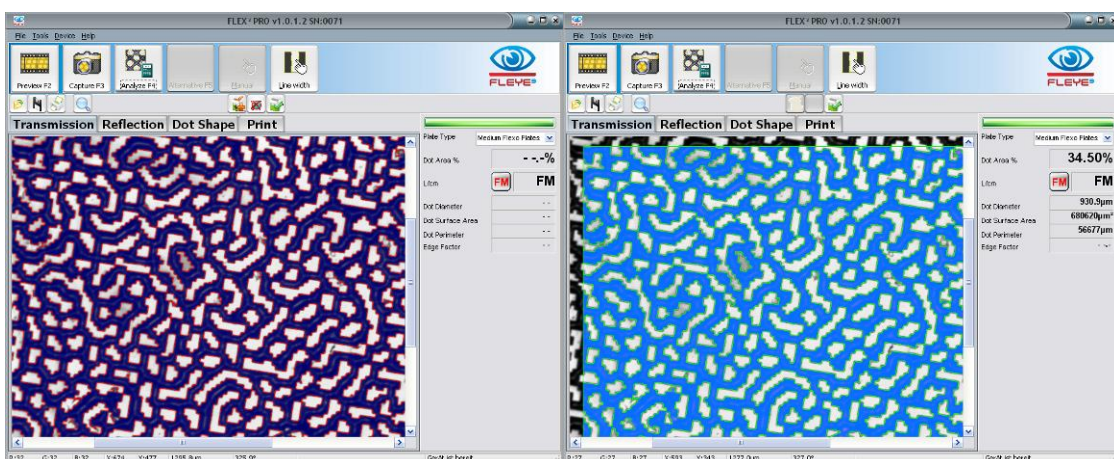


Quick FM screen measurement:

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

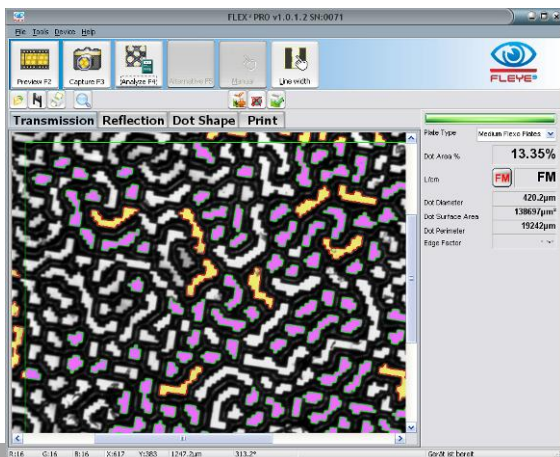


If almost all shoulder regions (black) are connected to each other and no large floor regions (white) are visible, then move the mouse pointer over the shoulder region and click the left mouse button. The shoulder regions now will show selected. Click the Add Dots Icon to add the shoulder regions to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



In order to maximize inter-instrument agreement between FLEX³ devices and to improve the absolute accuracy, the FLEX³ software always picks printing area elements within a constant area when in FM Mode. The size of the area can be selected in the settings.

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 proposed group of dots that may be added to the FM result **if appropriate**.



If additional dot groups are available, the FLEX³ 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.

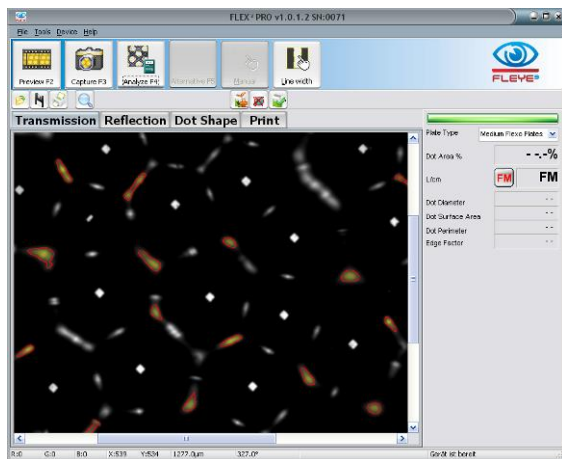
Click the ADD Icon again to add these dots to the overall result. The Add Icon will be disabled when no more dot groups are available.



After a few clicks all dots and regions are added and the FM result can be calculated by clicking the Consolidate Result 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. FLEX³ 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:

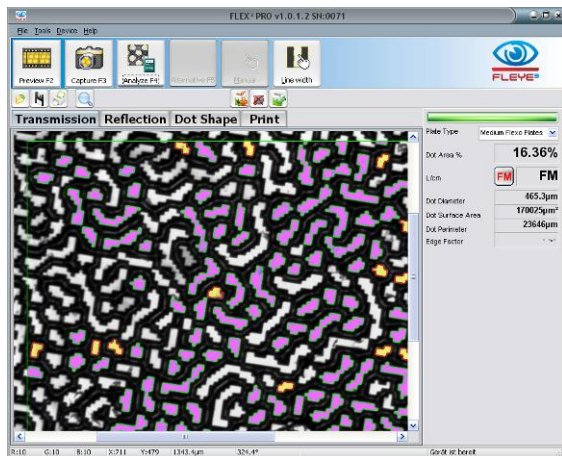


In this case skip to the next proposal by clicking the Dot Remove Icon. The proposal will be removed from the list of proposals.

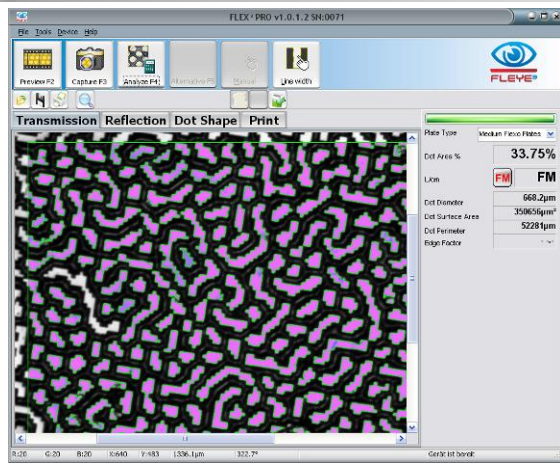
The next proposal, if any, will be displayed automatically.

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 left 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.

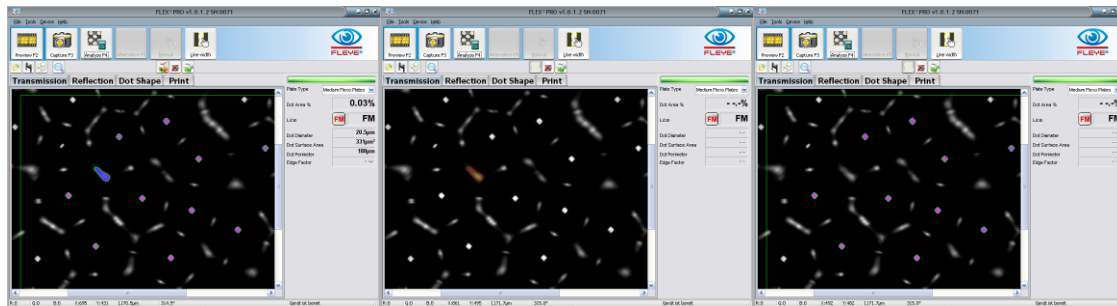


Add several objects manually to the FM result

Press key CTRL down and keep it depressed. Move the mouse pointer into an object that should be added to the result. Click the left mouse button to add the object to the final result.

Remove single objects 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:



Line width measurement

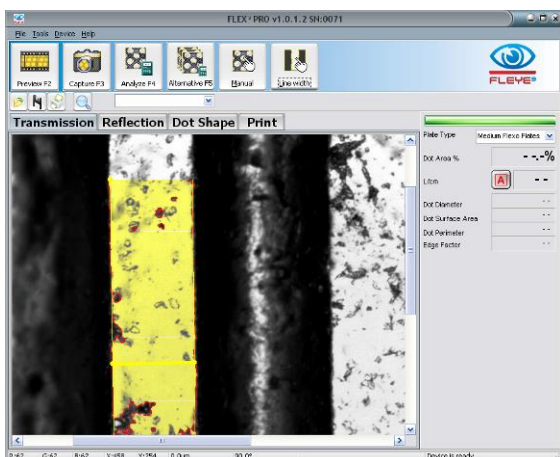
The FLEX³ software supports a high-precision line width measurement function. The line width measurement calculates the average width of a positive or negative line along a length of exactly 1mm. To measure the width of a line, follow the procedure outlined in the following steps:

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



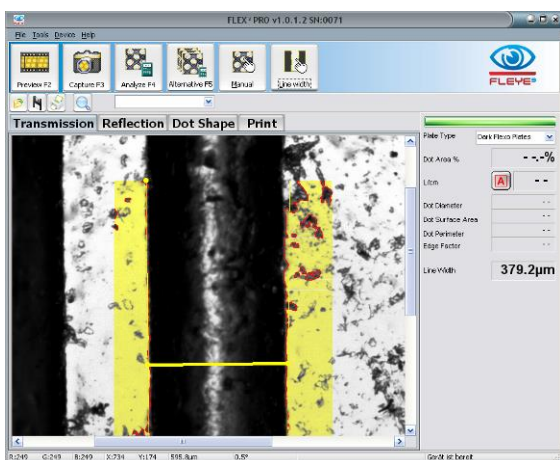
Click the Line Width Icon. The little hand will turn yellow to indicate that the line width measurement mode is active.

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.

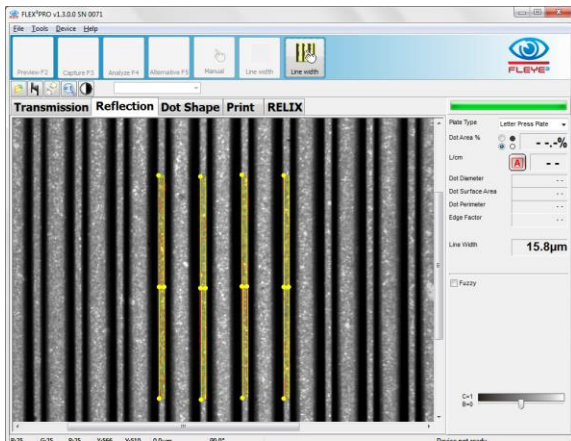
- Move the cursor to the area left of the negative line
- Press and hold the left mouse button down
- Drag the mouse across the negative line to the area right of the line
- Release the left mouse button. The line width function will automatically find the edges of the negative line. The area outside 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.

Use the Multi Line Width measurement tool to measure the average line width of several lines.





Magnifier Tool

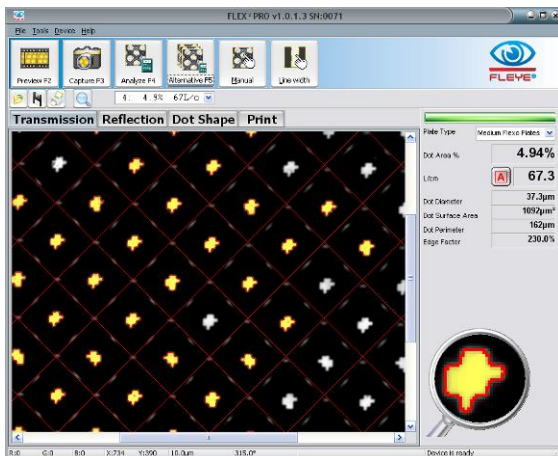
Sometimes it is helpful to be able to see the image in greater detail. The FLEX³ software offers a magnifier next to the Print Icon on the secondary icon bar.



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

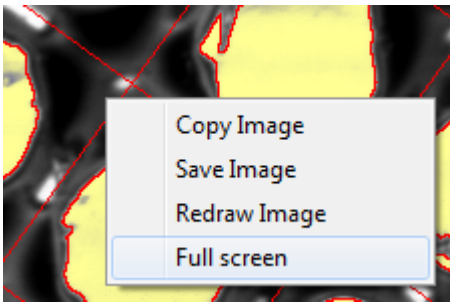
As you move the mouse over the image a 2x magnified view will appear inside the magnifier glass.



Click the Magnifier Tool Icon again to step through the available magnification levels and return to the 1x mode to stop the magnification process.

Save Image, Copy Image to Clipboard, Full screen display

Click the right mouse button inside the Analysis Window. A Popup Window will appear. Select Save Image to save the image in JPG format, select Copy Image to copy the Image to the Windows Clipboard



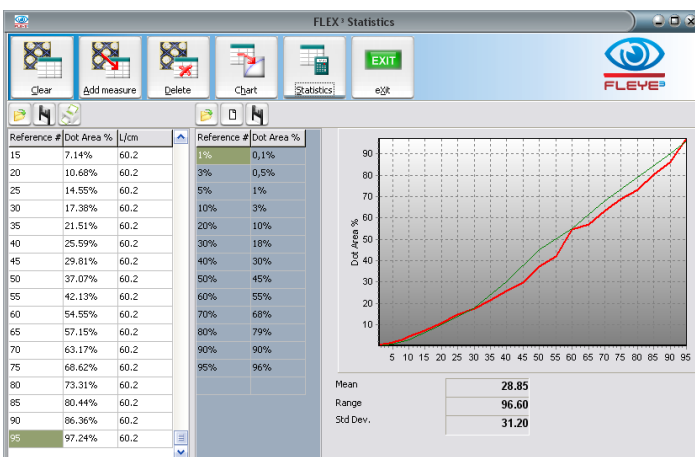
Copy partial Image

- Press the SHIFT key down and keep it depressed.
- Move the mouse pointer to the top of the 3D dot
- Press the right mouse button down and select 'Copy Image' from the pop up menu
- The proper part of the image will be copied to the windows clipboard.

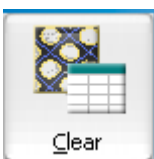
Select Full screen to display the actual analysis image in full screen mode.

FLEX³ Statistics

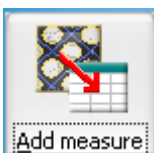
Select the Tools/Statistics Item from the main menu. The FLEX³ Statistics window will open.



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



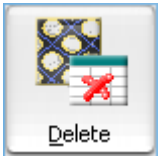
Select Clear to remove all data from the table at the left.



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 to load data, the File Save Icon to save data, and the Print Icon to print a report or the PDF Icon to create a PDF report.

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



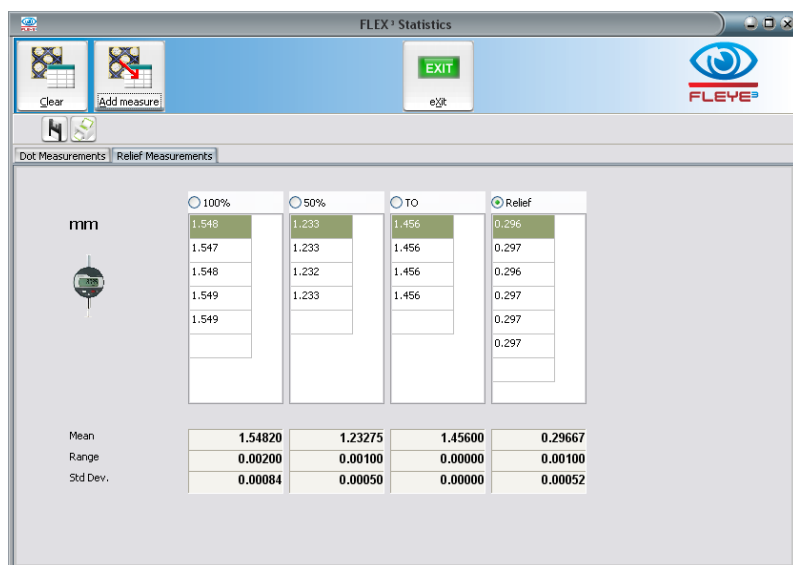
In the middle there is a table containing the Reference Curve data. Re-load the reference curve into the graph by clicking the File Open Icon on top of the table. Click the New Icon to clear the reference curve and type in a new reference curve. Click the Save Icon to save the reference curve.

Statistic data is stored into a tab-delimited text file. You can open the file with many other applications such as spread sheet programs for further analyses.

Measure relief depth using RELIX

When the optional RELIX depth measuring micrometer is fitted you may select the page 'Relief Measurements'. Select the type of measurement you would like to make (100% Patch, 50%Patch, TO Patch, Relief depth). Position the patch below the digital indicator and click Add measure to

add the actual measurement to the table. Mean, Range and Standard Deviation are updated automatically. Inch/mm are used according to the settings in the software.



FLEX³ Image Comparison

Select Tools/Image Compare from the main menu to open the FLEX³ 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 FLEX³ image into each box.

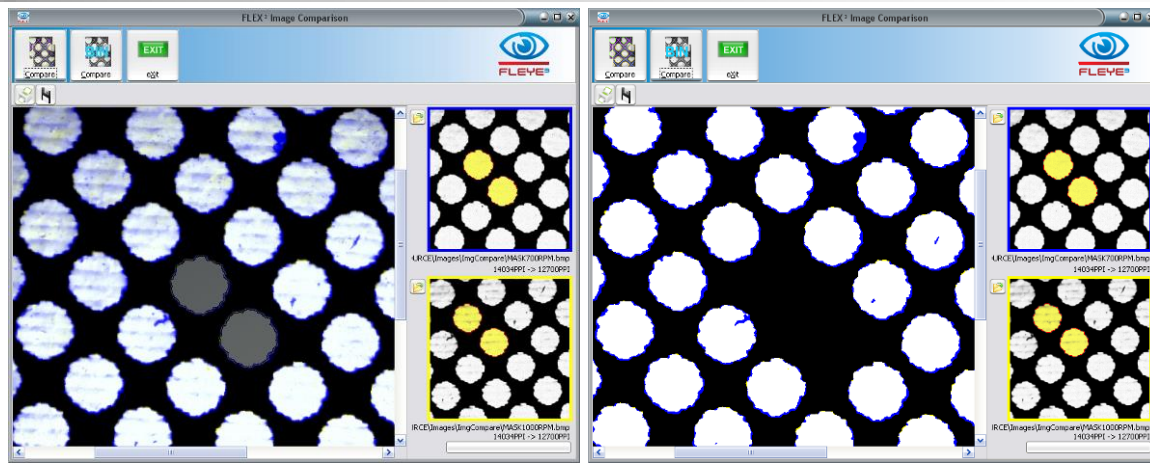
Now select two dots adjacent to each other in each image by clicking on the dot centers. On shadow tints select two single holes per image. The four selected dots will be automatically overlaid during the image comparison process. Click the Compare Icon to overlay the two images.

The FLEX³ software automatically performs the following steps:

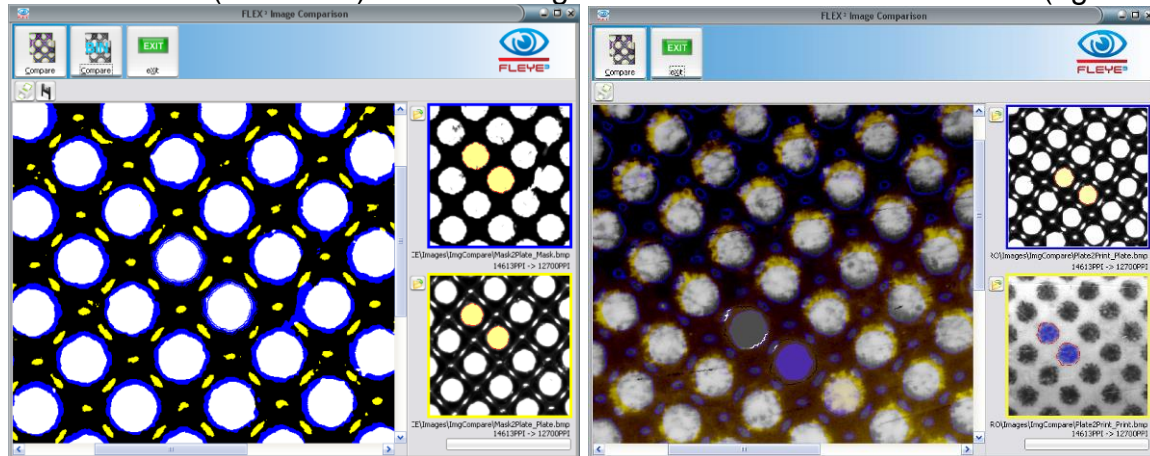
- Resize the images to exactly 12700PPI resolution. This makes it possible to compare images captured with two different FLEX³ devices.
- Adjust Brightness and Contrast such as both images are showing a very similar gray scale.
- Automatically detect the orientation and position of the dots and rotate 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.



The examples above show differences in masks due to exposure and machine RPM. Compare Mask to Plate (left below) to see the digital dot reduction or Plate to Print (right below):

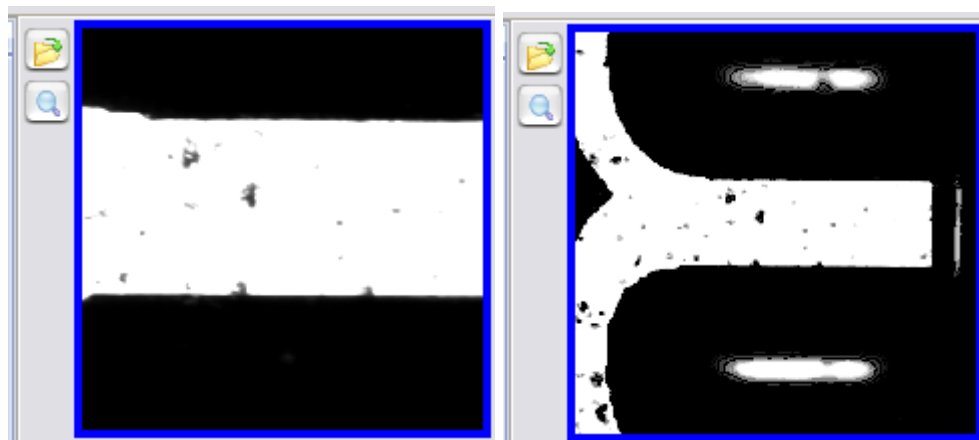


The blue areas surrounding the dots means that the blue image dots (ablation mask) are larger, showing the dot reduction between ablation mask and finished plate.

Export the comparison image in JPG format for documentation by clicking the Save Icon.

Zoom in function

Click the Magnifier icon to toggle between two magnifications



Standard (0.5x)

Zoomed in (0.25 x)

Manual selection of overlay position by drawing a vector:

- Move mouse arrow to the starting position (rotation zero position)
- Press left mouse button down and keep it depressed
- Move mouse arrow along the reference line
- Click right mouse button to confirm the coordinates
- Release left Mouse button
- The vector is drawn as a red line. The rotation zero position is displayed by a little red circle.

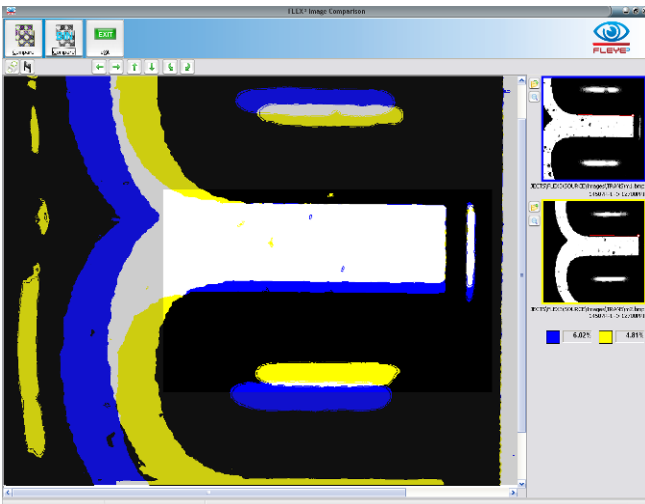


Fine tuning of location and direction overlay image:

There are functions available to move the overlaid image left, right, up and down by a pixel at a time or to rotate it counter clockwise or clock wise by 0.25° at a time.



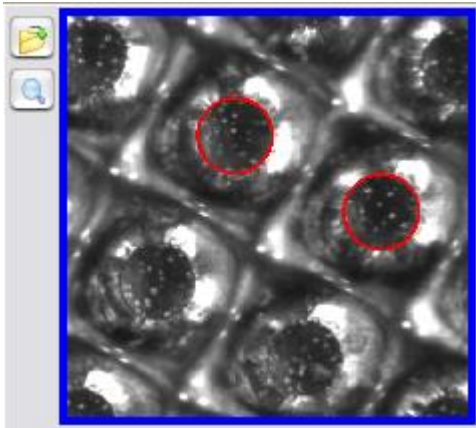
Example: real difference of a font:



Manual Selection of dots by drawing the dot based on 3 positions

Additional possibility to select dots by manually selecting edge coordinates the same way as in reflection mode:

- Move the mouse arrow to the first edge position of the dot
- Press left mouse button down and keep it depressed
- Move the mouse arrow to the second edge position of the dot
- Click right mouse button
- Move the mouse arrow to the third edge position of the dot
- Click right mouse button
- Release the left mouse button.
- A circle is calculated based on the 3 positions and drawn as dot.



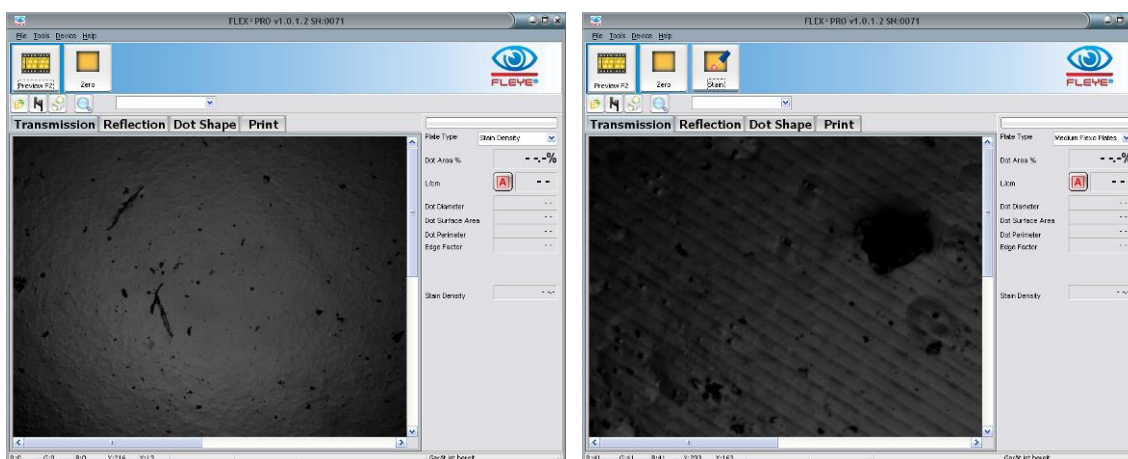
Stain Density measurement

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

The 'Zero' button on the Tool bar will activate. Position the aperture on a tape-pull region of the ablation mask. Lower the sensor head and click Zero. Use a double-ablated image if the mask cannot be removed with tape.

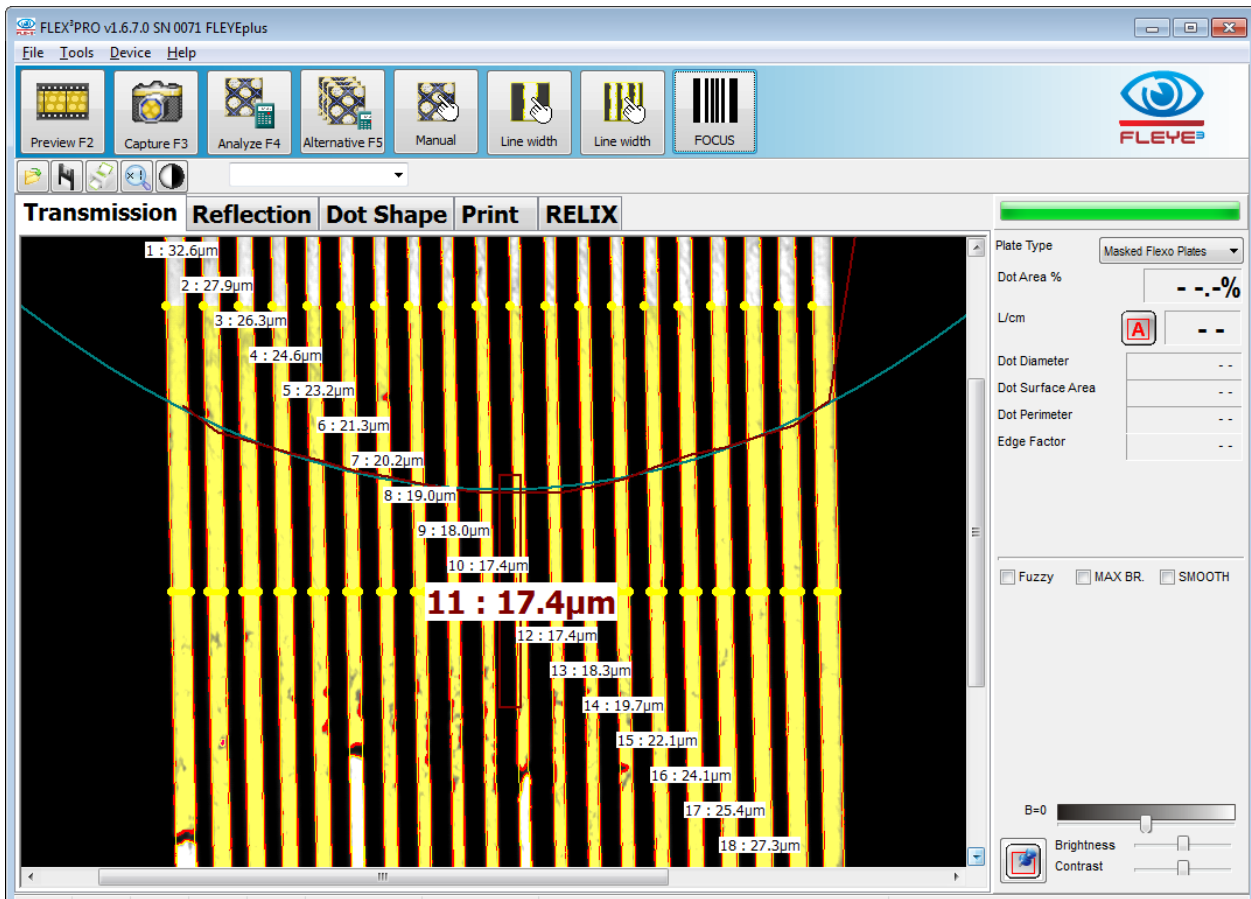
Now position the aperture on a 100% exposed patch of the ablation mask, lower the sensor head and click Stain.

The stain density is displayed in the data panel on the right side. The transmission densitometer function is linear up to a density of 1.00



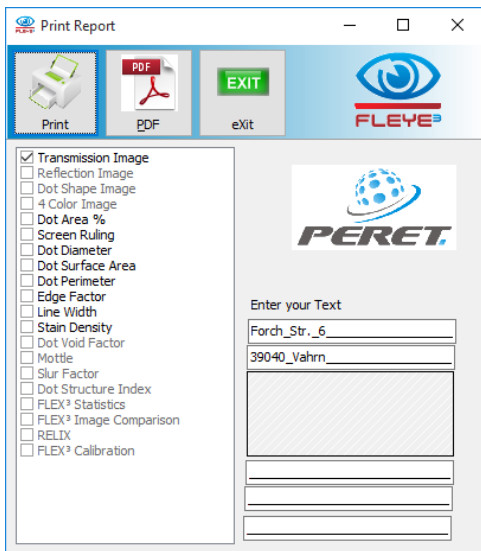
Laser Focus Test

The optimal Laser Focus is achieved when a single pixel line produces the thinnest ablated mask image. A series of lines are exposed while the focus is automatically changed.. Select Masked Plates, Capture an image of the lines and click the Focus Test Icon. The narrowest line is automatically determined and its position is reported.



Print FLEX³ Reports

Select the Print Icon to print FLEX³ 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, etc.)

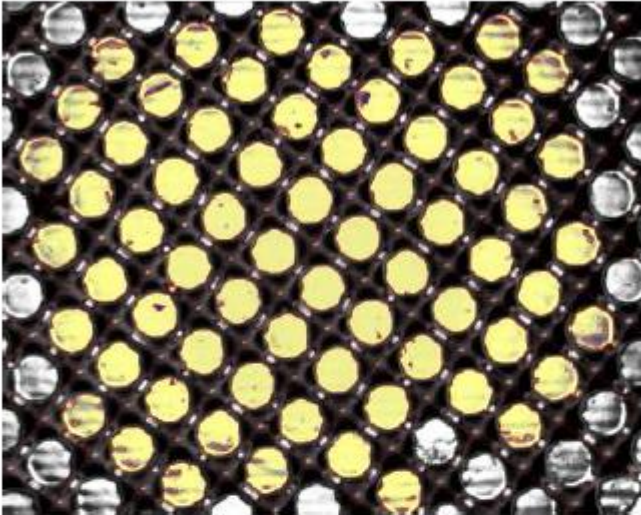
When you open the print report window the next time, the header and footer text will automatically be loaded.

Click the Print Icon to print the report. Click the PDF Icon to create a PDF report file.

A sample Report is shown below:

FLEX[®] REPORT
Peret GmbH
Vahmer 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	--

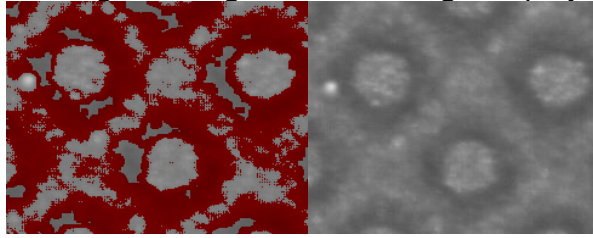
01.07.2010	Sample Customer
	Sample Order
	Sample data

Reflection mode measurement

Non-transparent 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.

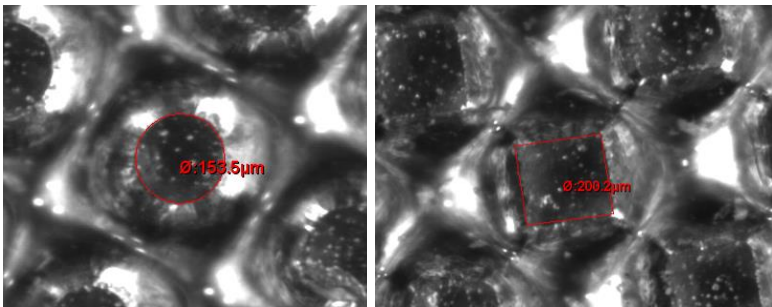


In Reflection mode the Shadows of the dot shoulders are displayed in red color. Click the contrast icon to switch between original image and red-image display.



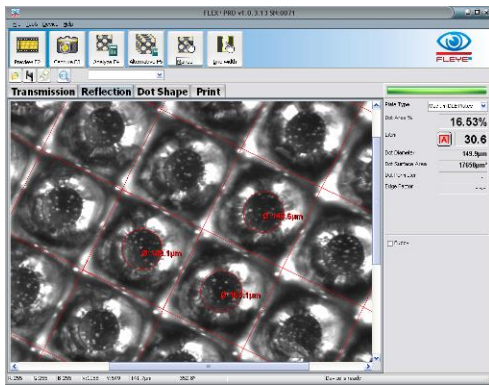
In reflection Mode an additional manual measurement possibility is available. The dot size can be determined as follows:

- Move the mouse pointer to the edge of the dot and press the left mouse button down. Keep the left mouse button depressed until the end of the process
- Move the mouse pointer to another position at the edge of the dot and confirm the position with a right mouse button click
- Add up to 15 positions
- Release the left mouse button.
- If 3 positions have been inserted, a circle through these positions is calculated and drawn
- If more than 3 positions have been inserted, a polygon is drawn. The diameter displayed is the diameter of a circle with the identical area of the Polygon.
- If less than 3 positions have been inserted, no result is calculated



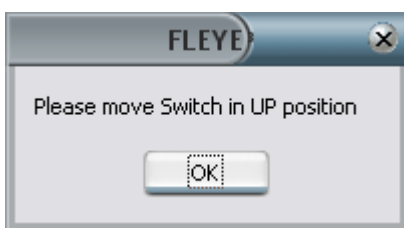
The same function can be used to measure dot percentage and screen ruling.

- Select Manual first.
- Then measure at least 3 dots in the neighborhood.
- Click Manual again to obtain the final result.



Dot Shape measurement

Select the Dot Shape Page of the main Window. The device will ask you move the switch to the UP position on front of the Sensor head.



Click Preview to display a live image, click Capture to capture the image

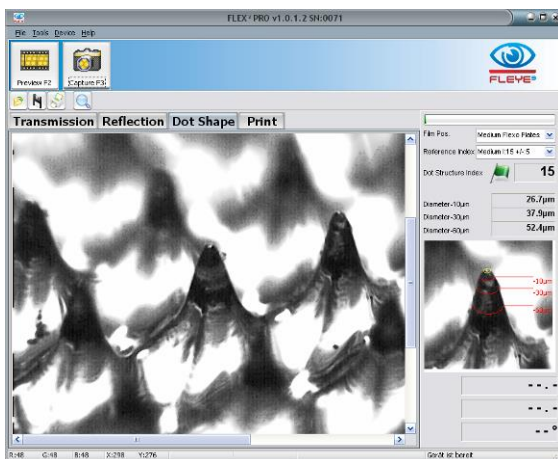
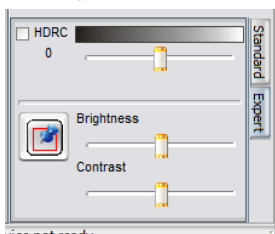


Image Contrast and Image Brightness



When EXPERT Mode is selected in the Settings dialog an Expert tab is available in the lower right corner. Functions to optimize the visual contrast and brightness of the 3D image are available there.

HDCR : High Dynamic Range Capture. If HDCR is selected, the captured image is based on 3 real images captured with different camera settings. This will improve the visibility of image details on some plate materials.

Black&White Track bar: This Track bar controls the physical illumination brightness to optimize reflections during image capture.

Brightness and Contrast Track bar. Use these track bars to optimize the visual brightness and contrast of the image. These modifications affect only the visual appearance of the captured

image. They do not affect the measured result or the saved image. The effects are displayed in real time in the main window.



Click the Fixed Icon to make the adaptations permanent. After Fixed has been clicked, all subsequent images captured with that Plate Type setting are adjusted the same way.

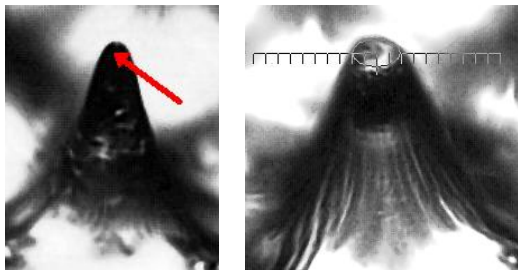
These functions are available only in EXPERT MODE.

Dot Structure Index

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

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

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



Click inside the black top of the dot to obtain a dot structure index calculation in case of a small dot.

Draw the diameter of the printing dot surface to obtain a dot structure index in case of a larger dot.

Dot Structure Index		11
Diameter-10µm	▲ ▼ ◀ ▶	15.6µm
Diameter-30µm	▲ ▼ ◀ ▶	27.8µm
Diameter-60µm	▲ ▼ ◀ ▶	42.3µm

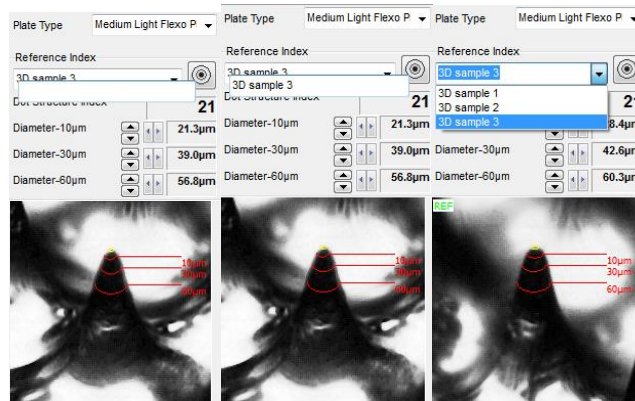
Use the up and down icons next to the diameters to enlarge or make the diameter smaller, use left and right icons to specify their positions.

Dot Structure Index Reference handling:

The Dot Structure Reference database contains 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 current dot as a Reference. Select the Reference from the reference list to re-load the reference numbers and the reference image



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

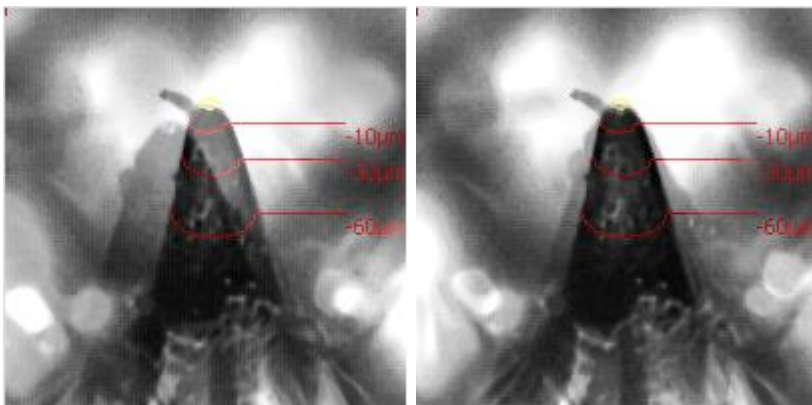
- Green flag: $\text{abs}(\text{ref}-\text{act}) < 0.6 \cdot \sqrt{\text{ref}}$
- Warning: $\text{abs}(\text{ref}-\text{act}) \leq \sqrt{\text{ref}}$
- Fail: all other values

Store dot shape reference images

Click with the left mouse button inside the top of the dot with the SHIFT key depressed. Save the reference as described above.

Compare Dot Shape images:

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



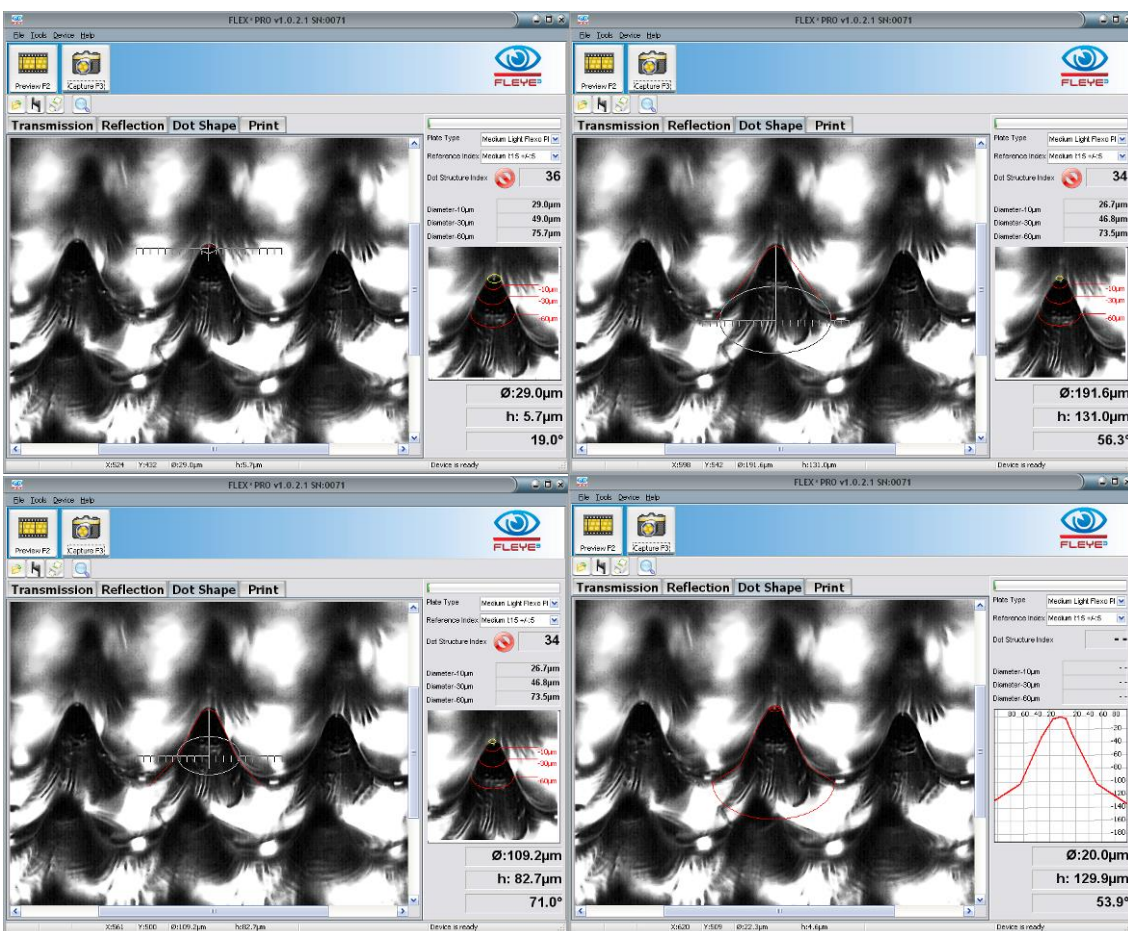
Create a dot cross section

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
- Click the right mouse button while the left mouse button is still depressed. The following popup menu will appear:

Create a dot cross section
 draw actual diameter
 draw actual height
 Draw actual angle

-
- Select 'Create a dot cross section' from the menu to start the coordinate selection.
- 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.

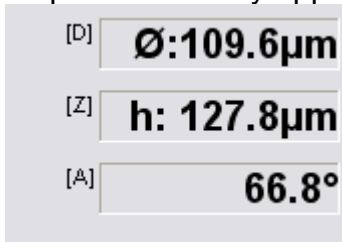


When moving the cursor across the window with left mouse button depressed, the diameter of the displayed ellipse, the relief depth, and the angle between the start point and the current position will be displayed.

Manual measurements of Dot characteristics

Move the mouse cursor 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. The actual motions are documented as diameter, height, and angle.

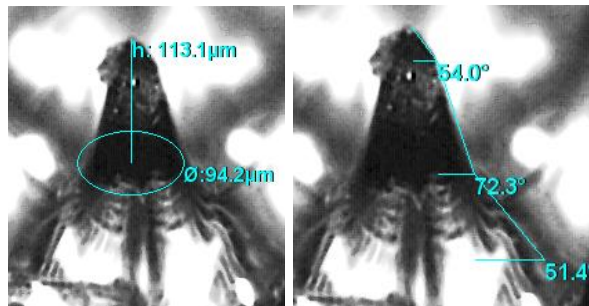
To copy the dot measurement data to the Windows Clipboard press CTRL+D. Once copied it may be pasted into any application.



- The diameter is the diameter of the actually displayed ellipse corrected by the viewing projection
- The height is the actual height of the relief from starting point to actual position of the mouse pointer. It is not the distance on the screen, but the distance vertically into the relief corrected by the viewing projection.
- The angle is the angle from the starting point to the actual position of the mouse.

Next to this information a letter shows, which key on your keyboard can be used to draw the information into the analysis Window.

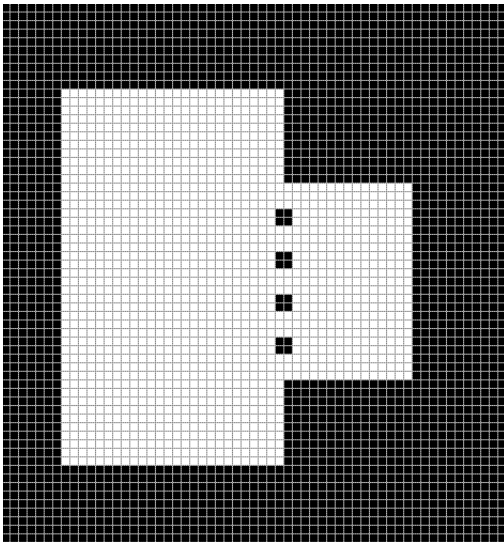
- Press key D on your keyboard to draw the actual diameter
- Press key Z to draw the Z axis height
- Press key A to draw the angle.



Measure UnderCut on DLE Plates

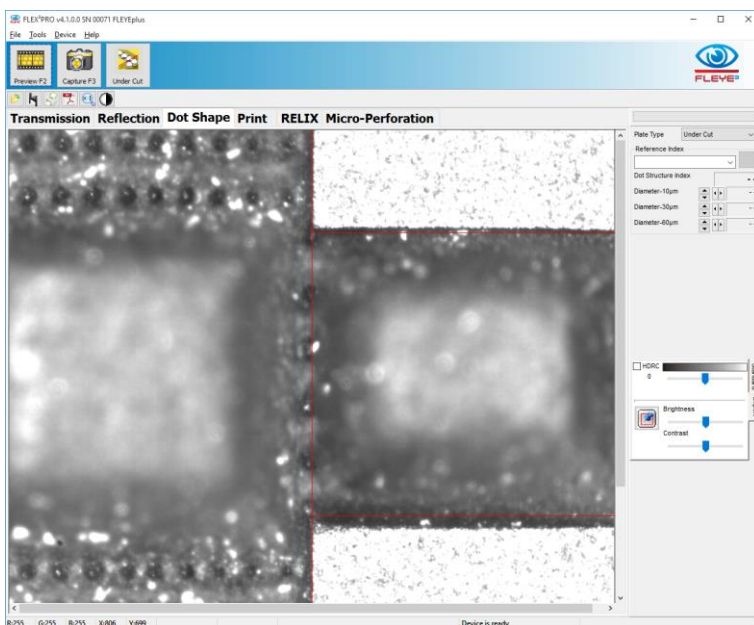
V3.0.0.0 and newer implement a procedure to measure the undercut (sub-surface imaging) on DLE (Direct Laser Engraved) plates. The undercut can be measured using a special test patch.

Undercut is measured using a special test patch with small dots in a line with surface areas.

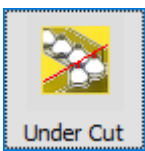


Select the DOT SHAPE mode. Place the test patch below the sensor aperture in the direction displayed.

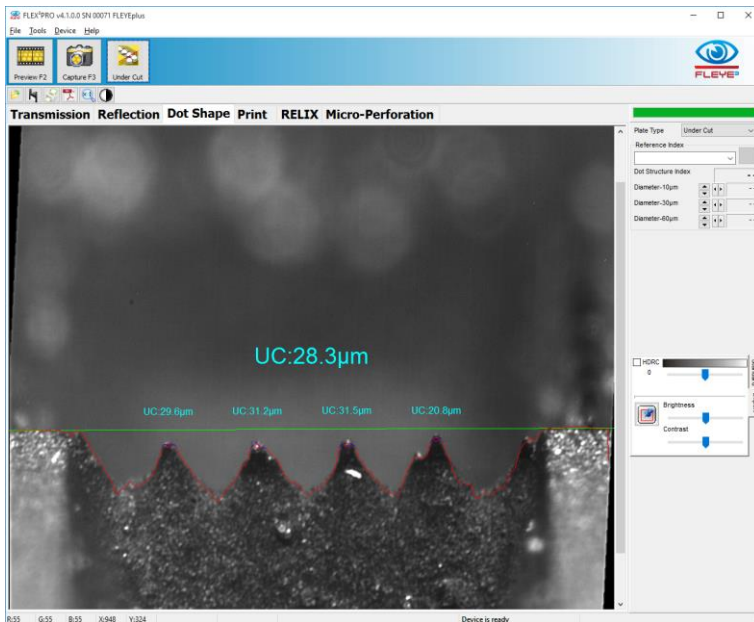
Move the top view/side view switch to top view. The top view will make the proper positioning easier. A red line and a red rectangle will guide you in positioning the patch.



Now set the top view/side view switch to side view and capture an image.



Click the Under Cut Icon to automatically measure the under cut.



Manual measurement of under-cut

The Brightness and Contrast sliders may be adjusted to optimize the appearance of the image. Move the mouse to the left surface and press the left mouse button. Keep the left mouse button depressed until the entire process has finished.

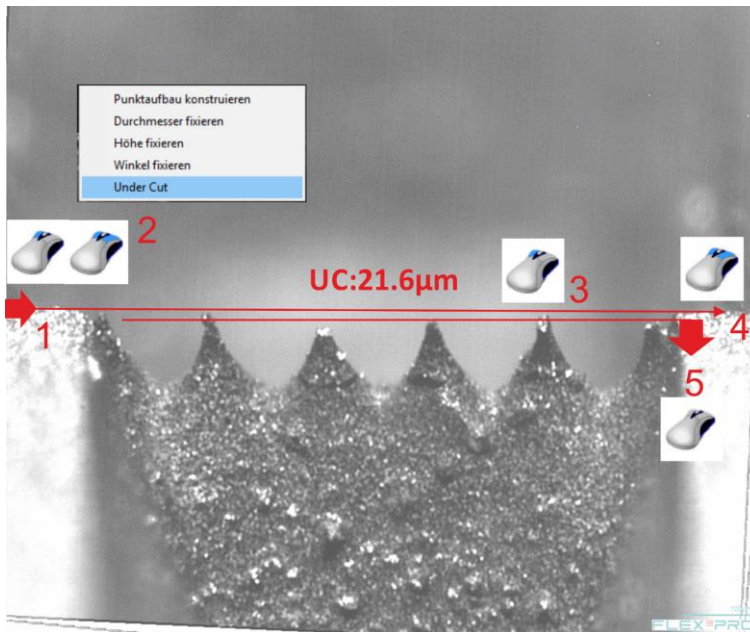
Click the right mouse button to open the pull-up menu.

Select undercut from the pull-up menu and confirm by clicking the right mouse button.

Drag the mouse to the right surface (with left mouse button still depressed). Click the right mouse button to confirm.

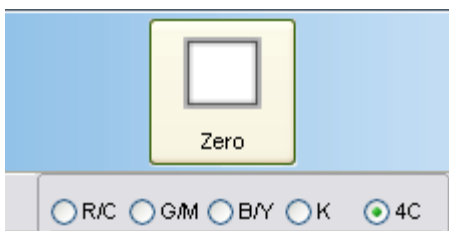
Drag the mouse down until the line will cross the average top of the 4 dots.

Release the left mouse button to calculate the undercut depth.



Measure Print

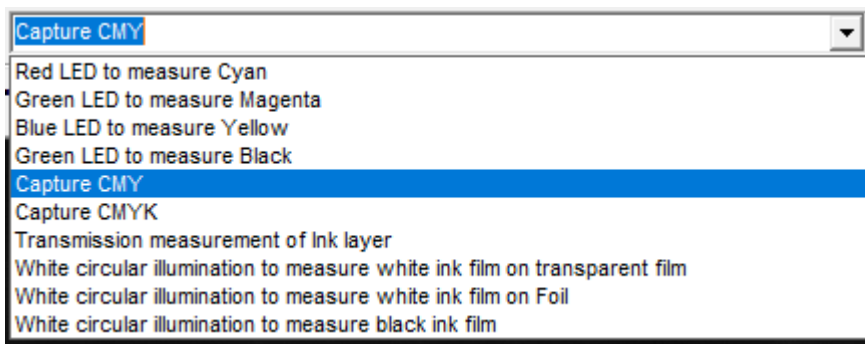
Select the proper substrate type from the Plate Type List.



Before starting measurements it is necessary to zero the device on your substrate. Repeat the zero function whenever a new substrate is used.

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:



- measure a cyan (or blue, cold green) tint percentage patch with red illumination
- measure a magenta (or red, violet) tint percentage patch with green illumination
- measure a yellow (warm green, orange) tint percentage patch with blue illumination
- measure a black tint percentage patch
- measure balance (Cyan, Magenta, Yellow)
- capture a multi color image CMYK
- use the Transmission light source to measure pinholes in white ink print

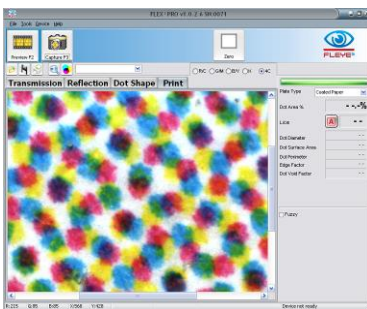
- use circular white illumination to capture white ink film on transparent film for Mottle and Coverage measurement
- use circular white illumination to capture white ink film on foil for Mottle and Coverage measurement
- use circular white illumination to capture white ink film in general for Mottle and Coverage measurement

In order to quickly pre-select a primary color (CMYK), click inside the corresponding color patch.



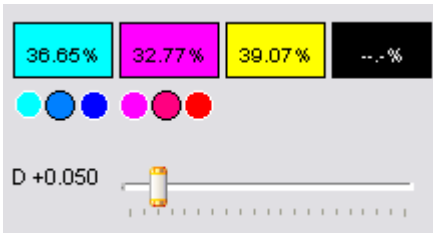
Preview, capture and analyze the image.

Multi-color analyses (BAL & 4C)



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

Click Analyze to analyze all three or four color channels. The results will be displayed as shown below:

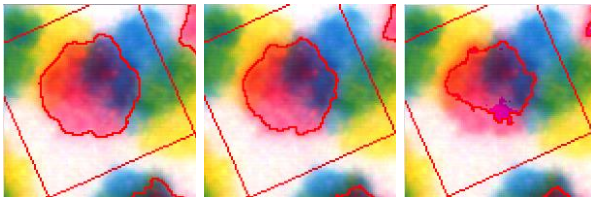


Below the cyan result and the magenta result you can select the type of ink in use: cool, normal or warm. This has an impact on color separation as the secondary densities are different for different inks.

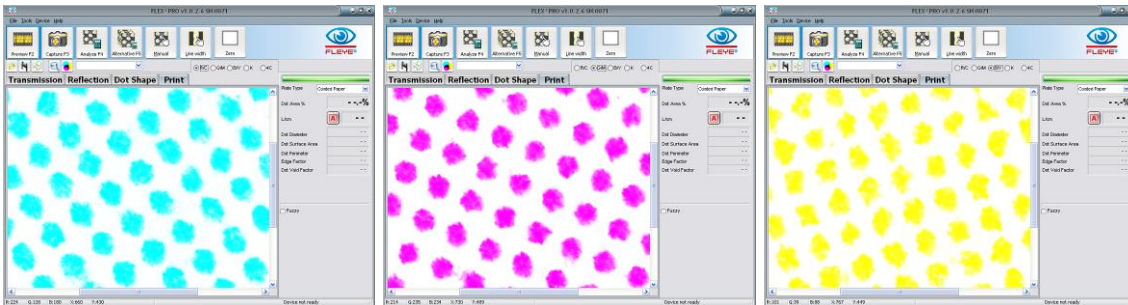
How to know which ink is actually used? Capture an image on a tint percentage of this color (> 10%). A little Pointer will give the recommendation.



The slider control below the result boxes allows the dot edge detection threshold to be manually adjusted. **This function is available only in expert mode.**



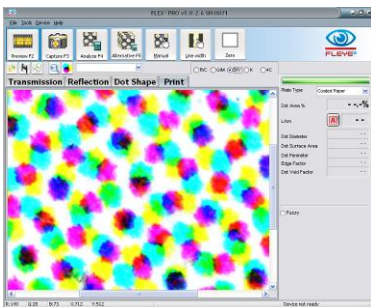
Click on the color you want to see. The proper color will be separated and displayed:



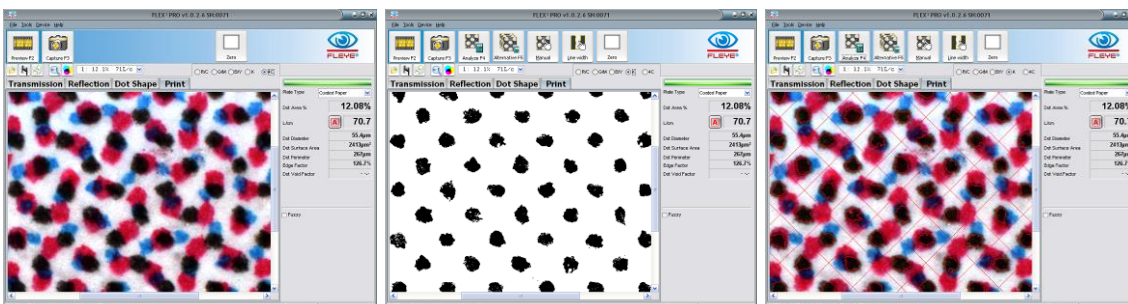
Click **Analyze** to determine the dot area of the separated color.



Click the Color Contrast Icon to display the multi-color image with high contrast schematic color.



Black color separation:



Mottle, Coverage, ISO Graininess for color ink

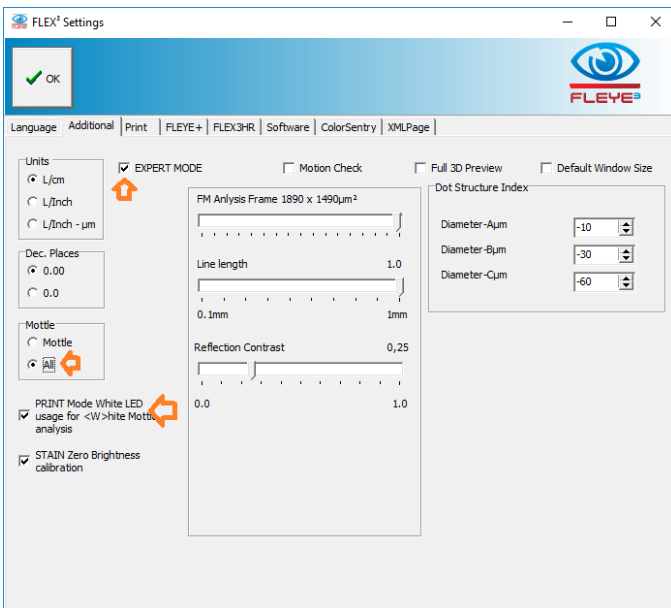
The FLEX³PRO software implements 3 different measurements to quantify the quality of the homogeneity of the ink layer printed on a substrate.

1. Mottle. This basically measures the density variations whereby variations in high density are less critical than density variations down to density 0.00 (white).

- Coverage: Human eye is more sensitive to large pinholes than to small pinholes. Very small pinholes cannot be seen at all by human eye. The coverage measures the average size of the pinholes excluding pinholes smaller than the resolution of human eyes.
- Iso 13660 Graininess measures the standard deviation of gray values inside the image.

Numbers close to 0.00 are high quality ink layers, Numbers close to 100.00 are very bad quality for all three measurements.

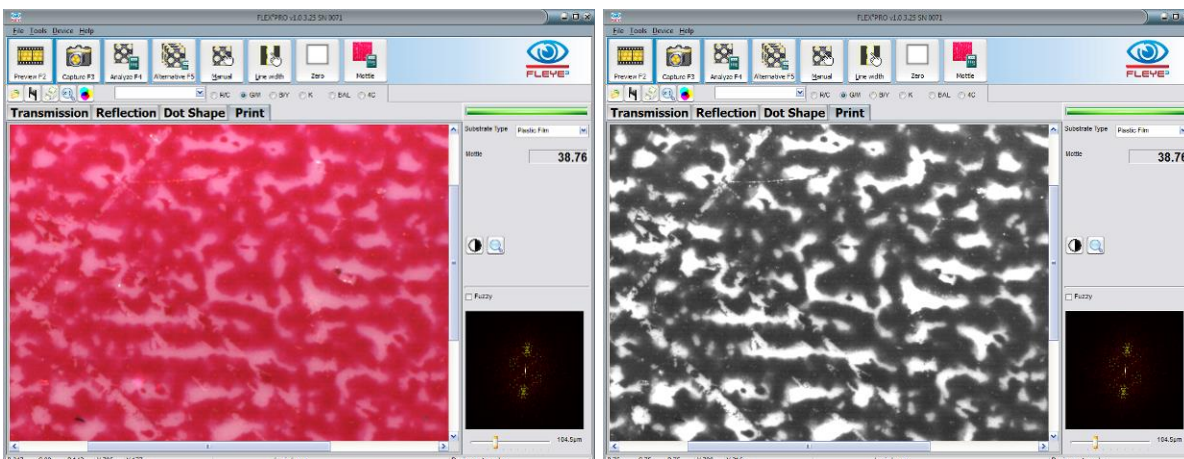
Select the EXPERT MODE and set the Mottle Flag to ALL in the Settings window to display all three calculations. Select also PRINT Mode White LED flag to measure white ink mottle.



IMPORTANT: select the color channel to measure the mottle of the current color.



Click the contrast icon to display the mottle effect in high contrast.



The FLEXYPRO Software offers two major possibilities to measure the quality of white ink on transparent film

White Ink mottle

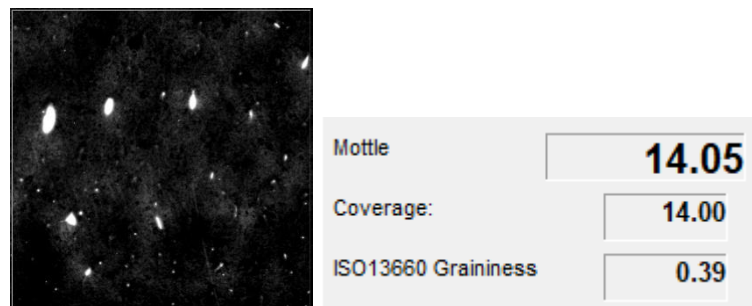
Transmission

ZERO on the transparent film with NO support behind the sample and the transmission lens aperture. The White LED power will be adjusted. The LED Power setting is saved in the .INI file and will be used until ZERO is performed again.



The new capture algorithm in PRINT mode with TR (transmission illumination) selected will capture a series of images and create a high dynamic range image. This will produce a wider range of density information such that Mottle, Coverage, and ISO Graininess can be calculated with higher accuracy and in a more repeatable manner.

Small spots, that are invisible to the human eye, are ignored when calculating the Coverage Value.



CAUTION: Measurements in Transmission Mode are not comparable to measurements in Reflection Mode! Always use the same approach if you need to compare results.

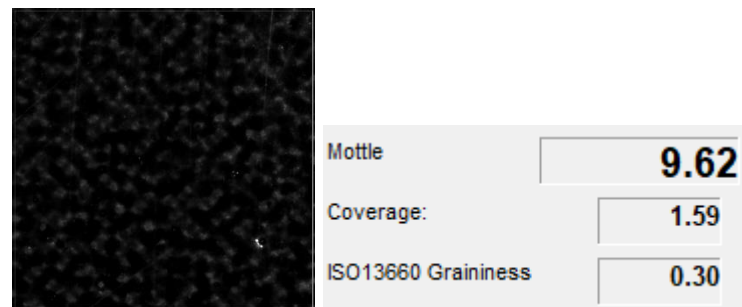
Mottle Function to measure white ink film on aluminum foil

An additional selection has been added to the drop-down list in PRINT mode. Zero on unprinted aluminum foil. The Software will automatically adjust the LED brightness of the white circular illumination. The LED brightness will be saved to the .INI file and used until Zero is performed again.



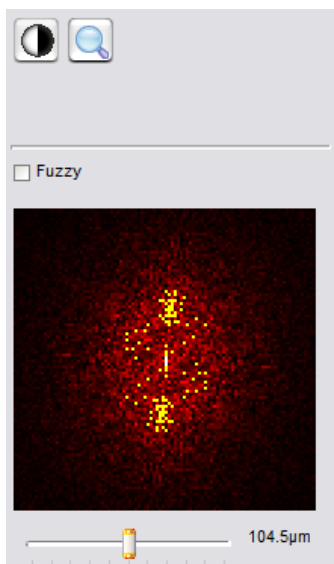
Mottle Function to measure Black Ink with white circular illumination

The ZERO feature is active in this mode. The ZERO function will detect the optimal LED brightness for the measurement of the Black Ink film using the white circular LED illumination. ZERO on the white substrate. The brightness will be saved in the .INI file.



Fourier analysis of the mottle structure

If EXPERT MODE is selected, than there will be calculated the frequency image of the captured sample and it will be displayed in the right bottom corner.



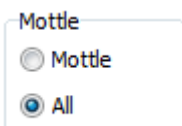
Click the zoom icon to zoom the frequency image.

Position the track bar on bottom to the right and left to adjust the brightness of the frequency image and to highlight better single frequencies (dots).

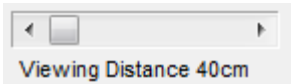
Click with the left mouse button on a Frequency (bright dot) to calculate the periodic distance. The periodic distance can be an indicator for the source of a high mottle.

Click with the left mouse button on the periodic distance value to insert a distance. The periodic distance will be translated into frequency and displayed as white circle inside the image.

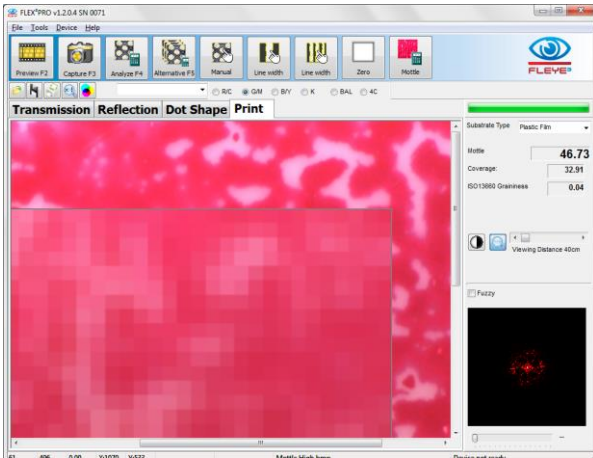
Additional Mottle values



Select the 'ALL' setting in the settings Window to get access to the additional mottling analysis



In case 'ALL' is selected, the visual impression of the solid is displayed in the main window in relation to the viewing distance. The viewing distance can be selected using the ruler on the right side.



The 'All' setting offers two additional values to evaluate the surface coverage of solid ink films.

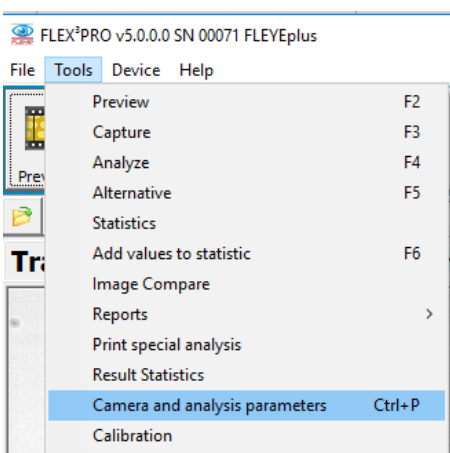
Coverage: This is a value calculated based on the average size of the areas not covered well with ink.

ISO 13660 Graininess: this is the density standard deviation calculated on a ISO tile of 1.27mm x 1.27mm, taking 900 readings inside the tile.

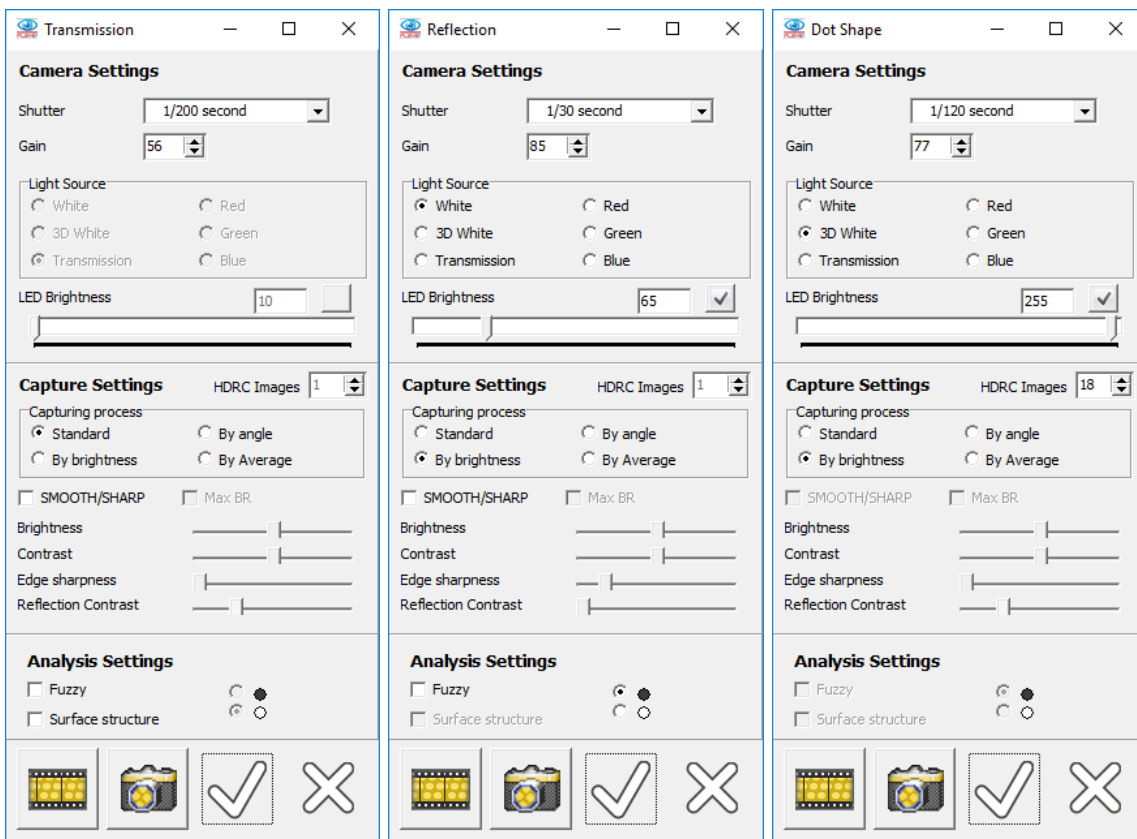
Customized plate types and substrate types

There are various parameters that can be used to define a special plate type. Plate measurement now has the ability to test the best camera settings, the optimum capture and image filter settings, and the analysis parameters. Earlier Software versions required settings to be changed in various locations of the Software, and some settings couldn't be modified at all. Version v5.x now makes the definition of customized plates significantly easier and more flexible.

Select Camera and analysis parameters from the Tools menu or press Ctrl+P on your Keyboard.

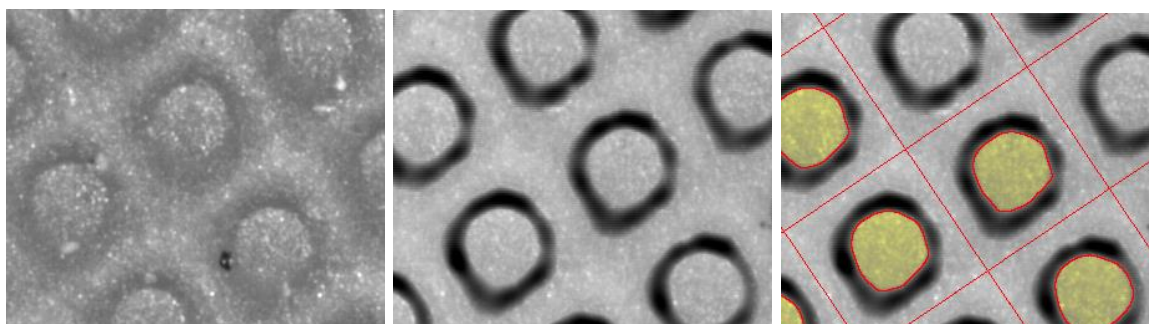


A secondary Window will open giving access to all parameters that can be changed for a special measurement mode: TRANSMISSION, REFLECTION, and DOTSHAPE.



This feature makes it possible to measure plates that cannot be measured with standard plate settings.

Using customized plates enhances the range of plate types that can be measured with the FLEX³PRO.



Use the Preview and Capture buttons of the camera settings Window to perform a test using the settings of the camera settings Window.

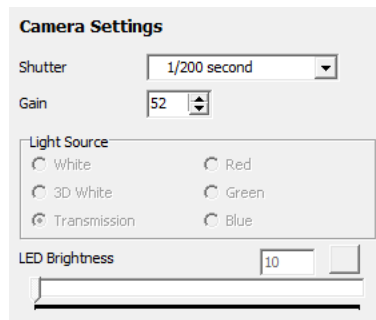


Once the settings are properly defined, click the check icon ✓ to save and add the new plate setting to the plate list. Use the X icon to close the window.



Camera Settings

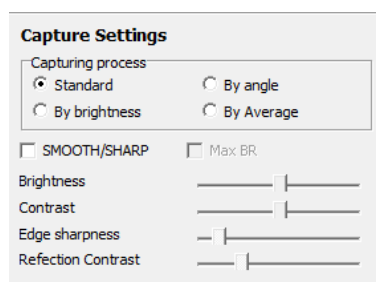
There could exist a plate type, where the [Medium Flexo Plate] preset results in dark images and the [Medium Dark Flexo Plate] preset results in excessively bright images. A setting between these two would give the best measurements. In this case the Camera Setting can be used to find the proper settings.



A short Shutter speed will result in darker images; a longer shutter will result in brighter images. A low Gain number will result in dark images; a high Gain value will result in brighter images. The LED Power itself can also be adjusted for all Light sources except the transmission light source which is fixed.

Capture Settings

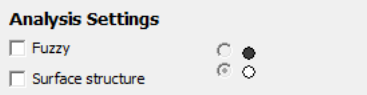
The capture of the image can be configured by the capturing process and filters that are going to be applied to the image after the capturing process is finished.



The Capturing process can be Standard, whereby one single image is captured with the current brightness settings. The capturing process [By brightness] will capture a series of images with different brightness settings and calculate a HDRC [High Dynamic Range Capture] image based on the image sequence. The [By angle] will capture images with illumination at different angles and calculate the resulting image based on that. Finally, the [By Average] will capture a series of images by varying the camera settings and calculate the average image based on that. The Filters that can be applied are the same as the filters on the main Window.

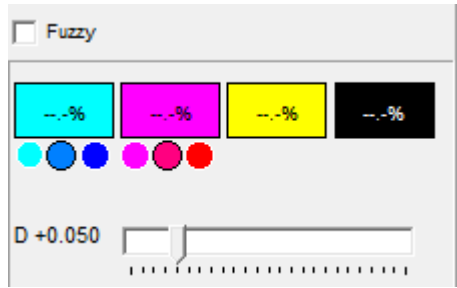
Analysis Settings

The same Analysis parameters that appear on the main Window can be selected and stored along with the customized plate setting.



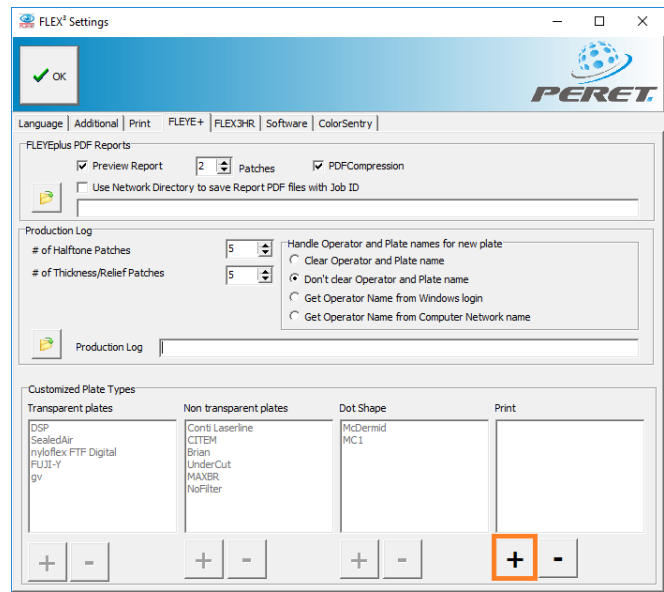
PRINT mode customized substrate types

V5.x now supports the creation of customized substrate types if the FLEYEplus option is installed. The settings Window now contains a list of customized print substrates. Test a substrate including zeroing and calculation parameters using the PRINT page in the main Window.



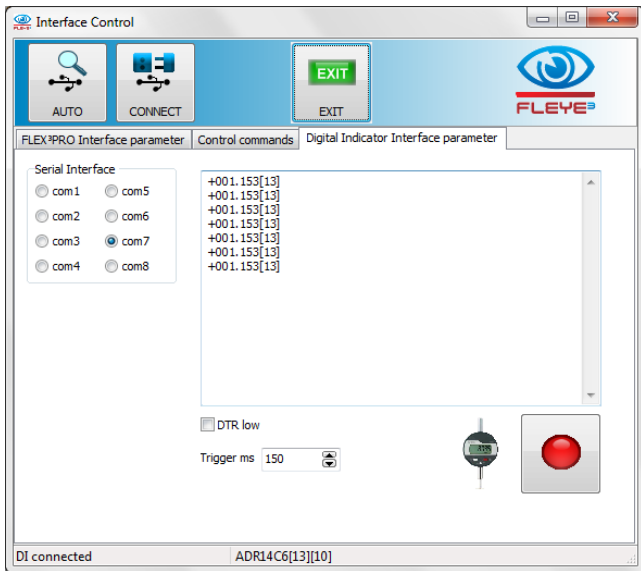
Open the File/Settings Window and select the FLEYEplus page. Click the [+] Icon and create a new Substrate name as shown below. The new substrate will be added to the Substrate drop down list. The settings will be saved and reloaded with the corresponding zero image settings.

Click the [-] Icon to remove a preset substrate type.



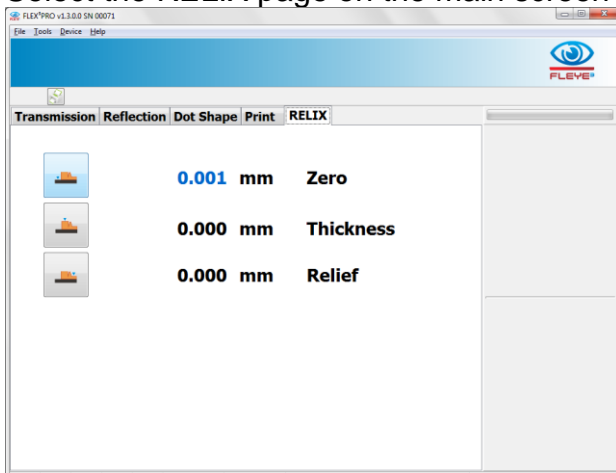
Measure Relief depth with RELIX

If you have installed the optional RELIX digital micrometer select Device/Control from the main menu to open the proper COM Port. The COM Port is saved and automatically connected at the next software start.





Test the proper connection by clicking the red button. Once the micrometer is connected multiple functions are offered.


Select the RELIX page on the main screen



The software offers a remote measurement such that there is no need to touch the micrometer buttons or to see the digital display at all. Click the ZERO icon to start the zeroing of the device:

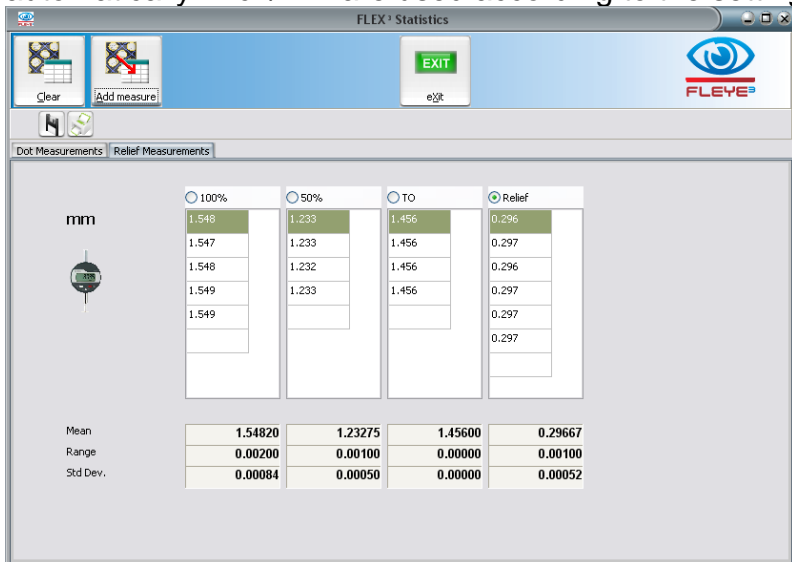
 The actual value of the micrometer will be displayed in real time at the screen. Remove any plate below the micrometer and zero the micrometer on the table. Click the Zero Icon again to save the zero position of the micrometer

 Now select the Thickness measurement icon. Position a solid area of the plate below the micrometer pin and click the Thickness Icon again. The difference in height between the zero position and the Thickness position will be displayed.

 Finally start the Relief measurement with a mouse click on the relief Icon. The difference between the Thickness position and the actual position will be displayed in real time. Position the micrometer pin on a relief depth position and click the icon again. The relief depth in terms of a difference between the plate top and the relief bottom will be displayed.

The RELIX measurements can be added to the statistics or the FLEYEplus reports (see FLEYEplus manual for details).

When the optional RELIX depth measuring micrometer is fitted you may select the page 'Relief Measurements'. Select the type of measurement you would like to make (100% Patch, 50%Patch, TO Patch, Relief depth). Position the patch below the digital indicator and click Add measure to add the actual measurement to the table. Mean, Range and Standard Deviation are updated automatically. Inch/mm are used according to the settings in the software.



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.

Dot area (%) = (Average_Dot_Area / Average_Cell_Area) × 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).

Screen ruling (lines/cm) = (1 / Average_Cell_Width) × Pixel_Per_cm

Screen ruling (lines/inch) = (1 / Average_Cell_Width) × 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.

Dot diameter (µm) = 2 × sqrt(Average_Dot_Area/π) × Pixel_per_µm

Dot diameter (mil) = 2 × sqrt(Average_Dot_Area/π) × 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).

Dot size (µm²) = Average_Dot_Area × Pixel_per_µm²

Dot size (mil²) = Average_Dot_Area × Pixel_per_mil²

Dot Perimeter

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

Edge factor

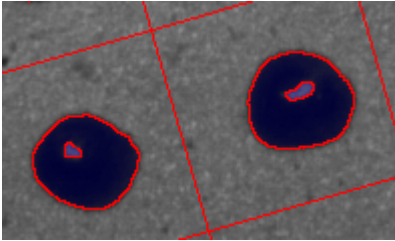
Many print defects start at the edge of the printed dot. For two dots of equal area, the one with the irregular edge will typically exhibit higher dot gain. The ratio of the increased length of the irregular edge, as compared to edge of a perfectly round dot is expressed as the Edge Factor.

Edge factor = 100 × (Average_Dot_Edge_length / Dot_Edge_Length_Circle)

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:

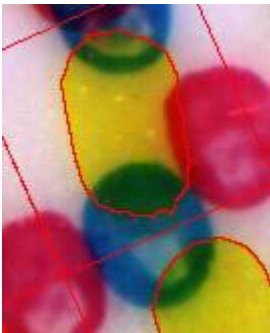
$$\text{Dot void factor} = 100 \times \text{Average_DotVoid_Area} / \text{Average_Dot_Area}$$



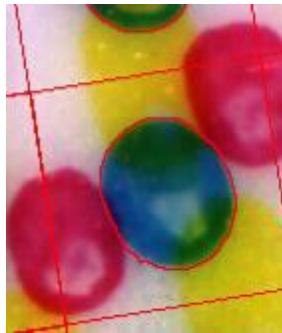
Slur Factor

The slur factor is a measurement value for the dot length to dot width relationship. For example incorrect printing pressures, printing speed changes, out-of-round printing cylinders, or variations in cut-off length can lead to stretched dots. This is measured with the Slur Factor.

$$\text{Slur Factor} = 100 \times \text{dot_length} / \text{dot_width} \%$$



Slur Factor Yellow = 170%



Slur Factor Cyan = 131%

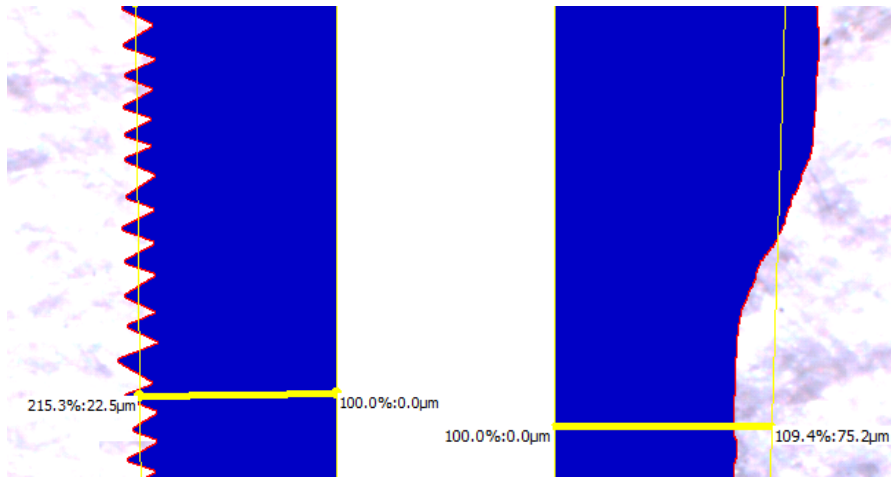
Line Quality index

Two additional line quality parameters are calculated in EXPERT MODE. The first one is a ratio in percent between the total edge length of the line and the shortest possible edge.

$$\text{Line smoothness [side]} = 100\% \times \frac{\text{line edge length[side]}}{\text{Shortest possible edge length [side]}}$$

The second one is calculated in microns as the mean thickness deviation of the line compared to the mean thickness of the line

$$\text{Line thickness variation [side]} = \text{average distance of real edge to yellow regression line [side]}$$



While the line smoothness is a sensitive indicator for high frequency deviations of the line edge, the line thickness variation is a sensitive indicator for low frequency thickness variations of the line.

Mottle

$$\text{Mottle} = \sqrt{\frac{1}{V} * \sum_{i=1..n} (w_i * p_i)} * 100\%$$

Whereby

$$V = \sum_{i=1..n} (w_i)$$

W_i = weighting function

P_i = surface coverage calculated with threshold i

Coverage = $\frac{\text{sum}(\text{size of bright areas})}{\text{number of bright areas}}$

ISO 13660 Graininess = Standard deviation of Densities

About

- Link to software upgrade download page