



**GMG ColorProof
Starter Kit Tutorial: Roland VersaUV LEC-
330/540, LEJ-640**

Imprint

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1. Introduction

GMG ColorProof comes with predefined GMG ProofMedia types for all commonly used proof printers. The product is shipped with optimized color management sets for GMG ProofMedia and for all proof printers suitable for meeting even the highest quality demands for contract proofing. We emphasize not only on reaching the highest level of color accuracy, but also on matching the visual appearance of the final print result as closely as possible.

With the integrated profiling tool, GMG ProfileEditor, you can also create your own MX based printer calibration files and proof profiles.

The present tutorial, which is part of a printer-specific **Starter Kit**, provides you with all basic information on creating a **custom** printer calibration and proof profile for a specific printer-medium combination.

Note Some of the features described in the following are not included in the standard GMG ColorProof version and require an additional license (GMG DotProof, GMG DotProof XG, GMG FlexoProof, GMG ProfileEditor, GMG ProofControl Inline, or GMG ColorServer). Please contact your local dealer for details.

Note Use of custom media is supported only by GMG ColorProof 5 Standard Version or higher licenses. GMG ProfileEditor is included only in GMG ColorProof 5 Pro Version or higher licenses.

1.1 Printer Control

When printing from GMG ColorProof, this is generally done by **printer drivers** developed by GMG Color GmbH & Co. KG (GMG Driver). The reason for developing proprietary printer drivers is to be able to get more control over the print output, allowing to linearize each channel, change ink limits and accurately define spot colors (which ensures a more realistic overprinting with spot colors).

If you want to use **custom media** and to create your own printer calibrations, you can use the printer driver based on the technology of the printer manufacturer as an **alternative** to GMG Driver. GMG Driver and manufacturer drivers may use different calibration file formats and the processing chain is slightly different. Being part of the **Calibration Set name**, the printer driver can always easily be identified.

Currently, the following printer drivers from printer manufacturers are supported.

- ▼ **HP Driver** for **HP Designjet Z3200, Z6200 Photo**
- ▼ **Canon Driver** for Canon imagePROGRAF iPF6300, iPF6350, iPF8300, iPF8310
- ▼ **Canon Driver** for Canon imagePROGRAF iPF6300S, iPF8300S, iPF8310S
- ▼ **Epson Driver** for **Epson Stylus Pro 4900, 7900, and 9900**
- ▼ **Epson Driver** for **Epson Stylus Pro 7890, 9890**
- ▼ **Epson Driver** for **Epson Stylus Pro WT7900**

For more information on the differences between GMG and manufacturer driver, please see the printer-specific comparison of the drivers.

1.2 Calibration File Formats

The following calibration file formats are used for different printers and printer drivers. Please note that each combination of calibration file format, driver and printer type requires a specific test chart.

<i>Printer Types</i>	<i>Printer Driver</i>	<i>File Format</i>	<i>Description</i>
4 color and multicolor printers based on CMYK inks such as Epson Stylus Pro 4000, x400, x450, x600, x800, x880, x890, 11880, Roland VersaUV LEC-330, Roland VersaCAMM VS, Mimaki UJF-706, Canon imagePROGRAF iPF6300S, iPF8300S, iPF8310S, HP Designjet 130, 5000, 5500, Z2100. Compatibility mode (for x880 printers) of GMG Driver for Epson Stylus Pro x900 series in 4/8 color	GMG Driver	*.MX3	3-dimensional color profile (CMY). The K channel is separately linearized which allows for smaller test charts.

1. Introduction

<i>Printer Types</i>	<i>Printer Driver</i>	<i>File Format</i>	<i>Description</i>
mode.			
Multicolor printers with additional (non-CMYK) inks from HP such as HP Designjet Z3200, Z6200.	HP Driver	*.MX3	3-dimensional color profile (CMY). If used with HP Driver (which is an RGB driver) to support custom media, you also need a corresponding MX4 profile for the color management that separates the color data from CMYK to CMY, Separation Mode: No Key (CMY Only) . Using an MX4 that sends K channel data to the MX3 and finally to the printer may lead to undesired print results.
Multicolor printers with additional (non-CMYK) inks from Canon such as Canon imagePROGRAF iPF6300, iPF6350, iPF8300, iPF8310.	Canon Driver	*.MX3	3-dimensional color profile (CMY). If used with Canon Driver (which is an RGB driver) to support custom media, you also need a corresponding MX4 profile for the color management that separates the color data from CMYK to CMY, Separation Mode: No Key (CMY Only) . Using an MX4 that sends K channel data to the MX3 and finally to the printer may lead to undesired print results.
4 color and multicolor Canon printers based on CMYK inks such as Canon imagePROGRAF iPF6300S, iPF8300S, iPF8310S.	Canon Driver	*.MX3	3-dimensional color profile (CMY). If used with Canon Driver (which is an RGB driver) to support custom media, you also need a corresponding MX4 profile for the color management that separates the color data from CMYK to CMY, Separation Mode: No Key (CMY Only) . Using an MX4 that sends K channel data to the MX3 and finally to the printer may lead to undesired print results.
Epson Stylus Pro x890, x900, WT7900 series	Epson Driver	*.MX4	4-dimensional color profile (CMYK). Needs to be used with Epson Driver (CMYK driver) to ensure control of the K channel. MX4 calibration files require a larger calibration test chart with more fulcrums than MX3 calibration files. Apart from this, an MX4 is created and handled in the same way as an MX3 printer calibration.
Multicolor printers with additional (non-CMYK) inks such as Epson Stylus Pro x900, WT7900 series, Canon imagePROGRAF iPF6300, iPF6350, iPF8300, iPF8310, and HP Designjet Z3200. An RGB/OG Pre-linearization (Pre-lin) is included in the calibration file. Please note that GMG ProfileEditor does not support MXC calibration files. This means you can create your own custom proof standard, but not use a custom medium together with GMG Driver.	GMG Driver	*.MXC	An MXC calibration file can only be used with GMG Driver and serves to split the CMYK color data to the multicolor space of the printer (with additional inks such as RGB or OG). MXC calibration files include the printer linearization for the additional inks and the full gamut file of the printer.

2. Printer Series

2.1 Roland VersaUV LEC 330/540, LEJ 640

GMG's key concepts—standardization and repeatability—and the versatility of the Roland printer allow for highly individual digital **mockups**. While the color management in GMG ColorProof ensures accurate process and spot color reproduction, the printer is kept in tight tolerances by the calibration and recalibration capabilities of the software.

Printer features

- The **VersaUV LEC series** developed by **Roland**, features powerful print and cut UV inkjets designed for high quality package **prototyping** and short-run production with the ability to print on a vast range of media.
- With the **VersaUV LEJ-640** Roland introduces a UV inkjet flatbed with the ability to print on **both** roll media and rigid substrates up to 13mm (0.51") thick and a media width up to 64".
- Printing **CMYK**, Opaque **White** and **Clear** inks in both gloss and matte, at resolutions up to 1440 dpi with six high-precision print heads, the **VersaUV** allows for unmatched versatility and remarkably rich special effects ranging from high gloss finishes to custom-textured three-dimensional effects—you can choose any combination of matte and gloss and layer them for interesting patterns - even Braille.
- Featuring the new environmentally friendly **Roland ECO-UV inks**, the **VersaUV** produces brilliant graphics that can be flexed and stretched across both curved surfaces and sharp edges without feathering or cracking.
- **Roland Intelligent Pass Control** technology enables smooth gradations and flawless solid colors.
- Safe, **low heat UV LED lamps** allow printing on heat-sensitive and pressure sensitive media such as shrink foils without any risk of damage. The LED curing technology can be turned on and off instantly for on-demand operation, requiring no warm up time.

White and Clear ink channels

- The white and clear inks are handled as spot colors in GMG ColorProof. Per default, the clear ink is mapped to the **White** channel. You can fine-tune the behavior of the spot color channel by adjusting the **Area Coverage** or by using a spot color **gradation** (sfg) file.

Contour cutting

With the integrated cutting technology, these printers offer a one-step operation which is also supported in GMG ColorProof. This way, you can create mockups already cut into shape, eliminating laborious manual work such as reloading and accurately repositioning the output in a separate cutter.

Available Proof Standards and Calibration Sets

GMG proof standards and calibration sets for **VersaUV** printers are available for the following print media:

- **GPPG Photo Paper Gloss**
- **UV Clear Polyester**

If you want to use a different print medium, you need to add the print medium in the **System** view (**System** > **Media**) and assign the printer to the medium. You can then proceed to the next step and create a calibration set and a proof standard for the new printer-medium combination. All these steps are explained in detail in our printer-specific **Starter Kits**.

Printer hardware settings

- To achieve maximum print quality, we recommend that a Roland technician adjusts the **print head**

position by 0.6 mm (from 2.2 mm low/3.2 mm high to 1.6 mm low/2.6 mm high).

- ▼ The **VersaUV LEC** series is available with four different ink configurations: **CMYK+White+Gloss** , **CMYK+Gloss+Gloss**, **CMYK+White+White**, and **CMYK+White+White ECO-UVS**.

Printer maintenance

- ▼ Due to the **Intelligent Ink Circulation System**, the white and clear inks are circulated every eight hours to keep the tube system in the printer clean. The **white** ink cartridge, however, still needs to be **shaken** prior to use each day to achieve homogeneous print results.

Tip For more information on producing mockups with GMG ColorProof, please see our printer specific **Best Practices**.

2.1.1 Further Recommendations

Drying times

Though the **Roland ECO-UV inks** are instantly hardened by the chemical curing reaction initiated by the UV lamps, they cannot be regarded as 100% stable and color-accurate just after being printed.

Extensive testing has shown that when **calibrating** your printer, you should allow the test charts to dry for about **15 minutes**. The same applies for printing test charts for full gamut files. When creating a **profile**, the test charts should be left drying for **two hours** before measuring to ensure accurate results.

<i>Measurement Type</i>	<i>Drying Time</i>
Measuring a control strip	15 min
Recalibrating (GMG AutoCali Wizard)	15 min
Measuring a Full Gamut test chart	15 min
Measuring a Gamut test chart	2 h
Optimizing an MX4 Profile	2 h

Gloss on Magenta areas

If you experience problems with a gloss finish on Magenta areas, the gloss appearing rather matte and not as glossy as desired, it might help to increase the number of **Overprint** passes, or to switch to the **Gloss Embossing** color mode.

3. Creating a New Printer Calibration for Custom Media

3.1 Test Chart Types

GMG Color GmbH & Co. KG provides test charts for all supported printers and measuring devices.

GMG test charts use the following naming convention:

GMG_<test chart type>_<random/visual>_<measuring device> _<version No.>_<total No. of pages>_<page No.>

<i>Placeholder</i>	<i>Meaning</i>
GMG	GMG is used in the file name of all test charts created or optimized by GMG Color GmbH & Co. KG.
test chart type	Different test chart types are used for different steps when creating a printer calibration or proof profile.
random/visual	In Random test charts, patches have been randomized to avoid influences of inhomogeneous printings to the measurements. It is recommended to use Random test charts if available.
measuring device	Use only test charts intended for use with the measuring device you are using.
version No.	In some cases, multiple versions of a test chart, denominated as V1, V2, etc. are available. It is recommended to use the latest version.
total No. of pages	In some cases, a test chart does not fit the printable area of a printer or the readable area of the measuring device. In these cases, the test chart is provided tiled into multiple pages. For example, <i>2pages</i> means that the test chart is tiled into two separate test chart files.
page No.	Page number of a multi-page test chart file. Make sure you print all pages of a multi-page test chart.

Where to find test charts

- ▶ All test charts can be found in the **Testcharts** subfolder of the main program folder of the application.
- ▶ **Templates** for measuring test charts in GMG ProfileEditor can be found in the **templates** subfolder of the main program folder of the application.

Test Chart Types

Type	Usage
TC4	Measuring the full gamut of a printer–medium combination. The TC4 test chart includes more color patches than the ECI2002 chart, with the focus on patches important for the printer calibration file.
CMY-Gamut	Measuring the gamut or full gamut of the printer–medium combination, only for HPZ3200 + HP Driver .
TC3	Measuring the target or current values for an MX3 printer calibration file.
Flexo V2	Measuring the target or current values when creating an MX5 flexo profile.
TC3-K	Measuring the target or current values for an MX4 printer calibration file. TC3 with additional K patches, only for Epson Stylus Pro 4900, 7900, 9900 + Epson Driver
TC3-MXC	Used internally by the program when calibrating a printer with an MXC printer calibration file. (MXCs cannot be edited in GMG ProfileEditor.)
TC-White-Calibration	Used internally by the program when updating the White Linearization in a printer calibration file for a white ink printer.
ECI2002	Measuring the gamut of a printer–medium combination. Also for measuring the target or current values when creating an MX4 proof profile.
SpotColor	Measuring the target or current values when creating a spot color profile in GMG SpotColor Editor.
DotGain	Measuring the current values for the Dot Gain when creating an MX5 proof profile.
Flexo-DotGain	Measuring the current values for the Dot Gain when creating an MX5 proof profile. Special test chart for calculating flexo dot characteristics.

3.2 Choosing a Suitable Media Type and Print Mode

3.2.1 Adding a New Print Medium

Note Color management sets installed with the product such as proof standards, calibration sets, printer media, and spot color sets are **read-only** and can be edited **only** after **duplication**. Files linked to those color management sets such as printer calibration files, proof profiles, spot color databases and ICC profiles should **not** be edited by the user. Modifications might lead to unwanted results. Modified files might be overwritten by the installer without notice when updating the software.

Tip When creating a new medium, it is recommended to duplicate an existing printer–medium combination with a comparable media type and use this as a template. For most printers, the **Media Thickness** and the **Paper Feed Adjustment** are the most important parameters that should be verified for the new media type. In most cases, all other parameters can be left unchanged.

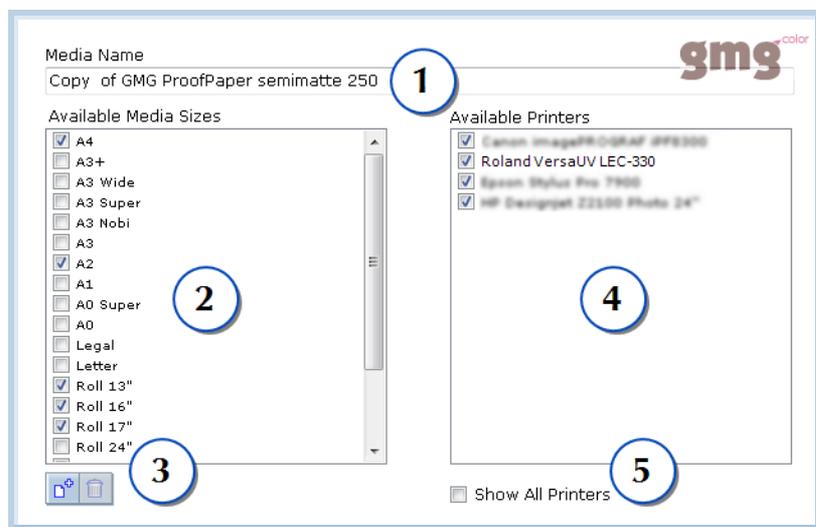


Fig. 1 Definition of printer–medium combinations.

You can set up custom media types under any name (1). You can then define available media sizes as a global property of this medium type, for all printers (2). You can also define new custom media sizes (3) or delete sizes (for all printers).

The media type (with all sizes) needs to be assigned to printer types (4). In this example, the medium is assigned to all available printer types.

(In the **Media** list in the **System** view, only the formats supported by this printer–medium combination will show up. Only supported media sizes will be available for printing a job.)

You can also set up printer–medium combinations for printers that have not been installed yet. Select **Show All Printers** (5) to update the list with **all** printers supported in GMG ColorProof.

How to add a new print medium to the database

1. Click the **System** button on the navigation panel on the left of the main window. Click the **Media** tab.
The **Media** page shows a list with all printer–medium combinations available in the database.
2. Select an existing printer–medium in the list, based on the printer you want to use and on a comparable new medium type. On the **System** menu, point to **Print Media** and click **Duplicate**.
—OR—
If you are unsure about a comparable medium type, create a new printer–medium combination from scratch. On the **System** menu, point to **Print Media** and click **New**.
3. Type in a **Media Name**.
4. Select the media sizes that are supported by this medium in the **Available Media Sizes** list.
5. (Click **Show All Printers** if you have not installed the desired printer in GMG ColorProof yet.) Select all printers that support this medium on the **Available Printers** list.
6. After creating the new medium, you need to define the **Advanced Media Settings** for all printer–medium combinations you have created in step 4.

Parent paper

Note For all printers using a **Parent Paper** parameter, you need to define a **Parent Paper** in the **Advanced Media Properties** dialog box for each new medium. New media for the printers without a **Parent Paper** will not be available for setting up a calibration set, proof standard, or printer.

Print modes that will give excellent print results for a printer–GMG ProofMedia combination were validated by GMG ColorExperts. When creating a new print medium, you choose the best matching **Parent Paper** from the list. Print modes available for the printer–parent paper combination will be available for the new printer–medium combination as well.

How to define the Advanced Media Settings for printer–medium combinations

1. Select the new created printer–medium combination, in this example, *Roland VersaUV LEC-330 – Custom Medium 1*, from the **Media** list and click the **Advanced Media Settings** button on the toolbar .

The **Advanced Media Settings** dialog box is displayed. Define parameters such as the media thickness or paper feed for the selected printer–medium combination. If you are unsure, keep the default settings and change the settings only if you experience any problems. For all printers using a **Parent Paper** parameter, select a **Parent Paper** from the drop-down list.

2. You can then proceed to the next step and define a **calibration set** and a **proof standard** for all new printer–medium combinations.

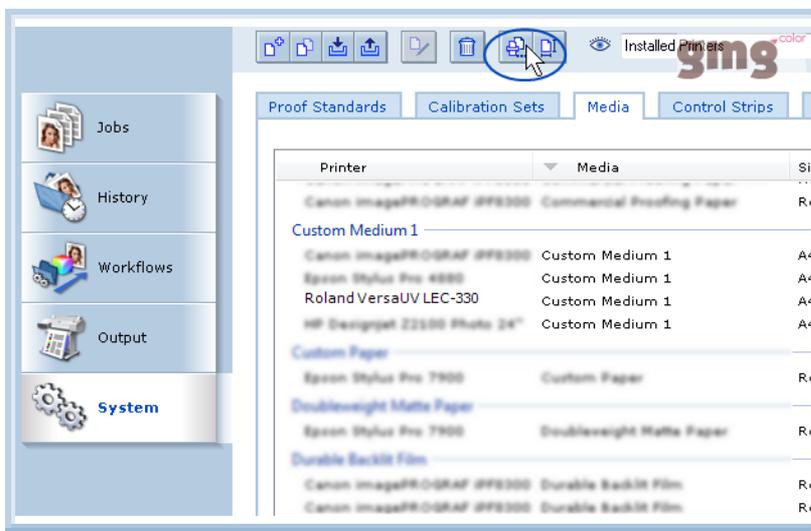


Fig. 2 Opening the Advanced Media Settings dialog for a printer–medium combination.

3.3 Evaluating the White Ink Limit

The goal of this test is to evaluate the physical limitations on **white** ink uptake of the printer–medium combination. This is especially important if you are planning to print a white **undercoat**.

As a result of this step, an MX3 printer calibration file from the starter kit will be identified as ideal color profile for creating the target values for the final printer calibration file.

A test page with color stripes printed on **white** with an **increasing** area coverage from row to row is printed. The rows simulate different intensities of white undercoat.

The test page is printed without any color management (linear color profile and printer calibration). A visual check of the printed test page allows deciding which undercoat intensity is supported by the printer–medium combination.



Fig. 3 Test page for the white ink limit.

The numbers on the right side of each row specify the area coverage of the white ink. For each number, a linear printer calibration file is provided in the starter kit, which is required for creating the Full Gamut file in a later step.

Select the row with the highest undercoat density that still shows bright and distinct color stripes, without overinking. For comparison, you can print the test page on a standard printer–medium combination, using a standard color profile and printer calibration.

How to create a job for the test image

1. Create a new job in GMG ColorProof and add the image **Undercoat-Intensity.tif** from the starter kit to the job. When creating the job, ignore the settings in the **New Job** dialog box. You will configure the job and image settings in the **Manual Job Manager**.
2. **Job > Printer Settings > Printer:** From the **Printer** list, select the installed printer you want to use, for example, Roland LEC-300.
3. **Job > Printer Settings > Printer:** From the **Medium** list, select the loaded medium.
4. **Job > Printer Settings > Printer:** Under **Calibration Set**, select **Custom**.
5. **Job > Printer Settings > Printer:** Under **Printer Calibration**, select the linear_Calibration.mx3 from the **starter kit**.
6. **Job > Printer Settings > Printer:** Under **Spot Color**, select the Starterkit_Roland_LEC-330_V1.db3 from the **starter kit**.
If the correct spot color database has not been selected, the **White** spot color in the test image will not be defined.
7. **Job > Printer Settings > Advanced:** Make sure the printer settings are correct, for example White|CMYK – 1440 x 1440 dpi – Unidir – 380 mm/s – 1x – V1.
If the wrong print mode has been selected, it will not be possible to use the printer calibration file from the starter kit.
8. **Image > Color Management > Proof Output:** From the **Proof Standard** list, select **Custom**. Under **Profile (MX DeviceLink / ICC Input)**, select a **linear** MX4 (default path: <installation path>\Profiles_Linear\CP_linear.mx4).
9. Click **OK** to print the job.

The test image with the **highest** undercoat density that still shows bright and distinct color stripes, without overinking, specifies the **maximum undercoat density** for this printer–medium combination.

3.4 Testing the Total Area Coverage of the Printer–Medium Combination

The aim of the test is to evaluate the physical limitations on ink uptake of the printer–medium combination. As a result of this step, an MX printer calibration file from the starter kit will be identified as ideal color profile for creating the target values for the final printer calibration file.

This test is required only for printers in combination with GMG Driver.

A test page with multiple test images (white lines set against a dark background) that show different levels of ink application (CMY and K) is printed. The test page is printed without any color management (linear color profile, linear printer calibration). A visual check of the printed test page allows deciding which TAC is supported by the printer–medium combination.

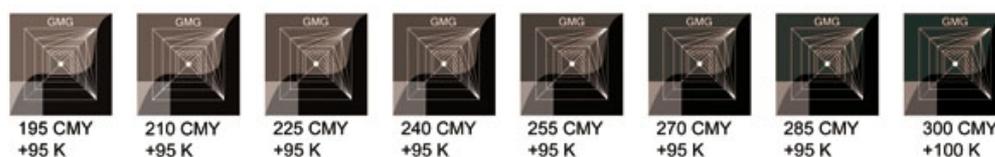


Fig. 4 Test image for TAC check.

The CMY values below the test images specify the TAC. A base MX3 printer calibration file is provided for each TAC in the starter kit.

Select the test image with the highest TAC that shows no overinking and gives a good print result. The white lines should appear sharp and crisp. You can print the test page on a standard printer with standard color profile and calibration for comparison.

See also:

- "Adding a New Print Medium" on page 10

How to create a job for the test image

1. Create a new job in GMG ColorProof and add the image **InkCoverage.tif** from the starter kit to the job. When creating the job, ignore the settings in the **New Job** dialog box. You will configure the job and image settings in the **Manual Job Manager**.
2. **Job > Printer Settings > Printer:** From the **Printer** list, select the installed printer you want to use, for example, Roland LEC-300.
3. **Job > Printer Settings > Printer:** From the **Medium** list, select the loaded medium.
4. **Job > Printer Settings > Printer:** Under **Calibration Set**, select **Custom**.
5. **Job > Printer Settings > Printer:** Under **Printer Calibration**, select the printer calibration file from the starter kit (for example, linear_Calibration.mx3).
6. **Job > Printer Settings > Advanced:** Make sure the printer settings are correct, for example the **print mode**.
7. **Image > Color Management > Proof Output:** From the **Proof Standard** list, select **Custom**. Under **Profile (MX DeviceLink / ICC Input)**, select a **linear** MX4 (default path: <GMG ColorProof installation path>\Profiles_Linear\CP_linear.mx4).
8. Click **OK** to print the job.

How to evaluate the result

→ Visually check the printed ink coverage test form.

The test image with the **highest** CMY value that still shows no overinking and gives a good print result specifies the TAC for this printer–medium combination. The corresponding **printer calibration file** will be used as a starting base for creating target values for the printer calibration file.

For example, if a total area coverage of 240 provided the best print results, use "Roland_LEC-330_Starterkit_V1_240.mx3" for all following steps.

3.5 Creating a New White Linearization

A linearization of the white ink channel serves to control a white ink printer in a way that the printed white ink behaves linearly to the input white channel. For most applications, a white linearization is **not** required, as the white ink is linearized by the printer driver (GMG Driver). **Skip** this step if you are satisfied with the default linearization and proceed with step "How to Transfer the Maximum Undercoat Density" on page 16.

Note The data for the **White Linearization** need to be gathered with **Black Backing** (external measuring device). The subsequent 'normal' calibration uses **White Backing**.

The first thing to do when creating a white linearization is to activate the **White Processing** functionality.

How to activate the white linearization in the printer calibration file

1. Start GMG ProfileEditor.
2. On the **File** menu, click **Open**.
3. Open the printer calibration file from the starter kit, for example Roland_LEC-330_Starterkit_V1_240.mx3.
4. On the **Common** tabbed page, select the option **White Processing**.

When the option **White Processing** is selected, a new tabbed page appears: **White Linearization**. On this page, you can define the **Target Values** for the white linearization and import or measure the corresponding **Current Values**, in a similar way as for the CMYK channels.

Proceed with step "Creating a White Linearization" on page 15.

3.5.1 Creating a White Linearization

Note Please check that the option **White Processing** on the **Common** tabbed page has been selected. Otherwise, the **White Linearization** tabbed page will be hidden.

How to create the job for printing the white linearization test chart

1. Create a new job in GMG ColorProof and add the appropriate **GMG_TC-WhiteLinearization** test chart for the printer and measuring device from the **Testcharts** subfolder of the ColorProof main program folder to the job.
2. Ignore all other options in the dialog box and click **Open** to edit the job in the **Manual Job Manager**.
3. **Job > Printer Settings > Printer:** From the **Printer** list, select the installed printer you want to use, for example, Roland LEC-300.
4. **Job > Printer Settings > Printer:** From the **Medium** list, select the loaded medium.
5. **Job > Printer Settings > Printer:** Under **Calibration Set**, select **Custom**. Under **Printer Calibration**, select a **linear** MX3 printer calibration from the **starter kit** (*linear_Calibration*).
6. **Job > Printer Settings > Printer:** Under **Spot Color**, select the Starterkit_Roland_LEC-330_V1.db3 from the **starter kit**.
If the correct spot color database has not been selected, the **White** spot color in the test image will not be defined.
7. **Job > Printer Settings > Advanced:** Make sure the print mode uses the correct driver, for example White|CMYK – 1440 x 1440 dpi – Unidir – 380 mm/s – 1x – V1.
8. **Image > Color Management > Proof Output:** From the **Proof-Standard** list, select **Custom**. Under **Profile (MX DeviceLink / ICC Input)**, select a **linear** MX4 (default path: <installation path>\Profiles_Linear\CP_linear.mx4).
9. Click **OK** to print the job.

How to repeat the measurement for averaging measured data

- In the GMG ColorProof **History** view, select the printed job and print the test chart again.

How to measure the data from the test chart

Note The data for the **White Linearization** need to be gathered with **Black Backing**. The subsequent 'normal' calibration uses **White Backing**.

1. Start GMG ProfileEditor.
2. Open the printer calibration file from the starter kit, for example Roland_LEC-330_Starterkit_V1_240.mx3.
3. On the **Common** tabbed page, select the option **White Processing**.
4. Click the **White Linearization** tabbed page.
5. On the **Tools** menu, click **White Linearization**.
The **White Linearization** dialog box is opened.
6. Select the measuring device you want to use from the list.

7. Click the **Measure** button.
The test chart measurement dialog box opens. As you can see, the appropriate template is pre-selected.
8. If you need to change the test chart template, click the browse button and browse your folders. In the **templates** folder, select the chart template corresponding to the test chart (with the same name).
9. Insert the test chart into the measuring device.
10. Click the **Measure** button.
The test chart is measured.
11. After a successful measurement, the following message is displayed: "Should the measured values be transferred?". Confirm the message by clicking **Yes**.
The measured values are transferred into the gradation file and the test chart measurement dialog is closed. (It is recommended to backup the displayed gradation file as initial gradation file so that you are always able to reset the gradation after unwanted changes due to calibration.)
12. In the **White Linearization** dialog, enter the white **Ink Limit** you evaluated in step "Evaluating the White Ink Limit" on page 12 and the number of **Fulcrums** you want to have taken into account.
13. Click the **Create** button to create the linearization file with the specified white ink limit and the corresponding Lab **Target Values**.
14. **Save** the MX3 profile.

3.5.2 How to Transfer the Maximum Undercoat Density

If you are using a white undercoat, you will need to manually edit the printer calibration file that you will use as a basis for your custom printer calibration file **after** you have completed the **TAC evaluation**.

See *also*:

- "Evaluating the White Ink Limit" on page 12

How to transfer the maximum undercoat density to the printer calibration file

1. Start GMG ProfileEditor.
2. Open the printer calibration file, for example Roland_LEC-330_Starterkit_V1_240.mx3.
3. On the **Common** tabbed page, make sure the option **White Processing** is selected.
4. Click the **White Linearization** tabbed page.
5. Edit the **W** value of the fulcrum with an **Index** of **100.00**: Enter the **maximum undercoat density** value.

This way, the printer calibration file will already **limit** the white ink application in the color management workflow.

In GMG ColorProof, you can select any **Undercoat Intensity** you want (up to 100%), without the risk of overinking.

3.6 Creating the Full Gamut File

In this step, the **full gamut** file for the selected printer–medium combination will be created by printing and measuring a test chart. The full gamut is used for calculating new color values in the printer calibration file when **calibrating** a printer. It defines the output values that need to be sent to the printer to achieve a target Lab value. Thus the full gamut file describes the color space the printer is able to print according to the print medium and print mode in a "neutral" state, **before** being calibrated.

White ink printers

When creating a printer calibration for white ink printers, consider for which prints you will **mainly** use the calibration later. If you will use it mainly for prints with undercoat, you should also print test charts with the same **Undercoat** settings. However, you will not be restricted to use the printer calibration with the exact same settings. Depending on the properties of your print medium, minor color deviations can occur under different conditions.

Required steps

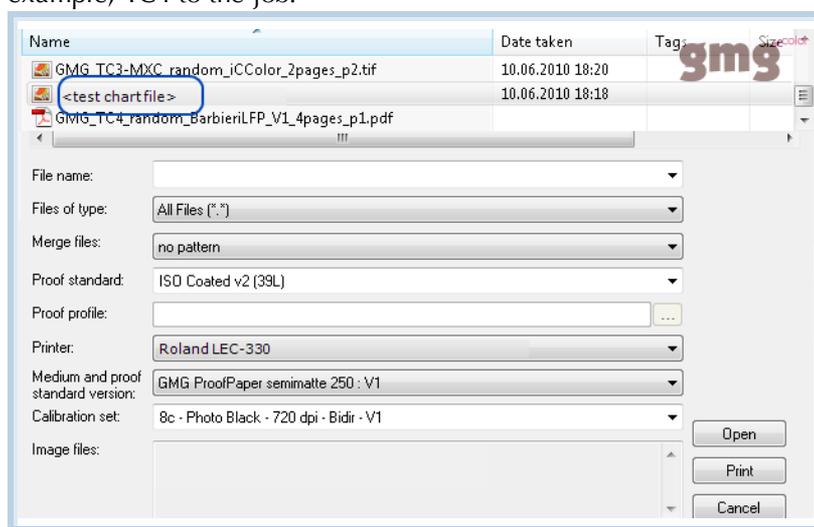
OK	Step	Application
	Print the full gamut test chart corresponding to the measuring device and printer. (If the printer supports an integrated measuring device, the test chart will be measured automatically.)	GMG ColorProof
	Measure the test chart.	GMG ProfileEditor
	Average the measurement data and export the data as a full gamut file.	GMG ProfileEditor

3.6.1 Printing a Full Gamut Test Chart

All test charts can be found in the **Testcharts** folder and subfolders (default path:<GMG ColorProof installation path>\Testcharts\).

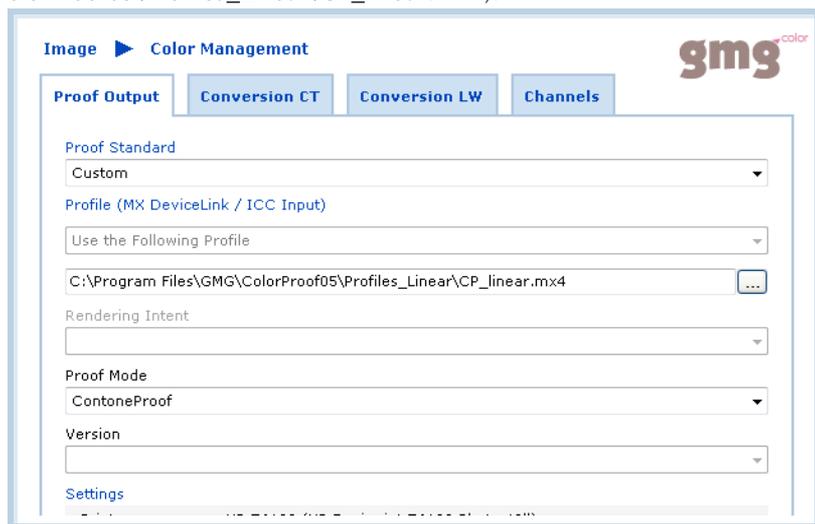
How to create and print the job

1. Create a new job in GMG ColorProof and add the appropriate **full gamut** test chart for the printer, for example, TC4 to the job.



2. Ignore the other options in this dialog box and click **Open** to edit the job in the **Manual Job Manager**.
3. **Job > Printer Settings > Printer:** From the **Printer** list, select the installed printer you want to use, for example, Roland LEC-300.
4. **Job > Printer Settings > Printer:** From the **Medium** list, select the loaded medium.
5. **Job > Printer Settings > Printer:** Under **Calibration Set**, select **Custom**.
6. Under **Printer Calibration**, select for example linear_Calibration_60W.mx3.
7. Under **Printer Calibration**, select the new MX3 you created in the preceding steps.
8. **Job > Printer Settings > Advanced:** Check to ensure you are using the correct print mode, for example White|CMYK – 1440 x 1440 dpi – Unidir – 380 mm/s – 1x – V1.

9. **Image > Color Management > Proof Output:** From the **Proof-Standard** list, select **Custom**. Under **Profile (MX DeviceLink / ICC Input)**, select a **linear MX4** (default path: *C:\Program Files\GMG\ColorProof05\Profiles_Linear\CP_linear.mx4*).



10. If you are using a color mode with White for printing an undercoat, click the **Channels** tab and activate the **Undercoat** option.
11. Click **OK** to print the job.

How to repeat the test chart printing for averaging measured data

- In the GMG ColorProof **History** view, select the printed job and print the test chart again.

3.6.2 Measuring a Full Gamut Test Chart with an External Measuring Device

For measuring the patches, an **empty MX4** profile is required. The measured data is loaded into the empty MX4 as **Target Values** in GMG ProfileEditor. The **Target Values** can then be exported as the **Full Gamut** file.

All test charts templates can be found in the **templates** folder and subfolders (default path: *<GMG ColorProof installation path>\templates*).

Test chart templates are named after the test chart image, with the file name extension **tpl** instead of tif.

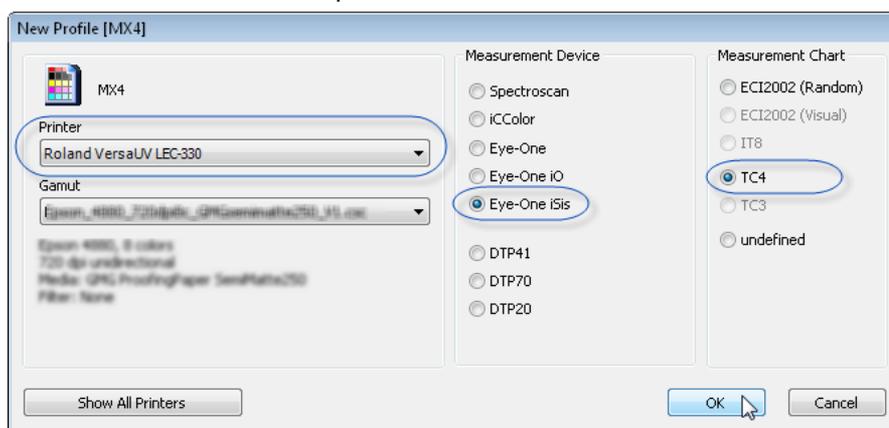
See also:

- "Test Chart Types" on page 9

How to measure the patches

1. Start GMG ProfileEditor.
2. On the **File** menu, click **New CMYK MX4**.
3. From the **Printer** list, select the used printer type, for example, **Roland VersaUV LEC-330**.
4. From the **Measuring Device** list, select the used measuring device.
5. Under **Measurement Chart**, select **TC4**.

- Click **OK** to create the new profile.



- Optional: You can change the measuring device type and the **UV cut** filter settings if required on the **Common** tabbed page, under **Measurement Settings**. Always use the same settings throughout the process.
- On the **Measure** menu in GMG ProfileEditor, click **All Target Values**. The test chart measurement dialog box opens.
- Click the browse button and browse your folders. In the **templates** folder, select the chart template corresponding to the test chart (with the same name) for the first page of the test chart.
- Insert the test chart (first page) printed in the first job into the measuring device.
- Click the **Measure** button. The test chart is measured. Measured data is read as **Target Values** into the open file.
- Repeat the procedure for further pages of the test chart (if any).
- On the **Import/Export** menu, point to **Export Target Values**, and click **Text File**.
- Save the file as `xx_fullgamut_1.txt` file.
- On the **Measure** menu, click **Reset Target Values** to delete the data from test chart 1.
- Insert the test chart printed in the second job into the measuring device.
- Repeat the measurement steps.
- Save the file as `xx_fullgamut_2.txt` file.

3.6.3 Averaging and Exporting the Measurement Data

It is recommended to print the test chart **twice** and average the results to achieve a reliable result.

For averaging the measured data and exporting it into a full gamut file, an **empty MX4** profile is required. The measured data is loaded into the empty MX4 as **Target Values** in GMG ProfileEditor. The **Target Values** can then be exported as the **Full Gamut** file.

It is best practice to name the file after the printer–medium combination, for example, as shown in the following:

```
<printer>_<print mode>_<medium>_V1_<measuring device>_<UV cut filter>_fullgamut.csc
```

How to average and export the measurement data

- If the MX4 you used for the measurements is still open in GMG ProfileEditor, you can directly average the data in this file. Otherwise, create a new MX4 like you did before.
- On the **Measure** menu, click **Reset Target Values** to delete any existing data.
- On the **Import/Export** menu, click **Import Target Values**.

3. Creating a New Printer Calibration for Custom Media

4. Browse your folders and select the *xx_fullgamut_1.txt* and *xx_fullgamut_2.txt* files while holding down the SHIFT key (multi-select).
The measured data from all selected files is automatically averaged and loaded into the MX4 as **Target Values**.
5. If an error message is displayed, confirm it with **OK**.
6. On the **Import/Export** menu, point to **Export Target Values**, and click **Gamut File**.
7. Save the file under an appropriate file name.

The resulting full gamut file will be linked within the final printer calibration file in a following step.

3.7 Creating Target Values for the Printer Calibration

A calibration test chart is printed with the calibration file from the starter kit. The calibration file defines the output values, that is, the values that the printer should print for each color patch in the test chart in order to achieve the correct color value in the print and to avoid overinking.

After **importing** a *.txt file with **predefined color values** from the Starter Kit, a TC3 test chart is printed.

The print result of this test chart will serve as the reference for all further prints with this printer–medium combination. The full gamut file will be linked to the printer calibration file in GMG ProfileEditor so that it can be used by GMG CaliWizard or AutoCali Wizard.

Required steps

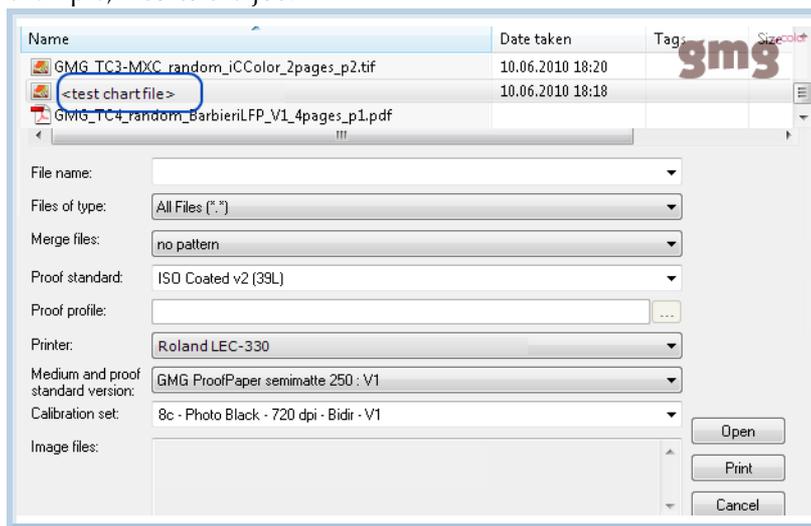
OK	Step	Application
	Print the calibration test chart corresponding to the measuring device and printer. (If the printer supports an integrated measuring device, the test chart will be measured automatically.)	GMG ColorProof
	Measure the test chart.	GMG ProfileEditor
	Link the full gamut file (*.csc).	GMG ProfileEditor

3.7.1 Printing a Calibration Test Chart

All test charts can be found in the **Testcharts** folder and subfolders (default path:<GMG ColorProof installation path>\Testcharts\).

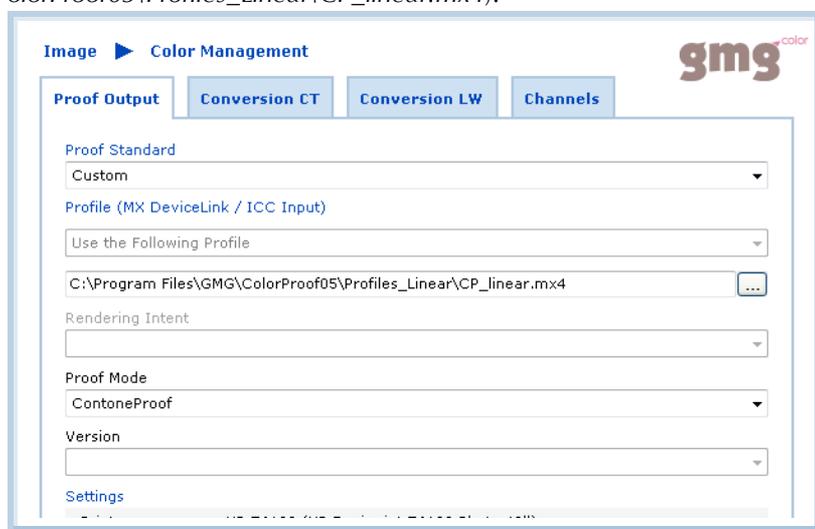
How to create and print the job

1. Create a new job in GMG ColorProof and add the appropriate **calibration** test chart for the printer, for example, TC3 to the job.



2. Ignore the other options in this dialog box and click **Open** to edit the job in the **Manual Job Manager**.

3. **Job > Printer Settings > Printer:** From the **Printer** list, select the installed printer you want to use, for example, Roland LEC-300.
4. **Job > Printer Settings > Printer:** From the **Medium** list, select the loaded medium.
5. **Job > Printer Settings > Printer:** Under **Calibration Set**, select **Custom**.
6. Under **Printer Calibration**, select the new MX3 you created in the preceding steps.
7. Under **Printer Calibration**, select for example Roland_LEC-330_Starterkit_V1_240.mx3.
8. **Job > Printer Settings > Advanced:** Check to ensure you are using the correct print mode, for example White|CMYK – 1440 x 1440 dpi – Unidir – 380 mm/s – 1x – V1.
9. **Image > Color Management > Proof Output:** From the **Proof-Standard** list, select **Custom**. Under **Profile (MX DeviceLink / ICC Input)**, select a **linear** MX4 (default path: *C:\Program Files\GMG\ColorProof05\Profiles_Linear\CP_linear.mx4*).



10. If you are using a color mode with White for printing an undercoat, click the **Channels** tab and activate the **Undercoat** option.
11. Click **OK** to print the job.

How to repeat the test chart printing for averaging measured data

- In the GMG ColorProof **History** view, select the printed job and print the test chart again.

3.7.2 Measuring Target Values with an External Measuring Device

The **target values** will be measured from a calibration test chart and saved within the new printer calibration file.

All test charts templates can be found in the **templates** folder and subfolders (default path: *<GMG ColorProof installation path>\templates*).

Test chart templates are named after the test chart image, with the file name extension **tpl** instead of **tif**.

See also:

- "Test Chart Types" on page 9

How to measure the patches

1. Start GMG ProfileEditor.
2. On the **File** menu, click **Open** and select the **printer calibration** you have used when printing the calibration test chart (for example, Roland_LEC-330_Starterkit_V1_240.mx3).

3. Creating a New Printer Calibration for Custom Media

3. Optional: You can change the measuring device type and the **UV cut** filter settings if required on the **Common** tabbed page, under **Measurement Settings**. Always use the same settings throughout the process.
4. On the **Measure** menu in GMG ProfileEditor, click **All Target Values**.
The test chart measurement dialog box opens.
5. Click the browse button and browse your folders. In the **templates** folder, select the chart template corresponding to the test chart (with the same name) for the first page of the test chart.
6. Insert the test chart (first page) printed in the first job into the measuring device.
7. Click the **Measure** button.
The test chart is measured. Measured data is read as **Target Values** into the open file.
8. Repeat the procedure for further pages of the test chart (if any).
9. On the **Common** tab, under **Gamut**, click **Selected**.
10. Click the browse button and select the **full gamut** csc file created in an earlier step.
11. Save the printer calibration under an appropriate file name.

The printer calibration file is now ready to use. You can now set up a calibration set and calibrate the printer.

To create a **proof profile**, you need to create a **gamut** file for the printer–medium combination first.

4. Preparations for Creating Proof Profiles

4.1 Creating a Gamut File for Proof Profiles

Note To make sure that the printer is still in the same state, this step must be done **immediately** after creating the full gamut and MX printer calibration file.

In this step, the **gamut** file for this printer–medium combination will be created. The gamut file is the base color space for creating MX4 proof profiles.

The gamut is created in a similar way as the full gamut. The only difference is that the test chart is printed with the **printer calibration** file.

The input values (measured from the color patches) are computed with the printer calibration to produce the output values (the color values the software outputs to the printer driver). The measurement values for the fulcrums in the test chart describe the gamut of this printer–medium combination. Thus, the gamut file describes the color space that the printer is able to print according to its technical specifications and according to the medium and print mode in the "**calibrated state**" **after** calibration.

White ink printers

When creating a printer calibration for white ink printers, consider for which prints you will **mainly** use the calibration later. If you will use it mainly for prints with undercoat, you should also print test charts with the same **Undercoat** settings. However, you will not be restricted to use the printer calibration with the exact same settings. Depending on the properties of your print medium, minor color deviations can occur under different conditions.

Required steps

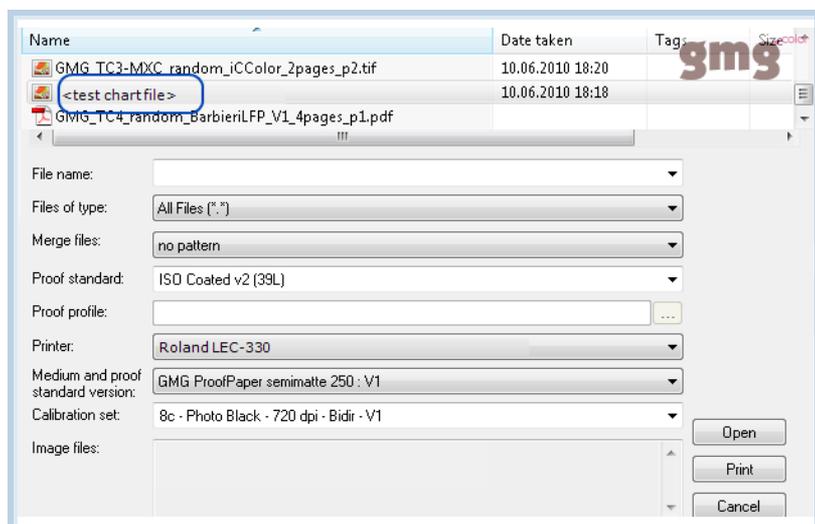
<i>OK</i>	<i>Step</i>	<i>Application</i>
	Print the gamut test chart corresponding to the measuring device and printer. (If the printer supports an integrated measuring device, the test chart will be measured automatically.)	GMG ColorProof
	Measure the test chart.	GMG ProfileEditor
	Average the measurement data and export the data as a gamut file.	GMG ProfileEditor

4.1.1 Printing a Gamut Test Chart

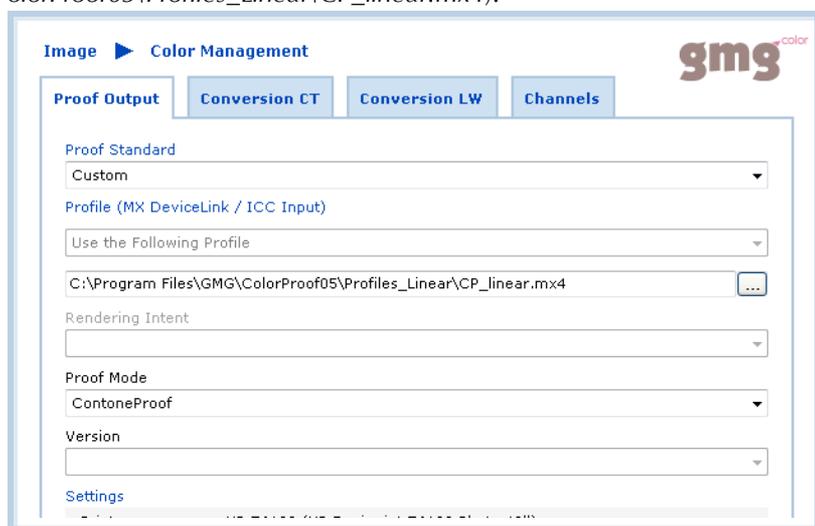
All test charts can be found in the **Testcharts** folder and subfolders (default path: <GMG ColorProof installation path>\Testcharts\).

How to create and print the job

1. Create a new job in GMG ColorProof and add the appropriate **gamut** test chart for the printer, for example, ECI2002 to the job.



2. Ignore the other options in this dialog box and click **Open** to edit the job in the **Manual Job Manager**.
3. **Job > Printer Settings > Printer:** From the **Printer** list, select the installed printer you want to use, for example, Roland LEC-300.
4. **Job > Printer Settings > Printer:** From the **Medium** list, select the loaded medium.
5. **Job > Printer Settings > Printer:** Under **Calibration Set**, select **Custom**.
6. Under **Printer Calibration**, select the new MX3 you created in the preceding steps, for example Roland_LEC-330_Starterkit_V1_<TAC>_<print mode>_<medium>_<measuring device>_<UVcut>.mx3.
7. Under **Printer Calibration**, select the new MX3 you created in the preceding steps.
8. **Job > Printer Settings > Advanced:** Check to ensure you are using the correct print mode, for example White|CMYK – 1440 x 1440 dpi – Unidir – 380 mm/s – 1x – V1.
9. **Image > Color Management > Proof Output:** From the **Proof-Standard** list, select **Custom**. Under **Profile (MX DeviceLink / ICC Input)**, select a **linear** MX4 (default path: C:\Program Files\GMG\ColorProof05\Profiles_Linear\CP_linear.mx4).



10. If you are using a color mode with White for printing an undercoat, click the **Channels** tab and activate the **Undercoat** option.
11. Click **OK** to print the job.

How to repeat the test chart printing for averaging measured data

- In the GMG ColorProof **History** view, select the printed job and print the test chart again.

4.1.2 Measuring a Gamut Test Chart with an External Measuring Device

For measuring the patches, an **empty MX4** profile is required. The measured data is loaded into the empty MX4 as **Target Values** in GMG ProfileEditor. The **Target Values** can then be exported as the **Full Gamut** file.

All test charts templates can be found in the **templates** folder and subfolders (default path: <GMG ColorProof installation path>\templates\).

Test chart templates are named after the test chart image, with the file name extension **tpl** instead of **tif**.

See also:

- "Test Chart Types" on page 9

How to measure the patches

1. Start GMG ProfileEditor.
2. On the **File** menu, click **New CMYK MX4**.
3. From the **Printer** list, select the used printer type, for example, **Roland VersaUV LEC-330**.
4. From the **Measuring Device** list, select the used measuring device.
5. Under **Measurement Chart**, select **ECI2002**.
6. Click **OK** to create the new profile.
7. Optional: You can change the measuring device type and the **UV cut** filter settings if required on the **Common** tabbed page, under **Measurement Settings**. Always use the same settings throughout the process.
8. On the **Measure** menu in GMG ProfileEditor, click **All Target Values**.
The test chart measurement dialog box opens.
9. Click the browse button and browse your folders. In the **templates** folder, select the chart template corresponding to the test chart (with the same name) for the first page of the test chart.
10. Insert the test chart (first page) printed in the first job into the measuring device.
11. Click the **Measure** button.
The test chart is measured. Measured data is read as **Target Values** into the open file.
12. Repeat the procedure for further pages of the test chart (if any).
13. On the **Import/Export** menu, point to **Export Target Values**, and click **Text File**.
14. Save the file as `xx_gamut_1.txt` file.
15. On the **Measure** menu, click **Reset Target Values** to delete the data from test chart 1.
16. Insert the test chart printed in the second job into the measuring device.
17. Repeat the measurement steps.
18. Save the file as `xx_gamut_2.txt` file.

4.1.3 Averaging and Exporting the Measurement Data

It is recommended to print the test chart **twice** and average the results to achieve a reliable result.

For averaging the measured data and exporting it into a full gamut file, an **empty MX4** profile is required. The measured data is loaded into the empty MX4 as **Target Values** in GMG ProfileEditor. The **Target Values** can then be exported as the **Gamut** file.

It is best practice to name the file after the printer–medium combination, for example, as shown in the following:

<printer>_<print mode>_<medium>_V1_<measuring device>_<UV cut filter>_gamut.csc

How to average and export the measurement data

1. If the MX4 you used for the measurements is still open in GMG ProfileEditor, you can directly average the data in this file. Otherwise, create a new MX4 like you did before.
2. On the **Measure** menu, click **Reset Target Values** to delete any existing data.
3. On the **Import/Export** menu, click **Import Target Values**.
4. Browse your folders and select the *xx_gamut_1.txt* and *xx_gamut_2.txt* files while holding down the SHIFT key (multi-select).
The measured data from all selected files is automatically averaged and loaded into the MX4 as **Target Values**.
5. If an error message is displayed, confirm it with **OK**.
6. On the **Import/Export** menu, point to **Export Target Values**, and click **Gamut File**.
7. Save the file under an appropriate file name.

5. Calibrating the Printer

5.1 Setting up a New Calibration Set

The next step is to set up a new calibration set in GMG ColorProof for the MX printer calibration you created in the preceding steps.

How to set up a new calibration set

1. Click the **System** button on the navigation panel on the left of the main window. On the **System** menu, point to **Calibration Sets**, click **New**.
2. On the **Properties** tab, enter a **Name** for the calibration set.
3. Enter a **version number**. The version number serves as a unique identifier if you have several versions of the same set. It is advisable to use a naming convention, for example, V1, V2, V3, and so on, but you can enter any string you like.
4. Optional: Select an **ICC Printer Profile** if you want to use an ICC based color management.

How to define the Print Settings

1. Click the **Print Settings** tab.
2. On the toolbar, click the + button to add new print settings.
3. Select the **Printer Type** you want to use from the drop-down list on the right side. The printer type is displayed in the tree view on the left side.
4. In the tree view, click the next node (< undefined >) to bring up the **Media Type** drop-down list.
5. Select the **Media Type** you want to use from the drop-down list on the right side. The media type is displayed in the tree view on the left side. The default **Print Settings** for the printer and media type are displayed as end node.
6. In the tree view, click the **Print Settings** node to show the properties of the printer and media type combination on the right side.
7. Change the default properties (e.g. the print mode) according to your requirements.
8. Optional: Add as many **Print Settings** as you like and choose a **Reference Print Mode** for calibration. Due to this functionality, you can use the same printer calibration file for multiple color modes or media with similar properties.

How to add printer calibration files to the calibration set

1. Click the **Measurement** tab.
2. Click the + button to add a measuring device and the corresponding printer calibration and gamut file.
3. Select the measuring device that you will use for this printer from the list.
4. In the **Initial Calibration** column, click the browse button, browse your folders, and select the printer calibration file.
5. In the **Gamut** column, click the browse button, browse your folders, and select the corresponding gamut (CSC) file. (Do **not** select the full gamut file.)
6. To set up more measuring devices, repeat steps 2 to 5.

How to set up quality criteria for the printer calibration

1. Click the **Quality Criteria** tab.
2. Select the quality criteria for this calibration set. If the quality criteria are not met anymore, print jobs using this calibration set will be put on hold until the printer is successfully recalibrated.

5.2 White Linearization

5.2.1 Quality Criteria for White Ink Printers

As for CMY **Color** and **Black**, there are additional **Calibration Tolerances** referring to the white ink channel and white available for white ink printers. These Calibration Tolerances refer to the White Linearization. As a default, they are deselected, because for most applications, a white linearization is not required.

However, to meet even the highest quality demands, GMG ColorProof offers the possibility to perform a printer linearization with respect to the white ink, guided by an easy-to-use **White Linearization** wizard. If you want to calibrate the white ink, you can define calibration tolerances with respect to the white linearization. If you do so, you will be required to perform a white linearization before using the printer, similar to a printer calibration, but with respect to the white channel. According to the **Maximum Age** settings, you will need to repeat the white linearization on a regular basis.

Undercoat for calibration

Printer calibrations for white ink printers are valid for prints with **and** without undercoat. However, if **most** of your prints are generated **with** undercoat, it is recommended that you will print undercoat also when calibrating your printer.

To do so, select the option **Undercoat** and enter the **Intensity** you will mainly use when printing jobs later. When calibrating a printer, undercoat is always printed in **Full Frame** mode. (You can change both settings on a job-to-job basis later, independent of the settings for calibration.)

5.2.2 GMG White Linearization Wizard

GMG White Linearization Wizard is used to calibrate the white ink channel for white ink printers. A linearization of the white ink channel serves to control a white ink printer in a way that the printed white ink behaves linearly to the input white channel. For most applications, a white linearization is **not** required. Note that you can use GMG White Linearization Wizard **only** if you have already created a **White Linearization**.

Note Some transparent media come with a protective peel-off liner which needs to be removed before measuring.

Note The data for the **White Linearization** need to be gathered with **Black Backing** (external measuring device). The subsequent 'normal' calibration uses **White Backing**.

GMG White Linearization Wizard supports the following measuring devices:

- ▶ X-Rite Spectrolino/SpectroScan
- ▶ X-Rite Eye-One
- ▶ X-Rite Eye-One iO

During the following procedure, the white linearization in the printer calibration file will be optimized to reach the **target values** within the defined tolerances. The existing printer calibration file will then be updated with the new **White Linearization** values.

The wizard will lead you through all steps required for the calibration. You can use other printers in the meantime. You can also set up jobs for the same printer that currently runs the calibration. They will be printed after the calibration will have been finished.

How to start GMG White Linearization Wizard

1. Click the **Output** button on the navigation panel on the left of the main window.
2. Select the printer you want to calibrate from the **Available Printers** list.
3. Select the calibration set you want to use from the **Available Printer Calibrations** list.

4. Click the **White Linearization Wizard** button  on the right side of the calibration set.
GMG White Linearization Wizard is started.
5. Follow the instructions of the wizard.

5.2.3 Finalizing

The **Finalizing** page shows you a short summary of the **Results**. Please check the results carefully before clicking **Finalizing**.

When clicking **Finalizing**, you will accept the **Results** of the iteration cycle and save the new output values and the **Current** values from the last iteration within the printer calibration file, **White Linearization**.

Note This action cannot be undone. After leaving the **Finalize calibration** page by clicking the **Finalizing** button, you will not be able to go back to a previous step.

5.3 Printer Calibration

Combined with MX proof profiles, a regular printer calibration ensures a consistent representation of colors. Undesired printer deviations caused by varying environment conditions such as temperature and humidity are counterbalanced. We recommend you to calibrate your printer(s) on a **regular** basis to ensure the highest **production stability** and **color quality**.

A calibration set fine tunes the CMY channels so that normal printer deviations are compensated and stable print results are ensured.

You can calibrate your printer easily by using a calibration wizard integrated into the main application. GMG ColorProof uses multiple **iteration cycles**, similar to a control loop, to **optimize** and update the calibration. The steps of each cycle are visualized in the wizard.

5.4 GMG CaliWizard

GMG CaliWizard is used to calibrate printers with an external measuring device (for printers not supporting an integrated measuring device).

During the printer calibration process, the **last** saved printer calibration file is used as a basis for a recalibration of the printer. During the following iterative cycle, the **output values** in the printer calibration file will be optimized to reach the **target values** within the defined tolerances. The existing printer calibration file will then be **replaced** with the modified file.

The wizard will lead you through all steps required for the calibration. You can use other printers in the meantime. You can also set up jobs for the same printer that currently runs the calibration. They will be printed after the calibration will have been finished.

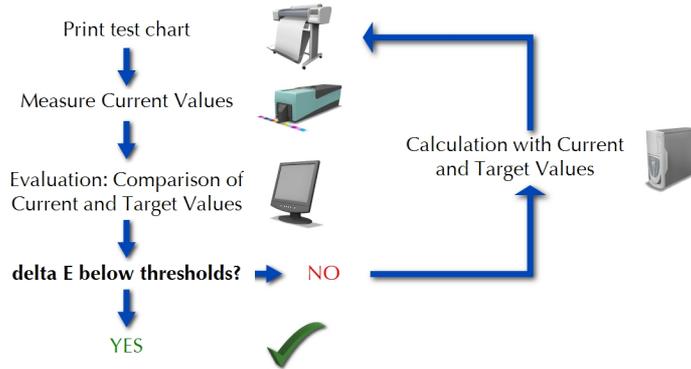
GMG ColorProof uses multiple **iteration** cycles, similar to a control loop, to optimize the calibration. The steps of a cycle are visualized in the wizard. The currently active step is highlighted by a white background color.

How to start GMG CaliWizard

1. Click the **Output** button on the navigation panel on the left of the main window.
2. Select the printer you want to calibrate from the **Available Printers** list.
3. Select the calibration set you want to use from the **Available Printer Calibrations** list.
4. Click the **CaliWizard** button  on the right side of the calibration set.
The GMG CaliWizard is started.
5. Follow the instructions of the wizard.

5.4.1 Iteration Cycle: Printing, Measuring, Evaluating

In the following steps, you will perform an **iteration cycle** to optimize the data.



In the **Printing** step of the iteration cycle, you will print a color patch for each fulcrum in the corresponding data table. In the **Measuring** step, you will measure the color values of each patch as **Current** values. In the **Evaluating** step, you will **compare** the **Current** values with the **Target** values.

The aim of the iteration cycle is to match the **Target** values as closely as possible, within the tolerances defined in the calibration set. Following each iteration cycle, the program computes new CMYK output values based on the deviation between the target values and the measured current values. The new output values are used in the next **Printing** step. Thus, the **Current** values will become closer to the tolerances with **each** iteration, that is, **Printing**, **Measuring**, and **Evaluating**.

For further information on the individual steps performed in an iteration cycle, please see the following links.

5.4.2 Step 1: Printing Test Charts

Test charts with color patches for spectrophotometric measurements are used for the following steps. Each color patch on a test chart represents a fulcrum, that is, data point, in the corresponding data table. By measuring patches, the data table is filled with data points.

Test charts have a different layout and size depending on the printer calibration they are used for and depending on the measuring device.

When calibrating a printer, a printer calibration test chart is printed with a separate color patch for each fulcrum in the printer calibration file. During the **first** printer calibration, the output color values corresponding to the input color values are taken from the printer calibration file linked as **Initial Calibration** within the calibration set. For all following calibrations, the output values are taken from the last saved printer calibration file.

The test chart job will be added to the job list with highest job priority. It is handled like any other job. The job name shows the number of the iteration cycle.

Step 2: Measuring Test Charts

The color values of the printed patches are measured (as **Current** values) with a spectrophotometer. Each **color patch** on a test chart represents a **fulcrum** (data point) in the corresponding data table within the printer calibration. By measuring patches, the data table is filled with data points.

Note Before you start measuring a test chart page, check that it is not visibly damaged, for example, by scratches. In case that a page cannot be used for measuring, go back to the **Printing** page and print the page again.

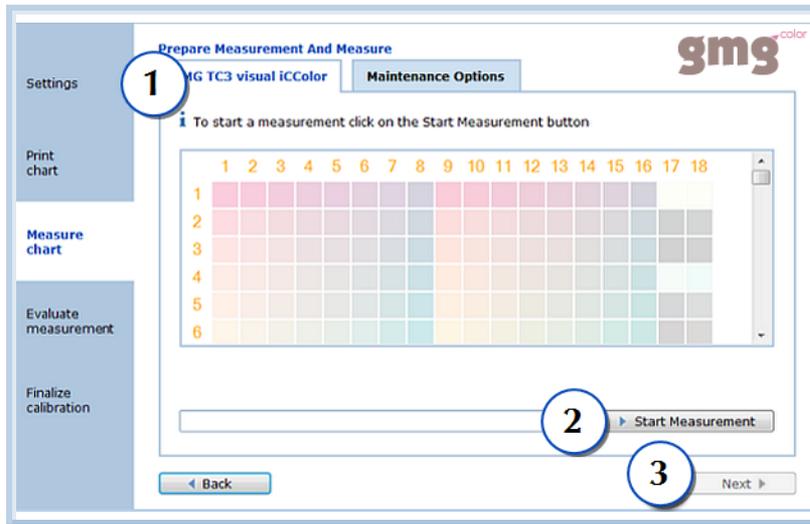


Fig. 5 Measuring page before starting the measurement.

Each test chart page is shown on a **separate** tabbed page (1) in the **Measuring** window.

Click **Start Measurement** (2) to start measuring the test chart page shown on the **front** tabbed page.

The measuring **progress** of the page is shown in the visualization of the test chart on the tabbed page. You can point to a **color patch** with the mouse to show a popup with more information. You can also measure single patches in this view.

After you have successfully measured **all** test chart pages, click **Next** to proceed to the next step (5).

How to measure test charts with multiple pages

Each test chart page is shown on a **separate** tabbed page in the **Measuring** window.

1. To measure a page, insert it into the measuring device, select the corresponding tabbed page, and click **Start Measurement**.
2. Repeat this procedure for all pages.

If there are too many test charts to fit in the window, you can click the small arrow on the top right side of the tabbed pages to bring hidden test charts or the **Maintenance** page to the front.

How to measure a single patch

This can be helpful, for example, if the measuring device cannot automatically scan the test chart.

1. In the test chart image, select a patch with the mouse and right-click it to show the context menu.
2. On the context menu, click the command **Measure Single Patch**.

Measuring Device Settings

You can click the **Measuring Device Settings** tabbed page to see the currently used measuring device parameters.

Depending on the used measuring device, some measuring parameters can be changed from within the software, for example, switching from **Scan** mode to **Single Patch** readings. Read-only parameters are grayed out and provided only for your information.

When using an X-Rite Eye-One, the software automatically switches to **Single Patch** mode if a row cannot be measured after three attempts.

Note Please check the hardware parameters such as **Standard Observer Angle**, **Illumination Type**, and **Filter** to ensure the software settings are correct and match the hardware configuration of the connected measuring device. Otherwise, this will result in wrong measurement values.

Evaluating Measurement Results

In the **Printing** step, you have printed a color patch for each fulcrum in the printer calibration or color profile. In the **Measuring** step, you have measured the color values of each patch as **Current** values. In the **Evaluating** step, you will now **compare** the **Current** values with the **Target** values.

The aim of the iteration cycle is to match the **Target** values as closely as possible, within the tolerances defined in the calibration set. Following each iteration cycle, the program computes new CMYK output values based on the deviation between the target values and the measured current values. When creating a printer calibration file, the **full gamut** file linked within the printer calibration will be used as a reference to calculate the new output values. The new output values are used in the next **Printing** step. Thus, the **Current** values will become closer to the tolerances with **each** iteration, that is, **Printing**, **Measuring**, and **Evaluating**.

You can repeat the iteration cycle until the values are either within the tolerances or until you decide to end the cycle by accepting the best iteration.

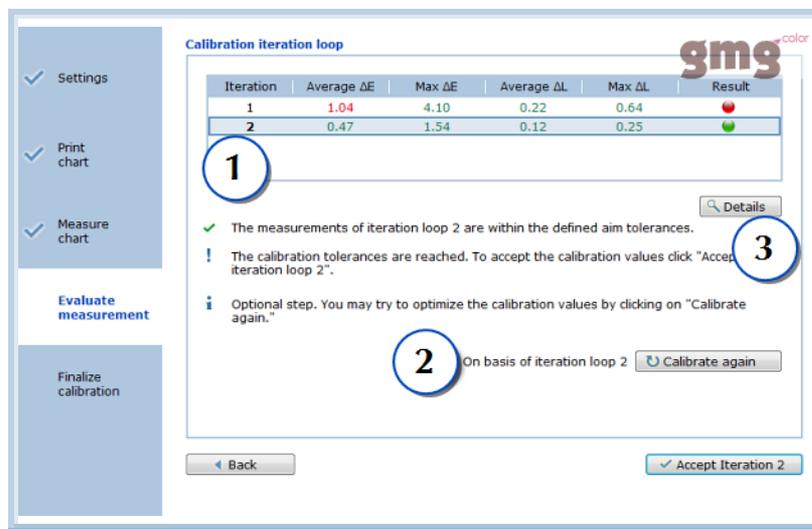


Fig. 6 Evaluating page after successful iteration cycle.

Accepting a successful iteration

The **Evaluating** page provides you with an overview on the results of the ongoing iteration cycle. The results of each **Iteration** (**printing** and **measuring** the test charts) are listed in a table (1).

If the current values of the first cycle (**Iteration 1**) are already within the tolerances (indicated by a green status lamp in the **Results** column), you can click the **Accept Iteration 1** button to accept the results. In the screenshot, the results of **Iteration 1** have not been within the tolerances (failed iteration).

Repeating a failed iteration

A failed iteration will be indicated by a red status lamp in the **Results** column. If an iteration fails, steps 1 and 2 will be repeated to further improve the calibration: The test chart will again be **printed** with the new output values and **measured**.

Generally, it makes sense to repeat the iteration cycle from the **last** iteration. However, you can also select a different one from the list and continue the iteration cycle from this iteration, thus ignoring the following iterations.

To continue the cycle, click the button **Improve further** (2). The label **Iteration 2** next to the button shows that **Iteration 2** will be repeated when the button is clicked.

You can show a table with all measured and target values for all patches by selecting an **Iteration** from the list and clicking the **Details** button (3). This can give you a hint on where to look for the problem if the printer cannot be calibrated.

Tip For example, if there are prominent color deviations in a specific color channel, you might need to replace the ink or clean the print heads. If the paper tint values (0, 0, 0, 0) are out of tolerances, you might have loaded the wrong media type into the printer.

Ending the iteration cycle by accepting a failed iteration

The iteration cycle can be repeated until the measured values are within the **tolerances** of the target values. However, if you are satisfied with the results of an iteration, you can also decide to end the iteration cycle and to proceed, thus **ignoring** the tolerances. To do so, **select the iteration** you are satisfied with from the list and click the **Accept Iteration** button to proceed.

5.4.3 Finalizing

The **Finalizing** page shows you a short summary of the **Results**. Please check the results carefully before clicking **Finalizing**.

When clicking **Finalizing**, you will accept the **Results** of the iteration cycle and save the new output CMYK values and the **Current** values from the last iteration within the printer calibration file.

Note This action cannot be undone. After leaving the **Finalize calibration** page by clicking the **Finalizing** button, you will not be able to go back to a previous step.

6. Creating an MX4 Proof Profile

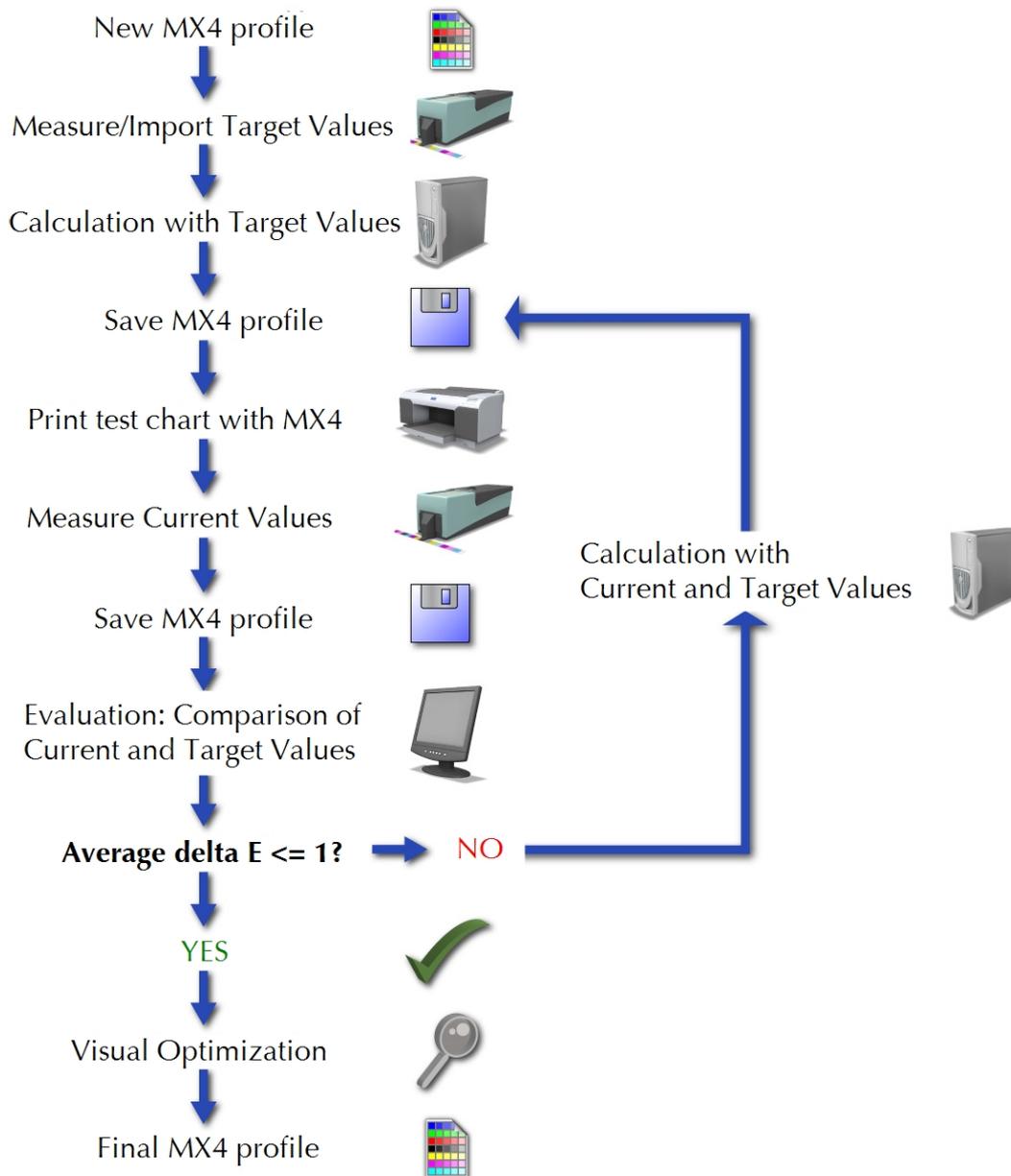
Creating a new MX4 proof profile requires a calibration set and a gamut file (*.csc) for the printer–medium combination you want to profile. The creation of an MX4 color profile is described in detail in the separate tutorial "Creating an MX4 Proof Profile for ContoneProof". The following chapters will give you an overview on the steps involved and highlight the main issues.

6.1 Creating an MX4 Proof Profile—Overview

After selecting basic parameters, **target values** are either measured or imported. The CMYK color values are calculated from the Lab target values. A test chart is printed (with the appropriate calibration set). The **current values** of the print are measured and **compared** to the **target values**. The profile is recalculated and the test chart is printed again with the recalculated profile. These iterative steps (printing, measuring the current values and recalculating) need to be repeated until the current and target values meet within the desired Delta E tolerance.

Having completed the color profile, you can optionally perform manual corrections to optimize the profile **visually**.

The flowchart provides an overview of the steps involved in creating a new MX4 color profile.



6.2 Separation Modes

The separation mode defines how GMG ProfileEditor calculates the profile. In principle, the separation mode defines the conversion from L*a*b* target values to CMYK color values of a defined color space (gamut file).

Due to different technologies used in proofing solutions, there are various modes you can choose from.

See also:

- "Profile Building Blocks" on page 35

6.3 Profile Building Blocks

Think of GMG ProfileEditor as a box of building blocks. Due to different printing technologies, you need specific building blocks to build your profile, for example, a specific calibration file format or specific test chart types.

Have a look at the following table to see which proof mode, separation mode, calibration file format and printer driver can be built on one another. Consider whether you just want to create an MX4 profile for ContoneProof or if you want to add another building block and create an MX5 profile for DotProof or DotProof XG. Depending on your printer type and your print medium (GMG or custom), see what calibration file format you need and if it is supported in GMG ProfileEditor.

See *also*:

- "Separation Modes" on page 35

Profile Building Blocks

<i>Printer Types</i>	<i>Printer Driver</i>	<i>Proof Mode</i>	<i>Color Space</i>	<i>Profile</i>	<i>Separation Mode</i>	<i>Calibration</i>
4 color and multicolor printers based on CMYK inks such as Epson Stylus Pro 4000, x400, x450, x600, x800, x880, x890, 11880, HP Designjet 130, 5000, 5500, Roland VersaUV, Roland VersaCAMM VS, Mimaki UJF-706 , Canon imagePROGRAF iPF6300S, iPF8300S, iPF8310S. Compatibility mode (for x880 printers) of the GMG Driver for Epson Stylus Pro x900 series in 4/8 color mode.	GMG Driver	ContoneProof	CMYK	MX4	Inkjet	MX3
	GMG Driver	DotProof	1 Bit	MX5	Inkjet	MX3
Multicolor printers with additional (non-CMYK) inks used together with GMG Driver such as Epson Stylus Pro x900 series, HP Designjet Z3200 and Canon imagePROGRAF iPF6300, iPF6350, iPF8300, iPF8310. Please note that GMG ProfileEditor does not support MXC calibration files. This means that you cannot create a custom MXC calibration file for use with custom media and need to use GMG calibration sets with the GMG Driver.	GMG Driver	DotProof (XG)	1 Bit	MX5	Preserve Separations	MXC
Multicolor printers with additional (non-CMYK) inks from HP such as HP Designjet Z3200, Z6200 .	HP Driver	ContoneProof	CMY	MX4	No Key (CMY Only)	MX3
Multicolor printers with additional (non-CMYK) inks from Canon such as Canon imagePROGRAF iPF6300, iPF6350, iPF8300, iPF8310.	Canon Driver	ContoneProof	CMY	MX4	No Key (CMY Only)	MX3
4 color and multicolor printers based on CMYK inks such as Canon imagePROGRAF iPF6300S, iPF8300S, iPF8310S.	Canon Driver	ContoneProof	CMY	MX4	No Key (CMY Only)	MX3
Epson Stylus Pro x890, x900 series.	Epson Driver	ContoneProof	CMYK	MX4	Multicolor Inkjet	MX4
Multicolor printers with additional (non-CMYK) inks used together with GMG Driver such as Epson Stylus Pro x900, HP Designjet Z3200 , Canon imagePROGRAF iPF6300, iPF6350, iPF8300, iPF8310. Please note that GMG ProfileEditor does not support MXC calibration files. This means that you cannot create a custom MXC calibration file for use with custom media and need to use GMG calibration sets with the GMG Driver.	GMG Driver	ContoneProof	CMYK	MX4	Multicolor Inkjet	MXC

6.4 Creating an MX4 Proof Profile—Short Summary

How to create an MX4 proof profile

1. On the **Tools** menu, click **ProfileEditor** to start GMG ProfileEditor.
2. On the **File** menu, click **New CMYK MX4**.

3. From the **Printer** list, select the printer for which you want to create the profile, for example, Roland VersaUV LEC-330.
(Corresponding to the printer selection, default settings such as the **Separation** mode will automatically be preselected when creating the profile.)
4. From the **Gamut** list, select the newly created gamut (csc) file.
5. Select the measuring device and test chart, for example ECI2002, you want to use for measuring the profile data.
6. Confirm with **OK**.
An empty MX4 profile is created.
7. On the **Common** tabbed page, under **Separation Mode**, check the separation mode for the **printer** and **driver** you are using, for example Inkjet Mode.

How to import the target values and define the output values

1. On the **Import/Export** menu, click **Import Target Values**, and select the characterization data for the target printing condition you want to simulate in the proof, for example *FOGRA39L.txt*.
2. On the **Measure** menu, click **Calculate with Target Values**.
The target values will be computed with the gamut file to produce the output values of the profile.
3. Save the MX4 profile.

The resulting profile can already be used as a proof profile. However, it is recommended to optimize the profile in the following steps to achieve high-quality proofing.

How to iterate the profile (in short)

1. Create a job with an ECI2002 test chart and print it using the new MX4 profile (last version) and calibration set.
2. On the **Measure** menu in GMG ProfileEditor, click **All Current Values**.
3. On the **Measure** menu, click **Calculate with Target and Current Values**.
The measured values will be compared to the target values. Output values will be adjusted accordingly.
4. Save the MX4 profile.
5. Repeat steps 1 to 4 until the deviation (Delta E) between **Target Values** and **Current Values** meets your requirements.

The proof profile is now ready to use and can be linked within a new proof standard.

7. Special Ink Spot Colors

Printing an image with special inks such as White, Silver or Silver Blended requires a spot color channel for each special ink you want to use. Spot colors and spot color gradations can be created in GMG Spot-Color Editor, a tool integrated in GMG ColorProof. You can mix your own spot colors with **Metallic Silver** or **White** ink using special ink settings which can be defined separately for each spot color in a set.

For a general introduction on how to create spot color sets and spot colors, please see "Creating a New Spot Color Set".

You can define the **Area Coverage** for the special ink (in our example, we added 50% Silver) by clicking the **Change Settings** button on the bottom of the main dialog. The **Area Coverage** defines the ink coverage at an **Index** of **100%**. Between an index of 0% and 100%, the spot color shows a **linear** behavior. You can, however, use a gradation correction to tweak the linear behavior.

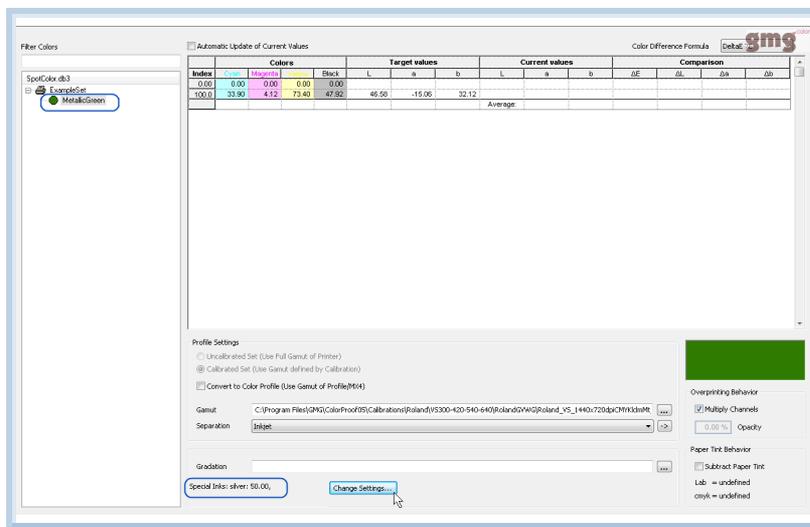


Fig. 7 Creating a new spot color with Metallic ink in GMG SpotColor Editor.