Founder EagleDot

version 4.6

Color Calibration Guide

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Contents

Welcome to use the Founder EagleDot proof software. This paper is the color calibration guide for this application, designed separately to help you make and apply the color calibration solution.

Chapter 1
Make Calibration Solution

EagleDot provides you with specially-developed calibration wizard to make or update the color calibration solutions used in proof.

It is an automatic wizard, composed of 8 successive steps. By following the wizard step by step, you can easily create or update your color calibration solution.

1.1 Preparation

Before you start the wizard, make the following preparations:

1. Connect the printer, ensure it works normally, and make the paper in place.

2. Create a parameter template, and make configuration as follows.

1) Under the **Printer Setup** > **General Parameters** tab, define a suitable resolution, e.g. 720*720, and a proper page size, usually the biggest size available.

2) Under the **General Parameters** tab, click **Advanced** to open the **Advanced Parameters** setup window, specify the ink type and paper type you are using.

3) Under the **Printer Setup** > **Port** tab, specify the correct port, ensuring that the printer can normally communicate with EagleDot. The USB or network port is recommended.

4) Under the **Color Setting** > **General** tab, suggest you to check **Paper White Simulation**, uncheck **Retain Black**, and leave **Calibration Solution** to none.

5) Under the **Color Setting** > **Advanced** tab, choose suitable screen and color modes. For pre-RIP proof, we recommend you to choose FM1 or FM3; for post-RIP proof, we recommend you to choose FM2 or FM3.

6) For post-RIP proof, under the **Options** > **Page Setup** tab, choose suitable descreening mode.

3. Adjust the speed of paper feeding. It is a capacity available for some of the Epson devices, that can be performed through the template parameter **Printer Setup** > **General Parameters** > **Advanced** > **Feed Paper Adjustment**.

4. Switch to EagleDot's job monitor, check **Continue Ripping** and **Continue Print**.

1.2 Start the Wizard

Click the button  in the toolbar from the main user interface of EagleDot.

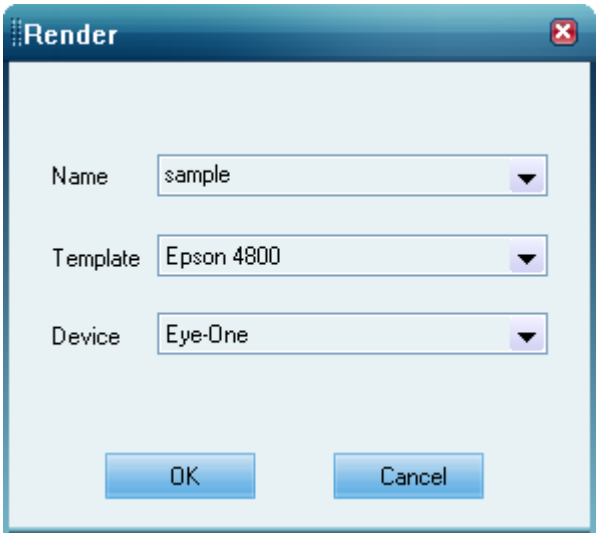

Figure-1

If you want to create a new calibration solution, please input the solution name into the **Name** edit box, choose the template, and the measuring device, and then click **OK**. If you want to update or correct an existing solution, please choose the solution to be updated from the **Name** dropdown list, and then click **OK**.

The **Template** refers to the one created beforehand, as mentioned in section 1.1 *Preparation*. The **Device** means the measuring device. EagleDot supports Eye-One, Eye-One iO, and Eye-One-isis. The measuring methods and the color charts may vary each other for these devices. The following description is based on Eye-One. For other two devices, refer to *Other Measuring Device*.

1.3 Step 1: Multicolor

This step is applied to some ink printers from Epson and HP. Its purpose is to generate a profile based on specific paper and printer, ensuring the shades quality and no ink heaping in the final output.

As the output of this step, the profile will be generated and stored in the finally-generated color solution, with a full name of Multicolor.ini, and can be opened in Notepad.

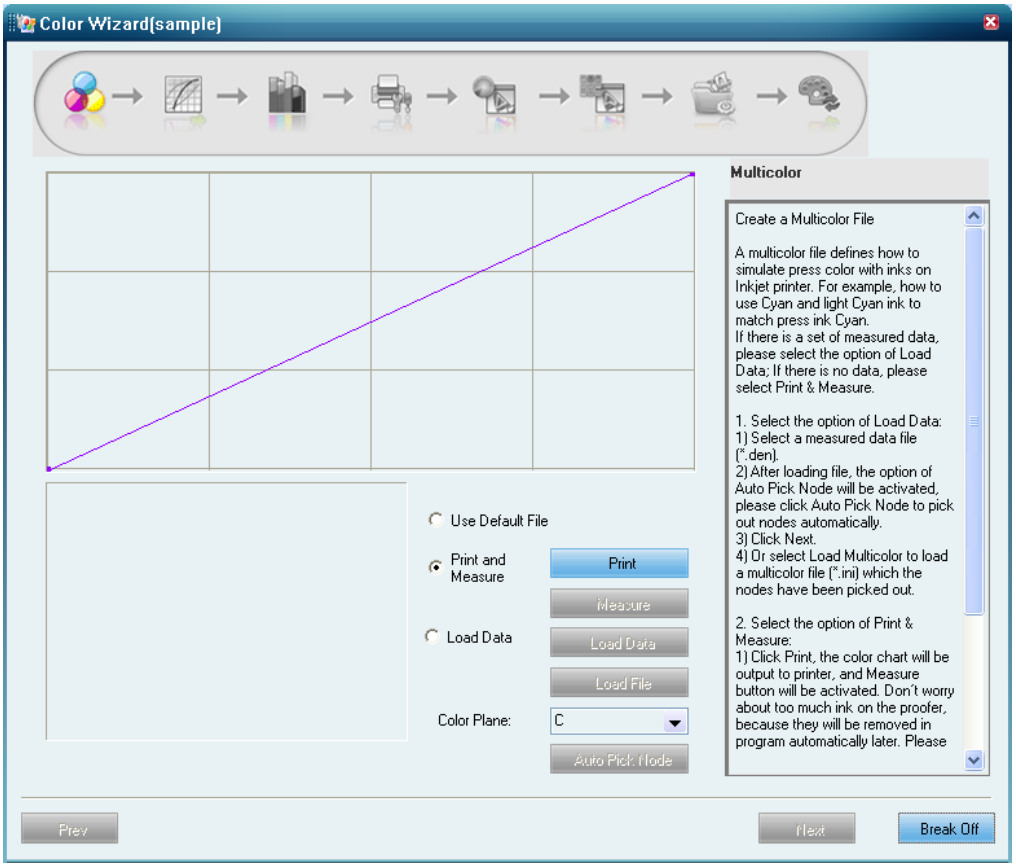

Figure-2

1. Use Default File

If needed, you can simply use a built-in profile by checking the option **Use Default File**.

2. Load File

You can make use of an existing and resembling profile.

To load a profile, check **Load Data** and then click **Load File** to open a dialog box, and in this dialog box, find out and open the profile you want to use. The device parameter setting such as resolution, separations and media type for your loading profile should keep consistent with those defined in the currently-used template.

3. Print and Measure

The general practice is to generate the profile based on actual measurement. Check **Print and Measure** and then click **Print** to print out a color chart. This chart is composed of multiple color strips, and each strip is composed of multiple color blocks.

After the print, click **Measure** to enter in the measuring window.

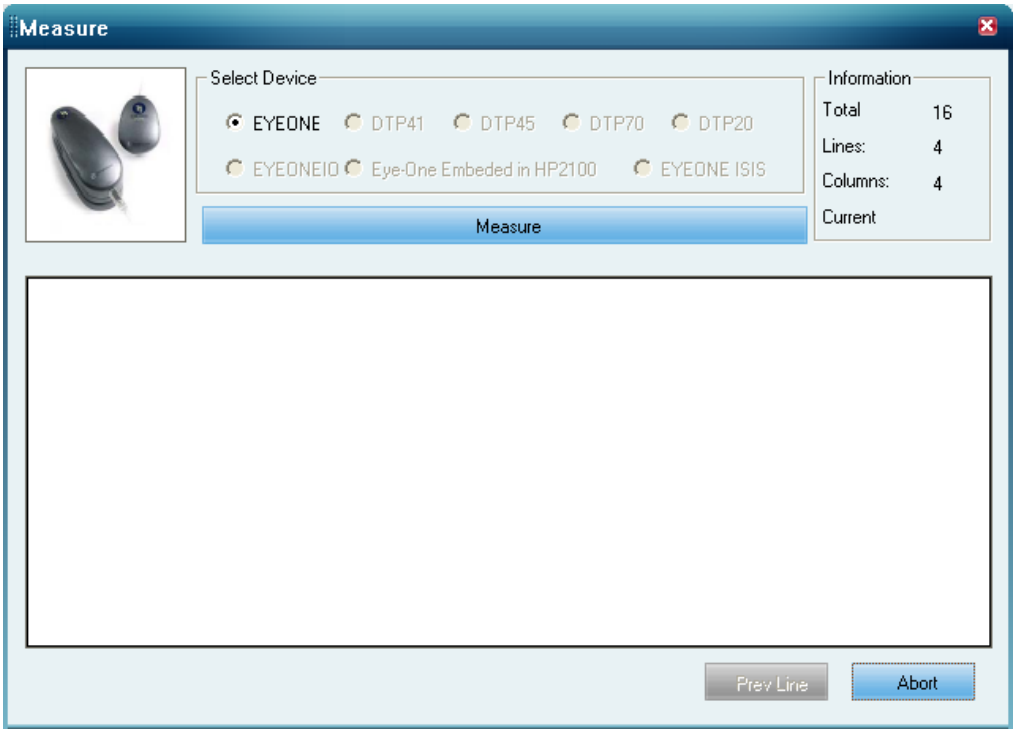

Figure-3

Please perform a white point calibration before the measurement. Click the **Measure** button in the window, and the button will immediately display a hint "Measuring WHITE TITLE… Click Here To Continue". Put the Eye-One device in place for the white point calibration and click this hint button, the device will then start the calibration. If the operation succeeds, the hint button continues to display as "Please measure the strip 1".

Put the Eye-One attached plastic soleplate on the printed chart, in alignment with the first strip. Then put the Eye-One device on the plastic soleplate. And then press and hold the operating button on the device. After a sound prompt is issued, slide the Eye-One device from left to right in regular speed to measure the first strip. And release the button till you get to the right end. If this measuring succeeds, it will ask you to measure the second strip. Continue the measurement as per the method above, till you finish all the rest strips.

For details on how to use the Eye-One device, refer to related documents attached to it.

Note: *When you use Eye-One to measure, we recommend you to put a piece of white paper under the chart. Later when you use it to measure the ECI2002 chart so as to create ICC, we also recommend you to put a piece of white paper underneath. If the calibration of the white points fails, it may be caused by insufficient power supply for the USB port, try another port. And as to measuring the trips, you need to slide Eye-One from left to right in regular speed, to ensure successful measurement.*

When you complete the measurement, you will see the hint "Measured successfully! Press here to continue". Click it, and it will then hint you to save the measured data. Specify the name and path for the data file, and then return to the main window.

4. Load Measured Data

Besides that you can gain the data from the print & measure operation, you can also load existing, resembling, or earlier measured data. Check **Load Data** and then click **Load Data**, and then in the pop-up dialog box, find out and open the data file you want to use.

Ensure to keep consistency in device settings such as resolution and separations.

The window appears as follows after you have loaded, or printed, measured and saved the data.

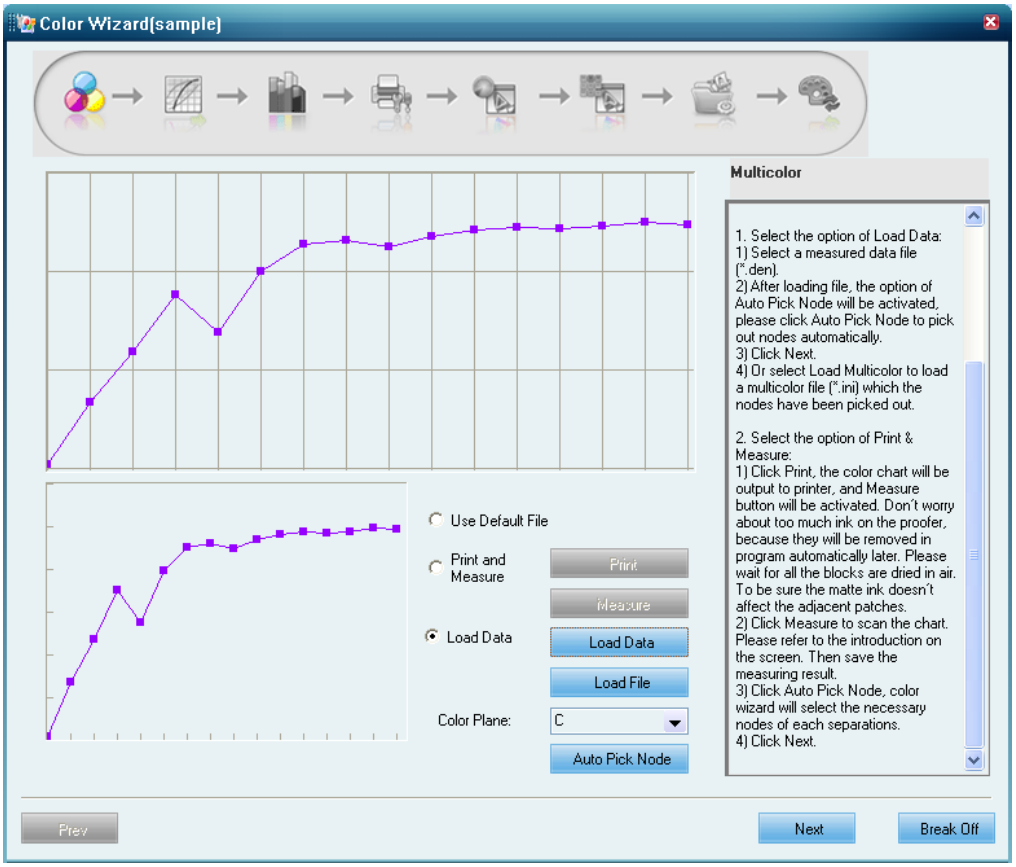

Figure-4

5. Pick Nodes

The window displays many nodes, each representing a color block. The horizontal axis indicates the blocks from left to right, while the vertical axis indicates the measured density on the blocks. Place the cursor on the node, and you can see detailed data, such as "No.12. Dens.2.446 DotType C(3), Lc(0)", No.12 indicating the 12th color block, Dens.2.446 representing the density value. This window can display the measured data only for one separation at one time. Choose from the **Color Plane** list to view the data for other separation.

EagleDot can automatically pick the suitable nodes for you to generate the profile, if you click **Auto Pick Node**. After you have clicked this button, you can also manually pick the nodes. Make the selection by clicking the blank node, and cancel the selection by clicking the node once again. In the manual selection, don't select the nodes that correspond to the blocks with ink flowing or heaping, and try to make the resulting node curve in the below as smooth as possible.

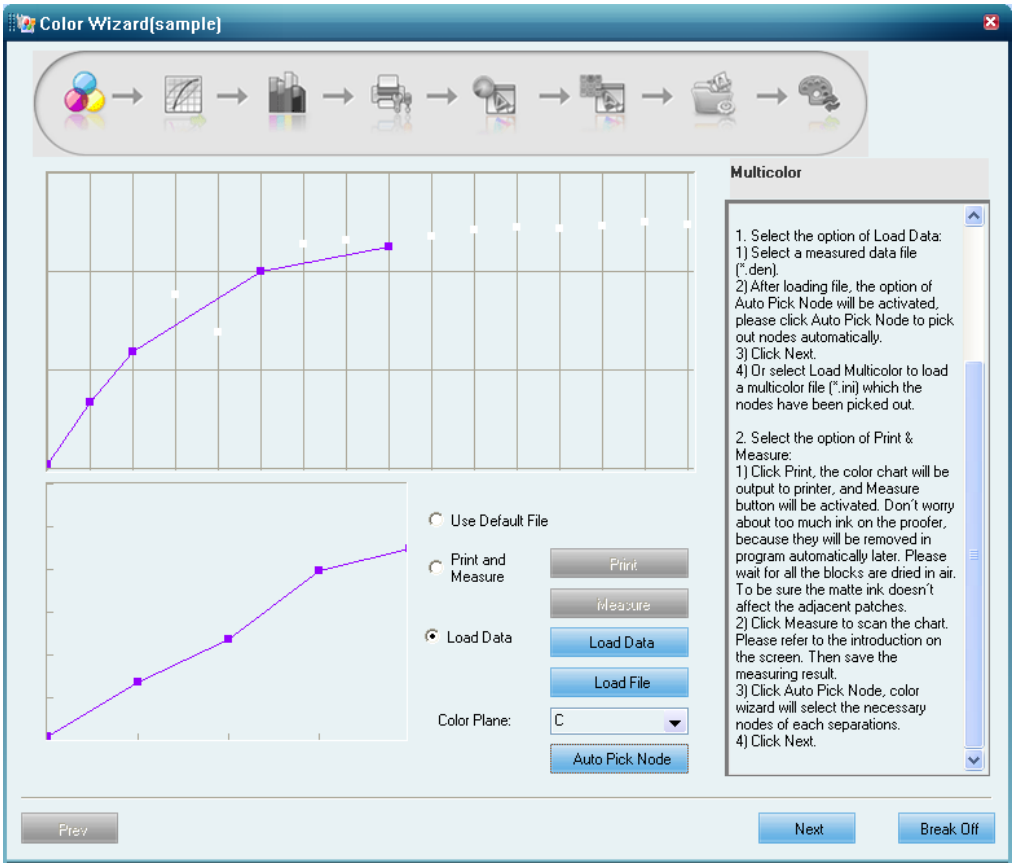

Figure-5

Click **Next** after the selection.

1.4 Step 2: Device Linearization

This step aims to set a linearization line to adjust the dot percentages. The inconsistency in the proof environment, e.g. looseness of the mechanical device parts after long use, changes in air humidity, ink quality and paper, may lead to varied shades quality in the output. For example, an area intended to be output with 90% ink, as a result of the above inconsistency, may actually become darker, or lighter, compared to the result normally output by other printer. If we apply the linearization, in the darker case, we can output this area with 87% ink instead of the original 90% ink; and in the lighter case, we can output with 92% ink, correcting the variance by changing the ink percentages.

The general linearization process is carried out as follow: first, print out the standard linearization chart; then, measure it to get the actual ink percentages; and then, base on the measured data to correct the shades variance, with built-in software algorithm. Such correctness is visualized on the user interface as the linearization curve.

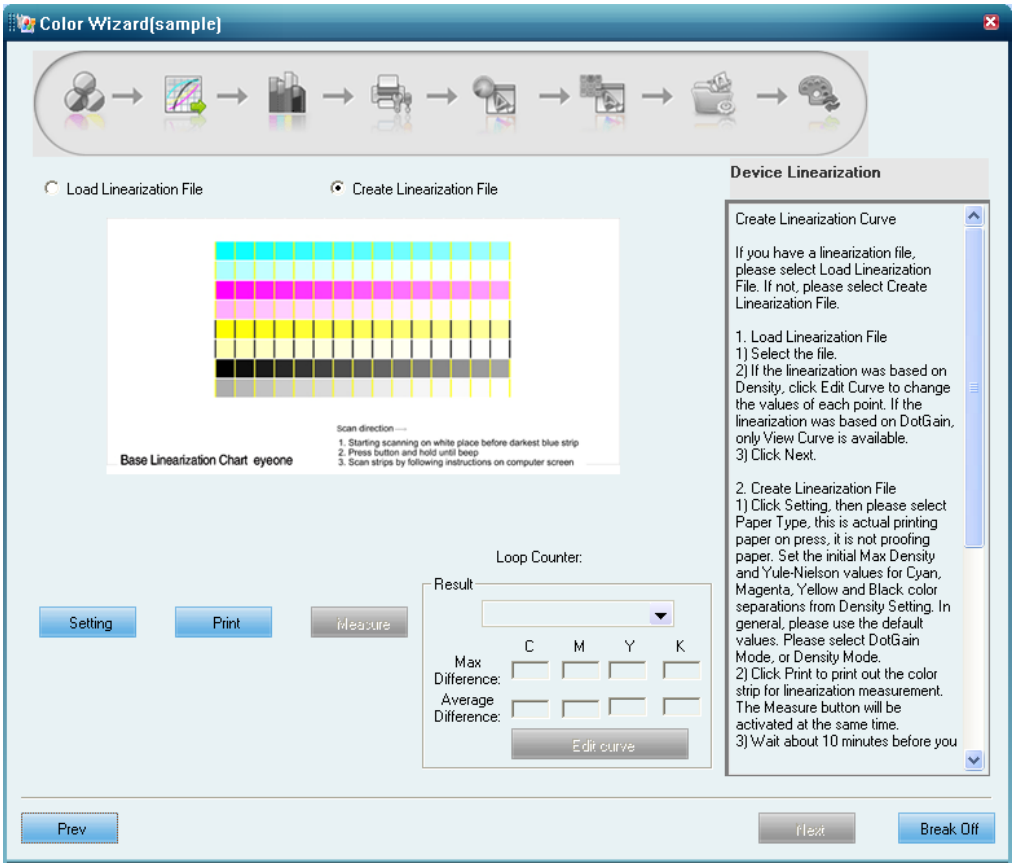

Figure-6

1. Load Linearization File

If you want to use an existing linearization curve, check **Load Linearization File** and then load the file you want to use. It is a simple practice, but we generally choose **Create Linearization File** to create a new one. The following are mainly about the operations in this way.

2. Parameter Setup

Before the print, click **Setting** to configure the following parameter as needed.

Note: *If you change the parameter settings during the linearization process, you need to carry out it over again from the very beginning.*

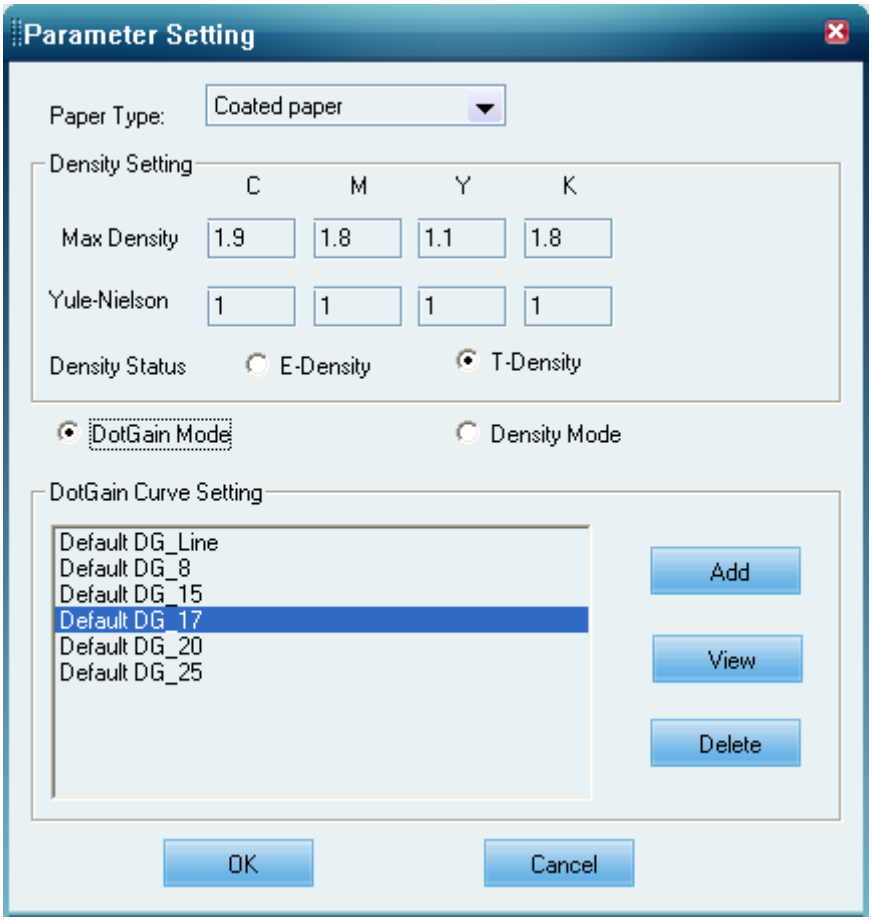

Figure-7

Paper Type: The paper used to print the linearization chart may be any of the three types, coated, uncoated and newspaper. The pre-defined density settings for the three paper types are different from each other.

Max Density: The maximum density allowed for each process color in the output. This setting influences on the final linearization curve. The pre-defined default values are specific to the paper. And the values can be manually modified, but note that the upper limit for each color has been determined in step 1, i.e. the highest density among the nodes you select.

Yule-Nielson: This setting controls the default shape of the generated linearization curve for each separation. The default setting is generally used, and is also specific to the paper.

Density Status: The standard to represent the measured data for the measuring device. E is European standard, T is USA standard. They bring out different numerical values.

Target Curve: EagleDot will apply a theoretically perfect curve as the target in the linearization process, i.e. the actually generated linearization curve will closely resemble this target curve. You can define this curve in two ways. In **Density** way, EagleDot automatically generates it based on the Yule-Nielson values. In **DotGain** way, you can manually specify a curve. EagleDot provides 6 built-in DotGain target curves for you to choose. Besides them, you can also click **Add** to create a custom curve.

3. Print and Measure

Click **Print** to print out the linearization chart. Wait about 10 minutes, and then you can begin the measurement. Click **Measure** to enter in the measuring window. The measuring method is basically the same as that in step 1.

Before the measurement, you also need to perform the white point calibration. After the calibration, it hints "Please measure the strip 1". Put the attached plastic soleplate on the chart, in alignment with the first strip. Then put Eye-One on the soleplate. And then press and hold the operating button. After a sound prompt is issued, slide Eye-One from left to right in regular speed to measure. When you finish the measurement, release the operating button. If succeeds, it will ask you to measure the second strip. Continue the measurement till you finish all the rest strips and see the hint "Measured successfully! Press here to continue". Click this hint to back the main window.

Figure-8

Files involved in the calibration wizard are saved automatically. After you have finished the measurement at the first time, you will see a generated linearization curve Linearization_0 displayed at the **Result** column, and meanwhile an option **Create Linearization Target Data** appearing (checked by default) on the interface.

Create Linearization Target Data: You need to crate this data in case that you want to perform a quick re-calibration operation in the future. When your device has been used for a period of time or its state has been changed, you can make use of the Re-calibration > Quick Calibration to restore your device to the state it had when you made the color calibration solution.

Note: *1) The **Next** button is grayed when this option is being checked, but becomes activated when you print and measure once again (see below). 2) In case that you choose to load a linearization file and the file contains such target data, this option will then become **Update Linearization Target Data**, and you can then check it, if needed, print and measure to update the data.*

Now, click **Print** to print out the linearization chart again, and click **Measure** to measure it. After the measurement, return to the main window, and at this moment, you can see the generated linearization curve Linearization_1 in the **Result** column, as well as the maximum and average differences between measured and reference data, from **Max Difference** and **Average Difference**.

If you are not satisfied with the maximum and average differences, you can repeat the print and measure operation, till you get the satisfied differences. The **Loop Counter** records the repeat times of measurement.

4. Edit the Curve

The **Edit Curve** button at the bottom of the window becomes activated when the linearization curve is generated. Click this button, and you will open the curve editing window, in which you can view and edit the generated linearization curve.

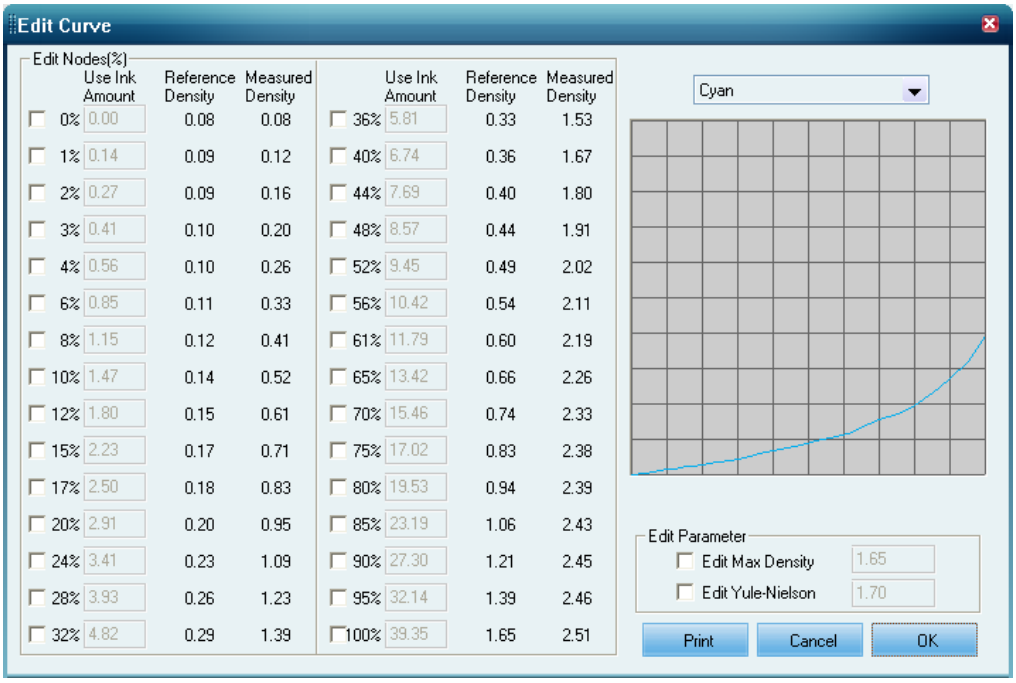

Figure-9

Each separation corresponds to a specific curve, and therefore, you should choose a separation correctly from the dropdown list at the upper-right corner. If you choose **View All**, you can view the curves for all separations, but in this case, you cannot edit them.

Each of the checkboxes in the leftmost column controls if to correct a specific ink percentage. A tick √ in the box means to correct.

Measured Density refers to the density from the actual measurement. **Reference Density** refers to the density calculated from Max Density and Yule-Nielson values, or defined by target Dotgain curve, used for reference. **Use Ink Amount** refers to the ink percentage applied in actual device output, editable.

At the lower-right corner of the window, you can modify the **Max Density** and **Yule-Nielson** settings. These two parameters affect the reference density and ink percentage values, in general, we recommend you to use the default values. To edit their values, check the corresponding boxes in front of them to activate the edit boxes behind them, the reference density and ink amount values change accordingly in real time.

When you have completed the curve editing, you can click **Print**, to apply the curve to print out a test chart, so as to check the actual linearization effect.

1.5 Step 3: Total Ink Amount

A limit to the total ink amount can effectively prevent too much ink from being flowing or heaped. The main window displays the chart for deciding the total ink amount. It consists of two parts, the upper half is used for auto measuring, and the lower half is used for you to make decision visually.

Click **Print** to print out the chart. After the print, scissor out the upper half of the chart, wait 10 minutes, click **Measure** to enter in the measuring window, and then follow the instructions on the window to measure. Return to the main window after the measuring. The measuring results appear in **Recommended ink value** and the **Maximum Ink** edit boxes.

The lower half of the chart is composed of three block groups, CK, MK and YK. Observe the chart, and choose separately from each of the three groups one block that shows the best appearance.

Choose the color block as follows:

1) The color block without any flowing or heaping ink, just in front of the semi-dry one.

2) The thin white lines on the blocks are designed for checking the ink penetration. Heavy penetration usually leads the white lines to fragment or disappear. In case that the paper is of high quality, you'd better choose the one on which the white lines are clearly visible.

3) In case that the paper is of coarse quality, you should check the ink penetration from the back side of the paper. The total ink amount is considered high if the ink penetration is so heavy that the paper has been obviously distorted. You can choose a block with neutral penetration.

Note: *The above way is used for reference only. In practice, you may make flexible decision based on the paper you are actually using. E.g., as to some newspapers, since they are subject to high penetration, the block without heaping ink may be good enough.*

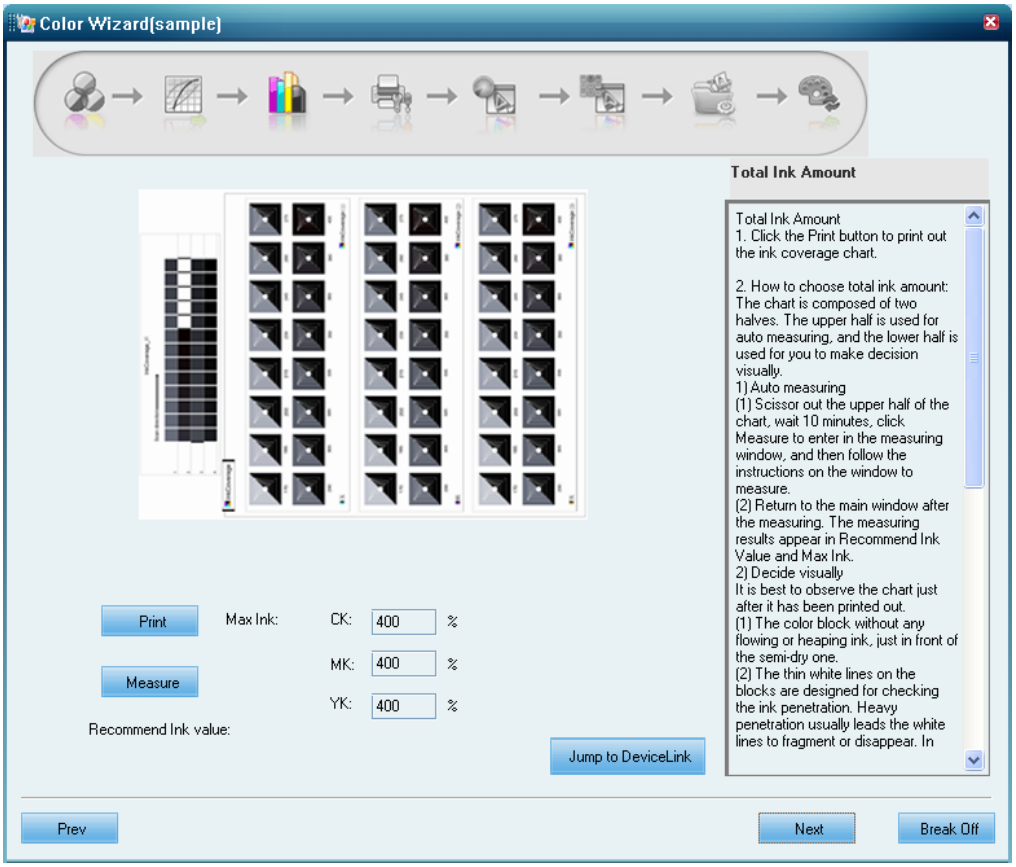

Figure-10

Base on both the measured values and the values below your chosen color blocks, to determine suitable values and input them separately into the **CK**, **MK** and **YK** edit boxes.

Jump to DeviceLink: Click this button, and you can directly leap to the step 7 of this wizard.

1.6 Step 4: Device Calibration

The purpose of this step is to make sure the neutral gray balance.

If you want to use an existing device calibration file, simply check **Load Device Calibration File** and then load the file you want to use.

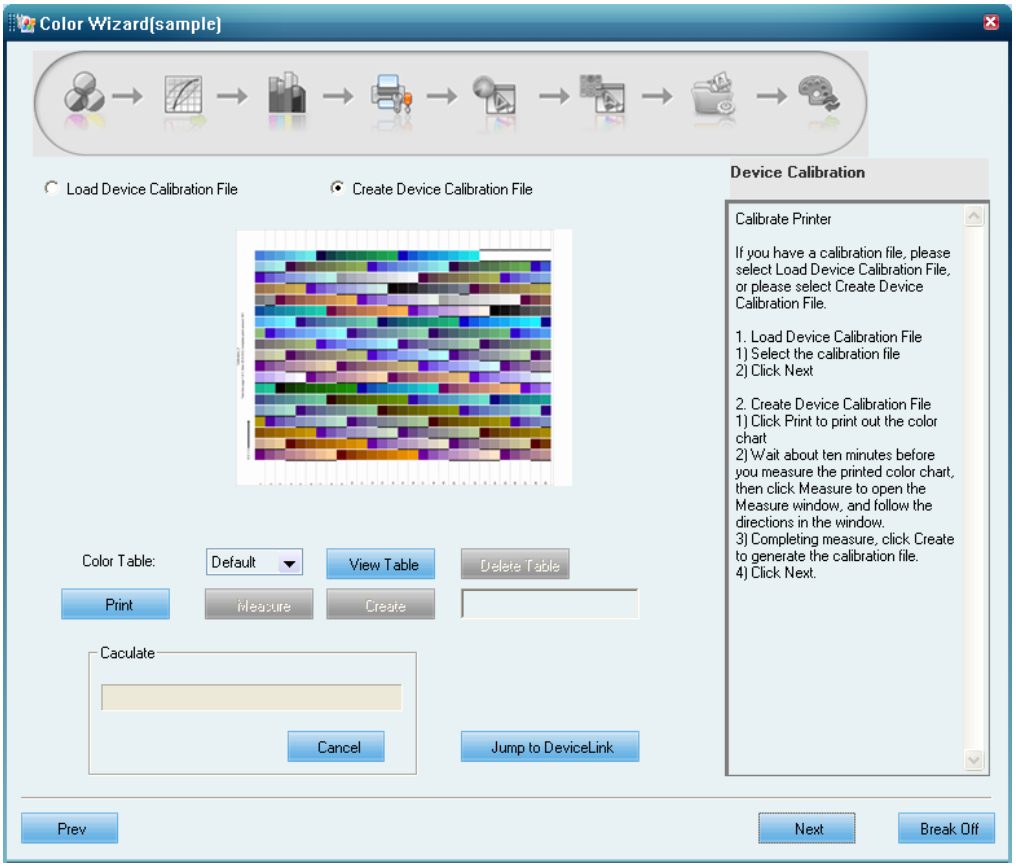

Figure-11

If you want to create a new calibration file by way of printing and measuring, choose **Create Device Calibration File**, then click **Print** to print out the gray balance chart, and then click **Measure** to start the measuring. The measuring is similar to that mentioned above. And after that, return to the main window. At this moment, click **Create** to automatically generate a linearization file ensuring the neutral gray balance.

The **Calculate** progress bar shows the progress of the file generation.

Later, an option **Create Calibration Target Data** appearing (checked by default) on the interface.

Create Calibration Target Data: You need to crate this data in case that you want to perform an entire re-calibration operation in the future. When your device has been used for a period of time or its state has been changed, you can also make use of the Re-calibration > Entire Calibration to restore your device to the state it had when you made the color calibration solution.

Note: *In case that you choose to load a calibration file and the file contains such target data, this option will then become **Update Calibration Target Data**, and you can then check it, if needed, print and measure to update the data.*

Print and measure again in case that you have the option **Create Calibration Target Data** checked.

Figure-12

As shown above, prior to you generate the linearization file, you can note down in a table the neutral gray colors that need to be specially controlled. In this way, when it comes to the calibration, EagleDot can optimize the control on these colors, to further ensure their neutral gray balance.

The default color control table (named as default) records some commonly-used colors, which can be viewed by clicking **View Table**. The input values are defined in CMY while the output values are in LAB (when you are using the default table, the a and b values are in effect, but L=0 doesn't mean the L value is 0, the actual L value depends on device calibration data). If you want to add other color, or customize the output LAB values, please use the **custom** table. **Weight** represents the level of preciseness in the color control, with a value ranging from 0 to 1000. The higher the value, the more precise the control is.

1.7 Step 5: Device ICC Profile

This step is used to specify the color space of the proof device, which is described with the device ICC profile.

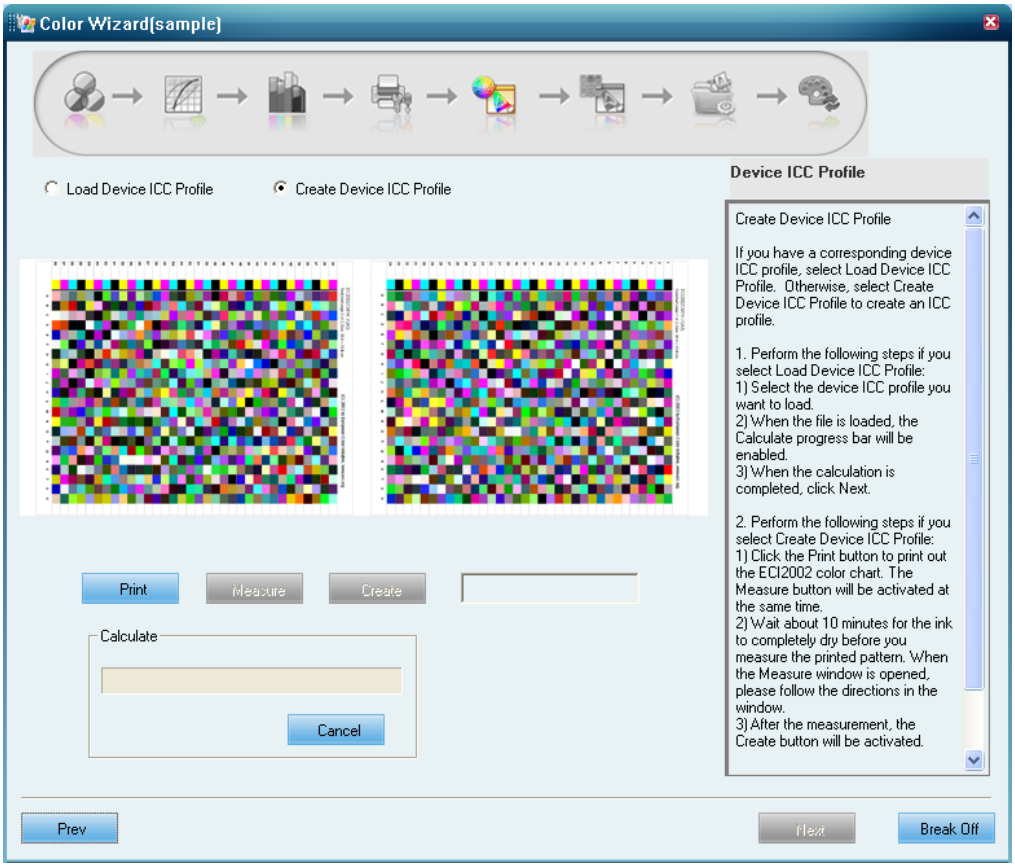

Figure-13

If you want to use an existing profile, simply check **Load Device ICC Profile** and then load the file you want to use. After the loading, you can edit its saturation. If you want to create a new profile by way of printing and measuring, choose **Create Device ICC Profile** and perform as follows.

Click **Print** to print out the ECI2002 chart, and then click **Measure** to start the measuring. The measuring is similar to that mentioned above. And after that, return to the main window. At this moment, click **Create** to automatically generate the ICC profile of the proof device. The **Calculate** progress bar shows the progress of the file generation.

Note: *If you use Eye-One to measure, we recommend you to put a piece of white paper under the chart. If you use other measuring device, a different chart may be used.*

1.8 Step 6: Press ICC Profile

This step is used to specify the color space of the press device.

If you want to use an existing profile, simply check **Load Press ICC Profile** and then load the file you want to use. After the loading, you can edit its saturation. If you want to create a new profile by way of printing and measuring, choose **Create Press ICC Profile** and perform as follows.

After you get the chart output by the press, click **Measure** to start the measuring. The measuring is similar to that mentioned above. And after that, return to the main window. At this moment, click **Create** to automatically generate the ICC profile of the press device. The **Calculate** progress bar shows the progress of the file generation.

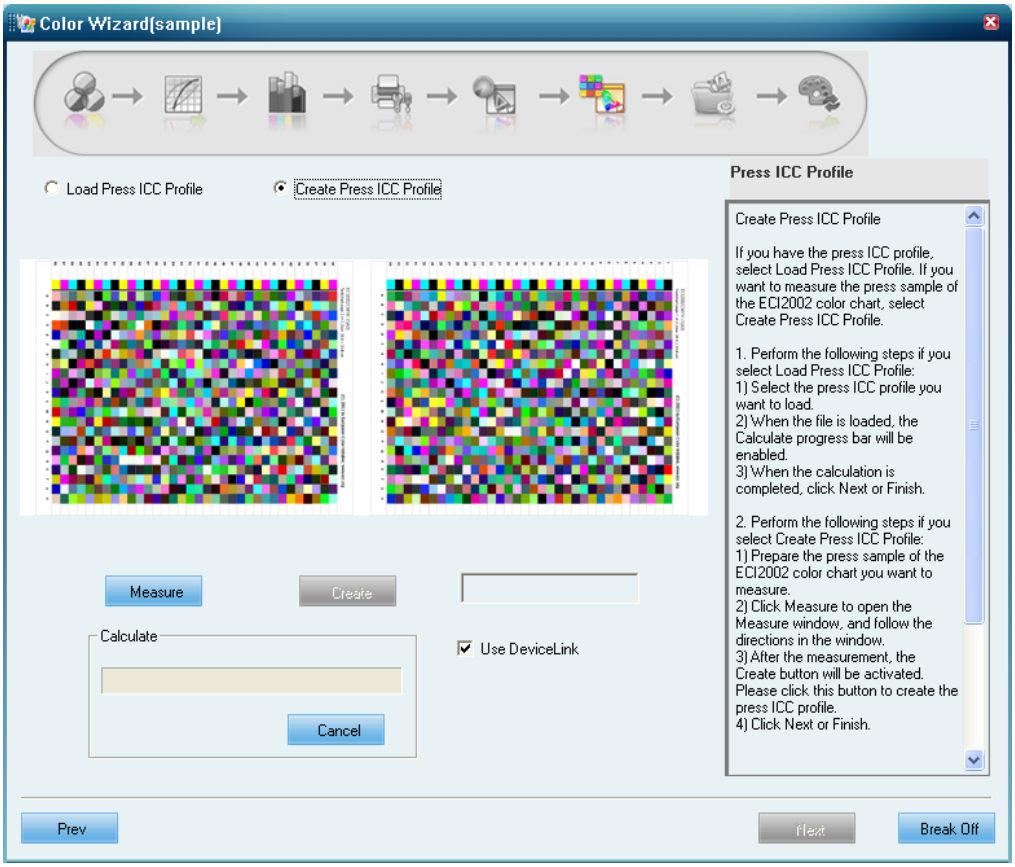

Figure-14

Use DeviceLink: If you check this option, you can continue the color wizard to the next step, DeviceLink. If not, the wizard ends at the current step. In the latter case, you can choose a rendering intent, and then click **Finish** to complete the wizard.

1.9 Step 7: DeviceLink

DeviceLink is a device connection profile generated based on device ICC and press ICC. You can check **Load DeviceLink ICC Profile** to load an existing ICC, or you can also create one based on the device and press ICC profiles created or loaded in previous steps.

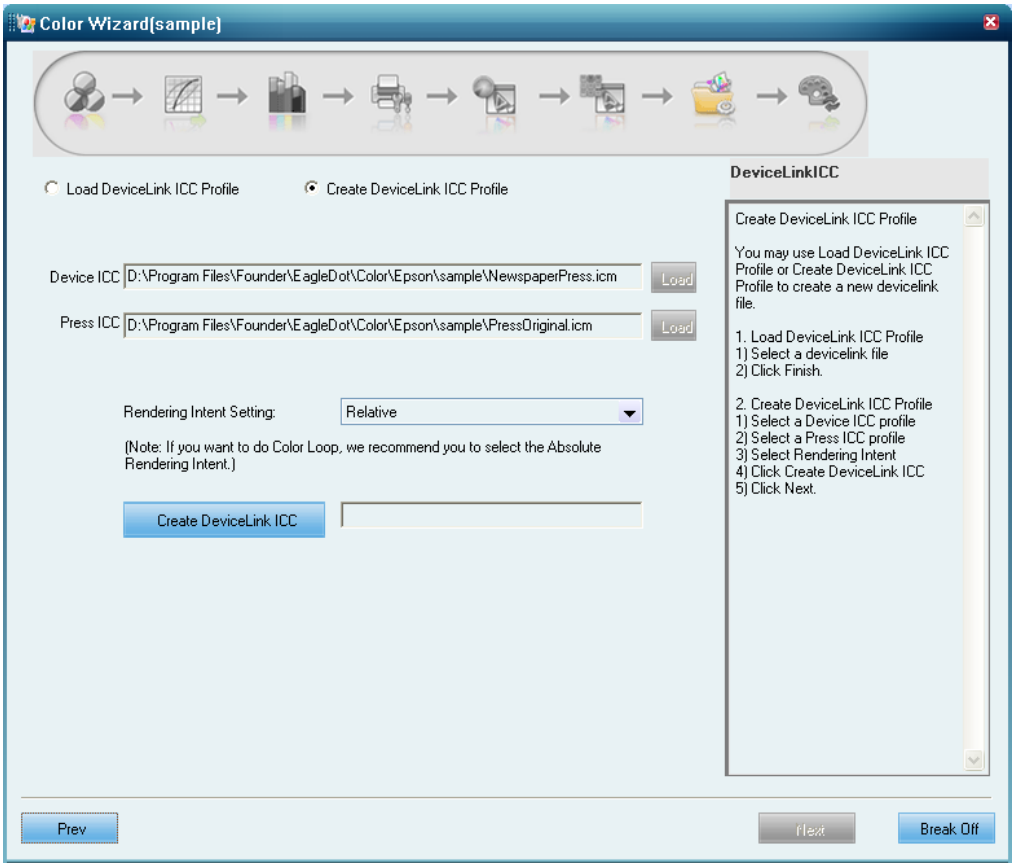

Figure-15

Note: *If you had chosen **Jump to DeviceLink** in step 3 or step 4, now you can separately choose the device ICC and press ICC. If you had come through the steps 5 and 6, then both will become grayed, only showing the ICC defined in these two steps.*

Choose a rendering intent, Perceptual, Saturation, Relative and Absolute, and then click **Create DeviceLink ICC** to generate the profile.

1.10 Step 8: Circular Calibration

This step is designed to minimize the color difference.

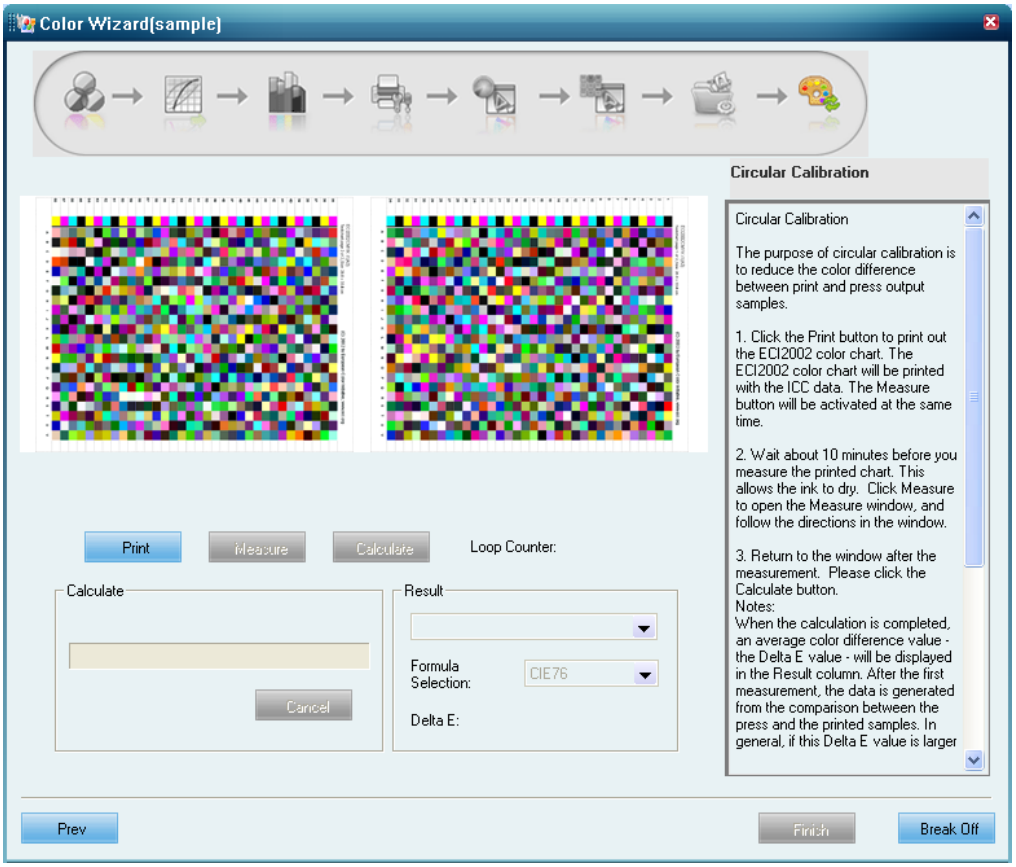

Figure-16

Click **Print** to print out the ECI2002 chart to which the ICC data has been applied. Wait for about 10 minutes and then click **Measure** to start the measurement. The measuring is similar to that mentioned above. And after that, return to the main window.

And then, click **Calculate**. When the calculation is completed, a Delta E value will be displayed in the **Result** column. The value at the first time comes from a comparison to the press data of the step 6, and generally larger than 1. Now you can start the loop calibration, i.e. to repeat the **Print**, **Measure** and **Calculation** operations. In general, the Delta E will be reduced to 1 after two loops. **Loop Counter** counts the times you have repeated. And the algorithm for the color difference can be customized.

Calibration can be ended when the mean color difference decreases to 1. Click **Finish** to complete. EagleDot automatically saves as a color solution file and exits the wizard.

1.11 Other Measuring Device

As mentioned previously, EagleDot supports multiple measuring devices. If you use a device other than Eye-One, the operations and applied charts may differ a little. Here we only briefly introduce their operational differences. For details on the operations and cautions for each device, please refer to the instructions provides with it.

1. Eye-One_iO

Click **Measure** after you have entered into the measuring window, and the window will first prompt you to specify three points. Follow the hint to define separately three points, and then the device will automatically measure the printed chart. When finishes, click the

hint “Measured successfully! Press here to continue” to return to the main window.

2. Eye-One iSis

After you have entered into the measuring window, put the printed chart correctly on the device, then click **Measure**, and the device will automatically slide the chart to measure. When it finishes, it displays the hint “Measured successfully! Press here to continue”. Click it to return.

Chapter 2
Apply Calibration Solution

The color calibration solution is applied by way of the parameter template.

1) Choose from the main menu **File** > **Parameter Template(s)** or click the button  in the toolbar to open the template window. Choose the previously used template.

2) Click the **Modify** button to open the template's parameter setup window.

3) Click the **Color Setting** button.

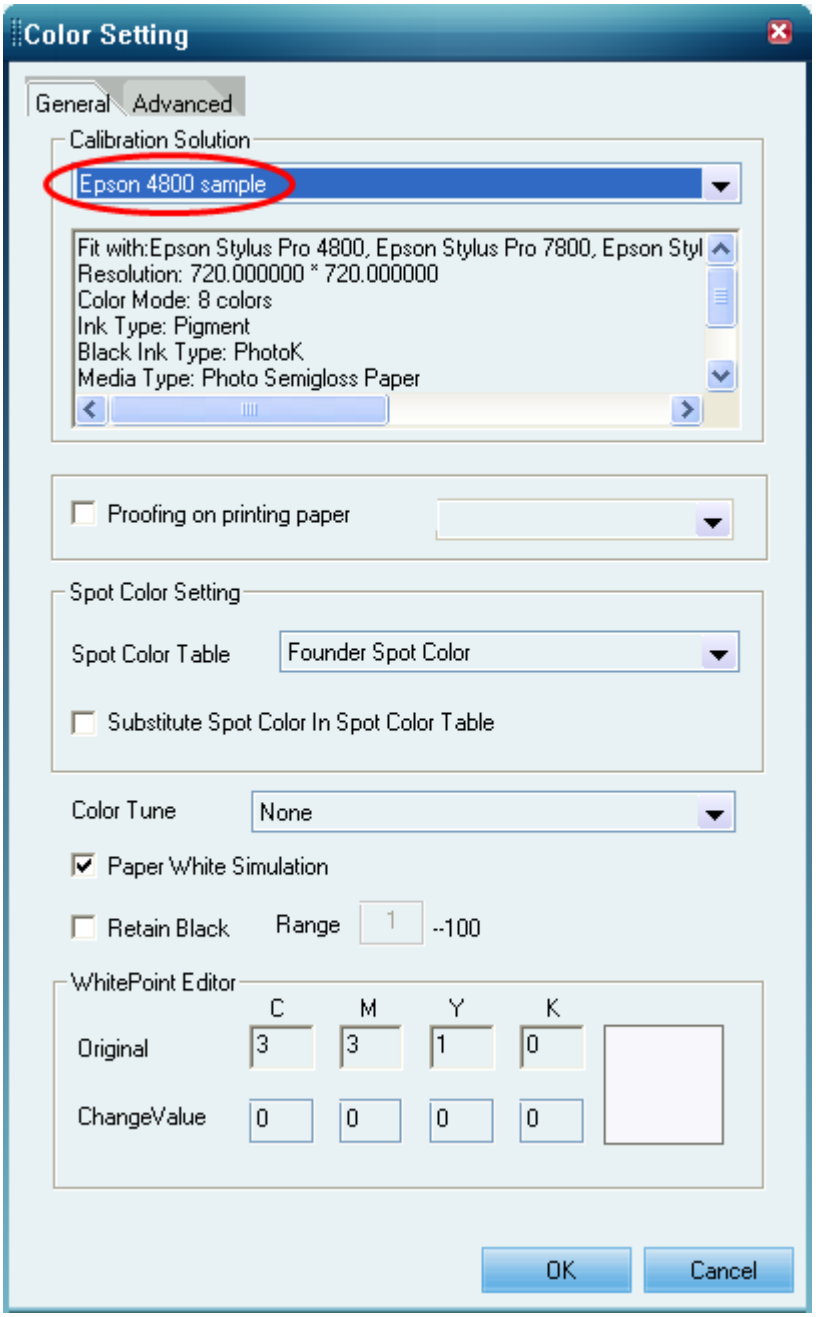

Figure-17

4) Under the **General** tab, choose the previously created or updated color calibration solution from the **Calibration Solution** dropdown list. After the selection, its detailed information, such as printing device, paper white simulation, resolution, ink type, black ink type, color mode, media type, measuring device, total ink amount, and etc., will all be displayed in its below.

5) Click **OK** to save the template.

Now you can use this template to proof your files. The color calibration solution will be applied during the proof process.