GMG ColorProof
Creating an MX4 ContoneProof Profile for White Ink Applications

Imprint

GMG GmbH & Co. KG

Moempelgarder Weg 10

72072 Tuebingen

Germany

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1. Getting Started

1.1 About this Tutorial

In this tutorial, you will learn how to create your own MX4 proof profile for **white ink** printing. In the MX4, you can activate a separate channel for **White** to simulate your target printing condition, for example, a white foil or a white coating, or a white printing ink printed on transparent foil. This way, you can create a DeviceLink profile with five channels, which are easily mapped to the image channels, giving you a perfect match of proof and print. As the white ink channel is part of the proof profile, choosing the white color designed for use with the profile in GMG ColorProof is fail-safe.

Creating an MX4 proof profile requires a **gamut file** (*.csc) which defines the color space of the printer and the print medium. When creating a profile, the gamut file is computed with the target values to produce output values for the printer so that the printed colors will match the target values as closely as possible. Since printing on white ink or printing on a white print medium results in different color spaces, you will need to create separate profiles for these applications. A white undercoat should only be printed with a proof profile that has been created under the same conditions.

A gamut file is part of the **printer calibration** which in turn is part of a calibration set. If there is no calibration set available for the printer-medium combination you are using, you need to create your own printer calibration before creating an MX4 profile.

Custom printer calibrations can be created as described in detail in our printer-specific **Starter Kit** tutorials available on our website (**Support Area** > **Downloads** > **Printer Utilities** >**Starter Kits**).

Tip Before starting, make sure the printer is running at its optimal level. Check to ensure the heads are clean and printing correctly.

See also:

- GMG-ColorProof-5_Tutorial_CustomMediaSupport_en.pdf
- GMG-ColorProof-5_Tutorial_MX5_en.pdf

1.2 White Ink Profiling: Interplay of White Ink and Paper Tint

From GMG ColorProof version 5.5 onwards, the white ink simulation of the target printing condition can be defined by an MX channel and does not need to be defined as a db3 spot color anymore.

This way, only the white ink areas are printed with a paper tint and transparent areas remain transparent, so that you can produce areas **without** paper tint, for example, to create a package proof with "windows", showing the content of the packaging.

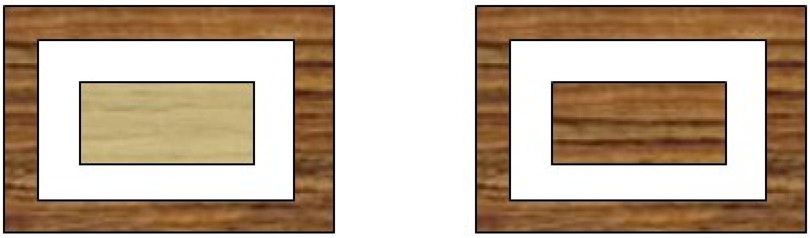


Fig. 1 A packaging with a white frame and a transparent "window" on a wooden surface. Left: previous behavior with the paper tint printed on transparent area. Right: only the white frame is printed with the paper tint, the transparent area is clear.

As the image white channel name is usually different to the MX channel, you need to manually select the "mx white" from the MX profile (**Color Management**: **Channels** tab > **Color** list). You can **automate** the white channel mapping by using the channel mapping function to replace the image channel name with the mx color name "mx white" (**Tools** menu > **Edit Channel Mapping Rule Sets**).

Comparison of previous and current white handling

Previous white handling	*New white handling (from version 5.5 onwards)*
White is defined by a spot color and must be manually selected for the matching profile.	White is defined by the MX channel "mx white".
The white paper tint is taken from the CMYK part of the profile and added to the white spot color.	The white paper tint is taken from the CMYK part of the profile and added to the MX white channel.
The paper tint is printed beneath the entire image, including transparent areas.	Only the white ink areas are printed with a paper tint, transparent areas remain transparent.

Can I update old profiles to apply the new white handling?

Changing profiles to the new white ink handling is simple. You open the profile in GMG ProfileEditor, activate the option **White Processing** and save the profile. When using the profile in GMG ColorProof, the new white ink handling will be used, that is, the channel list will provide a new color named **mx white** (just like mx cyan) which you simply map to the white channel.

1.3 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 an MX5 profile for DotProof. 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 26

Profile Building Blocks

Printer Types	*Printer Driver*	*Proof Mode*	*Color Space*	*Profile*	*Separation Mode*	*Calibration*
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**, **5200**, **5500**, **Roland VersaUV**, **Roland VersaCAMM VS**, **Mimaki UJF-706**, Canon imagePROGRAF iPF6300S, iPF8300S, iPF6400S, and iPF8400S. 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	Preserve Separations	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 iPFx3x0, iPFx4x0. 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	1 Bit	MX5	Preserve Separations	MXC

Printer Types	*Printer Driver*	*Proof Mode*	*Color Space*	*Profile*	*Separation Mode*	*Calibration*
Multicolor printers with additional (non-CMYK) inks used together with GMG Driver such as **Epson Stylus Pro x900**, **HP Designjet Z3200**, Canon imagePROGRAF iPFx3x0, iPFx4x0. 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 Ink-jet	MXC
Epson Stylus Pro x890, **x900** series.	Epson Driver	ContoneProof	CMYK	MX4	Multicolor Ink-jet	MX4
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 iPFx3x0, iPFx4x0.	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, iPF6400S, and iPF8400S.	Canon Driver	ContoneProof	CMY	MX4	No Key (CMY Only)	MX3

1.4 What You Need from Your Printing Company

To create a profile that simulates a certain printing condition on your proof printer, you will need the following files from your printing company.

Required Files	*MX4*	*MX5*
4–5 prints of a test chart (e.g. ECI2002) for the measuring device you are using.	Yes	Yes
Test images or visual test charts (to visually optimize the profile).	Optional	Optional
1-bit TIFF files of a test chart (e.g. ECI2002), produced under exactly the same target printing conditions you want to simulate.	No	Yes
Compensation Curve from RIP.	No	Yes

1.5 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.>

Placeholder	*Meaning*
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, *2pages* 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** folder (*<GMG ColorProof installation path>\Testcharts*).
- Test charts for the **integrated measuring device** of Epson Stylus Pro **x900** and **WT7900** can be found in the **Epson Testcharts** folder.
- Test charts for the **integrated measuring device** of Canon imagePROGRAF **iPF 6450** can be found in the **Canon Testcharts** folder.
- Test charts for the **integrated measuring device** of HP Designjet **Z2100** and **3200** can be found in the **HPZx100 Testcharts** folder.
- **Templates** for measuring test charts in GMG ProfileEditor can be found in the **Templates** folder (*<GMG ColorProof installation path>\Templates*).

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** and for **Canon imagePROGRAF** + **Canon 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_Linearization	Used for creating an ink linearization and restriction for CMYK and special inks.
ECI2002	Measuring the **gamut** of a printer–medium combination. Also measuring the **target** or **current values** when creating an **MX** proof profile.
SpotColor	Measuring the **target** or **current values** when creating a **spot color** profile in GMG SpotColor Editor.

2. Creating an MX4 ContoneProof Profile—Checklist

The following list provides you with a summary of the tutorial showing all steps required for creating an **MX4 proof profile**. Please read the tutorial or follow the **See also** links for detailed step-for-step instructions safely guiding you through the profile creation.

Step	***Short description***	***See also***
Set up the printer **hardware** and **software** settings	Printer panel: Select the print medium you want to create a profile for. GMG ColorProof: Select the same print medium for your printer in the **Output** view.	"Changing the Print Medium" on page 5
Create a new empty **MX4** profile	GMG ProfileEditor: Create a new **empty MX4** and link the **gamut** file.	"Starting a New MX4 Profile" on page 7
Define the **target** values	**Import** the characterization data from an existing print standard as **Target Values** or **measure** the **Target Values** from a print sample (produced by the printing machine and process that you want to simulate in the proof).	"Defining the Target Values" on page 11
Calculate the **output** values	Calculate the CMYK **output** values (**Calculate with Target Values**).	"Calculating the CMYK Output Values " on page 16
Compare target and measured values	Optimize the profile in an **iterative** process (cycle): Print the test chart with the profile you are creating and measure the patches. Compare the **Target Values** with the **Current Values** and adjust the output values accordingly (**Calculate with Target and Current Values**). Repeat the process until the measured values match the target values within reasonable tolerances.	"Measuring the Current Values" on page 16
Visual optimization	(Optional step) Manual corrections of the proof profile can optimize the visual match between the original print sample and the proof.	"Visual Optimization" on page 19

2.1 Changing the Print Medium

Note Some printers with a **bidirectional** connection can send information about the currently loaded print medium to GMG ColorProof. If the media synchronization is activated, the software will be automatically updated after a media change in the printer.

When setting up a new printer, you need to define a print medium which you are going to use with the printer. If you change the print medium in your printer, it is very important to also change the medium in GMG ColorProof to make sure you are using the correct profiles for printing.

How to change the print medium

1. Click the **Output** button on the navigation panel on the left of the main window.
2. Select the printer that you want to change the printer medium for from the **Available Printers** list.
3. Click the **Change Media** button on the right side of the printer.
4. Select the currently loaded **Media Type** and the appropriate **Media Size** from the list. If a sheet type **Media Size** is selected, you need to define the **Orientation** of the sheet in the printer as well.
5. Optional: Customize the **Media Specific Printer Settings** for the selected printer (e.g. the drying time).

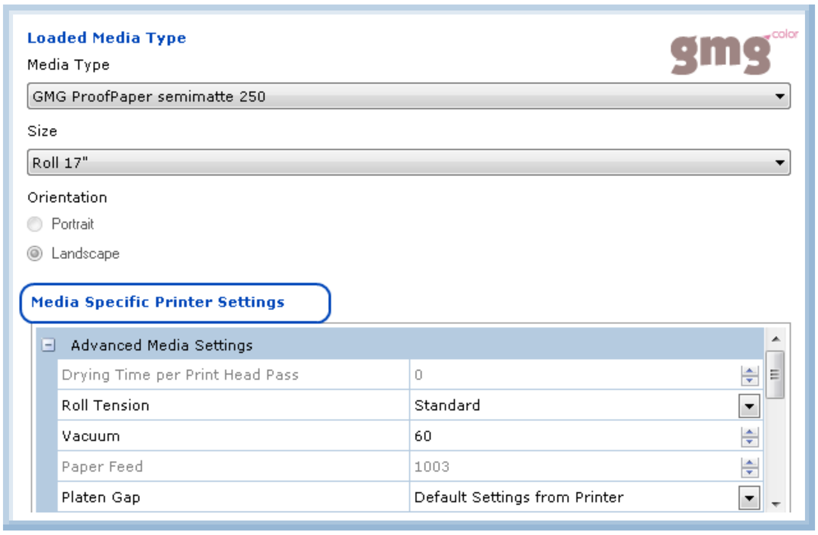


Fig. 2 Changing the print medium in the Output view.

See also:

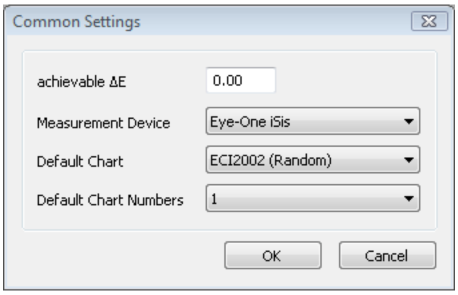
- "Media Synchronization between Printer and Software"
- "Media"

2.2 Defining Default Profile Settings

You can define default settings in GMG ProfileEditor, which will be used whenever you create a new profile.

How to define default profile settings

1. Start GMG ProfileEditor either from the GMG ColorProof menu bar (**Tools** > **ProfileEditor**) or from the **Windows Start Menu** (**GMG** > **Tools**).
2. On the **Options** menu, click **Settings**.
   The **Common Settings** dialog box is displayed.



3. Check to ensure the **Achievable Delta E** is set to **0.00**.
   This way, you ensure that all test chart patches are measured. If this value is not set to zero, only those patches of the test chart are measured that exceeded the defined Delta E value at the preceding measurement.
4. Select a **Measurement Device** and a **Default Chart**.
5. Under **Default Chart Numbers**, you can define your preferences when using a multi-page test chart.
6. Click **OK** to confirm the settings.

2.3 Starting a New MX4 Profile

Note Make sure the gamut file you use has been created from a test chart printed with white undercoat, as you intend to print the proofs.

How to start a new profile

1. Start GMG ProfileEditor.
2. On the **File** menu, click **New MX4**.
   The **New Profile** [MX4] dialog box is displayed.
3. Select the printer type from the **Printer** list.
   Click **Show All Printers** to show all printers supported in GMG ColorProof.
4. Select the **gamut file** (*.csc) for your printer–medium combination from the **Gamut** list.
   If the **Gamut** list is disabled or no gamut file is available for your printer–medium combination, you first need to create this file in the course of creating a printer calibration and then link it to the profile (**Common** tab > **Gamut**).
5. Under **Measuring Device**, select the measuring device you will be using for the test chart measurements.
6. Under **Measurement Chart**, select the test chart you want to use for the profiling.
7. Click **OK** to create the new profile.

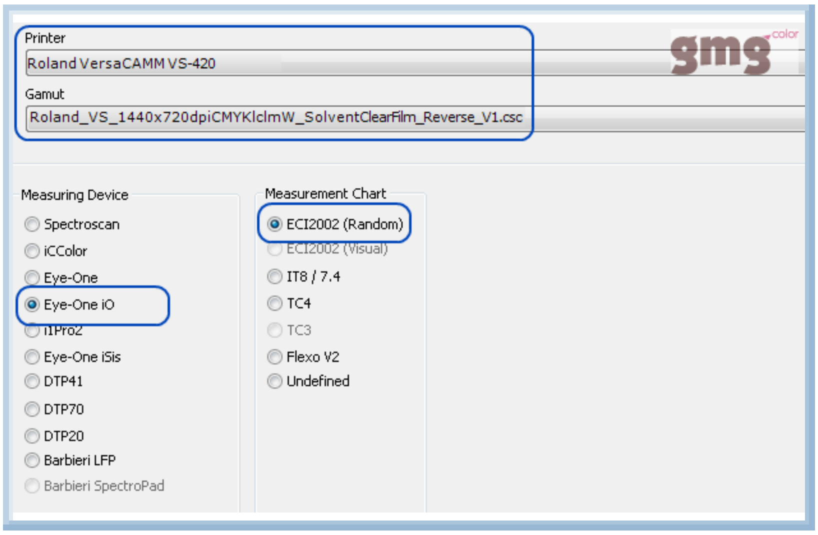


Fig. 3 Starting a new MX4 profile in GMG ProfileEditor.

2.4 Defining Basic Profile Settings

Note Check to ensure all settings are correct and change them if necessary before you proceed. If you change any of these basic settings at a later point of time, you will need to restart the profile creation right from step one.

How to define the basic profile settings

1. Click the **Common** tab.
   All parameters you have entered in the **New Profile** dialog box have been applied to the new profile.
2. Under **Profile Type**, select **CMYK Proof Profile** from the drop-down list.

3. Enable the option **Use Printer Calibration**.
   (This is important to ensure that a printer calibration is used in GMG ColorProof. If the option is **not** enabled, the selected printer calibration in GMG ColorProof will be ignored.)
4. Check the **Measurement Settings** and adjust them if required.
5. Select a **Separation** mode.
   If selecting an **Inkjet** mode, click the **Settings** button to display the mode properties. For more information on the mode properties, please refer to chapter Separation Modes (see "Separation Modes" on page 26).
6. Activate the option **White Processing**.
   A new tabbed page appears: **Special Inks**. On this page, you can measure the **Current Values**, in a similar way as for the CMYK channels.
7. Use the **Specification** text box and enter profile information such as the used printer, resolution, print medium, measuring device, UV cut filter, backing method, and the single steps you have taken each time you save the profile.
8. Click the **Save** button on the toolbar to save the first step of the profile creation.

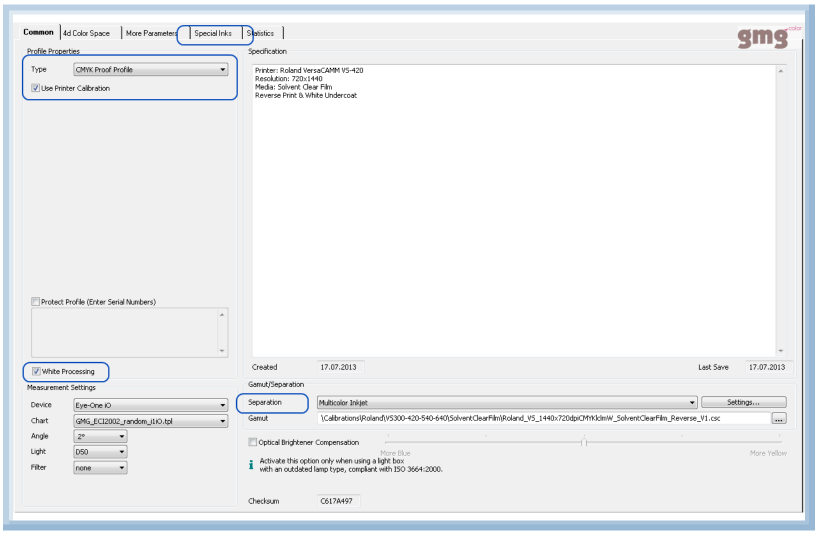
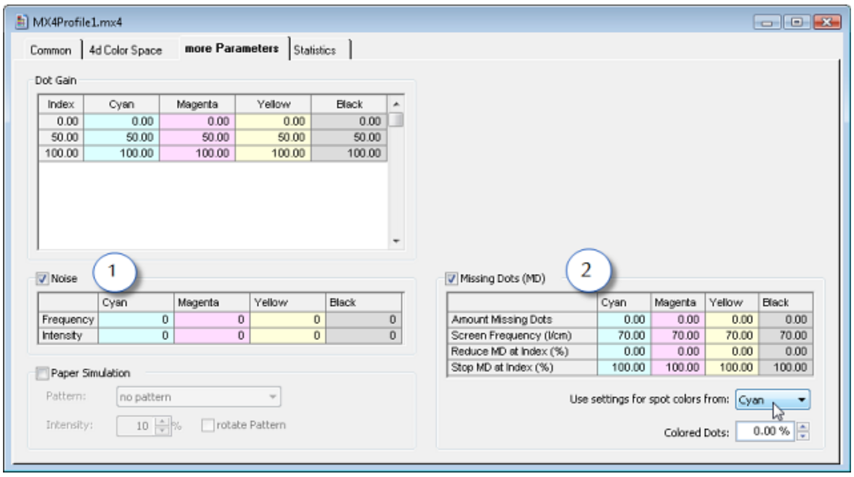


Fig. 4 Defining the basic profile settings in GMG ProfileEditor.

2.5 Advanced Simulation Features

MX proof profiles offer advanced features for an even more realistic simulation of the target printing process such as a simulation of **Noise** or of non-printing raster dots (**Missing Dots**).

If you want to use these features, it is recommended to enter the required parameters into the proof profile right at the beginning (just like in our tutorial), **before** optimizing the proof profile in a first iteration. Advanced simulation features of MX profiles such as **Noise** or **Missing Dots** will affect both the measured color values as well as the visual appearance of the print.



2.5.1 Noise

When simulating Flexo printing, the proofs might appear "**too smooth**" if compared to the original print. With the **Noise** option (**More Parameters** > **Noise**), you can add artificial "errors" with a customizable **frequency** and **intensity** to the proof so that print and proof match as closely as possible.

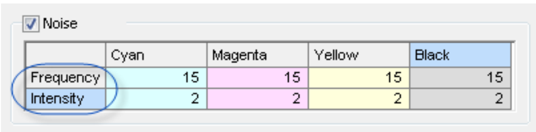


Fig. 5 Noise simulation of an MX4 profile.

Usually, **Noise** is **not** required to simulate a press run on **coated** paper. When simulating a print on **uncoated** paper, it is recommended to use a frequency of 20 and an intensity of 2.

Experience has shown that a frequency of 30 and an intensity of 3 are rather maximum values. In most cases, the required frequency lies within 15–20, the intensity amounting to no more than 2.

2.5.2 Missing Dots

When do I use a Missing Dots simulation?

Note The **Missing Dots** simulation **cannot** be used together with the **Sharpening** feature in GMG ColorProof, because **Missing Dots** is applied before **Sharpening**. Jobs that use a profile with **Missing Dots** simulation and with selected **Sharpening** option will be **canceled**.

Note The **Missing Dots** simulation is supported only by ContoneProof mode, **not** by DotProof mode.

The option **Missing Dots** simulates non-printing raster dots often occurring in **gravure** printing. This typical characteristic in gravure printing is caused by a non-ideal ink transfer from the gravure cells onto the printing medium due to a non-ideal take up of the ink by the paper and/or due to cell clogging. The amount of missing dots depends on the type of printing machine and medium used. Missing dots are more pronounced when an uneven or low-quality medium is used, for example, for specific applications in the packaging industry.

How does it work?

Missing Dots works similar to a filter that adds noise to the image. Please note that missing dots are therefore less pronounced if noise simulation is used in the same profile. **Missing Dots** parameters are defined individually for each CMYK color channel when creating a profile in GMG ColorProof. The same **Missing Dots** parameters applied to one process color channel are also applied to all spot color channels.

Define the **amount** of missing dots (range: 0–10) according to the characteristics of the printing machine and media used for the gravure printing process. The lower the screen frequency, the lower is usually the **amount** of missing dots you need to obtain the same visual appearance. Generally, an amount **less than 1** is already sufficient for a realistic missing dots simulation.

If different color channels have different values for the **Amount of Missing Dots**, some of the missing dots will be colored.
Example: the **Amount of Missing Dots** is Cyan = 0.25, Magenta = 0.5, Yellow = 0.5, and Black = 0.5 because the ink transfer is better for the Cyan channel than for the other channels (and the **Colored Dots** level is set to 0). In a gray area of an image, where the ink is equally distributed for all color channels, half of the resulting missing dots will have a Cyan color. In a pure Cyan area of the image, the number of missing dots will be half the number as in other areas.

The **size** of the missing dots is defined according to the screen frequency (range: 76.20 lpi – 254 lpi). The screen frequency is entered as lpi or l/cm (according to the **Measuring Unit** settings in the **General Settings** dialog box in GMG ColorProof). The screen frequency used in the plate-making process is only a **recommended** value for the **Screen Frequency** parameter. You can also adjust the size of missing dots according to the visual appearance of the proof by adjusting the **Screen Frequency** parameter.

Missing Dots are started at a 1% tonal value. The frequency is decreased at a user-defined tonal value in percent (**Reduce MD at Index (%)**) and stopped completely at another user defined tonal value (**Stop MD at Index (%)**). Between **Reduce** and **Stop**, the relationship between frequency and tonal value is **linear**.

The parameter **Colored Dots** describes how much influence the **media** quality and the **ink system** of the printing press have on the missing dots characteristics. A **Colored Dots** level of 0 means that the missing dots are caused by the media properties. Missing dots are printed in the **paper tint** color. Please note that the missing dot area is printed in paper tint **only** if the **Colored Dots** level is 0 and the **Amount of Missing Dots** in the profile is the **same** for all color channels. If, for example, the Cyan channel has a lower amount of missing dots, the missing dots will be printed in Cyan color. This example would simulate that the media has a better ink uptake for Cyan than for the other inks.

A **Colored Dots** level of 100 means that the missing dots are caused by a failure of the ink system. Missing dots are always printed as **colored** dots. The color that is printed in the "missing dot" area is arbitrary, based on the probability that is implied in the target printing color.

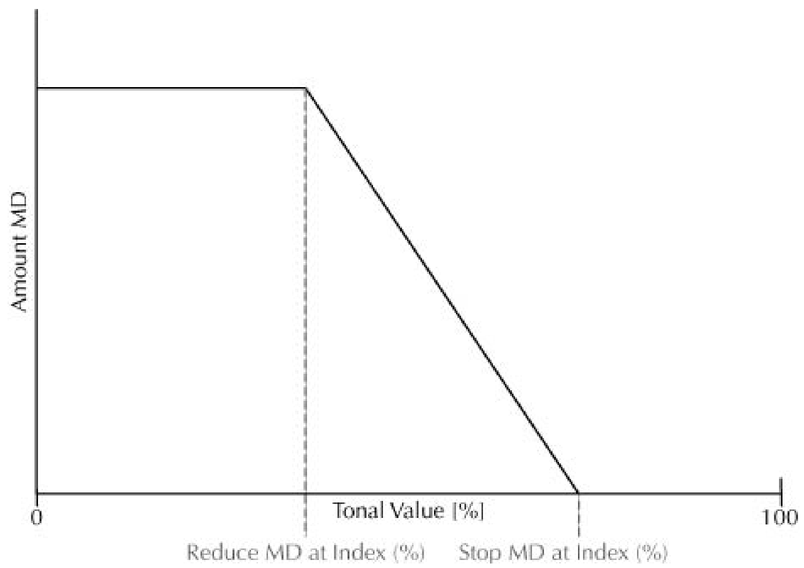


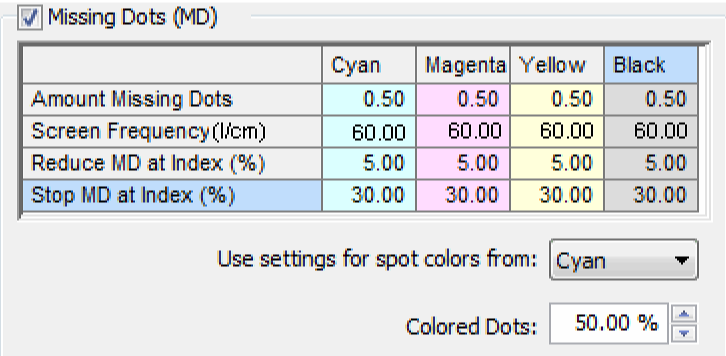
Fig. 6 Automatic reduction of Missing Dots amount according to tonal value.

Missing Dots starts at the full user-defined amount (**Amount MD**) at 1 % index. The amount is then decreased and finally reduced to zero (that is, no **Missing Dots** applied) at user-defined indexes.

Setting Up a Profile with Missing Dots

How to set up a profile with Missing Dots

1. Click the **More Parameters** tab.
2. Select the option **Missing Dots**.
3. Type in the required **Missing Dots** parameters for all **process** colors, for example, **Amount** = 0.5, **Screen Frequency** = 60 l/cm, **reduction** at 5 % tonal value, **stop** at 30 % tonal value.
4. Select one of the process colors from the drop-down list for applying the same **Missing Dots** parameters to all **spot color** channels.
5. **Save** the profile.


Missing Dots (MD)

	Cyan	Magenta	Yellow	Black
Amount Missing Dots	0.50	0.50	0.50	0.50
Screen Frequency(l/cm)	60.00	60.00	60.00	60.00
Reduce MD at Index (%)	5.00	5.00	5.00	5.00
Stop MD at Index (%)	30.00	30.00	30.00	30.00

Use settings for spot colors from: Cyan

Colored Dots: 50.00 %

Fig. 7 Missing Dots simulation in an MX4 proof profile.

In our example screen shot, the same missing dots parameters have been defined for all color channels. At a tonal value of 5 %, the missing dot intensity is decreased. Missing dot simulation is stopped at 30 % tonal value. A **Colored Dots** level of 50 means that half of the missing dots are caused by the printing medium properties and are therefore printed in **paper tint** color. The other half of the missing dots are caused by a failure of the ink system and therefore one of the ink color channels is not printed in the missing dot area (resulting in colored dots).

2.6 Measurements and Calculations

2.6.1 Defining the Target Values

Basically, target values are the color values, generally specified in Lab, that should be met when printing a certain CMYK value under a certain printing condition. Target values can be either imported or measured.

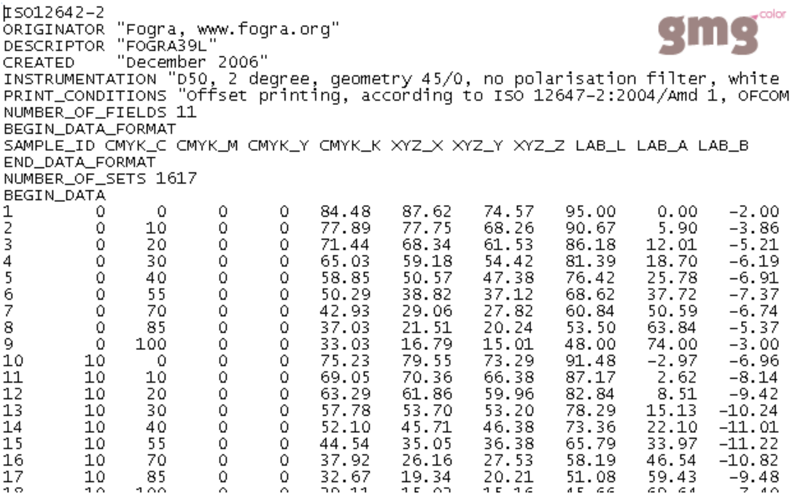
- Industrial or commercial printing standards, for example, ISO standards or SWOP, provide target values as **characterization data**. If you want to profile according to an international industry standard, you can simply **import** the target values from a **text file** or **ICC** profile (which can be downloaded from the Internet).
- If the target values for the target printing condition are not available or in case you want to create a profile for a **custom** (in-house) standard, you can **measure** the target values from a **test chart** printed on the target machine. To get more reliable results, you should measure several prints and then average the target values.

See also:

- "Importing Target Values" on page 12
- "Measuring Target Values" on page 13
- "Averaging Target Values" on page 13

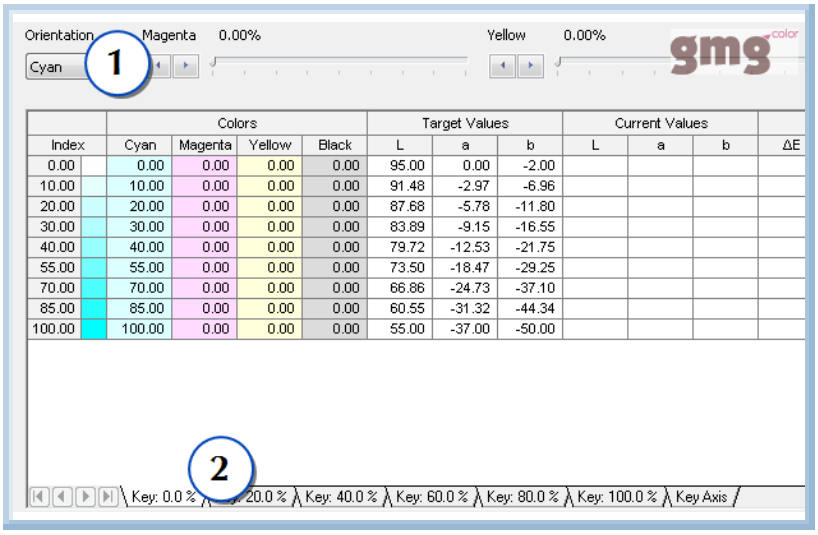
Importing Target Values

Characterization data sets contain nominal values for **standardized** printing processes, usually available as text file. If you open such a file, you can see the averaged data from several measurements of a particular test chart.



```
ISO12642-2
ORIGINATOR "Fogra, www.fogra.org"
DESCRIPTOR "FOGRA39L"
CREATED    "December 2006"
INSTRUMENTATION "D50, 2 degree, geometry 45/0, no polarisation filter, white
PRINT_CONDITIONS "Offset printing, according to ISO 12647-2:2004/Amd 1, OFCOM
NUMBER_OF_FIELDS 11
BEGIN_DATA_FORMAT
SAMPLE_ID CMYK_C CMYK_M CMYK_Y CMYK_K XYZ_X XYZ_Y XYZ_Z LAB_L LAB_A LAB_B
END_DATA_FORMAT
NUMBER_OF_SETS 1617
BEGIN_DATA
1     0    0   0   0   84.48  87.62  74.57  95.00   0.00   -2.00
2     0   10   0   0   77.89  77.75  68.26  90.67   5.90   -3.86
3     0   20   0   0   71.44  68.34  61.53  86.18  12.01   -5.21
4     0   30   0   0   65.03  59.18  54.42  81.39  18.70   -6.19
5     0   40   0   0   58.85  50.57  47.38  76.42  25.78   -6.91
6     0   55   0   0   50.29  38.82  37.12  68.62  37.72   -7.37
7     0   70   0   0   42.93  29.06  27.82  60.84  50.59   -6.74
8     0   85   0   0   37.03  21.51  20.24  53.50  63.84   -5.37
9     0  100   0   0   33.03  16.79  15.01  48.00  74.00   -3.00
10   10    0   0   0   75.23  79.55  73.29  91.48  -2.97   -6.96
11   10   10   0   0   69.05  70.36  66.38  87.17   2.62   -8.14
12   10   20   0   0   63.29  61.86  59.96  82.84   8.51   -9.42
13   10   30   0   0   57.78  53.70  53.20  78.29  15.13  -10.24
14   10   40   0   0   52.10  45.71  46.38  73.36  22.10  -11.01
15   10   55   0   0   44.54  35.05  36.38  65.79  33.97  -11.22
16   10   70   0   0   37.92  26.16  27.53  58.19  46.54  -10.82
17   10   85   0   0   32.67  19.34  20.21  51.08  59.43   -9.48
```

Fig. 8 Fogra 39L characterization data.



	Colors				Target Values			Current Values			
Index	Cyan	Magenta	Yellow	Black	L	a	b	L	a	b	ΔE
0.00	0.00	0.00	0.00	0.00	95.00	0.00	-2.00				
10.00	10.00	0.00	0.00	0.00	91.48	-2.97	-6.96				
20.00	20.00	0.00	0.00	0.00	87.68	-5.78	-11.80				
30.00	30.00	0.00	0.00	0.00	83.89	-9.15	-16.55				
40.00	40.00	0.00	0.00	0.00	79.72	-12.53	-21.75				
55.00	55.00	0.00	0.00	0.00	73.50	-18.47	-29.25				
70.00	70.00	0.00	0.00	0.00	66.86	-24.73	-37.10				
85.00	85.00	0.00	0.00	0.00	60.55	-31.32	-44.34				
100.00	100.00	0.00	0.00	0.00	55.00	-37.00	-50.00				

Fig. 9 Profile with imported target values.

How to import target values into the profile

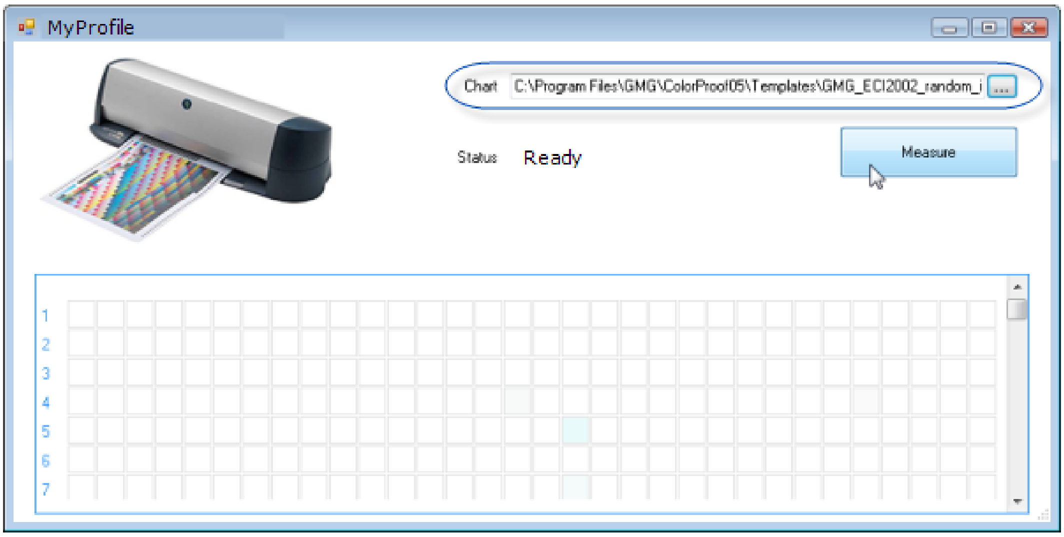
1. On the **Import/Export** menu, click **Import Target Values** and browse for the characterization data.
   The target values are imported as Lab values into the profile.
2. Click **Yes** if the following message is displayed: "In file XX some indices exist twice. Would you like to calculate the average?"
3. Click **OK** if the following message is displayed: "Not all values could be imported into the current color profile because there are no fulcrums for these values."
4. Click the **4d Color Space** tab.
   Use the **Orientation** drop-down list (1) and the **Key** tabs (2) at the bottom of the dialog to view the target values from various perspectives.

Measuring Target Values

Have the same test chart that you are using for the profile creation, for example, GMG_ECI2002_random_i1iO.tif, printed on the target printing machine and measure the printed color values as target values in GMG ProfileEditor.

How to measure target values from a test chart

1. On the **Measure** menu in GMG ProfileEditor, click **All Target Values**.
   The measurement dialog box opens. The selected test chart template is pre-selected.
2. If you need to change the test chart template, click the browse button and select the template of the desired test chart (same name) from the **Templates** folder, for example, GMG_ECI2002_random_i1iO.tif.



3. Insert the test chart that has been printed on the target machine into the measuring device.
4. Click the **Measure** button.
   The test chart is measured.
5. 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 as target values into the profile.
6. **Save** the profile.

Tip If measuring older test charts, fulcrums may be missing. Click the **4d Color Space** and check to ensure all fulcrums have target values (do not forget to view the different **Key** tabs). If there are missing ones, click the **Measure** menu and select **Interpolate Missing Target Values**.

Averaging Target Values

It is recommended to use several test chart prints from the target machine (at least two) and measure and average the results to get more precise target values.

How to measure and average several measurements

1. On the **Import/Export** menu, point to **Export Target Values** and select **Text File**.
2. Save the measured target values as *xx_targetvalues_1.txt* file.
3. On the **Tools** menu, select **Reset Target Values** to start another measurement.
4. Insert the second print of the test chart into the measuring device and **measure** the target values as described in the preceding chapter.
5. Again, **export** the measured target values (*xx_targetvalues_2.txt)*.

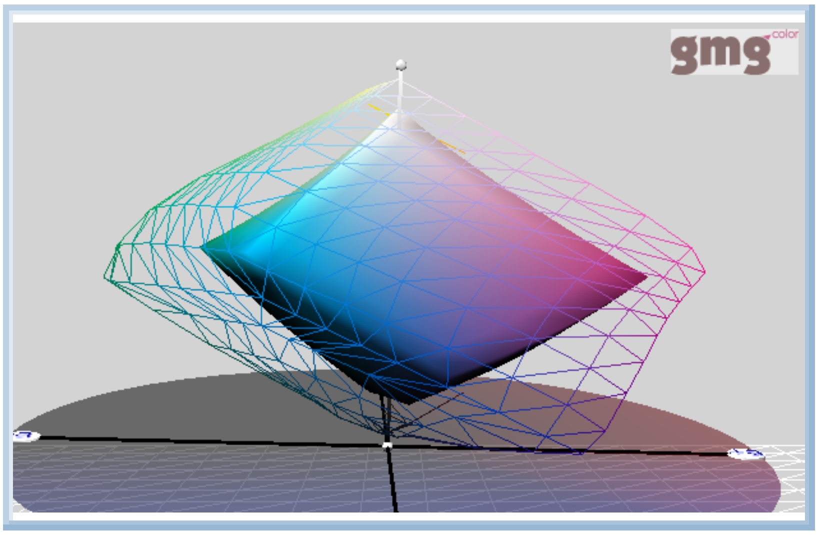
6. Repeat steps 3-5 for each measurement you want to do.
7. After you have completed all measurements and exported them as text files, click the **Import/Export** menu and select **Import Target Values**.
8. Mark **all** text files with target values you want to average by holding down the Shift key and click **OK**.
   The measured data from all selected files is automatically averaged and loaded into the profile as **Target Values**.

Comparing Gamut and Target Values

As printers can vary drastically in their color spaces, it is recommended to check the characterization data against the gamut of your printer–medium combination in GMG GamutViewer. In doing so, you will be able to assess if the proof printer gamut is physically able to match the color space defined by the target values and to localize so-called **Out-of-Gamut** colors.

How to compare gamut and target values

1. On the **Tools** menu, click **Compare Gamut/Target Values**.
   GMG GamutViewer opens showing both gamuts in 3D or 2D view.
2. Click the **color** buttons to change the depiction of the respective gamut according to your choice.
3. Click the drop-down list below each color button to select a **display format**.
   In our example, the **Reference Gamut** (target values) is shown as a multi-color solid. The **Sample Gamut** (printer gamut) is shown in multi-color lines. Ideally, the target color space is equal to or smaller than the color space that can be reproduced by printer-medium combination, as shown in the screen shot.



4. Left-click the gamut and hold down the mouse button. Move the mouse to **rotate** the gamut in all desired directions in 3D view. You can also **zoom** in and out of the image using the scroll wheel of the mouse.

What can I do if gamut and target color space do not fit?

In case the sample gamut does **not** encompass the reference gamut, the respective colors cannot be represented in the proof. Should this only pertain to minor color areas at the outer margin of the gamut, the proof may still be acceptable. If the gamut differences are more striking and apply to larger areas, it will not be possible to reproduce these colors with the chosen printer–medium combination.

White Point: If the white point of the printer-medium combination does **not** encompass the target color space, you can calculate the output values by **mapping** the target color space to the printer (see "Calculating the CMYK Output Values " on page 16).

Analysis of Target Values: If you have measured the target values from test chart prints of the target machine and you notice large bumps as shown in the following screen shot, it is recommended to use the **Smooth** function in GMG ProfileEditor (see "Smoothing Target Values" on page 15).

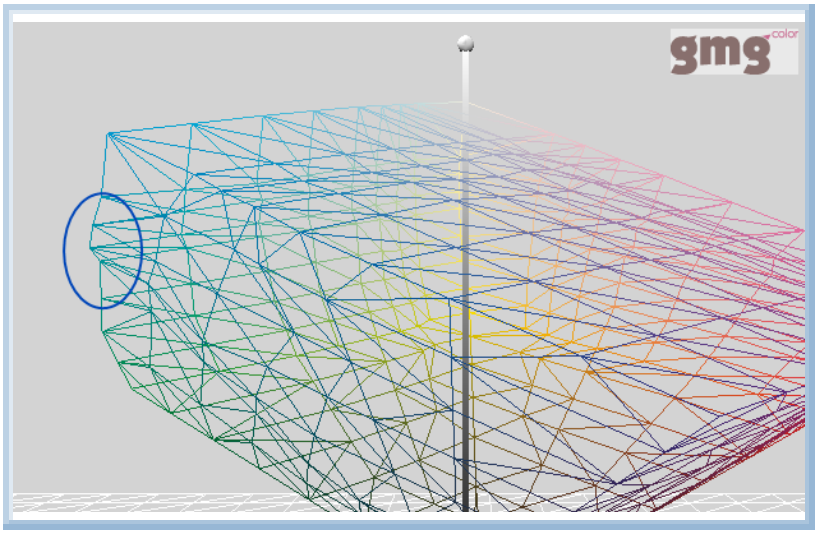


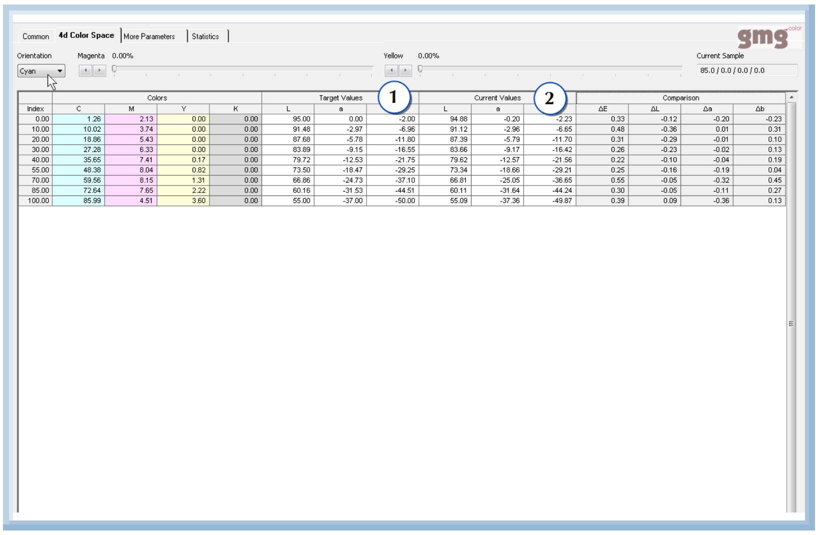
Fig. 10 Analysis of target values in GMG GamutViewer.

Smoothing Target Values

The automatic smooth function in GMG ProfileEditor interpolates the target values to compensate for larger deviations on the gamut hull.

How to smooth the target values

1. On the **Tools** menu, click **Smooth Target Values** .
   The **Smooth Target Values** dialog box with a slider is displayed, allowing you to determine the intensity of the smoothing.
2. It is recommended to use the **default** settings and click **OK**.
   The target Lab values are adjusted in the **Target Values** column (1). You can optionally load the former target values into the **Current Values** column (2) to see the effect on your data or visualize the differences in GMG GamutViewer.



	Colors				Target Values			Current Values			Comparison			
Index	C	M	Y	K	L	a		L	a		ΔE	ΔL	Δa	Δb
0.00	1.26	2.13	0.00	0.00	95.00	0.00	-2.00	94.88	-0.20	-2.23	0.33	-0.12	-0.20	-0.23
10.00	10.02	3.74	0.00	0.00	91.48	-2.97	-6.96	91.12	-2.96	-6.65	0.48	-0.36	0.01	0.31
20.00	18.86	5.43	0.00	0.00	87.68	-5.78	-11.80	87.39	-5.79	-11.70	0.31	-0.29	-0.01	0.10
30.00	27.28	6.33	0.00	0.00	83.89	-9.15	-16.55	83.66	-9.17	-16.42	0.26	-0.23	-0.02	0.13
40.00	35.65	7.41	0.17	0.00	79.72	-12.53	-21.75	79.62	-12.57	-21.56	0.22	-0.10	-0.04	0.19
55.00	48.38	8.04	0.82	0.00	73.50	-18.47	-29.25	73.34	-18.66	-29.21	0.25	-0.16	-0.19	0.04
70.00	59.56	8.15	1.31	0.00	66.86	-24.73	-37.10	66.81	-25.05	-36.65	0.55	-0.05	-0.32	0.45
85.00	72.64	7.65	2.22	0.00	60.16	-31.53	-44.51	60.11	-31.64	-44.24	0.30	-0.05	-0.11	0.27
100.00	85.99	4.51	3.60	0.00	55.00	-37.00	-50.00	55.09	-37.36	-49.87	0.39	0.09	-0.36	0.13

3. Optional: On the **Tools** menu, select **Compare Target/Current Values** to view the changes.
4. On the **Tools** menu, select **Reset Current Values**.
   The current values (unsmoothed target values) are no longer needed and are thus removed.
5. **Save** the MX4 profile.

2.6.2 Calculating the CMYK Output Values

The CMYK output values are the color values the printer receives and turns into print. The output values are generated by computing the **target values** with the selected **gamut file**.

There are two ways to calculate the output values as described in the following.

How to calculate CMYK output values from the target values

1. On the **Measure** menu, click **Calculate with Target Values**.
   The target values are computed with the gamut file to produce the output values of the profile, including an automated smoothing algorithm. The CMYK output values are displayed in the **Colors** column.
2. **Save** the profile.

How to calculate CMYK output values using paper tint compensation

If the **white point** of the printer-medium combination does **not** cover the target color space, you can calculate the output values by **mapping** the target color space to the printer gamut (gamut mapping).

Note The gamut mapping involved in compensating the paper tint **changes** the target values. If the target values are taken from a print standard, the proof may turn out not 100% color accurate, depending on the color space your printer-medium combination is able to reproduce. As a result, you may not be able to verify that your proof meets the standard (verification label).

1. On the **Measure** menu, click **Calculate Using Paper Tint Compensation**.
   The target color space is aligned with the printer color space to produce the output values of the profile, compensating the paper tint. The CMYK output values are displayed in the **Colors** column.
2. **Save** the profile.

2.6.3 Measuring the Current Values

Printing the Test Chart

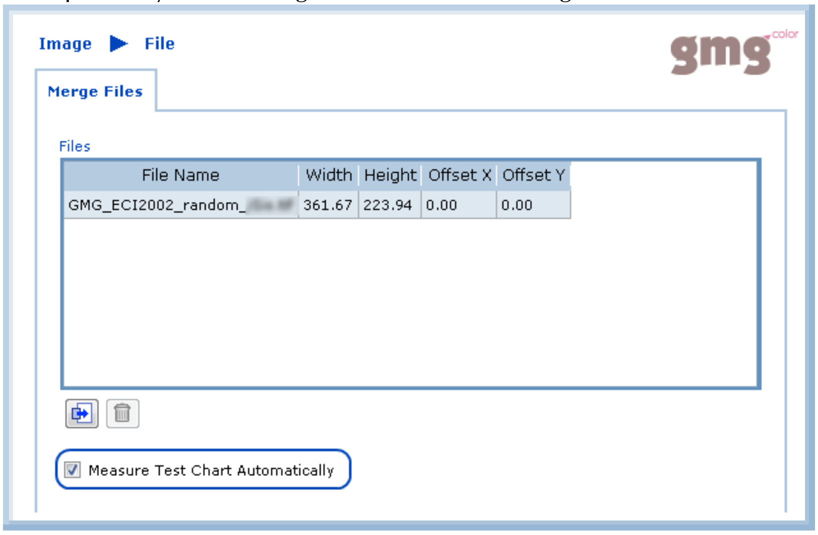
To print the test chart, you need to switch to GMG ColorProof and create a job. The test chart is printed to measure the **Current Values**.

Note If you are using an integrated measuring device, it is important to add the test chart directly from the original file path to the job. Otherwise, GMG ColorProof will not recognize the test chart and will not start the measurement.

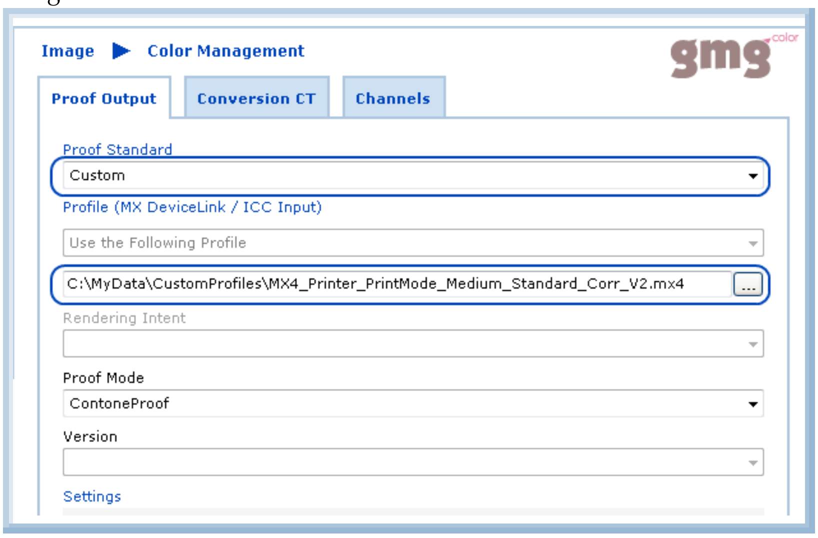
How to create a job for printing a test chart

1. Start GMG ColorProof.
2. Create a new job in GMG ColorProof and add the appropriate test chart (e.g. ECI2002) for the measuring device from the **Testcharts** folder of the main program folder to the job.
3. Ignore the other options in the **New Job** dialog box and click **Open** to configure the job in the **Manual Job Manager**.
4. **Job** > **Printer Settings** > **Printer**: From the **Printer** list, select your printer.
5. **Job** > **Printer Settings** > **Printer**: From the **Medium** list, select the loaded medium.
6. **Job** > **Printer Settings** > **Printer**: Under **Calibration Set**, select the appropriate calibration set.
7. **Job** > **Printer Settings** > **Advanced**, check to ensure the print mode uses the correct driver.

8. **Image** > **File**: If you loaded a test chart for using the integrated measuring device, select the option **Measure Test Chart Automatically**.
   If this option is not selected, the test chart is printed, but not measured by the printer. Do not select this option if you are using an external measuring device.



9. **Image** > **Color Management** > **Proof Output**: From the **Proof Standard** list, select **Custom**.
10. Under **Profile (MX DeviceLink / ICC Input)**, select the last version of the MX4 profile you are creating.



11. If you are using a color mode with White for printing a **white undercoat**, click the **Channels** tab, activate the option **Add Coating Channel** and select **White** from the **Color** list.
12. Click **Print** to print the job.

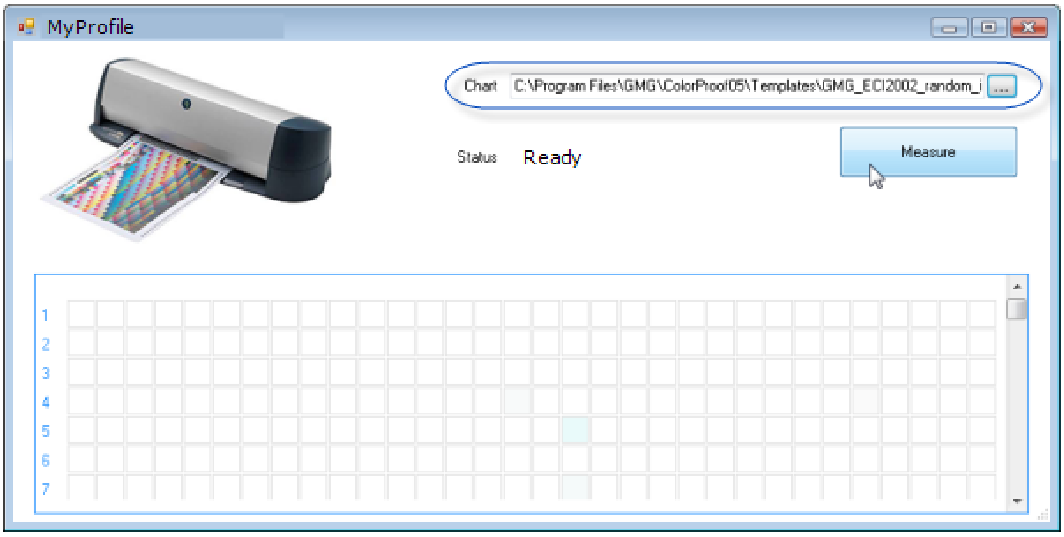
If the option **Measure Test Chart Automatically** has been selected, the printed image is automatically measured by the integrated measuring device after the specified drying time. The measured data is saved into a text file in the **ProofControl** folder of the GMG ColorProof main program folder. Existing files are not overwritten. Instead, the file names of new data are extended by an incremented number.

Measuring the Current Values

Depending on the printer you use, the **drying time** can have a very strong impact on the quality of the measurements required for profiling. It is thus recommended to investigate the minimum drying time for the printer you are profiling.

How to measure the current values

1. Open the profile you are creating in GMG ProfileEditor and click the **Common** tab.
2. Under **Measurement Settings** > **Chart**, select the appropriate test chart from the drop-down list.
3. Click the **4d Color Space** tab.
4. On the **Measure** menu, click **All Current Values**.
   The test chart measurement dialog is opened. As you can see, the appropriate template is already pre-selected. Click the browse button to change the test chart template type, if necessary.



5. Insert the test chart you printed in GMG ColorProof into the measuring device.
6. Click the **Measure** button.
   The test chart is measured. Measured data is read as **Current Values** into the open profile.
7. After a successful measurement, the following message is displayed: "Should the measured values be transferred?" Confirm the message clicking **Yes**. The measured values are transferred into the **Current Values** column.
8. Repeat these steps for the second page of the test chart (if any).
9. **Save** the MX profile.

Evaluating the Measured Values

To evaluate the measured values, switch to the **Statistics** tab. You can sort the values according to various criteria. On the screen shot, the data is sorted by Delta E in a descending order (click the **Up** and **Down** buttons to determine an ascending or descending order). By sorting the measured values this way, you can easily see which color patches yield the largest differences between the target values and the current values.

Under **Average all Values**, you can see the average Delta E value for all measured patches in the test chart. The higher the Delta E, the more inaccurate the color.

Note If the average Delta E is above 1.00 or the maximum Delta E is above 3.00, we generally recommend to repeat the above steps, i.e. re-calculate the current and target values, print the test chart and repeat the measurement. The profile can be optimized in an iteration cycle until the difference between actual color (Current Values) and target color (Target Values) is satisfactory. Experience has shown that an acceptable Delta E is generally reached within **2-3** iterations.

In our example, the maximum Delta E value is 4.13, as highlighted in the Delta E table row. With the used printer-medium combination, we would rather follow another iteration cycle as described in the following chapter (see "Iterating the Profile" on page 19).

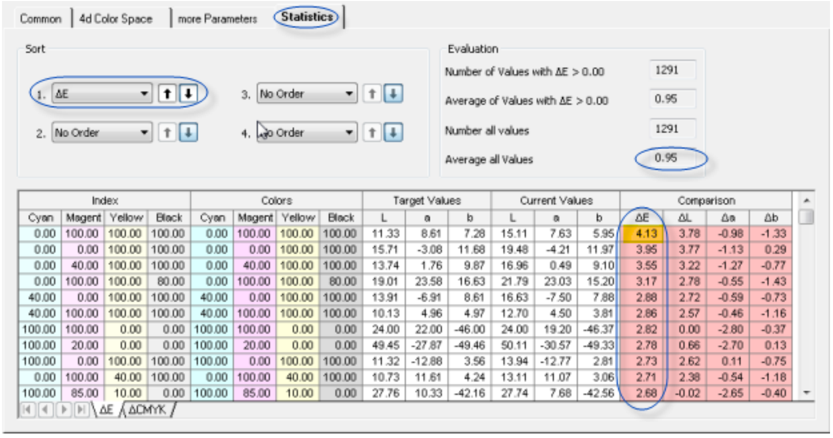


Fig. 11 Delta E evaluation of measured Current Values.

In case the measured values lie within the desired tolerance after the first measurement, you can proceed with visually optimizing the profile. Experience has shown that the desired tolerance level is generally reached within 2–3 iterations.

2.6.4 Iterating the Profile

The aim of an iteration is to match the **Target** values as closely as possible. Following each iteration, 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**.

How to recalculate the CMYK Output Values

1. On the **Measure** menu, click **Calculate with Target and Current Values**.
   New CMYK values are calculated from the target values and the measured current values. The current values are then removed as they are no longer valid for the current MX profile.
2. **Save** the profile with the calculated color adjustments.

After the recalculation, print the test chart again (for convenience from the **History** in GMG ColorProof), using the just recalculated MX color profile. Measure the test chart and evaluate if the recalculation was sufficient.

As soon as the measured values meet the target values within the desired tolerance, the color profile is **complete** as far as measurement is concerned. At this point, you should print a **test image** and check to see if it visually matches the reference prints.

See also:

- "Measuring the Current Values" on page 16
- "Measuring the Current Values" on page 17
- "Evaluating the Measured Values" on page 18

2.7 Visual Optimization

After completing the measurements, it is recommended to evaluate the calculated colors visually by printing a visual test chart or test image with the generated profile. If the result does not comply with your needs and satisfaction, you can perform manual corrections to attain a visually optimized match between target and proof. The table below provides an overview of the various correction possibilities which are explained in detail in the respective chapters.

Note Visual corrections may change the Delta E values.

Correction Possibilities	***Where to Find***	***See also***
Global correction of color shifts	**More Parameters** tab > **Dot Gain**	"Correcting Global Color Shifts" on page 20
Definition of the first printable dot	**More Parameters** tab > **Dot Gain**	"Defining the First Printable Dot" on page 21
Change primary and secondary color values (CMYK) at the 16 key points	**Tools** menu> **Color Value Correction**	"Correcting Colors at 100% Value" on page 21
Selective color correction (CMYK) of particular fulcrums	**Tools** menu> **Selective Color Correction**	"Changing Color Values Selectively" on page 23
Correction of paper tint	**Tools** menu > **Color Value Correction**	"Removing the Paper Tint" on page 25

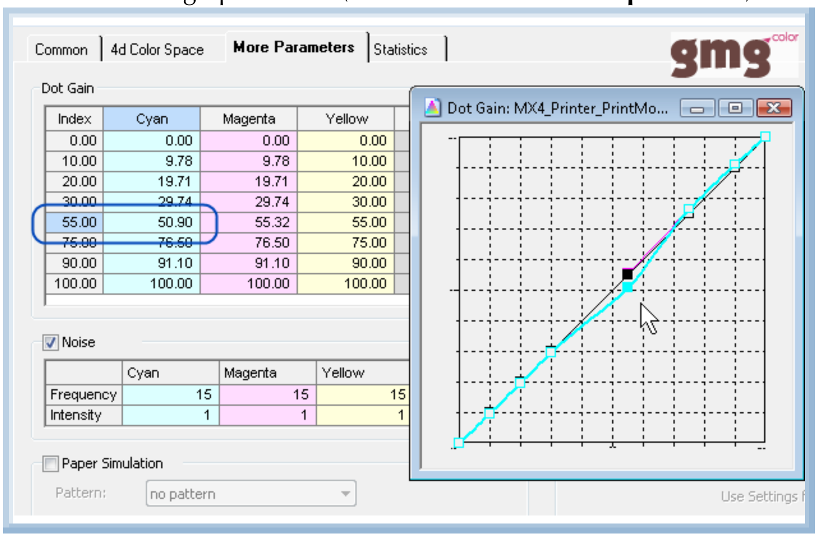
2.7.1 Correcting Global Color Shifts

If your visual test prints show global color shifts, for example in the midtones toward the Cyan direction, you can adjust your curves on index value level. The corrections apply to all colors of the modified index values and can be entered into the **Dot Gain** table or made in the **graphic view** by directly manipulating the curves.

Note Corrections entered in the **Dot Gain** table are **not** computed with the color values on the **4d Color Space** tab and remain separate. This way, the corrections can be modified any time.

How to correct global color shifts

1. Click the **More Parameters** tab.
2. Under **Dot Gain**, click the table and select **Add Fulcrum** from the **Edit** menu.
   This function allows you to insert additional **Index** values into the **Dot Gain** curve.
3. Correct the primary colors directly by clicking into the cell of the table or select and drag individual fulcrums in the graphic view (**Tools** menu > **Show Graphic View**).

   In our example, we modified Cyan at index value 55. The curve in the graphic view clearly visualizes the difference. This change of a single value affects all colors with 55% Cyan.

2.7.2 Defining the First Printable Dot

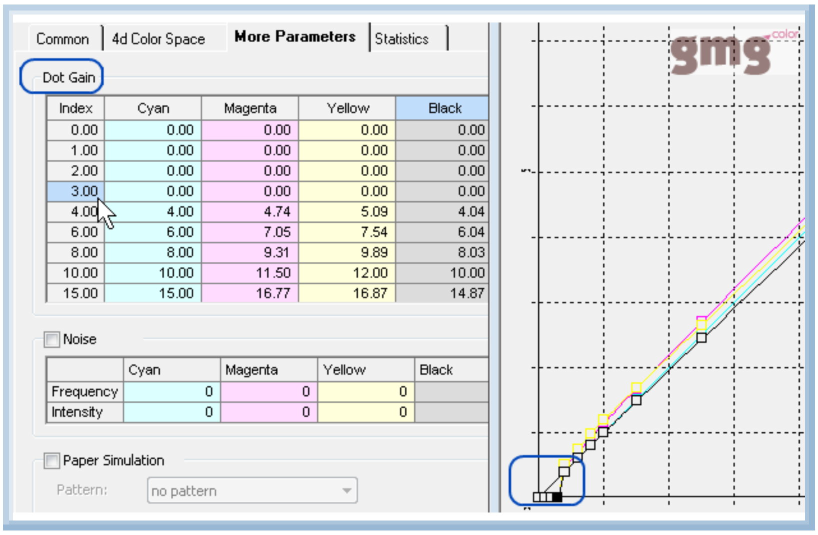


Fig. 12 Example with first printing tone at 4%.

With this simulation functionality, you can simulate the first printable dot of the target printing machine. Since usually no fulcrum exists in the exposure range under 10%, color values are interpolated without any information on the first printable dot in the profile.

In the following example, further fulcrums have been added and all CMYK values below 4% have been set to 0.00. This way, the first printable dot is printed at 4%. It is recommended to add **at least** one fulcrum before and after the first printable dot to 'hold' the curves and prevent them from oscillating.

How to define the first printable dot

1. Click the **More Parameters** tab.
2. Click into the **Dot Gain** table.
3. On the **Edit** menu, click **Add Fulcrum** and enter a fulcrum value.
   The new fulcrum is added to the table. Add as many fulcrums as required.
4. Set all values below the first printable dot to **zero**.
5. **Save** the profile and make a test print.

2.7.3 Correcting Colors at 100% Value

Note The **Color Value Correction** function immediately translates the changed values into the CMYK output values. Any change affects the whole gradation of the selected color starting with the solids and continuing proportionally from 100% to 0% into the highlights of this color.

If your visual test images or charts show color shifts in a certain full tone, for example in Cyan (and only Cyan, the other gradations print okay), you can use the **Color Value Correction** (**Tools** menu > **Color Value Correction**) to modify color values with regard to all 16 primary and secondary colors (also with black overprint) of the 4D color space.

In the following example, we used a blank profile to clearly show you the impact of the correction and changed the Cyan gradation by adding 10% Magenta in the highlights (Key 0%).

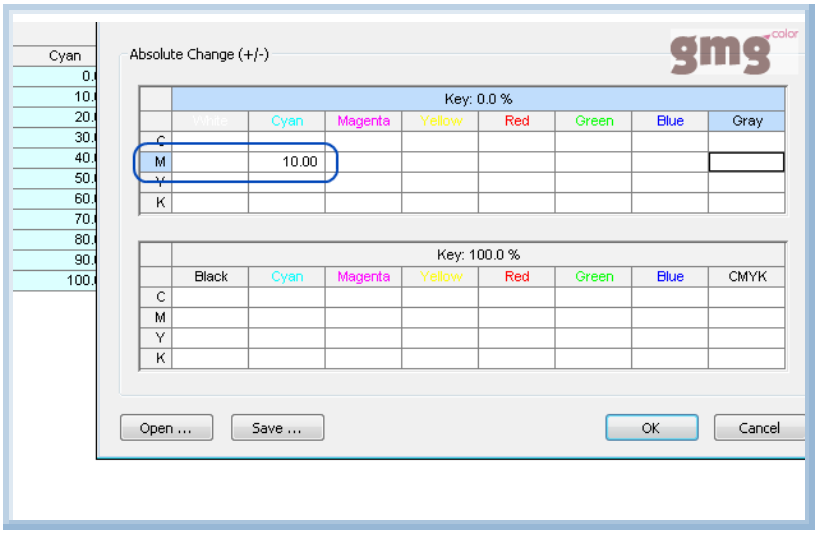


Fig. 13 Adding 10 % Magenta at 100% Cyan using the Color Value Correction.

The next screen shot shows the changed CMYK values and the way the color reproduction of a 100% Cyan in the proof is changed. Please note that not only 100% Cyan is modified, but also all other neighboring color tones, though proportionally decreasing.

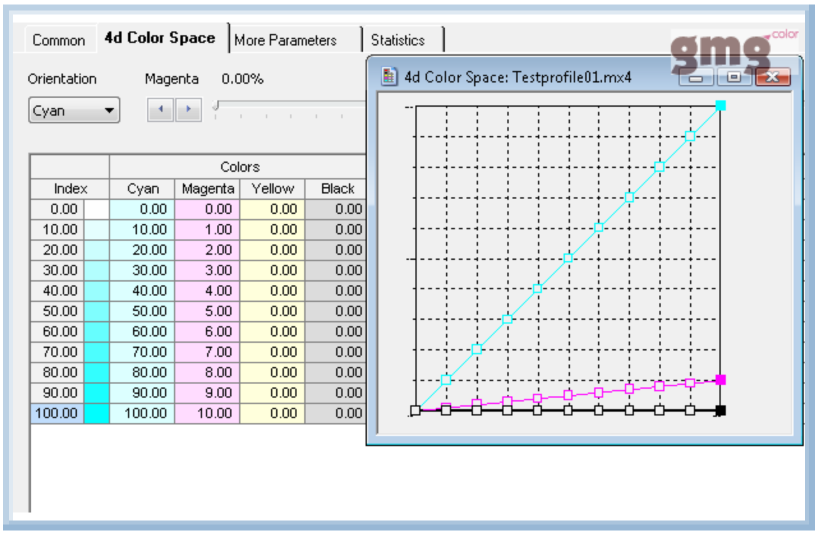


Fig. 14 CMYK values showing the extra 10% Magenta.

When selecting the Magenta **Orientation** at 100% Cyan, you can see changes in the Magenta color values, steadily increasing towards 100%.

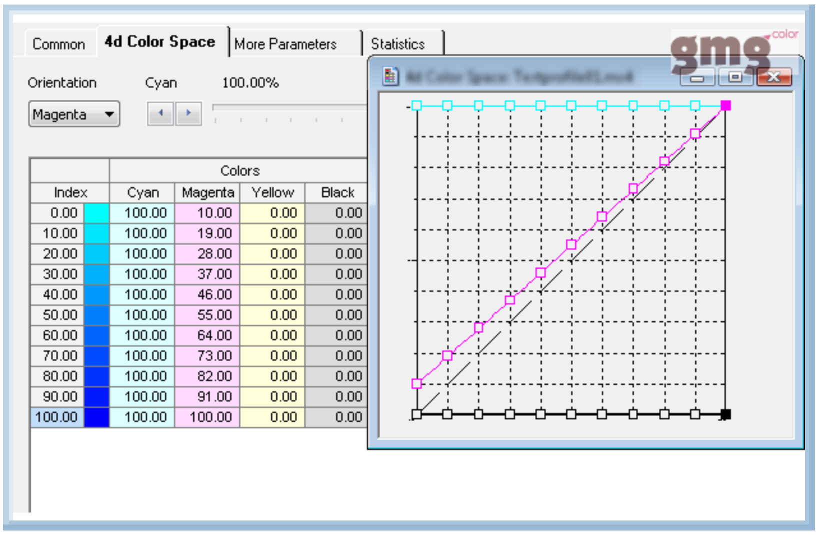


Fig. 15 CMYK values with the Magenta Orientation at 100% Cyan.

The same effect shows when selecting the Yellow **Orientation**.

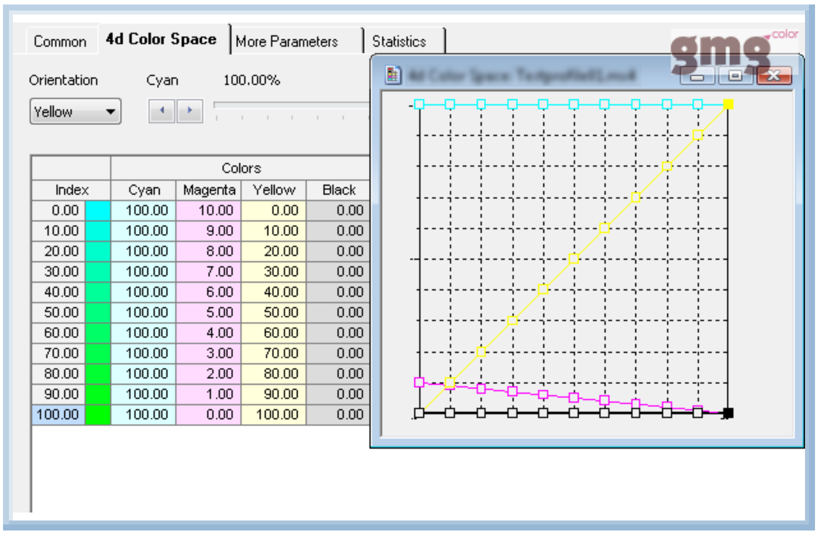


Fig. 16 CMYK Values with the Yellow Orientation at 100% Cyan.

Tip Changes to the **paper tint** should be made in the **White** column at Key 0.0%.
(see "Removing the Paper Tint" on page 25)
Changes to the **3-color gray** should be made in the **Gray** column at Key 0.0%.
Changes to **Black** should be made in the **Black** column at Key 100.0%.

2.7.4 Changing Color Values Selectively

Note The **Selective Color Correction** should be used with great care as, depending on the defined range, too many or too few color values can be affected, which in the latter case may lead to breaks in the proofs. Therefore, in case of doubts, it is recommended to define a wider color range rather than a too restricted range.

The **Selective Color Correction** (**Tools** menu > **Selective Color Correction**) allows you to perform changes **from any point** in the color space of the profile. Selective color corrections can, for example, be used to correct the skin tones. To determine the **Index** value, you can open the file in the GMG ColorProof pre-view or in an image editing software and use the color picker tool.

By entering the determined color value into the **Index** column, you define the starting point of the correction. In the **Colors** column, you can see the current CMYK output values.
In the **Correction** column, you can enter the desired CMYK change. The entered values are absolute correction values, that is, when you enter +1.5% Magenta, the Magenta color value is increased by 1.5%. In the following screen shot, you can see an index value of 55.0.0.0 and an increase of the Magenta value by 1.5%.

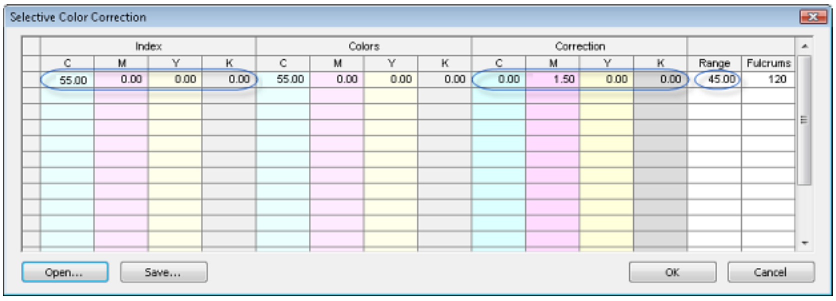


Fig. 17 Selective color correction at Index 55.0.0.0, adding 1.5% Magenta.

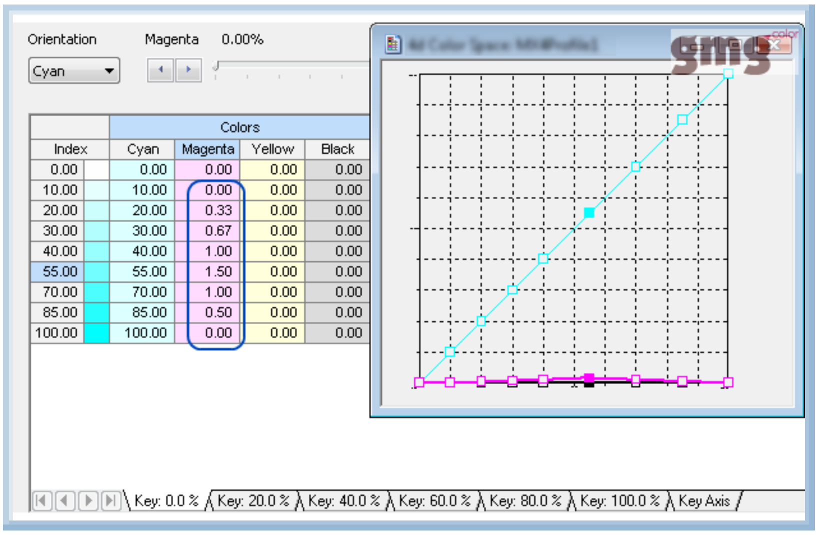


Fig. 18 Impact of the selective color correction on the CMYK output values.

Range: The range of the changes can be defined in the **Range** column in percent. The range value equally affects all directions within the color space. The higher the range value, the more colors are changed. We recommend a range value between 30-80%.

Fulcrums: The number of **Fulcrums** depends on the defined color range and is an indicator for the impact of your correction. The impact naturally depends on the distribution of the fulcrums in the profile. Typically, the number of CMYK fulcrums decrease with increasing Black levels (as you can see in the ECI2002 test chart). When using the same range as in the above example, but at Index 0.0.0.55, the number of fulcrums is considerably reduced.

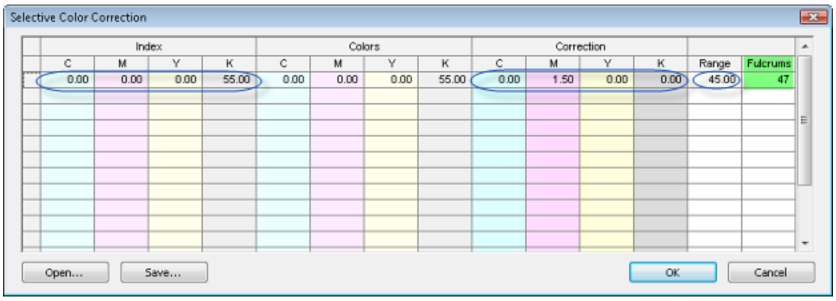


Fig. 19 Selective color correction at Index 0.0.0.55, adding 1.5% Magenta.

Tip We recommend to check the **paper tint** (Index 0/0/0/0) and the **Gray axis** after the correction and reduce the color range in case of undesired changes.

2.7.5 Removing the Paper Tint

If the profile white point is rather close to the proof media white point, you can subtract the paper tint without distorting the overall impression of the proof. The bigger the difference between these white points, the more changes are calculated into the proof output, possibly resulting in a failed proof verification, because the measured values of the control strips are not within the defined tolerances.

→ To remove the paper tint from your proof, deactivate the **Use Paper Tint Simulation** function in GMG ColorProof (**Printer Settings** > **Use Paper Tint Simulation**) when printing the proof.

Alternatively, you can **manually** remove the paper tint directly from the profile, using the **Color Value Correction** function in GMG ProfileEditor (**Tools** menu > **Color Value Correction**) and correcting the white point on a global level (changing all color values).

→ To correct the white point in the **profile**, transfer the CMYK values of the 0/0/0/0 Index into the **White** column (K 0%) and **invert** the values (by putting a minus sign in front).

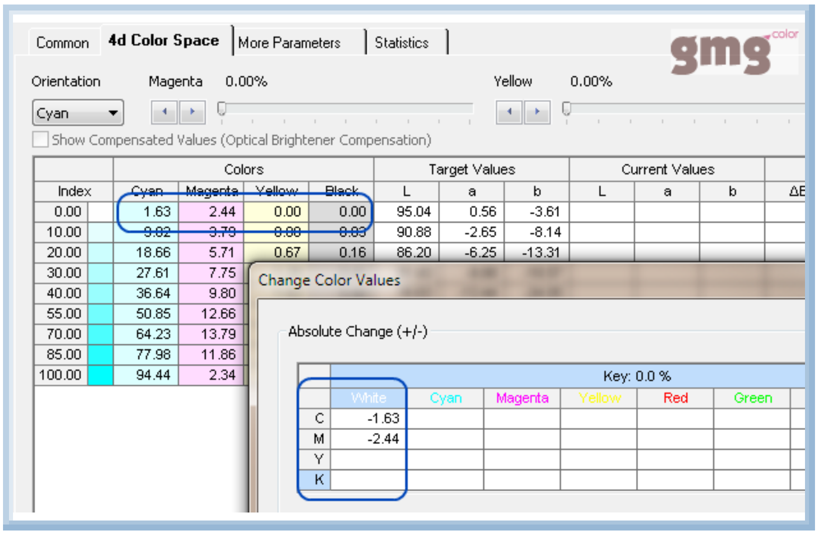


Fig. 20 Removing the paper tint by inverting the CMYK values at 0/0/0/0.

Note If you remove the paper tint from the proof profile, you also need to adjust the paper tint in the associated calibration file (see "Paper Tint Adjustments in the Calibration File" on page 25).

Paper Tint Adjustments in the Calibration File

If you remove the paper tint from a proof profile, this should be reflected in the calibration file by setting **all** color values at Index 0.00 / 0.00 / 0.00 to zero.

How to adjust the paper tint in the calibration file

1. Open the calibration file in GMG ProfileEditor.
2. Set the **CMY** values at Index 0.00 / 0.00 / 0.00 to zero to remove the paper tint.
3. Set the corresponding Lab **Target Values** at Index 0.00 / 0.00 / 0.00 to zero.
   Otherwise, the paper tint will be recalculated again with the next calibration.
4. **Save** the calibration file under a different name.

Note The removal of the paper tint and the corresponding adjustments in the calibration file should be regarded as a special case option which should be used with care. Because of the color value corrections, it will not be possible to print proofs with a GMG Logo.

3. 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.

3.1 Inkjet Mode

Since inkjet colors differ noticeably from press inks, the **Inkjet** mode calculates the profile by **reseparating** the black channel to achieve consistent colors and avoid metamerism effects.

Quite often, bright colors turn out rough-textured and grainy when using black on inkjet printers. The pure inkjet black generally does not achieve the density required to reproduce printing press results. For these reasons, the Inkjet mode provides additional settings for the definition of the black separation (**Common** tab > **Gamut/Separation** > **Settings**).

In the following screen shots, you can see the key channel and the gray axis for an ISO offset profile. The profile has been calculated with target values in Inkjet mode using the Roland VersaCAMM VS-420 gamut on Solvent Clear Film with a maximum black of 90% and a starting point of 0%.

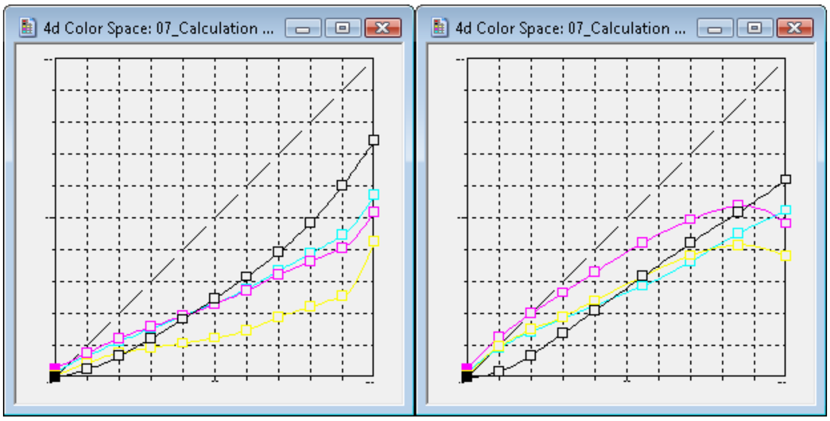


Fig. 21 Epson 4880: Black, Gray axis.

Since the Roland VersaCAMM VS-420 uses a light light black ink, a starting point of 0% for black is recommended; a maximum black of 90% results in a strong key axis (GCR) and homogeneous increasing CMYK values, enabling optimal proofs.

The following screen shots display the cyan, magenta, and yellow axes of the MX4 profile.

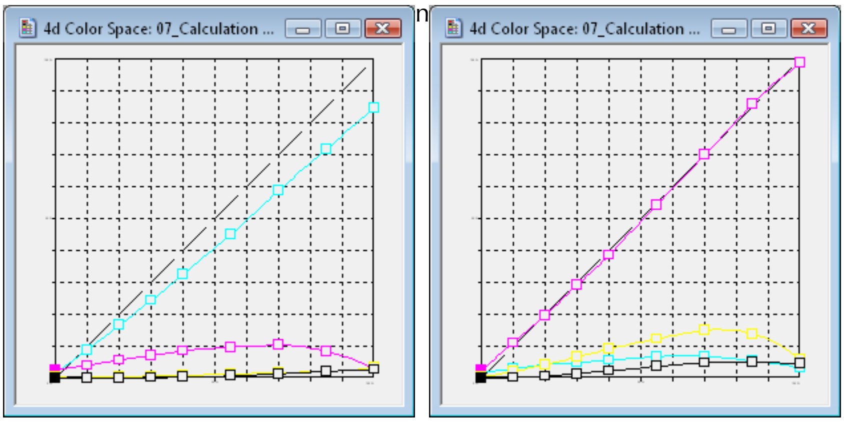


Fig. 22 Cyan, Magenta.

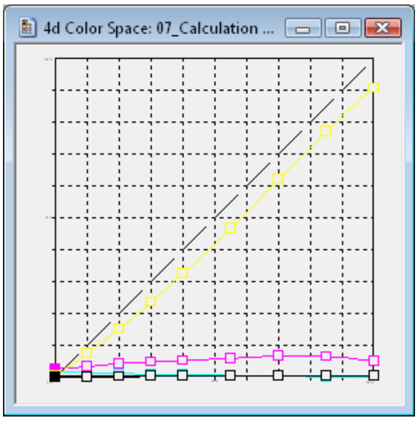


Fig. 23 Yellow.

The slight increase in magenta, yellow, and cyan in the primary colors is easy to see in order to reproduce the ISO offset target values with the proof system.

The color conversion affects all colors in the 4D color space. For a simplified view, the examples only show the primary colors and the gray axis.

In comparison, the same target values calculated for an HP Designjet Z2100 would need a maximum black of 100% and a starting point of 5% for black. The latter value enables a smooth depiction in bright colors, even though the printer does not use light black ink.

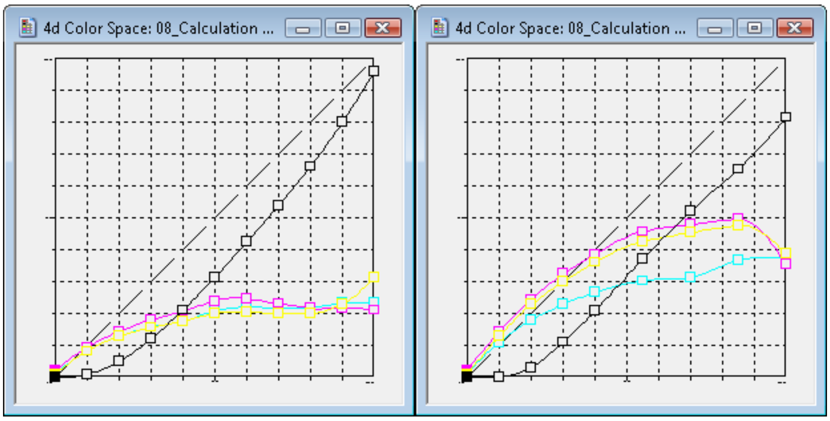


Fig. 24 HP Z2100: Black, Gray Axis.

Some print media, like most of the high-gloss materials, appear rather matte when using a lot of black in shadow areas. If shadow colors are mostly made up of CMY, this effect occurs considerably less often. In order to determine the decrease of the maximum black value, simply start profiling with the default parameter settings for Inkjet Mode, for example, with **Black** starting at 5% and **Maximum Black** at 95%. After measuring the target values, calculate the profile. Print an ECI2002 test chart using the new profile and check the behavior of the ink in dark shadow areas. If there are some measuring patches with a matte look, check their black color values. Reduce maximum black in the color profile from 95% to 90%, recalculate the profile, and reprint the test chart. You can repeat these steps, decreasing the maximum black value each time by another 5%-10% until the matte look disappears.

Note In general, you should try to keep the amount of black in your profile as high as possible, that is, use the lowest possible starting point and the highest maximum value for black to attain an optimal gray balance. If you use a 4c or 6c printer without light black ink, the black starting point should be moved slightly higher, usually around 20-30% to avoid "peppering" effects in highlight areas.

An important feature of inkjet printers is the maximum color application. Since all these printers can print enough ink to make it drip off the paper, the inkjet color application must be reduced in areas with a high CMYK color application while maintaining the visual result. The Inkjet Mode provides an automatic reduction of the respective colors.

In the following screen shots, you can see the color tone value curve from 0% to 400% CMYK (**Tools** > **Preview Axis**) and 0% to 300% CMY for the Epson 4880 and the HP Z2100.

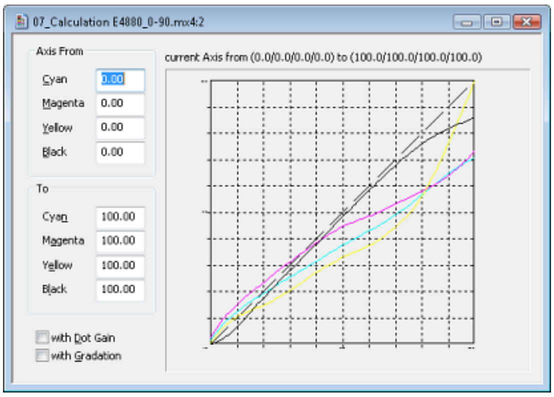


Fig. 25 Epson 4880: 0%-400%.

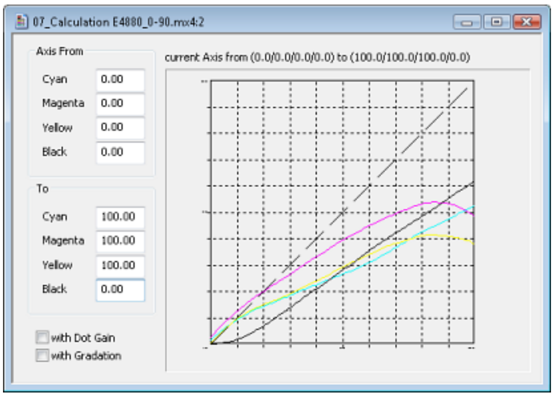


Fig. 26 Epson 4880: 0%-300%.

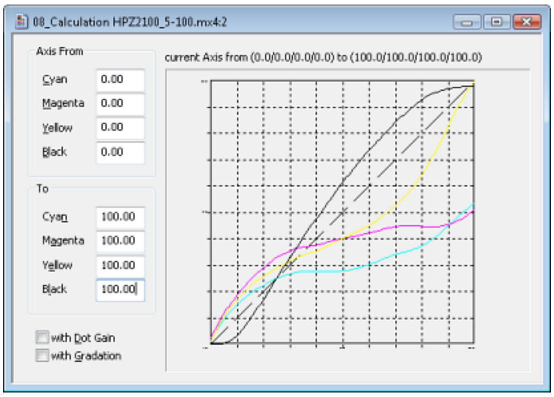


Fig. 27 HP Z2100: 0%-400%.

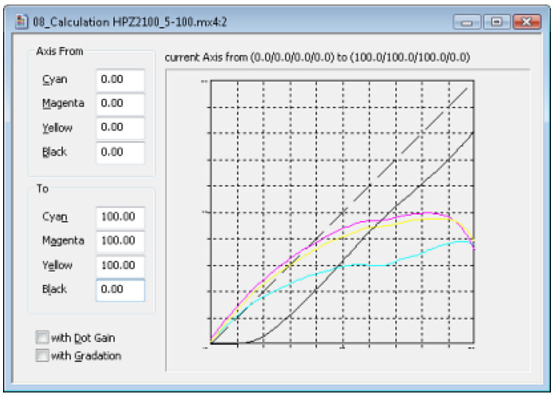


Fig. 28 HP Z2100: 0%-300%.

Both profiles are ISO offset profiles. The reduction of the color application in the ¾ tone and in the shadows is clearly visible. The UCR/GCR is automatically carried out by the software.

3.2 Multicolor Inkjet Mode

The **Multicolor Inkjet** separation mode is based on the **Inkjet** mode and should be used for printers of the HP Designjet Z3200 series (with GMG Driver) and the Epson Stylus Pro x900 series (with GMG Driver or Epson Driver).

In our example, we reduced the black expanse in the light area to obtain optimal results.

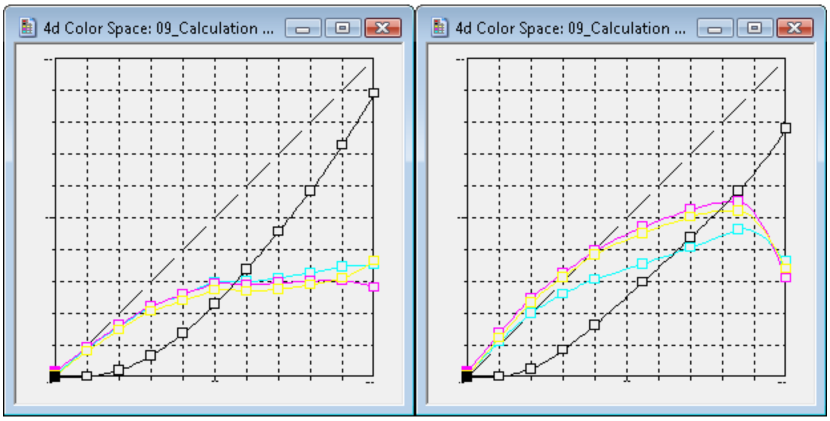


Fig. 29 HP Z3200: Black, Gray Axis.

3.3 No Key (CMY Only) Mode

If you want to create a profile for an HP Designjet Z3200 printer with HP print media, it is recommended to use the **HP Driver**. The same applies for Canon imagePROGRAF iPFx3x0, iPFx4x0 printers with the **Canon Driver**.

When using a manufacturer driver (HP or Canon), proof profiles have to be created in **No Key (CMY Only)** mode, because the manufacturer drivers are RGB drivers and accept only CMY input data. The **No Key (CMY Only)** mode results in a profile that separates CMYK to **CMY**.

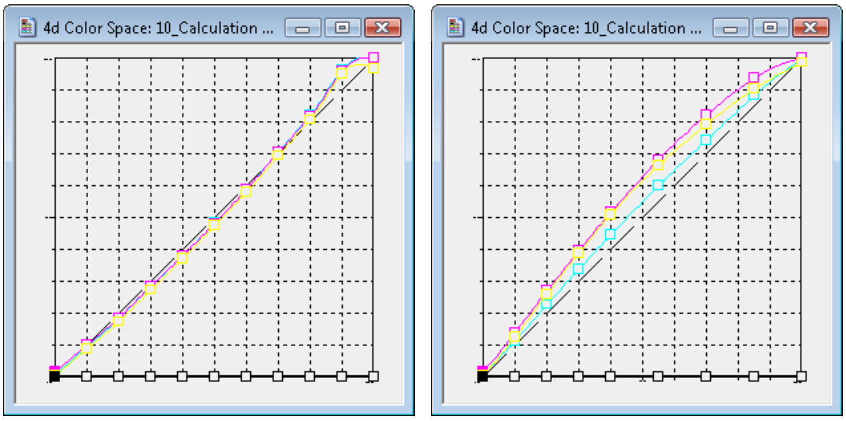


Fig. 30 HP Z3200: Black, Gray axis

The screen shots show that all colors are created only with CMY and without any K.

3.4 Preserve Separations Mode

Note The separation mode **IRIS** has been renamed to **Preserve Separations** to give greater clarity to the involved calculation process. The functionality as such has not been changed and is identical to the former IRIS separation mode.

The **Preserve Separations** mode calculates relatively linear in the primary colors and preserves the key axis across the entire color space. Color values without K will remain without K, avoiding artifacts such as Moiré patterns in DotProof XG profiles.

The following ECI2002 Visual CMYK test charts illustrate the difference between **Inkjet** and **Preserve Separations** mode.

In **Inkjet** mode, the black channel is **reseparated**.

Fig. 31 Black separation in Inkjet mode.

Black is composed with a certain amount of CMY and original CMY patches are composed with a certain amount of Black.

In **Preserve Separations** mode, the black channel is **not** reseparated.

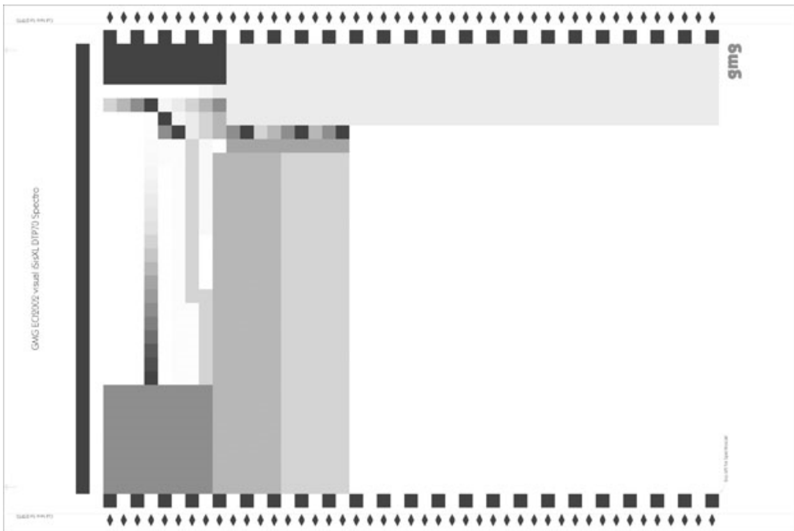


Fig. 32 Black separation in Preserve Separations mode.

Black is used **only** where defined in the **original** data.

See also:

- "Inkjet Mode" on page 26