GMG OpenColor
User Manual

Imprint

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This documentation refers to the GMG software version No. 2.4.

1. First Steps

1.1 Welcome to GMG OpenColor

Proofing for packaging printing is challenging, as standardization virtually does not exist due to the sheer variety of printing technologies, spot colors, and substrates, which define the market. The increasing complexity of packaging jobs, often requiring up to six different (or even more) inks, makes the necessary press fingerprinting and profiling very costly and time-consuming. Especially the overprinting behavior and color interplay between CMYK and spot colors poses a major problem in proofing.

Responding to the need for reliable proofs with more than the traditional four process colors CMYK, we designed the **n-channel** profiling software GMG OpenColor. GMG OpenColor is the first profiling software to accurately predict the overprinting behavior and color interplay while requiring only little measurement data. This has been made possible by combining **spectral** measurements with a patented **prediction engine** that applies mathematical models of printing processes to predict what will happen on the press. The centralized data management and the simple user interface make it easy for beginner and expert alike to create high-quality profiles—ready for immediate use.

In the course of GMG OpenColor development, we found that adding a **separation** functionality to the proofing capability is the next logical step for ensuring color consistency and accuracy throughout the production chain. While an OpenColor proof profile shows you how your actual print will look like, an OpenColor separation profile separates your design (e.g. standardized ISO Coated v2 images) to fit your printing condition. This way, your printing process becomes much faster and more reliable, as proof and print are safe-guarded by the same central color management.

Benefits

- **All-in-one profiling solution**: Test chart generation, measuring, profiling, central storage, and profile distribution.
- **Multi-purpose profiling**: Contone and halftone proof profiles as well as separation profiles.
- **Patented prediction engine**: Fast and inexpensive profiling via mathematical models instead of extensive fingerprints.
- **Predictable spot color overprints**: Precise simulation of the overprinting behavior and color interaction of CMYK and spot colors.
- **Easy fingerprinting**: Profiles can be created with less data than traditional methods. Measurements of different test charts can be combined, even when printed on slightly different substrates.
- **Color consistency throughout the production chain**: Proof and print with the same color management capabilities.
- **Support of diverse printing processes**: Accurate proofs for non-standardized printing processes.
- **Central data storage**: All color data can be accessed by multiple GMG ColorProof instances, including data from third-party databases.
- **Proof automation**: Channel specific profile creation "on-the-fly" significantly reducing the profiling effort (only contone profiling). Full automation possibilities based on the hotfolder technology of GMG ColorProof.

1.2 Supported Printing Conditions

Supported printing technologies

- Gravure, Offset, Flexo, as well as toner-based and ink jet digital printing technologies are fully supported.

Supported production stock

- All kind of “white” substrates, for example, coated paper, uncoated paper, yellowish paper, cardboard, white top linerboard, white foil, and transparent foil with white undercoat or backing.
- Metallic foil for prototype proofing on an Epson SC-S80600 printer.
- **Not** supported: Aluminum, metallic foil and transparent foil without white undercoat or backing.

Possible applications

- CMYK + spot colors, especially with overprinting spot colors: The design is based on CMYK, but the brand color is a spot color. The spot color is also used to overprint with CMYK, but the image is mainly separated in CMYK.
- Brand identification: CMYK inks are replaced by brand colors, e.g. Magenta is replaced by Red.
- Extended color spaces, for example, PANTONE Hexachrome or Esko Equinox

1.3 How Does It Work?

GMG's patented technology used in GMG OpenColor enables the most accurate proof simulation especially for (but not limited to) processes involving overprinting spot colors and multicolor printing as often used in packaging.

GMG OpenColor uses a **characterization** of the printing process, media, and inks to calculate an n-dimensional proof profile, where n is the number of inks. That means, for a 6-c printing process, a 6-dimensional profile will be calculated.

The characterization is based on **spectral measurement data**. Color patches (paper tint and full tones, tints and overprints if available) printed according to the specified printing conditions are measured with a spectral photometer. You can either measure data directly in GMG OpenColor or import data from 3rd party applications.

GMG OpenColor is able to use as many or as few data as you can provide. The GMG OpenColor Prediction Engine will predict "missing" data and thus you will still be able to get the highest possible profile quality from the available information. The higher the number of patches you are using for the characterization and the more specific the patch colors fit to the design, the higher will be the accuracy of the proof. But even from as few information as only a couple of measured colors from the printing sheet, without printing specific test charts, GMG OpenColor enables you to create a proof profile with astonishing quality. You can also combine your own measurements with spectral data from preinstalled spot color libraries or supported cloud solutions.

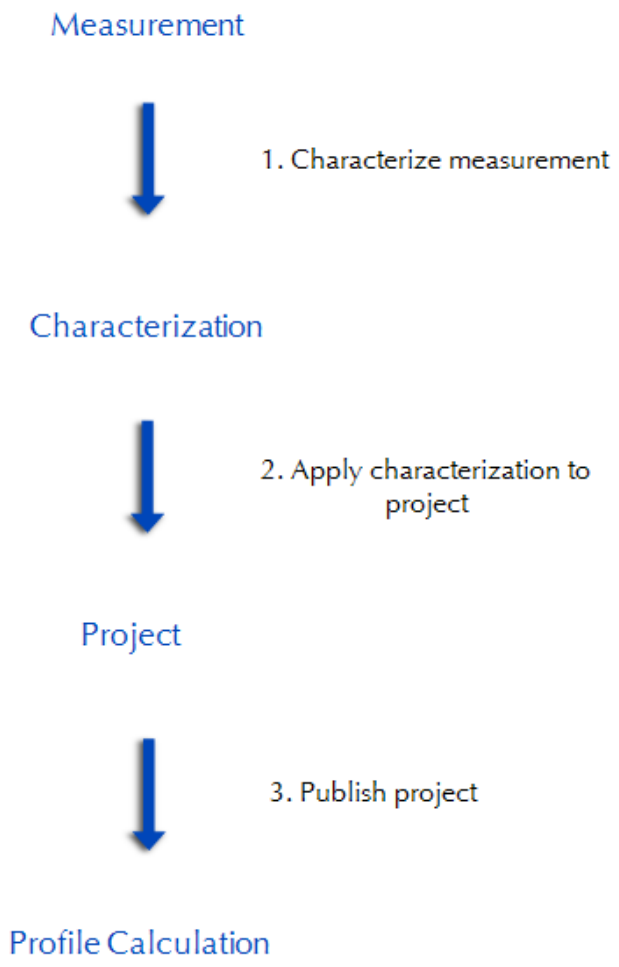
Profile calculation is completely automated and generally without the need for manual tweaking. You only need to measure a few patches, feed in some additional information on the printing process and media type, and the rest is done by GMG OpenColor. However, you will still be able to make manual adjustments if you feel the need to do so.

You can either export the finalized proof profile for use in GMG ColorProof or you can automate even this step: GMG ColorProof can automatically request a profile from GMG OpenColor based on the color channels used in the job. GMG OpenColor will then calculate the requested profile and send it to GMG ColorProof. GMG ColorProof will automatically print the proof using the calculated profile, without any manual user interaction.

Furthermore, you can use the same information you are already using for the creation of the proof profile also for creating design **separations** in GMG ColorServer or Adobe Photoshop using GMG ColorPlugin.

1.4 What Do I Need to Do?

Creating an GMG OpenColor profile is done in three major steps:



1. **Characterize the Printing Process and Media**: GMG OpenColor uses spectral measurement data representing a specific printing process and media type to create profiles.
2. **Apply the characterization to a project**: Characterizations are stored in the database and are the basis from which your profiles are created. This basis needs to be put into a "container" which also contains the target printing condition. We call such a container a "project".
3. **Publish the project**: Published profiles can be used in other applications such as GMG ColorProof, GMG ColorServer, or PACKZ.

1.5 Program Overview

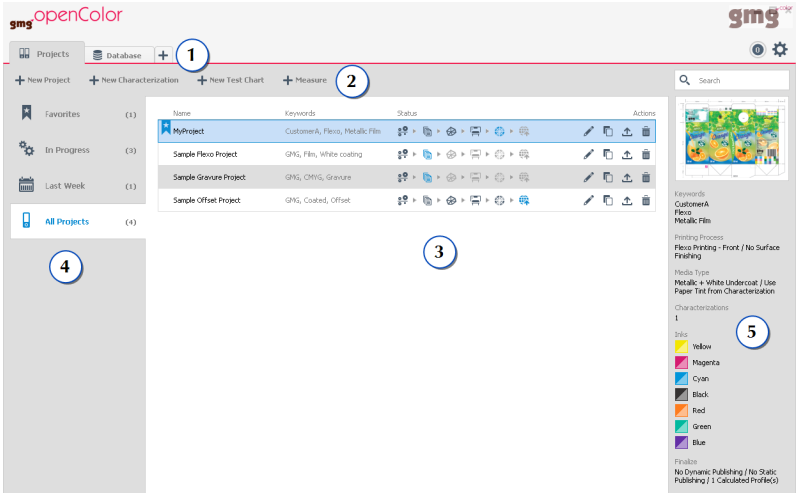


Fig. 1 Main GMG OpenColor window. 1 Navigation panel with variable number of tabs. 2 Action bar. 3 Content section. 4 Sidebar. 5 Property pane.

- At startup, GMG OpenColor shows a horizontal navigation panel (1) with two tabs called **Projects** and **Database**. These tabs are **static tabs** and cannot be closed or deleted, their position is fixed at all time. The screenshot shows the **Projects** tab content. You can view the content of each tab by clicking on the desired tab.
- The toolbar (2) provides quick access to often-needed actions such as creating a new project, characterization, or test chart. When you click a toolbar button, the application opens a new **tabbed page** in the main window.
- The content section (3) displays a project list that gives you a quick overview on the status and progress of each project. Use the respective project actions to edit, duplicate, or delete a project.
- The main navigation bar on the left (4) helps you **filter** your projects per status, modification date, and preference.
- The property pane (5) provides more information on the item that is currently selected in the list. At the upper right of the pane is a **search** box, which allows you to search for content (full text search).

Tab page overview

Tabbed page	*Description*	*See also*
Projects	Shows all projects in progress, finished projects and bookmarked projects.	"Projects" on page 46
Database	Shows all test charts, characterizations, and gradations.	"Database" on page 4
New Project	Set up a project as a folder or container for all data you need to proof a specific print job.	"Projects" on page 46
New Characterization	Each measurement you want to use for profiling, first needs to be categorized in terms of printing process, media type and print order.	"Creating a Characterization" on page 33
New Test Chart	Create custom test charts optimized for individual printing processes with up to 7 overprints.	"Creating Your Own Test Charts" on page 18
New Measurement Session	Measure test charts and strips directly within GMG OpenColor.	"Supported Measuring Devices and Formats" on page 15 "Measuring Test Charts" on page 26
New Gradation	Create gradation curves to correct the tonality of an ink.	"About Gradation Curves" on page 44

1.6 I'm an Experienced GMG ColorProof User–What's the New Proofing Strategy?

Basically, the working procedure in GMG ColorProof is the same, whether you are using standard CMYK or OpenColor proof profiles: You create a manual job or workflow and select a proof standard or profile.

The following table lists all **differences** between working with standard CMYK and OpenColor profiles.

Feature	*GMG ColorProof*	*GMG OpenColor*
Color management	CMYK profile + **spot color set**	Multichannel profile
	CMYK process colors are mapped to CMYK profile channels. Spot color channels are mapped to matching spot colors defined in spot color sets.	All image channels (CMYK, spots) are mapped to OpenColor profile channels.
Number of profile channels	**4**	Up to **15**
Characterization data	**Lab** target values	**Spectral** characterization data
Printing processes	**Standardized** printing processes such as ISO Coated v2	**Non**-standardized printing processes
Process specific profiling	Printing process related information is not taken into account. The same spot color set can be used together with any proof standard.	Various process specific parameters are taken into account such as process and media characteristics and surface finishing effects.
Overprint simulation	Simple overprint algorithm (**Choose** / **Define Spot Color** > **Multiply Channels**)	Complex and precise overprint prediction based on spectral overprint information and process relevant prediction models
Supported proof printers and media types	Wide range supported	Printers with extended color space in combination with GMG ProofMedia
Reuse of characterization data	1-to-1 ratio: Each profile requires its own set of measurement data.	1-to-many ratio: Measurement data can be flexibly combined to create multiple profiles.
Printing ink sequence	You cannot change the print order of CMYK inks.	You can flexibly create a profile for **any** combination of printing inks, including changing the **print order**.
GMG FlexoProof	**Paper texture simulation** supported	Paper texture simulation **not** supported
Profiling	You can create and edit CMYK profiles in GMG ProfileEditor. Custom spot colors can be created and edited in GMG SpotColor Editor, or optimized with the Spot Color Optimization wizard in GMG ColorProof.	You can create and edit **multichannel** profiles in GMG OpenColor using various editing tools. Contone profiles can be created almost automatically, on-the-fly. Halftone (DotProof) proof profiles can be created manually only.

What are the differences in DotProof profiling?

Feature	*GMG ColorProof / GMG ProfileEditor*	*GMG OpenColor*
RIP parameters	**DotProof** CMYK profiles take the RIP compensation curve into account.	Multichannel **DotProof** profiles created in GMG OpenColor take the RIP resolution, screen ruling and angles, and the RIP compensation curve into account.
Ink usage	-	The profiling is very precise due to a defined ink usage.
Iteration test chart	To optimize the profile, a standard test chart is used	Test charts for optimizing the profile are generated individually for each profile.
Spot color dot gain	To simulate the dot gain of spot colors, you need to define gradation corrections in GMG SpotColor Editor.	The dot gain of spot colors is part of the measurement and does not need to be created separately via gradation corrections.

1.7 System Requirements

Our recommendations and minimum system requirements are meant to provide general guidelines for running GMG OpenColor. We recommend systems that meet or exceed the following requirements.

Please note that the ideal computer configuration depends on the number of connected GMG ColorProof instances and on the level of profile calculation requests.

Operating system:

GMG OpenColor supports all versions of Windows Pro / Enterprise / Server officially supported and distributed by Microsoft. Windows Home is not supported.

Processor: Intel® Core ™ i7

Memory: 8 GB RAM, 512 GB SSD hard disk drive

Hardware components:

- Required for the GMG GamutViewer feature: Video card with enabled Direct 3D acceleration and OpenGL 3.2 or higher, updated driver (**not** Windows default driver)
- Minimum resolution 1280 x 1024 pixels
- USB port: 1 for dongle, 1 per measuring device

Measuring devices: GMG OpenColor does not support any measuring device taken out of production by the device manufacturer.

Software components:

- GMG ColorProof version 5.6 or higher for using ContoneProof profiles (MXN)
- GMG DotProof/GMG FlexoProof 5.8 or higher for using DotProof profiles (MXD)

1.8 Program Installation

1.8.1 First Time Installation of GMG OpenColor

The following information refers to the installation of GMG OpenColor for the first time on a new computer.

You can download the setup and all resources as a ZIP archive and then transfer the ZIP archive to the computer on which you want to install the application. The ZIP archive can be found in the download area of the GMG support website:

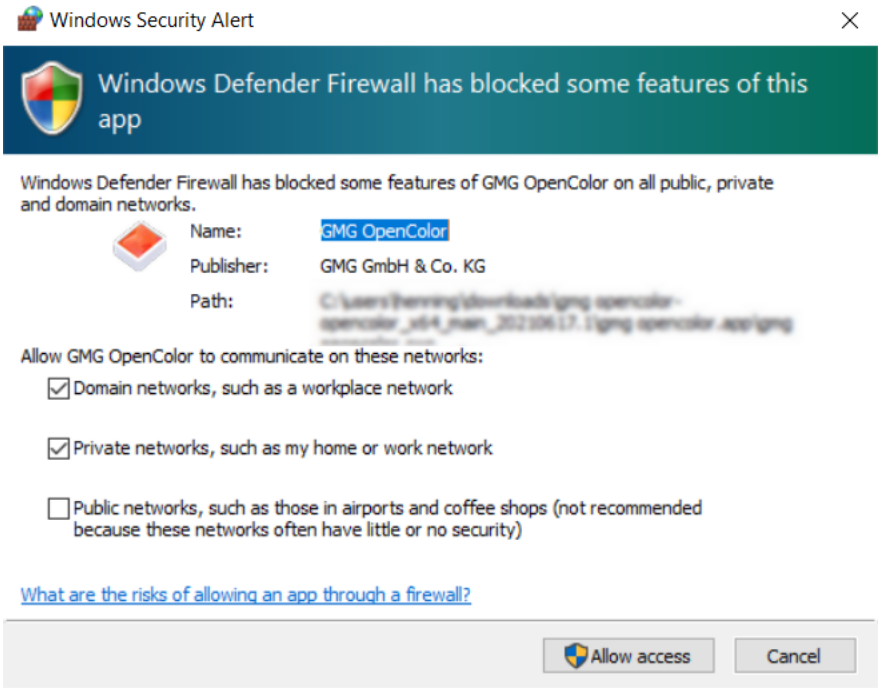
https://gmgcolor.com/support/download/product/opencolor/

Install the application from DVD or ZIP archive

1. Connect the license dongle to your computer.
2. If you downloaded the ZIP archive from the GMG website, copy it to a local directory and extract the compressed setup file.
3. Double-click the **GMGOpenColor_vx.x.x.xxx_x64_Setup.exe** file to start the installation.
4. Deselect the additional program feature **Techkon Device Service** if you do not plan to use a Techkon measuring device. This feature is required only if you want to measure with TECHKON SpectroDens in GMG OpenColor.
5. When the installation is complete, click the **Finish** button to close the wizard.

Configure the Windows Firewall

Depending on your configuration, Windows Firewall might ask you at the first program start of GMG OpenColor whether to **unblock** the program or not. In this case, click **Allow access**. GMG OpenColor needs the access for the communication with other applications such as GMG ColorServer.



Install GMG ColorProof

Printing a hardcopy proof is not required for using GMG OpenColor. However, using a hardcopy proof as a reference for your printing process is highly recommended.

You can install GMG ColorProof on the same or on a separate computer. In both cases, you will need to connect GMG OpenColor with GMG ColorProof.

Please follow the link for more information on the installation:

https://gmgcolor.com/support/help/colorproof/cp-system/installation.htm

Please follow the link for more information on the connection:

https://gmgcolor.com/support/help/opencolor/GMG_Text/OpenColor/FirstUse/OC_ConnectCP.htm

1.8.2 Ports and URLs

GMG OpenColor is designed to connect easily without any special firewall configurations being necessary. However, in some situations, for example in a corporate environment with strict security policies, a firewall might be set up to block all unknown connections. In this case, you will need to configure the firewall to allow the connection.

Which ports are used by GMG OpenColor?

Feature	*Port*	*Type*	*Required for*	*Can be changed here*
Dynamic profiling, connectivity to other applications, GMG OpenColor RemoteClient	8080	TCP inbound	HTTP connection	Preferences > Service Settings > Web Service Port
Application Service	443	TCP outbond	License updates via the GMG Cloud	Enable the port or, alternatively, put the following endpoint URL on your firewall's whitelist: *.gmgcolor.com

Open the port

1. On the computer where the GMG OpenColor application is installed, open the **Firewall & network protection settings** of the Windows operating system.
2. Navigate to **Advanced settings**.
   The **Windows Defender Firewall with Advanced Security** window is opened.
3. In the tree view on the left side, click **Inbound Rules**.
4. On the **Actions** pane on the right, click **New Rule**.
   The **Rule Type** window is opened.
5. Select **Port** and click the **Next** button.
6. Select **Specific local ports** and enter **8080** for the port.
7. Click the **Next** button and keep the default settings until the **Name** step.
8. Enter a **Name**, for example, "OpenColor Web Interface" and click **Finish**.

The new rule will appear in the **Inbound Rules** list.

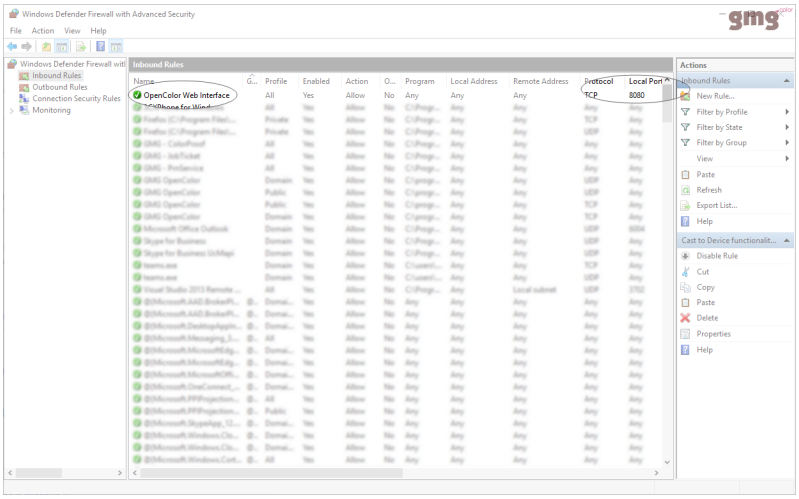


Fig. 2 Screenshot of the **Inbound Rules** list.The top item is the new "OpenColor Web Interface" rule.

Configure the Windows Firewall

Depending on your configuration, Windows Firewall might ask you at the program start of GMG OpenColor whether to **unblock** the program or not. If you are not prompted, you might need to manually unblock GMG OpenColor by adding an exception to the firewall, as described in the following.

1. Open the **Control Panel**.
2. Click **Windows Defender Firewall**.
   The **Windows Defender Firewall** dialog box is displayed.
3. On the left pane, click **Allow an app or feature through Windows Defender Firewall**.
   A list of allowed programs is displayed.
4. Add a check mark to GMG OpenColor.
5. Click **OK** to confirm your changes.

1.8.3 Connecting GMG OpenColor with GMG ColorProof

Note GMG OpenColor is designed to be used in a local network. Proxy servers are not supported. (It is, however, possible to use GMG OpenColor via a VPN connection.)

For requesting and sending profiles, GMG OpenColor and GMG ColorProof can communicate via an http **web service**. Per default, the web service in GMG OpenColor is already activated and only needs to be configured if you want to change the default web service port. The connection will be automatically established as soon as both programs are up and running.

How to connect GMG OpenColor with GMG ColorProof

1. Make sure GMG OpenColor is running and the option **Share Application via Web Service** (**Options** > **Preferences**) is has a check mark. If GMG OpenColor is installed on a separate computer, make sure the network connection is fine.
2. Optional: Change the **Web Service Port** (default = 8080), if required.
3. Start GMG ColorProof.
4. On the **System** tabbed page in GMG ColorProof, under **Centralized Color Management Settings**, enter the **OpenColor Server Address**. Enter "localhost" if GMG OpenColor is installed on the same computer as GMG ColorProof.
5. Optional: On the **Database** menu in GMG ColorProof, point to **Download** and click **From GMG OpenColor** to immediately update GMG ColorProof. (GMG ColorProof is also updated automatically in a regular interval. If you do not update GMG ColorProof manually, it could take a moment until the connection is established and you can use OpenColor proof standards.)
6. Submit a proof job using an OpenColor proof standard (see "OpenColor Proof Standards" on page 79).
   GMG ColorProof will automatically request a profile from GMG OpenColor. The job is processed as soon as GMG OpenColor delivers the requested profile.

Tip If the connection cannot be established, enter the IP address **127.0.0.1** into the address bar of Windows Internet Explorer. If the connection is in principle available, the main IIS web site will be displayed. If the IIS web site is **not** displayed, please check to ensure IIS is activated and the firewall correctly configured.

1.9 Lizenzen

1.9.1 Available GMG OpenColor Licenses

GMG OpenColor Profiler Base

The base license allows the use of GMG OpenColor, including the support of widely-used measuring devices, industry-standard characterizations, and spot color libraries from Pantone and HKS.

GMG OpenColor is available with four different preset options with printing process related preset data for simulating **flexo**, **offset**, **gravure**, and digital environments.

To fully operate, the base license requires the following additional licensed options:

- At least one profiling preset (**Flexo** / **Offset** / **Gravure** / **Digital**)
- **Separation** and/or **Proofing** option
- **Profiling Prototype Proofing** option

Proof profiles

- **Proofing** option: Required for the creation and export of static proof profiles, and for dynamic proof profile generation for use in GMG ColorProof. Without the additional **DotProof** license, only ContoneProof profiles are supported.
- **DotProof** option: Required for the creation and export of DotProof profiles for use in GMG ColorProof. This license also requires the **Proofing** option.
- Using the created proof profiles in GMG ColorProof also requires a **GMG OpenColor Output** license on the machine GMG ColorProof is running.

Separation profiles

- **Separation** option: Required for the creation and export of separation profiles and spot color separations.
- **GMG OpenColor ColorBook** option: Required for the generation of a ColorBook PDF from **Separation Rules** in GMG OpenColor or in GMG ColorServer.

Advanced features

- **OpenColor Export Target Values** option: Required for the export of Lab target values from GMG OpenColor RemoteClient. This license is available as an additional option with pricing on request. Please follow the link for more information: "Export Lab Target Values" on page 8

Licenses for connectivity to third-party applications

- **MeasureColor**: 1 seat per connected Colorware MeasureColor instance

1.10 Starting the Software

How to start GMG OpenColor

1. Connect the license dongle to a USB port.
2. Double-click the GMG OpenColor program icon on the Windows desktop or click GMG OpenColor on the Windows **Start** menu.
   The program verifies the license information on the dongle and then starts the application. GMG OpenColor is initialized, loading the application data. The main application window is opened and the program is ready to use.

Note For the dynamic profile creation, both GMG OpenColor and GMG ColorProof need to be running at the same time. Using exported multicolor profiles in GMG ColorProof, on the other hand, does **not** require a live-connection to GMG OpenColor.

1.11 Program Preferences

After starting the software for the first time, it is recommended to configure defaults and basic settings (**Options** > **Preferences**).

Group	*Short description*	*See also*
General Settings	You can change the **language** of the program here. The user interface will be updated after program restart. For speeding up calculations and processing multiple profiles simultaneously, you can define the **number of CPU cores** you want to be used by GMG OpenColor. The **Automatic** setting uses the maximum number of cores minus one (leaving one core for other tasks).	
Service Settings	For requesting and sending profiles, GMG OpenColor and GMG ColorProof can communicate via an http **web service**. You can change the **Web Service Port** if required. To make our products even better, we collect anonymous usage information from the application. We do not collect any personal information or data from processed documents. If you do not wish to share this information with us, you can easily opt in and out at any time with the **Allow Anonymous Usage Data** option.	"Connecting GMG OpenColor with GMG ColorProof" on page 9
Profile Settings	Default settings for the **profile creation**.	"Profile Settings" on page 12
Proofing Settings	Default settings for the **proof profile creation**.	"Proofing Settings" on page 12

Group	*Short description*	*See also*
Default Settings	Default settings that will be used when you add new data to the database, for example, when you add new spot colors. Select **Custom Defaults** to customize the default settings.	"Proofing Settings" on page 12
Log Settings	Error, warning, and information messages related to the system can be stored in a log. It is recommended to use the default log settings (= storing only **Errors**).	

1.11.1 Profile Settings

You can define default settings for the **profile creation**. Define the settings carefully, especially when using the dynamic profile creation, as the settings cannot be changed in GMG ColorProof.

Option	*Description*
Maximal Profile Size	By limiting the profile size, the number of patches used for profile calculation will be reduced if necessary to meet the limit. The file size generally depends on the number of channels and on the number of patches.
	GMG ColorProof caches profiles locally so that brief network errors have no impact on job processing or printing. Transferring large profiles > 30 MB from GMG OpenColor to GMG ColorProof however, can result in high network traffic.
Allow Automatic Profile Creation	With the option **Allow Dynamic Profile Creation**, you can activate or deactivate the dynamic profile creation via GMG ColorProof.
Convert All X-Rite Measurements to XRGA	Makes sure that all measurements from X-Rite measuring devices conform to the new XRGA standard.

1.11.2 Proofing Settings

You can define default settings for the **proof profile creation**. Define the settings carefully, especially when using the dynamic profile creation, as the settings cannot be changed in GMG ColorProof.

Option	*Description*
Proofing Condition	Describes the color space of the used proof printer, media type, and print mode, like the calibration set in GMG ColorProof.
Profile Connection Space	Default for the **Profile Connection Space** that can be set in the project (in the **Proofing Condition** group). If you are using **delta E 76** for proof verification, it is recommended to use **Lab** as profile connection space. If you are using **delta E 2000**, it is recommended to use **DIN99**.
Dim to Fit Proof Media	This option is useful if the **white point** of the **production** media is brighter than the **proofing** media, resulting in an **out-of-gamut** white point.
	If the option is selected, the brightness (not the color) of the white point of the target color space (describing the print production) will be lowered to the brightness of the proofing media. Select this option if the **visual appearance** is more important for you than a proof verification via measured color patches. The option reduces clipping in the highlights and results in a general darker color of the proof.
	If the option is **not** selected, the proof profile will be calculated with the **original** white point of the target color space. Select this option if a proof verification via **measured color patches** is more important for you than the visual appearance. All target values that are in gamut will be reached. The out-of-gamut part in the highlights will be clipped and thus could result in a loss of detail.
M0/M1/M2 Validation	Activates the validation, whether the same **Measurement Condition** is used throughout the project. If this option is selected, the application will automatically suggest the appropriate proofing condition for the used measurement condition.

1.11.3 Default Settings

You can set the default settings here: **Preferences** > **Default Settings**. Select the option **Enable Custom Spot Color Defaults** to customize the default settings.

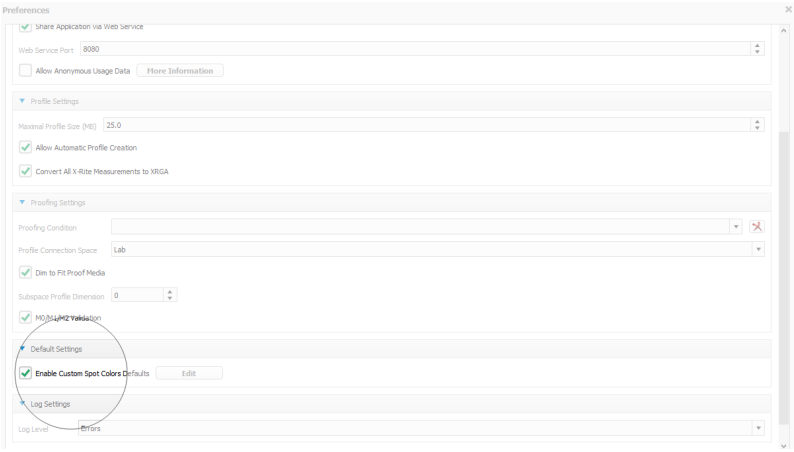


Fig. 3 **Enable Custom Spot Color Defaults** selected.

You can deselect the option any time. Your customized settings are saved and you can switch back to **Enable Custom Spot Color Defaults** later.

Custom default settings for new spot colors

You can predefine the **Target Mode** and **Target Gradation** that will be assigned to **new** spot colors. Custom defaults will save you valuable time, as you customize the defaults once and that's it. You can feel sure that new spot colors will have the settings you want them to have.

- The **Target Mode** will be assigned to **all** new spot colors.
- The **Target Gradation** will be assigned to new spot colors that have **only** solid colors defined.

As spot color characteristics depend on the printing technology and media type, you can predefine the **Target Mode** and **Target Gradation** for each combination of printing technology and media category.

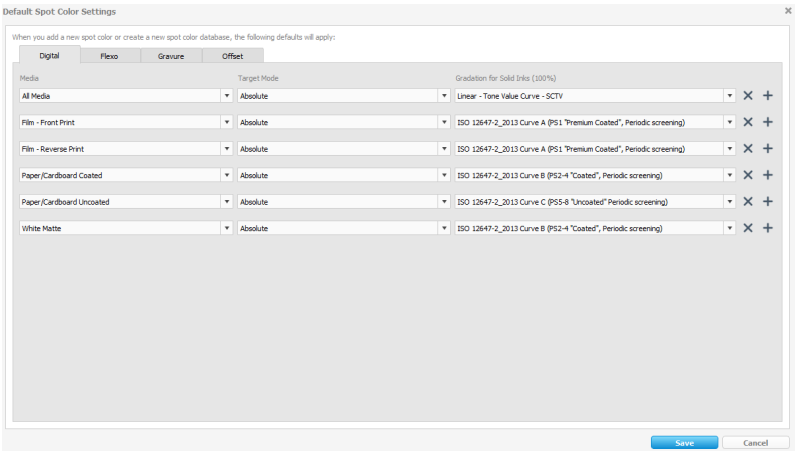


Fig. 4 Example: Default settings for new spot colors that will be added to a characterization of a **Digital Printing** process.

It is recommended to define a general fallback for all media types (**All Media**) that do not have specific default settings defined.

The **most specific** default settings will **overrule** less specific defaults. Example: For **Film—Front Print**, "Curve A" will be used as gradation curve. Even though **White Matte** belongs to the **Film—Front Print** group, there are more specific default settings (using "Curve B") defined for **White Matte**. So "Curve B" will be used for **White Matte**. However, **White Semimatte**, which also belongs to the **Film—Front Print** group, will use "Curve A". As there are no specific default settings for **White Semimatte**, the defaults for **Film—Front Print** will be used.

See also:

- "Target Mode" on page 55
- "About Gradation Curves" on page 44
- "Media Types" on page 37

2. Characterization

2.1 How Do I Get a Characterization?

To simulate a specific printing condition in a proof or to optimize the separation of a design for a printing condition, it is crucial to get as much information on the printing condition as possible, which is referred to as **characterizing** the **printing condition**.

To do so, **spectral color data** is measured from **prints**. It is important that the prints are an **exact** match to the real production run, including media, inks, separations, imagesetter and printing machine settings, and post processing such as varnishing. Any changes in the resources or the process might affect the color accuracy.

You will need to either **measure** prints with a spectral photometer or to **import** existing spectral data provided by the printer. You will also need to provide information on the **media characteristics** and **printing process**.

See also:

- "Characterization Levels" on page 16
- "Creating a Characterization" on page 33

2.2 Supported Measuring Devices and Formats

GMG OpenColor can build and measure test charts with n channels and supports the following measuring devices.

Measuring in GMG OpenColor

- X-Rite i1Pro2
- X-Rite i1Pro3
- X-Rite i1Pro3 Plus
- X-Rite i1iO 2nd Generation
- X-Rite i1iO 3rd Generation
- X-Rite i1iO 3rd Generation Plus
- X-Rite eXact
- X-Rite eXact Xp
- X-Rite i1Sis
- X-Rite i1Sis XL
- X-Rite i1iSis 2
- X-Rite i1Sis 2 XL
- Barbieri Spectro LFP RT
- Barbieri Spectro LFP Series 3
- Konica Minolta FD-7
- Konica Minolta FD-9 (only connection via USB supported)
- TECHKON SpectroDens

Further info on X-Rite i1Pro3 Plus

You will be able to use X-Rite i1Pro3 Plus and i1iO Generation 3 Plus Table to measure color patches and test charts.

The large aperture results in large color patches (16 mm). As the test chart size is limited by the i1iO table, the number of test chart pages will be increased when using the i1iO table.

When the optional polarization filter is used, you will need to select the **Device Type Plus-M3** to activate M3 measurement condition in GMG OpenColor. With the filter, the patch size is even larger (20 mm x 16 mm), resulting in larger test charts (manual measurement) or more pages (i1iO table).

Measuring in third-party software and importing the measurement

To offer a maximum of flexibility, you can import measurement data from any kind of spectrophotometer, provided that the measurement data is **spectral** data.

Select **<other>** from the **Measuring Device** list when importing data from a measuring device that is **not** included in the list.

Supported wavelength

Ideally, the spectral data recorded by the measuring device should cover the whole visible range of the light from **380 nm to 730 nm**. GMG OpenColor also supports the use of data covering only a narrower bandwidth from 400 nm to 700 nm.

Supported file formats

- ANSI IT8.7/4 standard for measuring data (.txt)
- ANSI CGATS 17-2009 standard for measuring data (.txt)

See also:

- "Importing Measurement Data" on page 27

2.3 Characterization Levels

GMG OpenColor is able to use as many or as few data as you can provide. The GMG OpenColor Prediction Engine will predict "missing" data and thus you will still be able to get the highest possible profile quality from the available information.

The **color accuracy** of the proof will depend on the level of characterization you are using as explained in the following table.

Characterization level	*What does it mean?*	*See also*
Full characterization	A test chart with patches representing all used inks and spots including tints and relevant overprints is printed by the printing company using the same media and printing parameters as the production run. You can send ready-to-use GMG test charts to the printer or you can use GMG OpenColor to create a custom test chart specifically fit to the design of the print product. For example, if Greens are especially important for the design, you might want to include more green tints and overprints so that the characterization is especially accurate in the green area of the color space. A full characterization means higher costs and effort, but also provides the most information to GMG OpenColor and thus results in the most accurate proof profile.	"Test Charts" on page 17
Fingerprint, mini strip	The printing company can add a mini strip with only a few patches to the printing form. The GMG OpenColor Prediction Engine will predict "missing" data. This method often presents a good compromise between a full characterization and using only little information. It is advisable to include a few tints of all process colors. If the design uses tints or overprinted spots, it is recommended to add all relevant color tones as well.	"Test Charts" on page 17

Characterization level	*What does it mean?*	*See also*
Without test chart—use only the color information available on the printed sheet	You might encounter having difficulties to get characterization data from the printing company and might simply be left with the print product itself. For such cases, GMG OpenColor offers you the possibility to measure colors from the printed sheet, i. e. from the design itself (provided you know the color separation of the measured tone) and from standard process control strips included on the printing form. This method requires almost no effort and no additional resources such as print cylinders. Profile creation relies to a high degree on the GMG OpenColor Prediction Engine. You can also combine a full characterization of the process colors with a quick measurement of a spot color.	"Without Test Chart—Measuring Custom Patches" on page 24
Spot color library	For widely used spot colors, you can use the spectral data as provided by the spot color manufacturer. GMG OpenColor comes with ready-to-use spot color libraries from PANTONE and offers a direct link to major cloud-based spot color solutions. Please make sure that the printing process and media type are in line with the specifications of the spot color manufacturer. You can also combine a full characterization of the process colors with spot colors from a library. Whenever possible, it is preferable to measure spots from the printed sheet.	

2.4 Test Charts

A test chart with patches representing all used inks and spots including tints and relevant overprints is printed by the printing company using the same media and printing parameters as the production run. You can send ready-to-use GMG test charts to the printer or you can use GMG OpenColor to create a custom test chart specifically fit to the design of the print product. Alternatively, you can also import existing measurement data from diverse test charts.

For the perfect match of proof and press, we recommend to create individual (product-specific) test charts. Here are some product-specific examples:

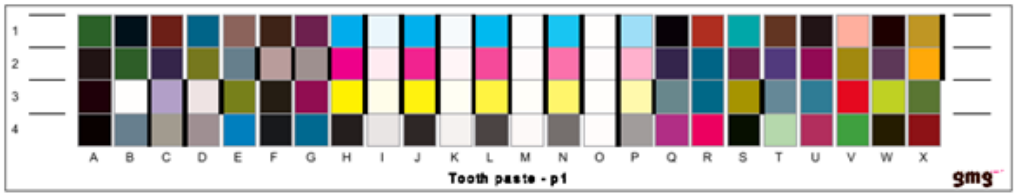


Fig. 5 CMYK chart with overprints for toothpaste tube (220mmx 45mm).

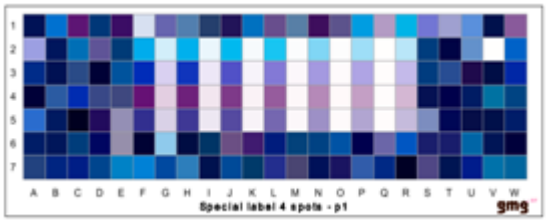


Fig. 6 Spot color chart with overprints for flexo label (150mmx 55mm).

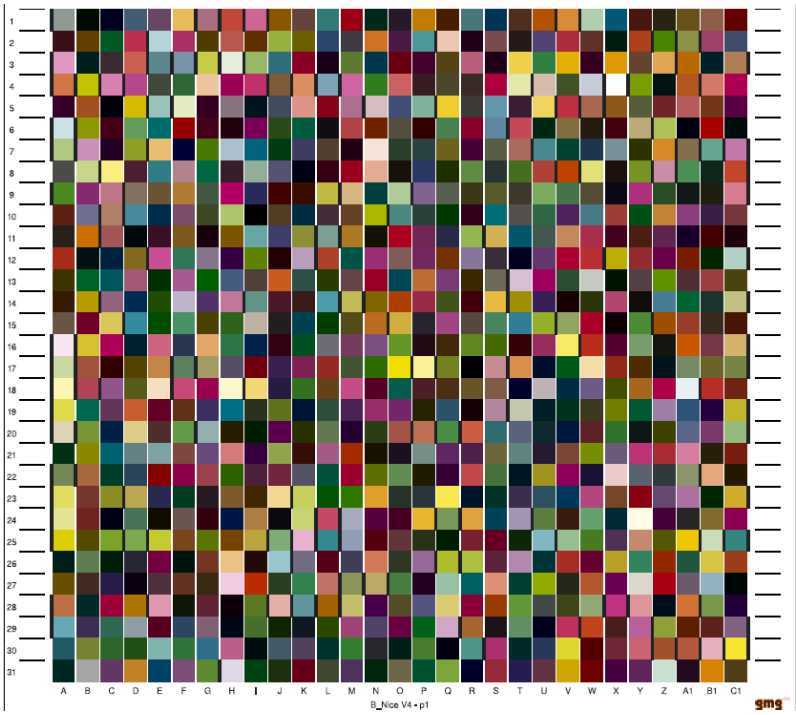
2.4.1 GMG Test Charts

Alternatively to creating your own charts, you can also download GMG test charts (*.tif) and measuring templates (*.txt) from the GMG support website (https://support.gmgcolor.com/). The following strips and test charts provide a good balance between size and precision and are optimized for the mathematical model used by GMG OpenColor:

- Single ink strips for 1, 3, 4, 6, 8 inks
  (small version with the following patches: 0/2/10/25/40/60/80/100, large version with the following patches: 0/2/6/10/20/30/40/50/60/70/80/90/100)
- ECI2002 / IT8.7.4 / TC4 test charts, FlexoChart V2
- TCN test charts with 6 / 7 inks for Flexo and Offset/Gravure

2.4.2 Iteration Test Charts

To optimize the quality of **halftone** proof profiles, GMG OpenColor automatically generates matching iteration test charts. These charts are generated individually for each profile and fit one page. The patch configuration depends of the defined ink usage, the number of channels and the printing process.



See also:

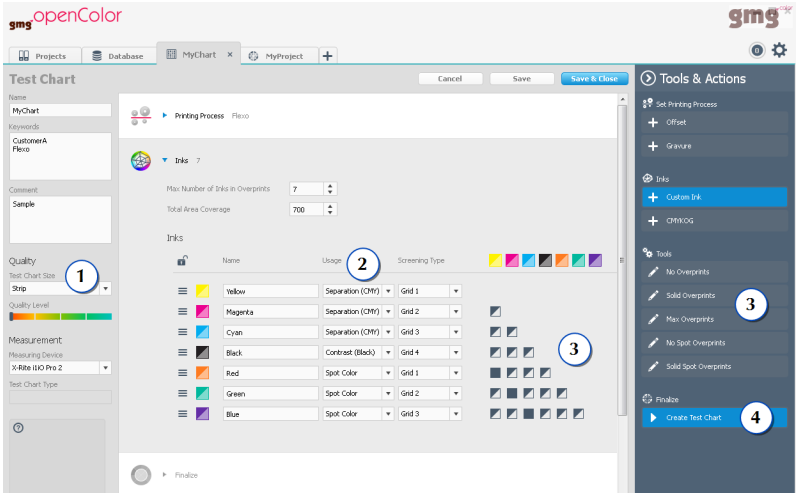
- "Optimizing the Profile Quality" on page 74

2.4.3 Creating Your Own Test Charts

You can create test charts with virtually any number of channels and patch configurations to fingerprint your press. The test charts can be saved and exported as PDF.

How to create a custom test chart

→ On the **Projects** or **Database** toolbar, click the **New Test Chart** button.



The test chart generator helps you to find the best patch configuration by **automatically** selecting the relevant patches for your print process, inks, and test chart size (1). The amount of the patches can be controlled by defining the **Usage** (2) of each ink and the overprinting configuration (3).

To see a **preview** of the test chart or to edit the page or patch size, click **Create Test Chart** on the **Tools & Actions** panel (4).

Test Chart Sizes

The basic size and layout of the test chart is set by choosing one of the following test chart sizes. Further factors that determine the test chart size are page and patch size, and the ink settings.

Size	*Description*
Mini-Strip	As few rows as possible.
	Two rows are default, but further rows may be added to meet the minimum measuring space of the selected measuring device.
Strip	As many rows of patches as inks.
	If there are too few rows to meet the minimum measuring space of the selected measuring device, further rows may be added.
Page	As many patches as fit on one page.
Multi Page	Maximum number of patches.

Page Size and Patch Size

When selecting a measuring device, the ideal patch size is automatically set, but can be changed in the preview of the test chart (> **Create Test Chart**), just like the page size. This way, you have full control on the dimensions of the test chart.

Ink Settings

You can define enhanced ink settings to tailor the test chart layout and the number of patches to your requirements.

Group	*Description*
Print Order	The print order is optional to set at this stage of profiling, but gives you the advantage of being stored in the PDF metadata, so that you do not have to think about it at a later stage.
🔓	To change the print order, select an ink and move it to the desired place. Click the lock icon when you are finished to confirm the set print order.

Group	*Description*
Usage	Every ink channel can be defined the way it will be used, as either **Separation**, **Contrast**, **Spot** or **Solid** color. If you have a design with a spot color that is part of the image separation, define it as **Separation** (Cyan, Magenta, Yellow or other), if it is not part of the image separation, define it as **Spot Color**. If it is only used as solid color, define it as **Solid**.
	Separation channels are sampled most thoroughly with patches, whereas inks that are used as a contrast or spot color do not need to be fingerprinted with that many patches. Therefore, the usage of the inks influences the **choice of patches** and the total number of patches in your test chart.
Screening Type	Different screening grids serve to avoid **moiré** patterns. If you want to fingerprint more than four inks, you can use the same grid for complementary colors, as complementary colors normally do not overprint.
	For example, Red can have the same grid as Cyan, and Green the same as Magenta. If the colors strongly differ in lightness, however, they should use different screening grids.
Overprints	To define overprint patches, either use the **Tools** on the **Tools & Actions** panel, or click on single patches in the patch preview to change the overprinting mode.

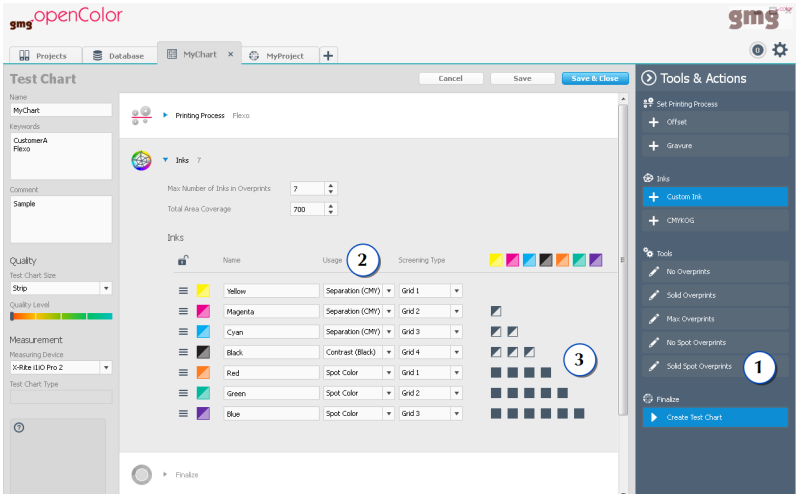
Defining Overprint Patches

There are three possibilities to define the overprint patches of your test chart:

→ Use the **Tools** on the **Tools & Actions** panel (1)

→ Define the **Usage** of the inks (2)

→ Click on individual patches in the overprint preview (3)



In our example, we used **Solid Spot Overprints**, only including the solid overprints of Red, Green and Blue in the test chart.

Tip Use the test chart preview to check your overprint configuration (> **Create Test Chart**).

Defining the Test Chart Layout

In the **Finalize** step, you see a preview of the test chart layout and can adjust it to your needs.

Fig. 7 Finalize Test Chart window.

You can change the dimensions of the test chart (1). The number of color patches will be adjusted accordingly. You can add pages to include more patches if not all possible patches fit onto a single page (2).

If you create a test chart to be measured in scan mode, it is recommended to add black and white gaps in-between patch columns to make sure the measuring device will be able to recognize the patch borders correctly. If you create a test chart to be measured in manual mode, you can deactivate the gaps to save space (3).

Tip Measuring a test chart without gaps in scan mode is possible in many cases. If you are unsure whether or not you will need gaps , you can make a measurement test run using a proofing paper before sending the test chart to the printing company.

Advanced Info GMG OpenColor uses a smart algorithm to fill the available space with color patches. It starts wit the most important (full tone) patches and adds patches in the order of priority. Also, dark and light patches are alternated. This way, it is often possible to use scan mode even when gaps are deactivated.

You can then **export** the created test chart as PDF and send it to your printer. You can then **measure** the printed test chart in GMG OpenColor to characterize the printing condition under it was printed.

See also:

- "Managing Your Test Charts" on page 22
- "Starting a Measurement" on page 23

Managing Your Test Charts

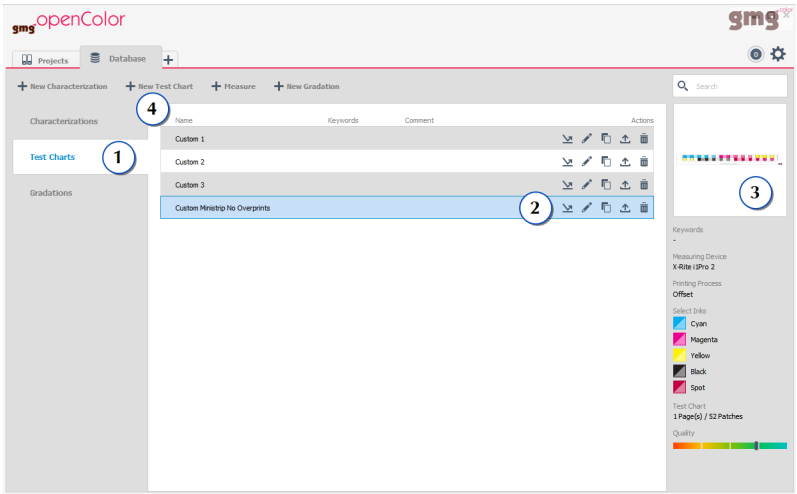


Fig. 8 Custom Test Chart List

In the **Test Charts** list (1), you can manage all **custom** test charts. Factory-default test charts cannot be edited and are therefore not shown.

You can use the button array (2) to measure, edit, duplicate, export, and delete the **selected** test chart. The info pane on the right (3) will show you more information on the selected item. You can edit, duplicate, export, or delete only your own custom test charts, not the factory defaults, which names are marked with " (GMG)".

You can use the toolbar (4) to create a **new** test chart.

See also:

- "Starting a Measurement" on page 23
- "Creating Your Own Test Charts" on page 18

2.4.4 Can I Use Old Charts and Measurement Data?

Basically, yes. Measurement data of the TC4 require a special procedure as described in the following.

How to import TC4 measurements

The TC4 test chart is not considered an ideal choice for characterizing a 4c printing process in GMG OpenColor and has thus **not** been integrated as a regular option in the measurement import. If you want to use a TC4 measurement, maybe because you have already printed and measured these charts for other purposes, you have the possibility to enable this import option by copying a configuration file to the program folder. Please contact GMG Support to provide you with the configuration file.

1. Please close GMG OpenColor before adding the configuration file to the database.
2. Extract the received ZIP archive to your local computer. It contains a folder named **{d409247f-0c84-42fb-a31c-0e7db5bfd376}** including a file named **_document**.
3. Copy this folder from the archive to the GMG OpenColor subfolder **MeasureChartDef**.
4. After restarting GMG OpenColor, the TC4 will be available in the **Test Chart Type** list.

2.5 Measurement Data

When you have decided which level of characterization to use, you can acquire spectral measurement data from the selected test chart or print product.

You can measure custom patches or test charts created in GMG OpenColor directly in GMG OpenColor or you can **import** measurement data from other applications.

2.5.1 Starting a Measurement

Tip If you connect the measuring device before opening the **New Measurement** page, the correct device type will already be preselected.

Tip The measurement data can be exported as CGATS file for use with other applications.

How to start a measurement

Depending on the context in which you want to measure the colors, there are multiple options to start a measurement.

→ Project independent, before creating a characterization or a project or if you want to create a spot color library: On the **Projects** or **Database** toolbar, click **Measure**.
Measurement data will be saved as a **new** characterization and will not be linked to a project. You can link it to a new or existing project later.
—OR—

→ Project independent, linked to an **existing** characterization: Open the characterization from the **Database** tabbed page and click the **Measure Additional Spot Color** button on the **Tools & Action** panel.
—OR—

→ If you want to use it as a characterization for a new or an existing **project** right away: Open the target project from the **Projects** tabbed page and click the **Measure** button on the **Tools & Action** panel.
(You will still be able to use the measurement data in other projects.)
—OR—

→ If you want to add a new spot color to an existing **spot color library**: Open the target library from the **Database** tabbed page and click the **Measure Additional Spot Color** button on the **Tools & Action** panel.

→ Project independent, if you want to measure a specific custom **test chart**: On the **Database** tabbed page, browse for the test chart and click the corresponding **Measure** button.

A **New Measurement** page opens.

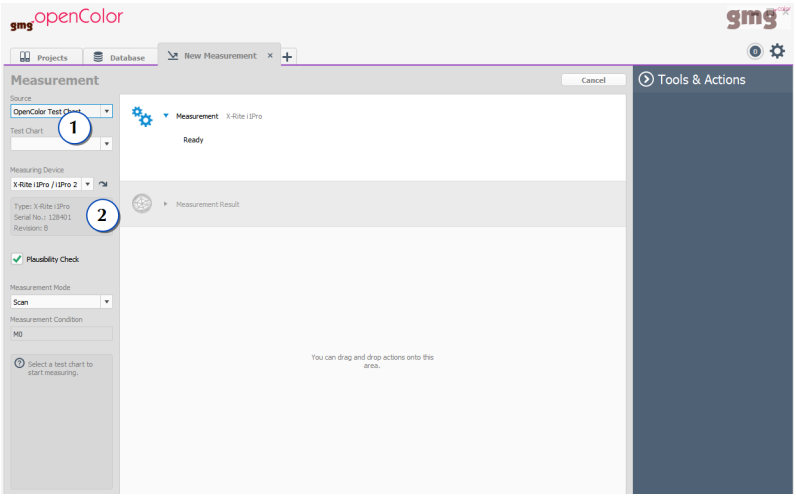


Fig. 9 New Measurement page.

Before starting the measurement, you will need to select a measurement source (1) and measuring device (2) on the left. Information on the connected measuring device is displayed below the **Measuring Device** list.

See also:

- "Spot Color Libraries" on page 39

2.5.2 Without Test Chart–Measuring Custom Patches

You might encounter having difficulties to get characterization data from the printing company and might simply be left with the print product itself. For such cases, GMG OpenColor offers you the possibility to measure colors from the printed sheet, i. e. from the design itself (provided you know the color separation of the measured tone) and from standard process control strips included on the printing form.

This method requires almost no effort and no additional resources such as print cylinders. Profile creation relies to a high degree on the GMG OpenColor Prediction Engine.

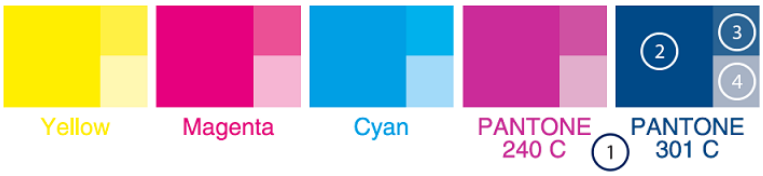


Fig. 10 Print control strip example.

Measuring these 12 example patches is all you would need to create a proof profile for a 5c printing process. You could measure the four numbered colors to characterize Pantone 301c:

1. Medium: Paper tint
2. Solid: PANTONE 301 (100%)
3. Tint: PANTONE 301 (80%)
4. Tint: PANTONE 301 (20%)

See also:

- "Measuring Colors without Test Chart" on page 24

Measuring Colors without Test Chart

You can use GMG OpenColor to measure any color patch—directly from the print product, from a single color patch, from a print control strip, or from any patch layout. You only need a hand-held spectral photometer and information on the color separation of the tone you want to measure, i. e. which inks are printed and the tint percentage value, for example, "PANTONE 301 (80%)".

Tip Double measurements of the same color and tint will be **averaged** automatically.

How to measure

You will need to switch to **Custom**.

1. From the **Source** list, select **Custom**.
   The **Measurement Mode** will be automatically switched to **Patch**.
2. On the **Tools & Action** panel, click **Start Measurement**.
   The measuring device will be initiated for measuring. If manual interaction is required such as white calibration, you will be notified by a message.
3. Follow the instructions to prepare the measurement.
   When the measuring device is ready, the **Measurement** status changes to **Measuring...** and you will be asked to measure the paper tint.
4. Measure the paper tint: Move the measuring device to an unprinted substrate area and press the device button to measure.
   The measured paper color is shown and categorized as **Media**.
5. Proceed with the color patches: Press the device button to start the measurement and measure all color patches in any order.

GMG OpenColor lists the measured patches in the order of measurement. The list is updated after each reading. Recognized colors are automatically assigned.

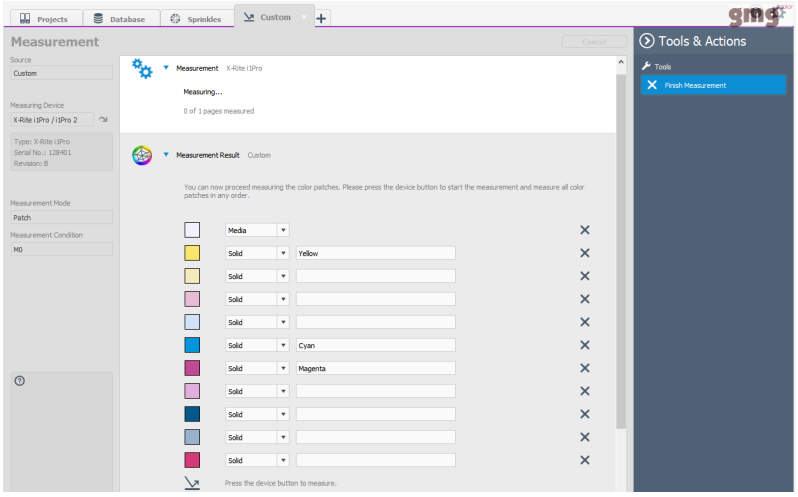


Fig. 11 Measured colors.

You will now need to assign inks and percentage values to the measurements.

See also:

- "Assigning Inks to the Measurements" on page 25

Assigning Inks to the Measurements

You can either read in all colors and then assign them or make the assignment at any other time, for example, after each reading.

Tip GMG OpenColor will automatically suggest ink names for recognized solid colors such as Cyan, Magenta, Yellow, Black, Red, Green, Blue and automatically fill in percentage values after your first manual entries.

How to assign inks

Assign ink names and percentage values to the measured colors to use them for creating a characterization.

1. Enter a name for each solid color (2).
2. For each non-solid color, select **Tint** from the list (3).
3. Select a "parent" solid color from the list (4).
4. Enter a percentage value for the tint (5).

GMG OpenColor will now have sufficient information to add the inks to the database so that they can be used for creating a characterization.

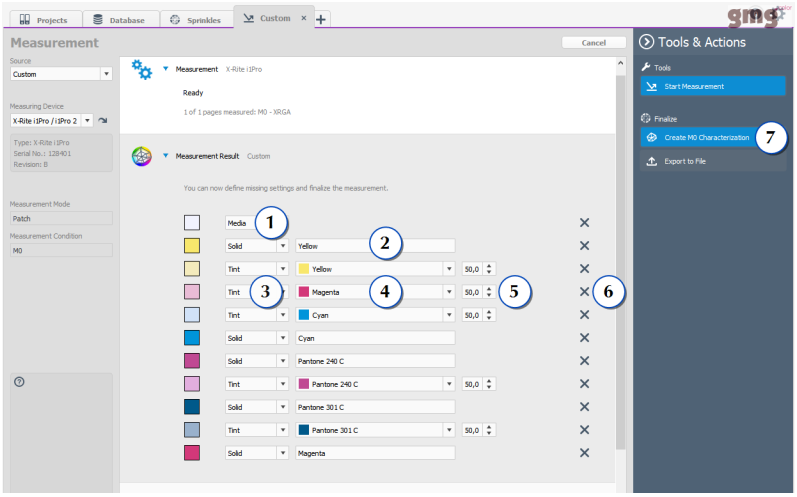


Fig. 12 Finished measurement and ink assignment.

Measuring the paper tint (1) is mandatory. You can measure and assign as many solids and tints as you like. You can delete a measurement by clicking the x button (6). When all measurements have been assigned, you can use them to create a characterization (7). If you are using a measuring device supporting multiple measurement conditions, one measurement will automatically generate measurements for all supported conditions. Select the condition you want to use for the characterization.

Tip Double measurements of the same color and tint will be **averaged** automatically.

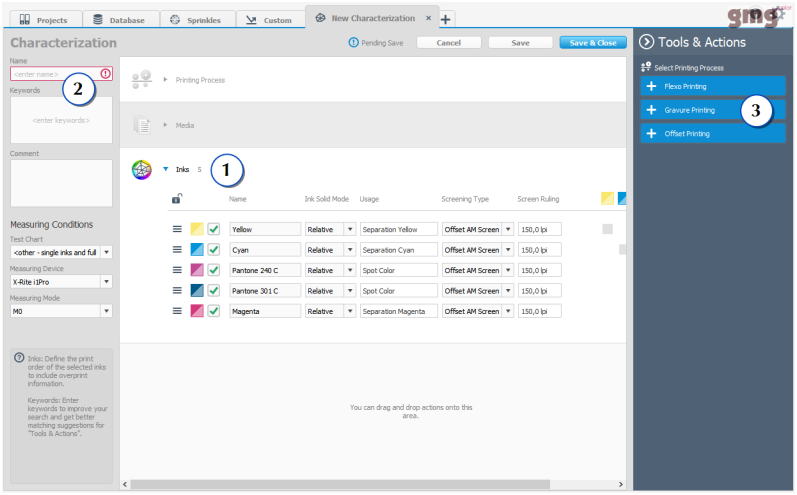


Fig. 13 Creating a characterization from the measured colors.

The 5 inks are listed on the **New Characterization** page (1). You will need to enter a **Name** for the characterization (2). You can then proceed with describing the **Printing Process** and **Media** (3) that was used for printing the measured colors.

See also:

- "Creating a Characterization" on page 33

2.5.3 Measuring Test Charts

All test charts created with GMG OpenColor can also be measured within the application.

How to measure a test chart

You will need to switch to **OpenColor Test Chart**.

1. From the **Source** list on the left, select **OpenColor Test Chart**.
2. Select the test chart you want to measure from the **Test Chart** list.
   Each test chart page is shown separately in the **Measurement Result** group.
3. If you are using an X-Rite measuring device in scan mode, you can add a check mark to the **Plausibility Check** box to use this X-Rite feature to detect faulty scans. If the plausibility check failed, you will be notified.
4. If you are using an automated chart reader, insert the first page into the measuring device.
5. On the **Tools & Action** panel, click **Start Measurement**.
   The measuring device will be initiated for measuring. If manual interaction is required such as white calibration, you will be notified by a message.
6. Follow the instructions to prepare the measurement.
   When the measuring device is ready, the **Measurement** status changes to **Measuring...**.
7. Proceed with the measurement and repeat this procedure for all pages.

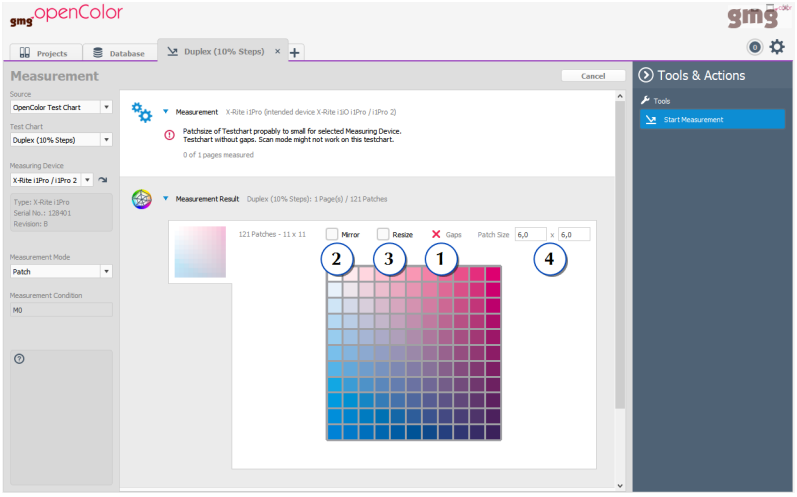


Fig. 14 Measuring a test chart.

You will see a preview of the selected test chart. The preview shows if gaps have been deactivated (1). You can measure a test chart that has been mirrored during printing (2). If a test chart has been resized during the printing process, for example, because of RIP or paper feed settings, you can use the **Resize** feature (3) to measure it. You can measure the dimensions of one of the printed color patches and enter the values into the **Patch Size** boxes (4).

Following the measurement, you need to create a characterization from the measurement data (**Tools** > **Create Characterization**).

Importing Measurement Data

As an alternative to measuring in GMG OpenColor, you can also import measurement files from third-party software.

→ On a **Characterization** / **Project** tabbed page, click the **Import** button on the **Tools & Actions** panel.

You can additionally use the characterization data and spot color databases shipped with GMG OpenColor, but it is recommended to print the inks you want to simulate under the exact printing condition (printing process, media type, etc.) you want to proof.

Following the import, you need to create a characterization from the measurement data (**Tools** > **Create Characterization**).

Importing several measurement files

→ To import multiple measurement files, select the files while pressing the **Shift** key (multi-select) and click **Open**.

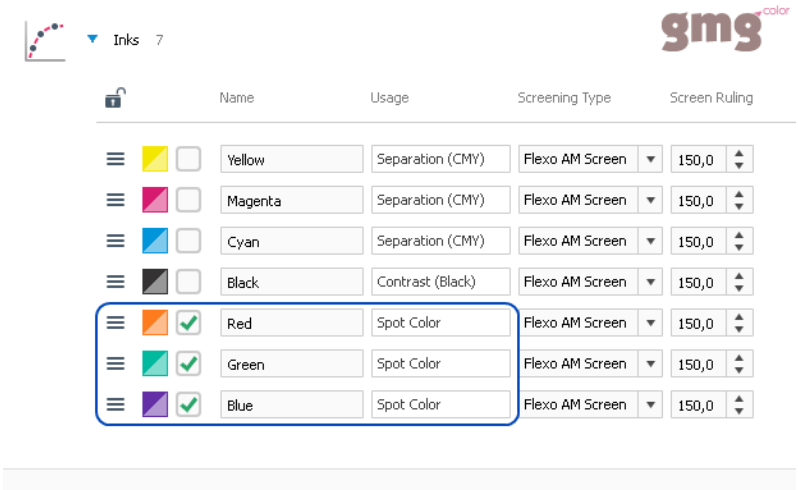
Note Multiple measurements are automatically **combined** if they have the same number of inks, ink names, and spectral range.

Can I rename the ink names during import?

The ink names are read out from the selected measurement file. The inks can be renamed by clicking on an ink name. The color preview next to the ink name shows the measured color of the ink, calculated from the spectral data. You might find this color patch helpful to allocate the ink names.

Can I import only part of the measurement file?

You can skip measurements by **deselecting** single channels in the channel list. In our example, only the measurements of orange, green, blue are used for calculating profiles.



2.5.4 OBA Detection

The **OBA detection** helps you to choose the right **measuring condition** for your **characterization** depending on the optical brightener agents (OBA) level of the used media and recommends a corresponding proof media type. OBA Usage is automatically detected when measuring the paper tint with a measuring device that supports to measure M1 (or M0) and M2 measurement conditions, i. e. with and without UV.

Note You can use the OBA detection only during the **Measurement** step. Once you have finished the measurement and created a characterization, this functionality is no longer available.

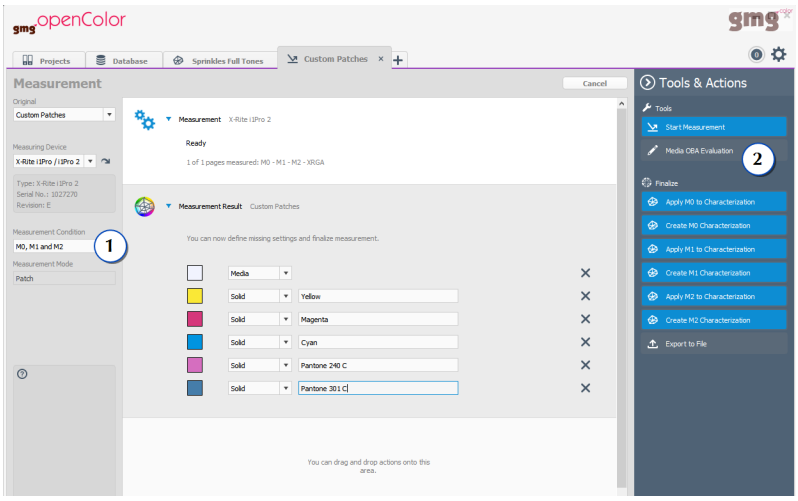


Fig. 15 Starting the OBA detection.

You can start the detection from the **Measurement** page. Please make sure that you are using a measuring device that supports M1 (or M0) **and** M2 measurement conditions and that these measurement conditions have been selected (1) before starting the measurement. On the **Tools & Actions** panel, click **Media OBA Evaluation** (2) to open the window.

Advanced Info If you are using a measuring device that supports M0 and M2, but not M1, GMG OpenColor will calculate the M1 measurement condition from the M0 measurement.

Media Optical Brightener Evaluation

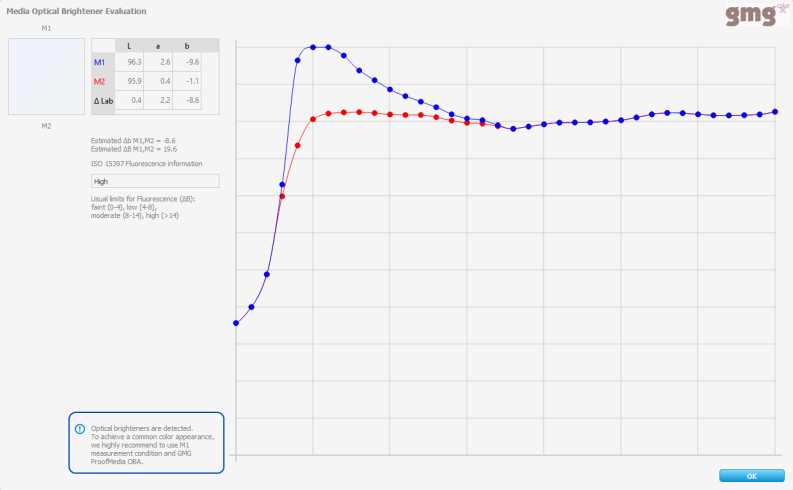


Fig. 16 Media Optical Brightener Evaluation window.

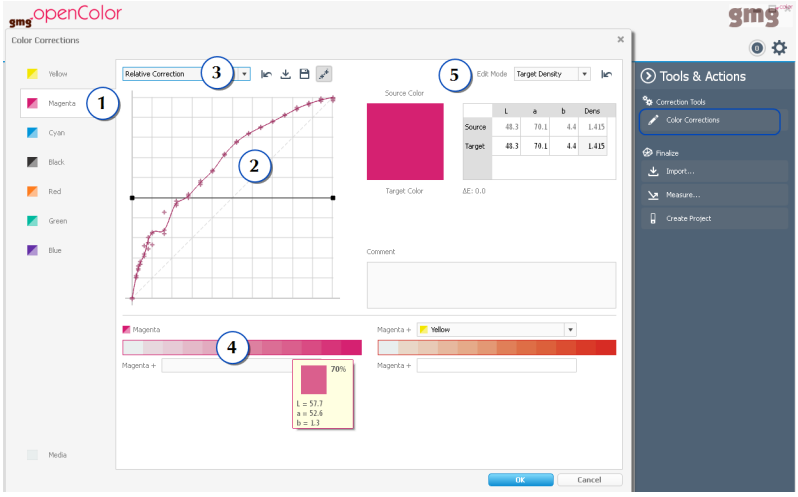
Comparing the M1 measurements with UV (blue line) and M2 without UV (red line) shows the impact of OBA usage on the paper tint. GMG OpenColor will classify the OBA usage as either faint, low, moderate, or high and recommend a suitable proof media to ensure the highest possible color accuracy and visual match.

2.6 Correcting Measurement Data

Note Corrected measurement data can always be reset to the original values.

To view and correct your measurement data before profile creation, GMG OpenColor has multiple tools to help you figure out potential sources of error and to optimize your data.

→ In a **Characterization**, click **Color Corrections** on the **Tools & Actions** panel.



Select an ink (or multiple inks) by clicking on the ink name (1). For each ink, a **tone value curve** is shown in a two-dimensional view (2). You can edit curves by selecting a correction option (3). Each curve can be saved as a correction curve for other inks.

Beneath the curve view, there is a visualization of the ink measurement (4), showing the color and L*a*b* value of each fulcrum. You can visualize several inks at the same time to also view the overprint information, as in our example with Magenta + Yellow.

Full tone corrections can be performed in terms of density and L*a*b* (5).

2.6.1 Automatic Spectral Correction

GMG OpenColor offers an automatic spectral correction for measurement data. GMG OpenColor **averages duplicates**, **removes outliers**, and **smooths** the measurement data.

You will get the highest possible profile quality, both for proof and separation profiles, even if the data quality is limited, for example, due to printer instabilities and noise or due to media characteristics. This feature eliminates the need for an external tool, saving investment costs and time. It also avoids a smoothing based on Lab values, thus providing an ideal basis for the GMG OpenColor Prediction Engine. Proof profiles will achieve a better print-to-proof match, so you might need less or even no optimization cycles when creating the profile.

Note This feature is available only for characterizations.

How to apply the automatic spectral correction

Note To use the automatic correction, the characterization **settings**, i. e. printing process and media, need to be fully defined. The selected **test chart** needs to **match** the **measurement data**, i. e. the patches found in the measurement data need to be available in the test chart. The **Measurement Data** dialog box, see screenshot, shows the **Match** number (2). The **Match** needs to be at least **95%** to enable the use of the automatic correction.

1. Import measurement data
   —OR—
   click the **Measurement Data** button (1) in the **Tools & Actions** pane if you want to use the correction on already existing measurement data.
   GMG OpenColor will open the **Measurement Data** dialog box. If you imported multiple matching data sets, GMG OpenColor will automatically **average** the data and show the name "**Combined Measurement File**". GMG OpenColor shows the inks found in the measurement data. If the used test chart has not already been defined, GMG OpenColor automatically analyzes the data and tries to recognize it.
2. Specify the measurement condition.
3. Enter a percentage value limit (3). This preserves printing process related non-linear behavior in the measurement data that you want to simulate in the proof and not get smoothed away.
   Measurement values below the selected percentage will be preserved.
4. Start the correction by clicking the arrow button (4).

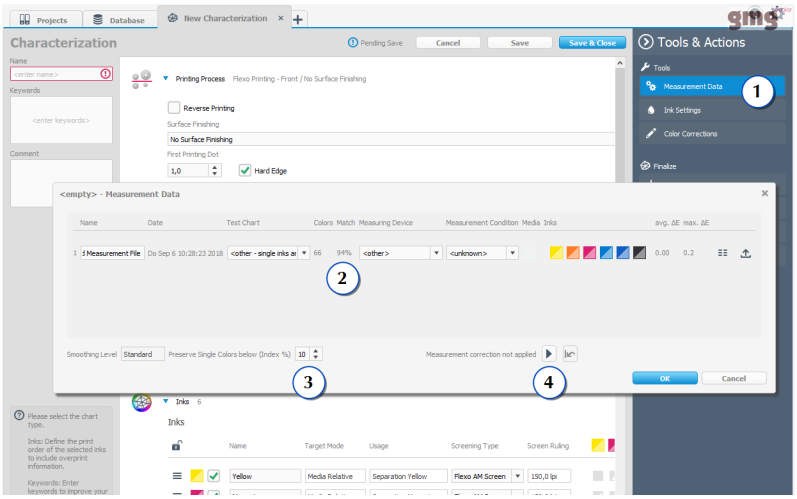


Fig. 17 Measurement Data dialog box before the correction.

The dialog box lists all measurement data sets in a table and shows the corresponding inks.

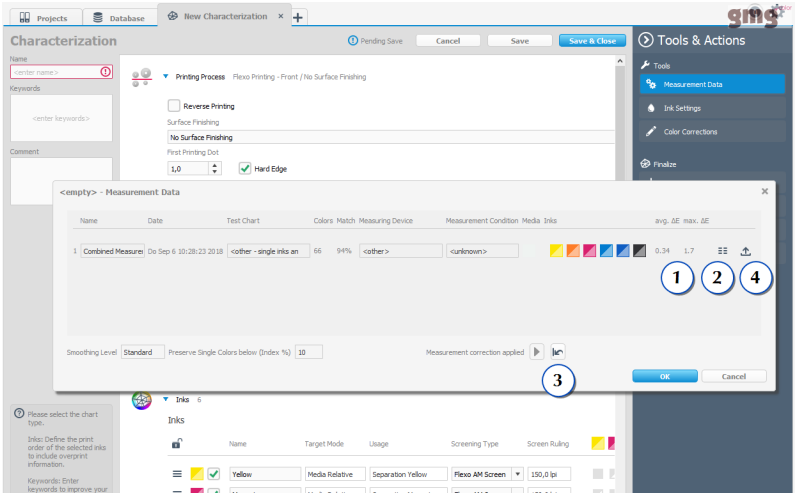


Fig. 18 Measurement Data dialog box after the correction.

After the correction, the **Measurement Data** dialog box shows the deviation from the original measurement data (1). This gives you an indication of the data quality and how much impact the correction has on the data.

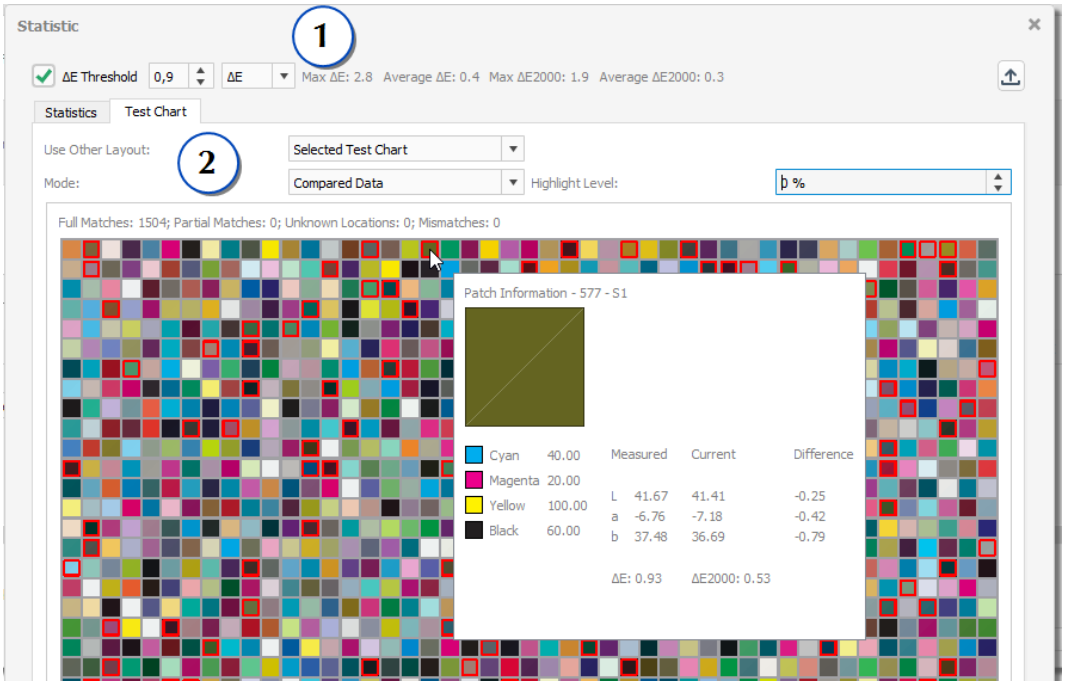
→ For further analysis, you can show the results of the correction (2) in form of a **table** or in the **test chart layout**. The table view shows Lab values for all measurement values before and after the correction, and the difference between them. You can **sort** the table by the columns. You can **export** the table as CSV. Please note that the displayed Lab values are provided only to give you a simplified view of the corrections. The actual corrections are applied directly to the **spectral data**.

→ You can **revert** the measurement data to the original state by clicking the undo button (3).

→ Clicking the **Export** button (4) allows you to **recover** the original measurement data files if you have no longer access to them. All files will be exported **exactly** as they have been **imported** to the selected target folder. It is also possible to export data that was measured directly in GMG OpenColor. (It is **not** possible to export factory-default application data.)

2.6.2 Evaluation of the Corrected Test Chart Patches

The **Test Chart** view (**Measurement Data** dialog box > **Show detailed statistic** button > **Test Chart** tabbed page) allows you to view the **results** of the **automatic spectral correction** in the test chart layout. This feature simplifies the analysis of wrong color values.



Screenshot of the **Test Chart** view.

In this view, you can compare pre- and post-correction color values. You can highlight patches showing a higher difference in a red box. To do so, you define a threshold (1) for the minimum difference between the original measurement value and the corrected value that you want to be highlighted.

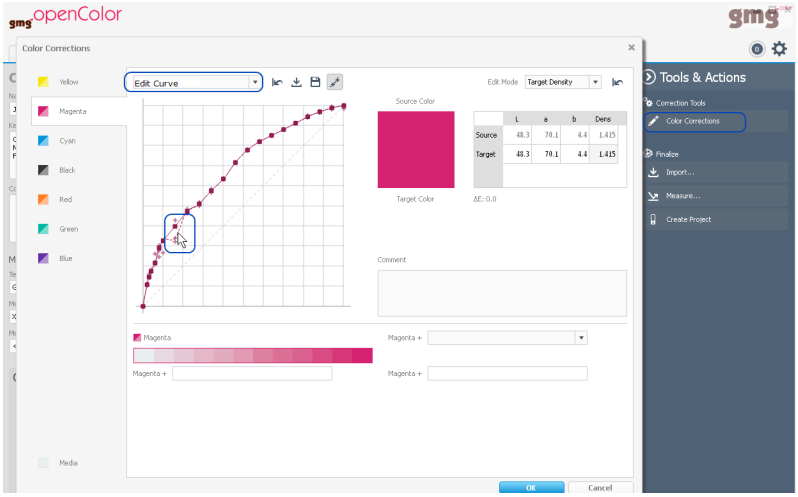
The following options (2) are available to customize the view.

Available options	*Description*
Layout	You can display the results either in the layout of the test chart you have **selected** in GMG OpenColor for the measurement or data import (**Selected Test Chart**) or in the layout that is **specified** in the measurement file if available (**Measurement File**).
Mode	In **Compared Data** mode, you can compare the originally measured and corrected colors. Alternatively, you can show only the **differences** between the original and corrected values as **delta E**.
Highlight Level	You can turn the level up if the difference is not visible enough. The higher the level, the stronger will be the color. This option is not available in **Compared Data** mode.

2.6.3 Editing Curves

You can edit a tone value curve by applying a gradation (*.txt), or by manually selecting and moving individual fulcrums with the mouse.

→ In a **Characterization**, click **Color Corrections** on the **Tools & Actions** panel.



How to manually edit a curve

If there are spikes in a curve that might lead to banding, you can select individual fulcrums and move or remove them to **smooth** the profile.

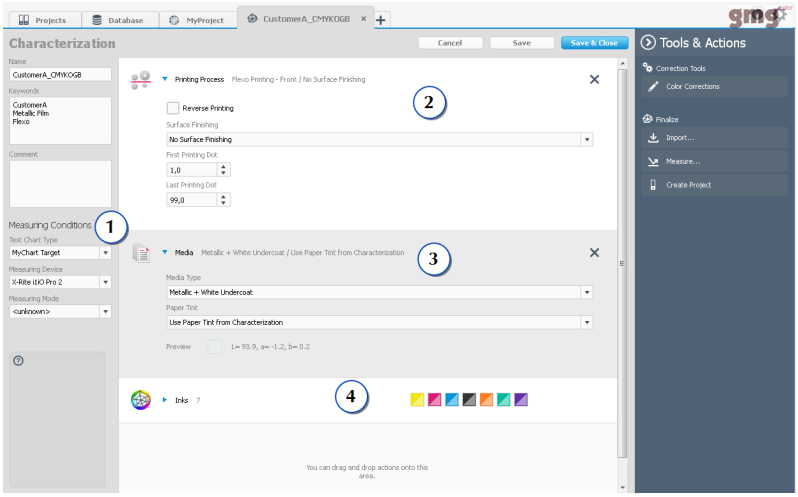
1. Select an ink from the ink list on the left.
   The tone value curve of the ink is displayed.
2. From the drop-down list, select **Edit Curve** to unlock the curve.
   The curve is now shown with the fulcrums of the measurement.
3. Optional: Left-click the curve to insert further fulcrums.
4. Optional: Right-click fulcrums you want to have deleted.
5. **Show measured points** by clicking on the corresponding button on the toolbar.
   All measured points are displayed as crosses.
6. To smooth a curve, select deviating measurement points and drag them into position to produce a smooth curve.
   In our example screenshot, there is a spike caused by two of three measurement points. To smooth the curve, the lower two measurement points have been dragged upwards to the third measurement point.

After editing the curve, the original curve is shown as a **dashed line**. If you are not satisfied with your changes, you can reset to the original curve by clicking the **Reset** button.

2.7 Creating a Characterization

In this step, you will also need to provide information on the **media characteristics** and **printing process**. This ensures that the right profiling algorithms are used and that the GMG OpenColor Prediction Engine delivers optimal results.

Note The fewer measurement data you can provide, the more important it is for you to feed in correct parameters, as profile calculation relies more on the GMG OpenColor Prediction Engine. If you provide a full characterization with relevant overprints, the entered parameters will have no or not much effect on the outcome.



A characterization describes the following:

- **Measuring Condition** (1)
- **Printing Process** (2)
- **Media** (3)

In the **Inks/Characterization** group (4), you will see the inks the application has recognized from the measurement data. You can change the ink names or adjust the print order.

If you are finished, click **Save** to save the characterization to the **Database** and then apply it to a related project.

2.7.1 Printing Process

Both GMG OpenColor editions are available with three different preset packages with printing process related preset data for simulating **flexo**, **offset**, and **gravure** environments.

Options	*Description*	*See also*
Reverse Printing	Reverse printing is printing a reversed image on the backside of a transparent media. Activating this option does not require changing the defined print order.	
Surface Finishing	This option describes whether the measured test chart was printed with or without a finishing effect. Select a **Surface Finishing** if the measured test chart has undergone a finishing process. If it has not, select **No Surface Finishing**. Special finishings such as varnish elements combined with non-varnish elements or a combination of two different kinds of varnish (matte and gloss) are not supported.	
First & **Last Printing Dot**	These settings allow you to control the highlight and shadow clipping in the proof, even if the measurement data does **not** correctly describe the target printing process. Enter the first and last printing dot of the target printing process in percent. With the option **Hard Edge**, you can control whether the transition in the highlight areas, i. e. from 0% to the **First Printing Dot** should be smooth or hard. For **flexographic** printing processes using **standard AM screening**, you should generally use the option **Hard Edge**. For gravure and offset printing processes, you should generally not use the option.	"First and Last Printing Dot" on page 35

First and Last Printing Dot

The first and the last printing dot are characteristics of the printing process that can result in highlight and shadow clipping. Especially in flexographic printing, the dot gain curve steps directly from zero to the minimum printable dot, showing a characteristic hard edge. Proofing with GMG OpenColor profiles ensures a realistic simulation of the press characteristics.

Why do you need to specify the **First Printing Dot** and the **Last Printing Dot** of the target printing process in GMG OpenColor?

If your characterization, i. e. the measurement data, accurately describes the target printing process, these settings are indeed not relevant. This means, the measurement data includes sufficient patches in the highlights that clearly show the first printing dot and sufficient patches in the shadows that clearly show the last printing dot. In this case, GMG OpenColor uses this information to calculate a proof profile that will show the same behavior in the proof: If the document contains colors with a percentage value lower than the first printing dot, these colors will not print, i. e. will be proofed as paper tint.

The **First Printing Dot** and the **Last Printing Dot** settings allow you to control the highlight and shadow clipping in the proof, even if the measurement data does **not** correctly describe the target printing process. For example, because you have not measured any patches in the clipped highlight or shadow areas. Or because the first and/or last printing dot behavior of the target printing process slightly deviates from the printing process on which the characterization was based on. In these cases, GMG OpenColor will use the **First Printing Dot** and the **Last Printing Dot** settings to calculate a proof profile that simulates the target printing process including the adjusted **highlight** and **shadow clipping**.

With the option **Hard Edge**, you can control whether the transition in the highlight areas, i. e. from 0% to the **First Printing Dot** should be smooth or hard. For **flexographic** printing processes using **standard AM screening**, you should generally use the option **Hard Edge**. For gravure and offset printing processes, you should generally not use the option.

How does the clipping show up in the proof profile?

After GMG OpenColor has calculated a proof profile, you can check and correct the dot gain behavior of the profile (**Finalize** > **Edit** button).

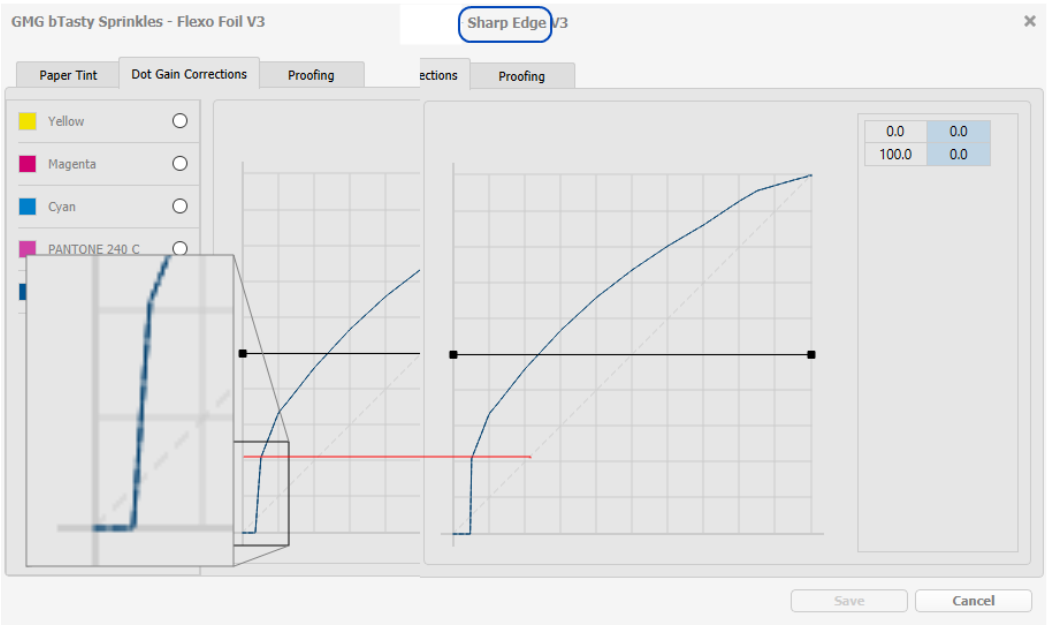


Fig. 19 Comparison of the dot gain curves with a first printing dot simulation with and without the option Hard Edge.

This illustration shows two screenshots of the dot gain curve of two proof profiles, with and without the option **Hard Edge**. You see that in both cases, the highlights are clipped. On the left side, you see the dot gain curve without the option **Hard Edge**. The transition between 0 and the first printing dot is zoomed in. On the right side, you see the dot gain of a proof profile that uses exactly the same characterization and settings, except for the **Hard Edge** option. The first printing dot is marked with a red line. It is a bit difficult to see the difference, but the curve without the **Hard Edge** option steps directly from 0 to 1 with an "infinite slope", i. e. straight vertical line. The curve with the **Hard Edge** option has a slightly lower slope, resulting in a smoother transition from 0 to 1.

How does the clipping show up in the proof?

Fig. 20 Document proofed in GMG ColorProof, with a first printing dot simulation with and without the option Hard Edge.

This image shows how the document will be printed in GMG ColorProof, without the **Hard Edge** option on the left and with the **Hard Edge** option on the right. The pink donut icing and the blurred highlights in the background show the typical hard edge on the right side.

2.7.2 Media

There are various media categories (parent papers) which define the supported media according to their basic properties. The media categories have different subcategories (media types), with different **surface** definitions, which help to further characterize the media.

Note The media should be defined according to the characteristics the media has **before** printing, to reflect the surface properties of the media such as its capability to handle the printing inks. Finishing processes applied **after** printing (such as lamination) are defined in the **Printing Process**.

Example:

If an uncoated medium is laminated **before** printing, it has the characteristics of a foil and needs to be set up as such. If the same medium is laminated **after** printing, it needs to be set up as **Paper Uncoated** with the lamination defined in the corresponding **Printing Process**.

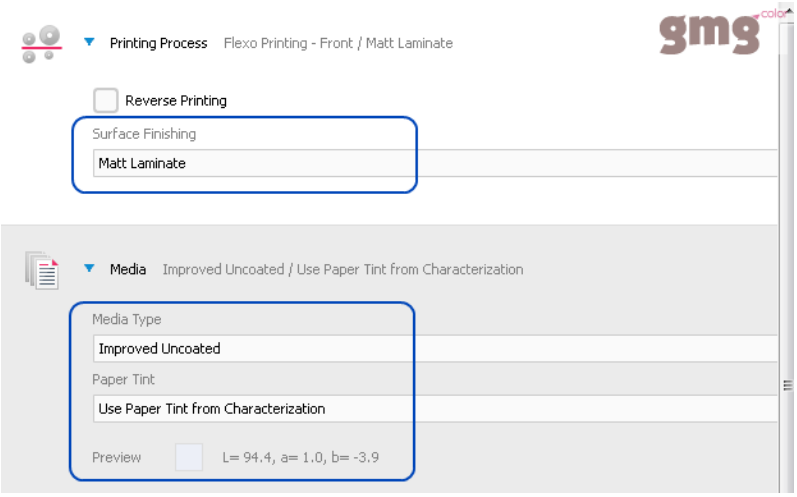


Fig. 21 Categorizing cardboard which is laminated after printing.

Media Types

Front or reverse printing?

All media types in GMG OpenColor have been set up for **front** printing except the media type **Film – Reverse Print**. Reverse printing, also called subsurface printing, is printing a reversed image on the backside of a transparent media.

In the following tables, you find descriptions to help you categorize your media. The media type also indicates the **compatibility** of a medium for an existing **characterization**: If the production material is the same media type, the prediction engine is able to predict the print result even though it is not exactly the same medium as was used for the characterization. For example, if you used a White Matte medium for characterization and are now using a different, but still White Matte media type for the print production, you can reuse the existing characterization. If the production material is glossy, you might not use this characterization.

Film—Front Print

All front printed media with film-like surface characteristics. For example, PE/ PP/ OPP films, or special packaging media such as cardboard laminated before printing.

Media Type	*Description*
Metallic + White Undercoat	Metallic foil with white undercoat (Please note that metallic effects from direct printing on the media with inks that are not completely opaque cannot be simulated.)
Transparent + White Undercoat	Transparent film with a white undercoat printed on top of the film before the other inks are applied.
White Glossy	White film with a glossy surface.
White Matte	White film with a matte surface.
White Semimatte	White film with a semimatte surface.
Prelaminated Cardboard	Cardboard that is laminated before printing, thus having a glossy, film-like surface.

Film—Reverse Print

All front printed media with film-like surface characteristics. For example, PE/ PP/ OPP films, or special packaging media such as cardboard laminated before printing.

Media Type	*Description*
Transparent + White Reverse Print	Transparent film with a white coating printed as a final layer on the other inks.

Paper—Cardboard Coated

All kinds of paper-like media with a surface coating. For example, typical coated printing papers or cardboards used in packaging and publication printing such as GD 2 coated cardboard.

Media Type	*Description*
Improved Coated	Papers or boards with a good quality surface coating. For example, improved light or medium weight coated media (Improved LWC/MWC), or cardboards with similar surface qualities.
Machine Finished Coated	Papers or boards with a medium quality surface coating. The surface texture of these media is produced in the paper-making process rather than in a separate coating step. For example, machine finished coated (MFC) papers, or cardboards with similar surface qualities.
Premium Coated	Papers or boards with a high-quality surface coating. For example, Woodfree Coated (WFC), gloss, semimatte or matte coated media.
Standard Coated	Papers or boards with a standard quality surface coating. For example, standard light or medium weight coated media (Standard LWC/MWC), or cardboards with similar surface qualities.

Paper—Cardboard Uncoated

All kinds of paper-like media with uncoated surfaces. For example, typical uncoated printing papers or cardboards used in packaging and magazine printing.

Media Type	*Description*
Improved Uncoated	Uncoated papers or boards with an improved brightness level and a smooth surface. For example, INP Improved Newsprint papers and standard uncoated cardboard.
Standard Uncoated	Uncoated papers with a standard, rather textured or “rough” surface. For example, SNP Standard Newsprint papers.
Super Calendered Uncoated	Uncoated papers with a slightly glossy surface due to the process of super calendering. For example, SC-A and SC-B papers.
Premium Uncoated	Premium uncoated papers or boards with a smooth surface. For example, Woodfree Uncoated (WFU), uncoated art papers, or high quality uncoated cardboard used in packaging and magazine printing.

Advanced Media Settings

The default values for **Media Gloss**, **Ink Adhesion**, and **Contrast** are inherent values of the selected media type. They primarily take effect with **single ink** measurement data to compensate "missing" overprint information. You can change these values, if required, but for most cases it is recommended to profile with the default values unless you encounter the described problems (see "Correcting the Paper Tint and Creating a Custom Medium" on page 51).

Media settings	*Description*
Paper Tint	The paper tint is displayed in Lab values so you get a better idea of where the white point is located. It can be defined by the selected characterization, or by a separate file. You can also directly measure the paper tint.
Media Gloss	Describes the media surface (the minimal CIEL luminance value).
Contrast	The effective range of the **Contrast** depends on the **Media Gloss** level and allows to fine-tune the color depth of the overprints in relation to the selected media. Simulating a print on uncoated paper, for example, usually requires less contrast than simulating a print on glossy coated paper, which can have a much higher contrast level. Generally, it is recommended to profile with the default values and only switch to another level if your prints turn out too light or too dark. The higher the **Contrast** level, the more contrast is applied. The white point and the highlights are not affected.
Ink Adhesion	Describes the printability of the media and potential ink trapping. Reducing the value reduces the ink film thickness of overprints which results in a reduction of the saturation and increases the lightness of the overprint of secondary and tertiary colors. If the proof is too saturated in the 2 to 4 colors overprints compared to the target print, the **Ink Adhesion** should be reduced.

How critical are the media settings for the profile quality?

The selected **Media** category has the biggest impact on the profile, as the difference between the media categories, for example film and uncoated paper, is very high. The listed subcategories (media types) basically differ regarding the **Media Gloss**.

Media settings have less impact if a full characterization (e.g. via TCN charts) is used.

2.7.3 Inks

Here, the inks used in the printing process are described.

→ You can deselect inks in the characterization that you do not want to use.

→ You can change the printing order of the inks by drag-and-drop.

→ You can define how an output color will be affected if the medium used in the project is different than the medium used in the characterization by setting the **Target Mode**.

See also:

- "Spot Colors and Paper Tint / White Point" on page 42
- "Correcting the Target Color and the Tone Value Curve" on page 53
- "Target Mode" on page 55

2.8 Spot Color Libraries

In GMG OpenColor, a spot color library serves as a collection of all spot colors that might be printed on the specified media type and under the specified printing condition.

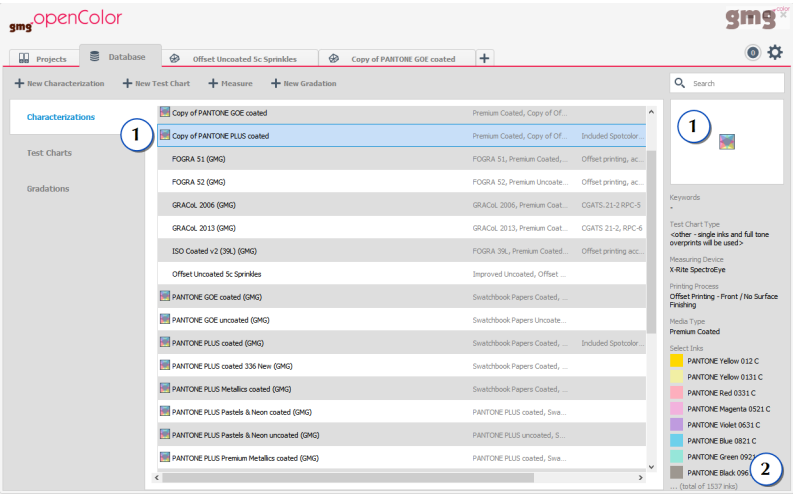


Fig. 22 Spot color library in the list view.

Spot color libraries are marked with a spot color icon (1). The info pane on the right will show more information on the selected spot color library such as the total number of colors (2) in the library. You can double-click to open one of your own libraries. Preinstalled GMG spot color libraries are read-only and cannot be opened. However, you can duplicate a library and then open it to adjust it to your needs.

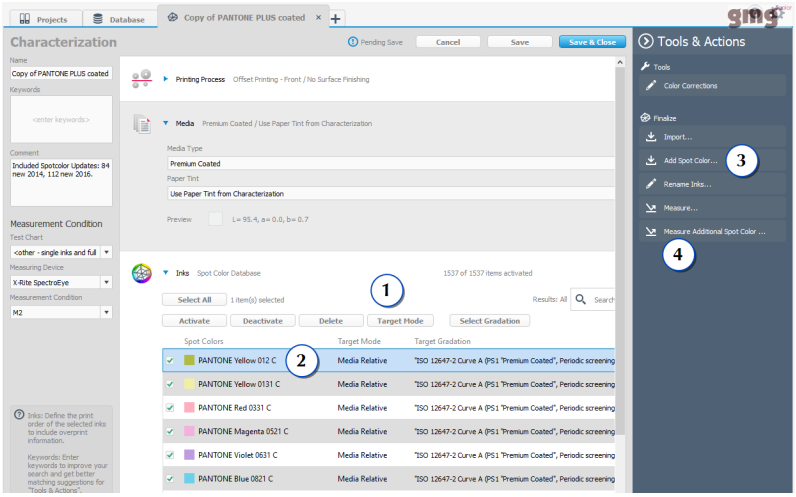


Fig. 23 Duplicated GMG library.

You can browse and search the library (1). You can double-click a spot color item (2) to edit the target value or the target gradation. You can add as many spot colors to the library as you need by importing measurements (3) or by measuring from the print product or color strip (4).

See also:

- "Measuring Colors without Test Chart" on page 24
- "Creating a Spot Color Library" on page 40

2.8.1 Creating a Spot Color Library

Create your own spot color library with all colors you might want to use later.

- You can **measure** any number of spots from one or multiple print products and then save the measurements as a spot color library.
- You can also create a spot color library from a **characterization** or vice versa.
- You can **duplicate** an existing spot color library and customize it.

How to create a new spot color library from scratch

If you have a **print product** or test chart, you can directly measure color patches from it to start your library. You do not even need a specific layout with "proper" color patches. Measuring full tones from the print product will be sufficient.

1. Start a measurement. From the **Source** list, select **Custom Patches**.
2. Measure the paper tint and any number of color patches.
3. Finish the measurement and create a characterization from it.
4. On the **Tools & Actions** panel, click **Convert to Spot Color DB** to convert the characterization into a spot color library. If you measured only full tone values, GMG OpenColor will perform this step automatically.

How to import a spot color library in CxF format

The ISO 17972-4:2018 standard defines a universal color exchange format in the form of a CxF document. You can use this standard file format for importing spot color libraries from other applications into GMG OpenColor.

The application recognizes relational information in the CxF file so that a spot color which might be characterized by a **solid** patch and **tints** of that color, for example Red 50%, Red 100%, will be imported correctly. GMG OpenColor will also read out **printing process** and **media information** from the CxF file. If the file contains information on multiple printing processes or media, GMG OpenColor will notify you, and you will be able to select the data you want to import.

1. On the **Database** tabbed page, under **Characterizations**, open an existing characterization or create a new one.
2. Select the **Printing Process** and the **Media**.
3. On the **Tools & Actions** panel, click the **Import** button and select the CxF file you want to import.

How to create a new spot color library from an existing characterization

If you have already measured or imported a **characterization**, you can extract all available colors to create a new spot color library from it.

You can create a spot color library **only** if the characterization does **not** contain any overprints.

1. On the **Database** tabbed page, under **Characterizations**, select a characterization and open it.
2. On the **Tools & Actions** panel, click **Convert to Spot Color DB** to convert the characterization into a spot color library.

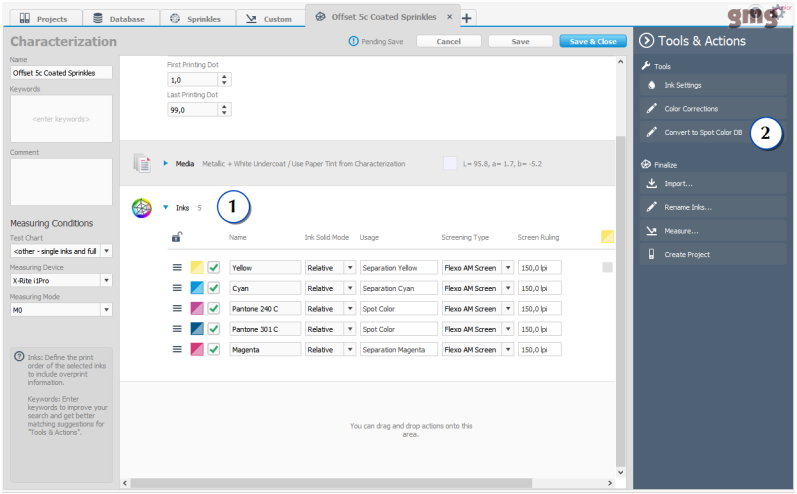


Fig. 24 A characterization (already existing or created from a new measurement).

You can see the 5 colors available in this characterization in the **Inks** group (1). Use the **Convert to Spot Color DB** action (2) to create a new spot color library from the 5 colors.

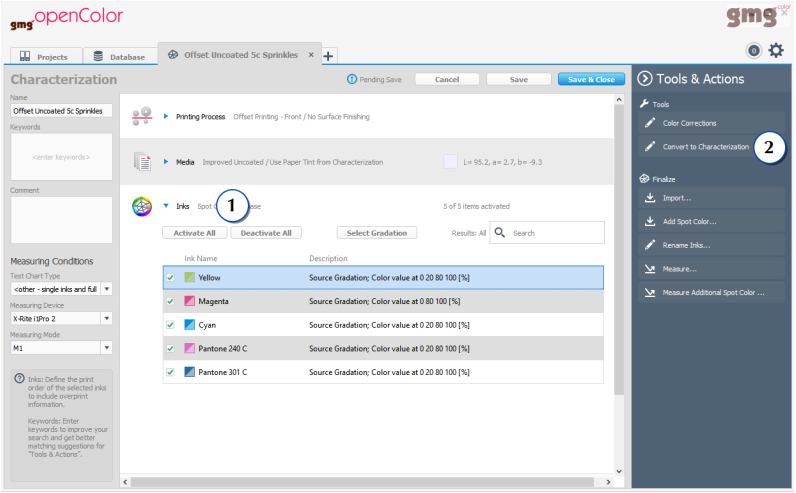


Fig. 25 Characterization converted into a spot color library.

The 5 colors are now saved as spot colors (1). You could use the **Convert to Characterization** action (2) to convert the spot color library to a characterization.

How to customize an existing spot color library

Extend or edit an already existing library, for example one of the included GMG libraries.

1. On the **Database** tabbed page, under **Characterizations**, select an existing spot color library and open it. GMG spot color libraries are read-only. You will need to duplicate a GMG spot color library first to customize it.
2. Select a gradation or use the tools on the **Tools & Actions** panel to edit the colors or to add new colors.

How to assign a gradation

If your spot color library contains only solid ink values, you can assign a gradation to define the tone value curve of the ink. If a color already has defined tints, you can assign a different gradation to redefine the tone value behavior.

1. On the **Database** tabbed page, under **Characterizations**, select an existing spot color library and open it.
2. In the **Inks** group, select all colors you want to assign the same gradation.
3. Click the **Select Gradation** button above the ink list.
   The **Select Gradation from Database** dialog box will be displayed. It will show only gradations of the type **Tonecurve**.
4. Select a gradation from the list and confirm with **OK**.

How to remove an assigned gradation

You can do the following to remove an assigned gradation from all selected colors. If only the solid value is defined in the library, the gradation will be **removed**. If the characterization contains **tints**, the gradation will be **reset** to the original tone value behavior.

1. On the **Database** tabbed page, under **Characterizations**, select an existing spot color library and open it.
2. In the **Inks** group, select all colors you want to remove the gradation.
3. Click the **Select Gradation** button above the ink list.
   The **Select Gradation from Database** dialog box will be displayed.
4. Click **Use Source Gradation**.

See also:

- "Measuring Colors without Test Chart" on page 24
- "Spot Color Libraries" on page 39
- "About Gradation Curves" on page 44

2.8.2 Spot Colors and Paper Tint / White Point

In GMG OpenColor, you can control the behavior of each **spot color** towards **paper tint** changes, i. e. proof a spot color either matching the **swatch book** or simulate how the paper tint will **affect** this spot color as explained in the following.

GMG OpenColor supports using the **same** spot color library in multiple projects using **different** print substrates, as long as the **Printing Process** and the **Media Type** are the same. For example, you can use the same spot color library for two projects based on **Flexo Printing** and **White Matte**, even though different media are used. This means the paper tint and/or color appearance of the media in the print product will be different.

Generally, a color accurate proof regards the paper tint of the production material. The proof profile will account for the paper tint differences between the material used for the characterization and used for the print production. However, regarding spot colors, one can distinguish between two different cases in the print production:

- If the spot color ink is not reformulated with regard to the medium, the paper tint of the final production material will have an impact on the printed color. In other words, the printed color will **not** match the **swatch book**. For a color accurate proof, you will need to simulate this **color change**.
- If the spot color is printed in a way so that the final print result still **matches** the **swatch book**, the paper tint will still have an impact on the process colors, but **not** on the spot color. This is simulated in the proof by a **relative** colorimetric rendering of the **process colors** and an **absolute** colorimetric rendering of the **spot color**. For example, you might use a different ink formulation to compensate the paper tint and come as close to the target spot color as technically possible. Also, if you are not using a premixed spot color ink, but reproduce spot color inks by using a fixed ink setup, you might also want to reproduce the spot color exactly as it was specified.

In GMG OpenColor, you can control the behavior specifically for **each** ink used in a project, as the requirements might be different from project to project and sometimes even from ink to ink in the same project.

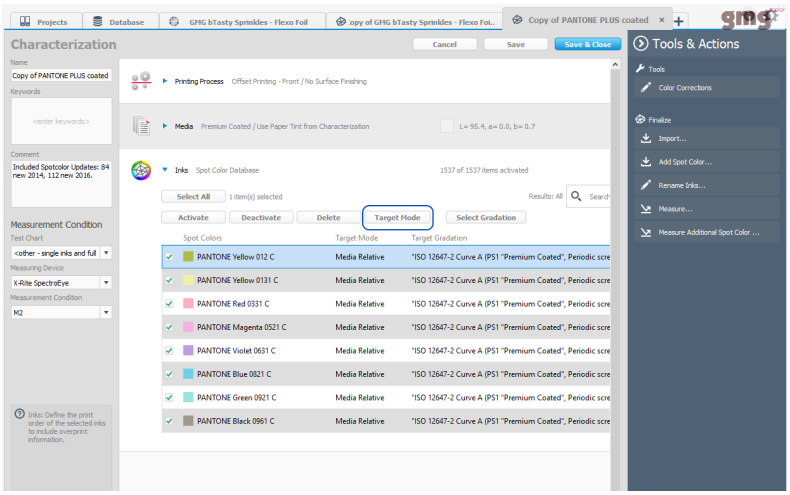


Fig. 26 Target Mode.

In GMG OpenColor, you will set a default **Target Mode** for each color in a characterization or spot color library. You are then able to change the mode for each ink used in a project in the **Color Corrections** dialog box.

Note The **Target Mode** is important only if the production material is different from the material that was used for the characterization. If the paper tint and color appearance are the same, it will have no effect.

See also:

- "Inks/Characterizations" on page 48
- "Correcting the Target Color and the Tone Value Curve" on page 53
- "Target Mode" on page 55

3. About Gradation Curves

In GMG OpenColor, you can use gradation curves for the following purposes:

- To specify the tone value curve of an ink if only **solid ink** measurements are available. This allows you to predict the ink behavior in the proof when the design uses tints. The factory-default PANTONE inks, for example, are all linked to one of the ISO gradation curves listed in the **Database**. (It is mandatory to specify a gradation curve if only solid ink measurements are available.)
- To change the tone value gradation of an ink if the target printing process is **different** from the characterization. This allows you to flexibly reuse existing characterization data to proof similar printing processes with different tone value curves.
- As a **RIP compensation curve**.

Calculation Methods for Tone Value Curves

In GMG OpenColor, make sure to use the **same** calculation method that is used at the printing press to ensure a print-to-proof match.

Note The two calculation methods are not compatible with each other. If you have imported or created a gradation curve based on the Murray-Davies equation, you cannot simply change it to SCTV in GMG OpenColor. If you want to use an SCTV curve, you will have to import SCTV data or create a new curve. However, GMG OpenColor allows you to view a Murray-Davies curve in SCTV mode and vice versa, so that you can see how it would look like.

Note Switching the **Calculation Method** from **Murray-Davies (MD)** to **Spot Color Tone Value (SCTV)** in the **Color Corrections** dialog box is possible **only** if the spot color characterization includes **tint** values and if **no** correction has been applied so far. This means, if either a gradation curve was loaded as a correction curve or if the calculated gradation curve was edited manually, the **Calculation Method** drop-down list will be disabled. This also means that if you are using a factory-default GMG spot color library such as PANTONE PLUS, the **Calculation Method** drop-down list will be disabled, as these libraries include only full tone values. However, you can load a custom gradation curve created with the **Spot Color Tone Value (SCTV)** calculation method to use the new method for these spot colors.

Available options	*Description*
Spot Color Tone Value (SCTV)	ISO 20654:2017 defines a metric for assessing intermediate tones of a spot ink. Instead of density, it works based on color measurements. It is able to produce approximately uniform visual spacing of tones between substrate and solid.
Murray-Davies (MD)	The **Murray-Davies equation**. is a traditional method to calculate tone values of CMYK inks from density measurements. This method has its limitations when it is applied to spot inks.

Where do I get gradation curves from?

- From the software used to calibrate / standardize the printing press.
- From measurements of the sample print.
- Use the **default** Offset gradation curves listed in the GMG OpenColor **Database**. These curves are ISO curves which conform to the PSO (Process Standard Offset). For Flexo printing, it is recommended to create your own gradation curves.
- Create one yourself. Since the values between the fulcrums are interpolated in a linear way, it is important to define a curve with more than just two or three fulcrums.

How do I create a gradation curve?

You can create a gradation curve either by selecting and duplicating an existing curve or by creating a gradation from scratch, as described in the following.

1. On the **Database** tab, click **New Gradation**.
   A new gradation curve is displayed as a straight line.
2. Enter a name for the gradation.
3. Select the **Type**. In case of a **Tone Value Curve**, select the **Calculation Method**.
4. Left-click on any point of the curve to add fulcrums. (Remove fulcrums by right-clicking on a fulcrum.)
5. Click-and-drag fulcrums, or enter values into the gradation table to shape the curve.
6. **Save** the gradation to the **Database**.

Tip Values in-between fulcrums are interpolated by linear regression. We recommend to add fulcrums in 10% or even smaller steps.

See also:

- "Creating a Spot Color Library" on page 40
- "Correcting the Target Color and the Tone Value Curve" on page 53
- "RIP Compensation Curves" on page 73

4. Projects

4.1 Projects

As in real life, each packaging product can be stored and managed within a **project folder**. A project folder holds all the data you need for a product as a **link** (to keep all data editable).

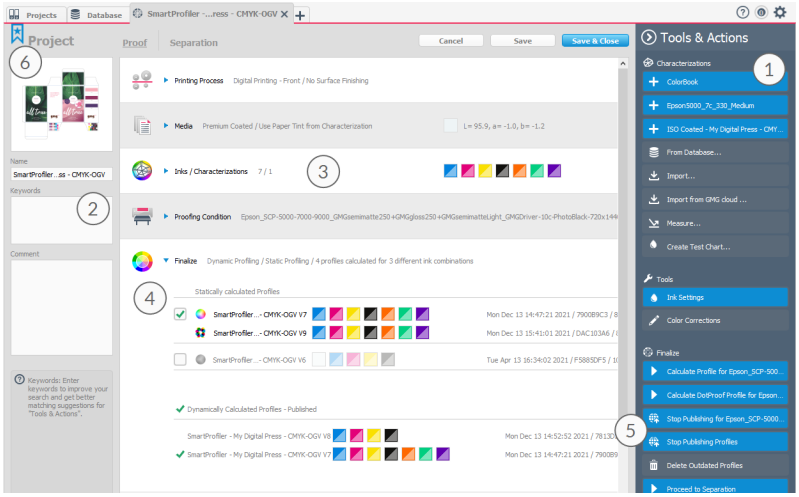


Fig. 27 Project settings.

After setting the printing process and media for your project, you need to add a characterization. If you tagged your characterization with a **keyword**, the characterization will show up on the **Tools & Actions** panel right first place (1), as soon as you enter that keyword in your project (2). Without keywords, all suggestions on this panel are sorted alphabetically.

The measurement data (characterization) is displayed in the **Inks / Characterizations** (3) section. Click the blue triangle icon to show all available in the project. You can change the ink sequence, if required, or the ink usage.

You can create profiles in a **dynamic** way (on-the-fly via GMG ColorProof), or you can create **static** profiles right within GMG OpenColor. All created profiles are stored in the **Finalize** section of a project (4). You can export and edit the profiles from here. To make the project data and profiles available to GMG ColorProof, they need to be published (5).

Add a **bookmark** (6), if you want to show your project among the **Favorites** on the **Projects** tab.

See also:

- "Dynamic Profiling" on page 62
- "Static Profiling" on page 64
- "Publishing Projects and Profiles" on page 65

4.2 Media

The **Media** section of the **Project** form describes the final production material. Here, you can adjust differences between the characterization and the final print production.

Group	*Short description*	*See also*
Media Type	The **Media Type** is a rough classification with underlying **Media Settings**, shown in the **Color Corrections** dialog box. The **Media Type** of the **Project** needs to match the **Media Type** of the **Characterization**. Otherwise, the GMG OpenColor prediction engine will not deliver correct results.	"Media Types" on page 37

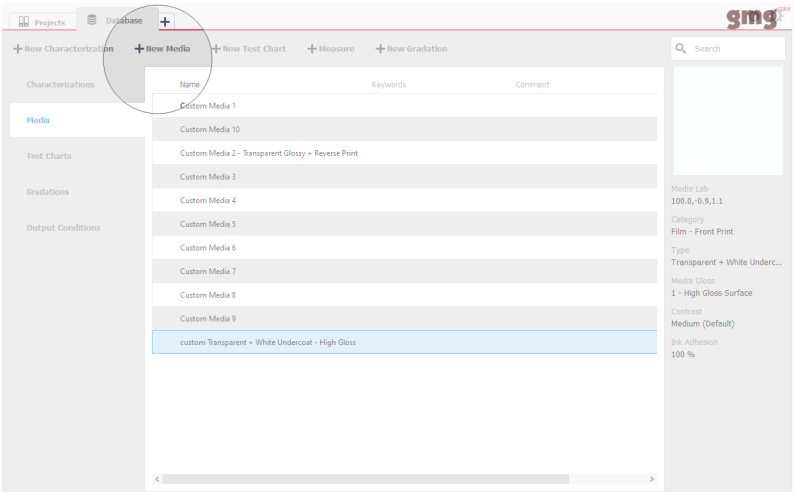
Group	*Short description*	*See also*
Paper Tint	Per default, the paper tint from the **characterization** is used. If you are combining multiple characterizations with different paper tints in one project, the paper tint from the **top** item of the **Characterizations** list is used. You can edit the paper tint and other media related properties in the **Color Corrections** dialog box. If you are saving the changes to the database, you will create a new custom medium. You will then be able to directly select this custom medium from the **Paper Tint** list in any project using the same **Media Type**.	"Correcting the Paper Tint and Creating a Custom Medium" on page 51

4.2.1 Organizing Custom Media

To simplify the adaption of the media to the target production stock, you can organize your custom media in the separate **Media** library (**Database** > **Media**). You can easily create new media, edit the paper tint or other media properties of existing media, and clean up unused media.

Creating a new custom medium

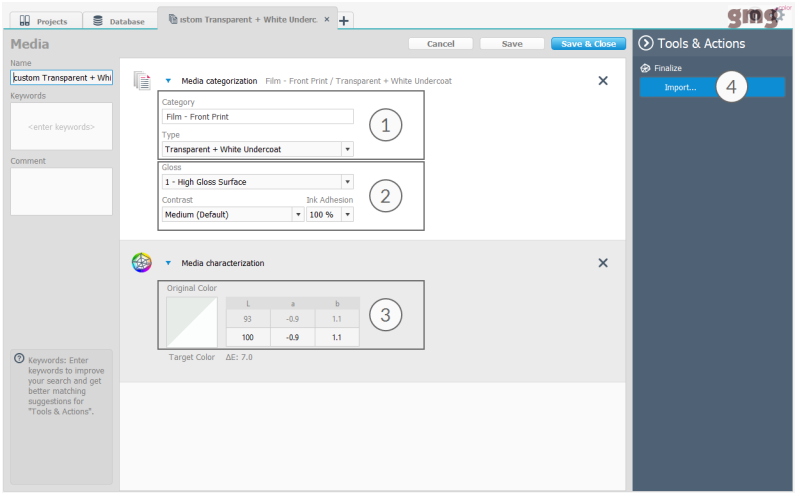
To create a new custom medium from a spectral measurement file, you can click the **New Media** button and then click the **Import** button on the **Tools & Actions** pane to load the measurement file.



If you just want to change the paper tint or media properties (without measuring), you can open a project that is already using the medium you want to customize, open the **Color Corrections** dialog box from the **Tools & Actions** pane, and click the **Save to Database** button (see "Correcting the Paper Tint and Creating a Custom Medium" on page 51).

Editing a custom medium

The screenshot shows the settings you can edit.



1 **Media Category** and **Media Type**. These settings will be used as a classification of media. When selecting a medium in a project, you will see only media of the same **Media Category** and **Media Type** in the list.

2 **Media properties** that will affect the profile.

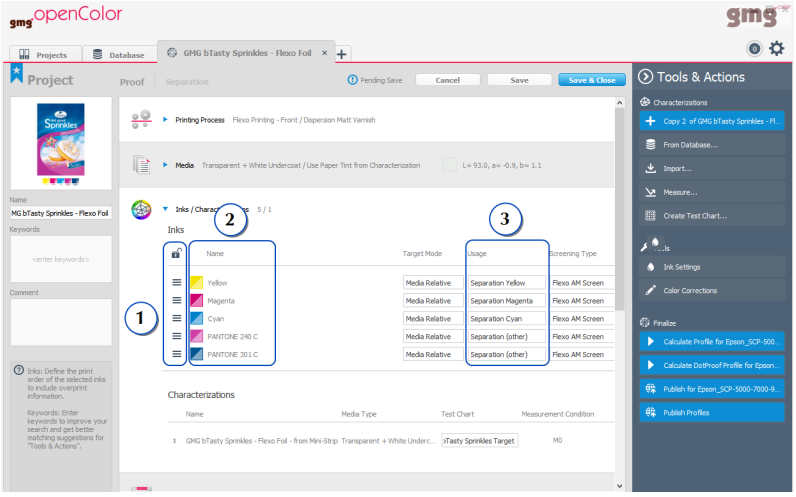
3 **Paper tint**. You can change the original paper tint (from the measurement/characterization) to a new target value (from the production stock).

4 You can import a new **spectral measurement file** to define the medium. The application will read out the paper tint from the measurement and update the **original** paper tint.

All projects referring to a changed medium will be updated automatically as well. This does not only save time and makes your life easier, but also ensures consistent paper tints across your projects and thus that the correct paper tint will be used in the proof.

4.3 Inks/Characterizations

The project inks provide flexibility in profiling without changing the underlying characterization. This way, you can create various profiles in one project.



The print order (1) reflects the sequence in which the inks are printed in the printing machine and should not be changed if overprint information is involved and required (see "Changing the Ink Sequence" on page 49). The **Usage** of the inks (2) determines how much overprint information and how many fulcrums are used to generate a profile.

The ink list provides you with an **overview** on the overprint information (3) contained in the selected characterization. Each check mark represents overprint information of two inks. In our example, you can see that there is overprint information for each ink combination.

See also:

- "Ink Settings" on page 93

4.3.1 Changing the Ink Sequence

→ You can **unlock** and change the ink sequence by clicking the lock icon.

→ You can **lock** and thus finalize the ink sequence by clicking the lock icon.

When changing the ink sequence, the application checks if the underlying characterization contains **overprint** information. If this is the case, it checks whether this overprint information is still valid for the ink sequence order or not. Characterizations without overprint information are valid for any ink sequence.

How to change the ink sequence

1. **Inks / Characterizations**: Click the lock icon to **unlock** the ink sequence.
   The numbered ink list changes to an unnumbered ink list.
2. Select the ink you want to move with the mouse, and drag it to the desired place.
   In our example, PANTONE 240 C is moved to the list bottom.
3. Click the lock icon after you are finished to confirm and **finalize** the new ink sequence.

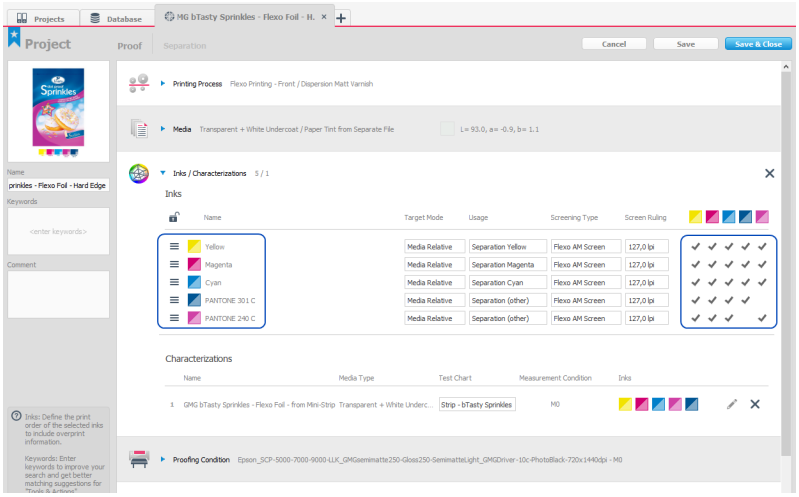
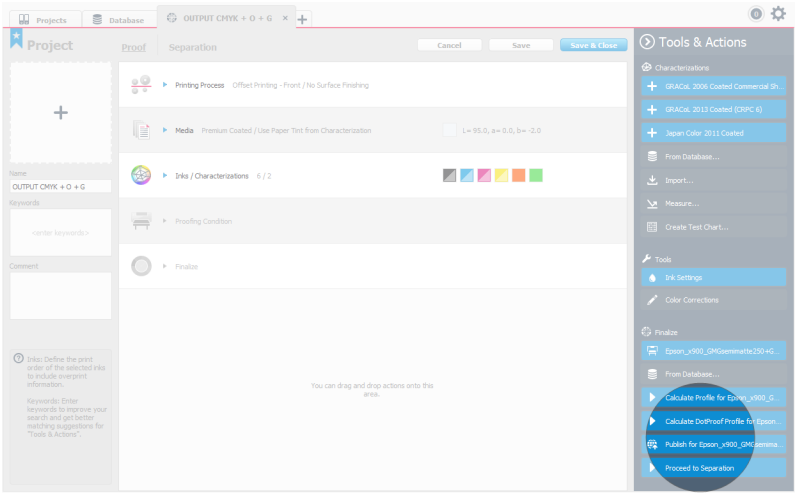


Fig. 28 Changing the ink sequence.

In this example, the two Pantone inks have swapped places. As you can see in the overprint overview on the right side, the overprint information is clearly **reduced** (fewer checkmarks indicating overprints), but not completely removed. Only overprint information of inks directly affected by the change will not be used.

4.4 Calculate Proof Profile or Proceed with Separation

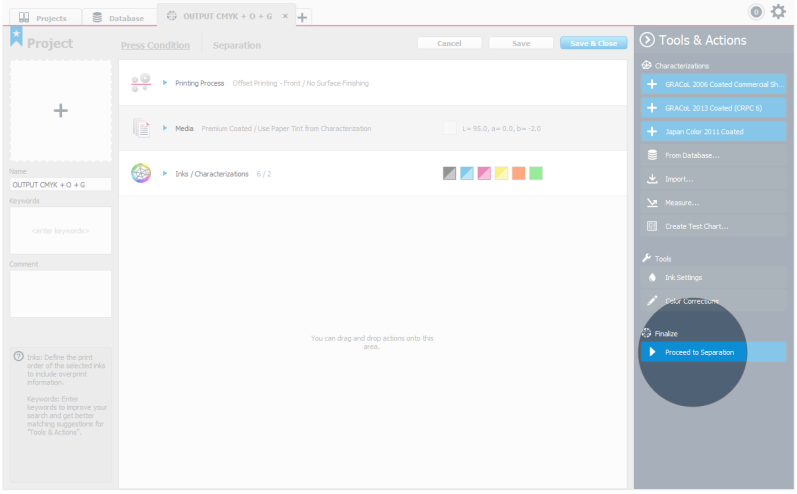
When you have defined and characterized the output press condition, you can calculate a proof profile in GMG OpenColor and then print a proof in GMG ColorProof.



Please follow the link for more information: "Proofing Condition" on page 59

If you have an **OpenColor Separation Only** license or if you do not wish to print a proof, you can also proceed directly with the separation. To do so, click the **Proceed to Separation** button on the right side.

With an **OpenColor Separation Only** license, the tabbed page on the left side, next to **Separation**, will be shown as **Press Condition**. The **Proofing Condition** and **Finalize** steps are not required and will not be visible.



Please follow the link for more information: "Creating Separation Profiles" on page 87

5. Color Corrections

5.1 Color Corrections

The **Color Correction** tools allow you to adjust your data to the actual printing project, so that the printed proofs match the print products as close as technically possible.

You can make the corrections either on the **Characterization** or on the **Project** level. **Corrections** on the **Characterization** level will be applied to all projects based on this characterization. **Corrections** on the **Project** level adjust a project to a specific print product, including production material and printing process details.

Correction type	*Short description*	*See also*
Paper Tint	Adjust the paper tint and other media related properties from the characterization to the production material.	"Correcting the Paper Tint and Creating a Custom Medium" on page 51
Target Color	Define the target color of an ink, as it will be printed on the production material and using the final printing process.	"Correcting the Target Color and the Tone Value Curve" on page 53

5.2 Correcting the Paper Tint and Creating a Custom Medium

To adjust the paper tint to the production material, you can import spectral measurement data or directly edit the Lab target value. A spectral measurement is generally the method of choice as it is more precise.

Note Paper tint corrections are not only applied to the white point, but are calculated into **all** inks that are set to **Relative**.

How to correct the paper tint

1. From a **Characterization** or **Project**, on the **Tools & Actions** panel, click **Color Corrections**.
2. From the ink list on the left, select **Media**.
3. **Import** a spectral paper tint measurement (1).
   —OR—
   Directly edit the **Target Value** (2).
   The paper tint will be changed accordingly and the preview will be updated (3).
4. Click **Save to Database** to save the paper tint and and other media related properties as a new **custom medium** to the database.

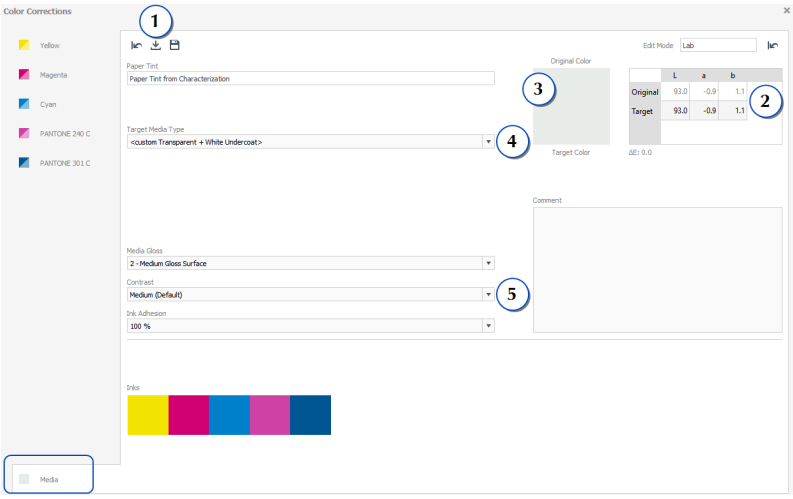
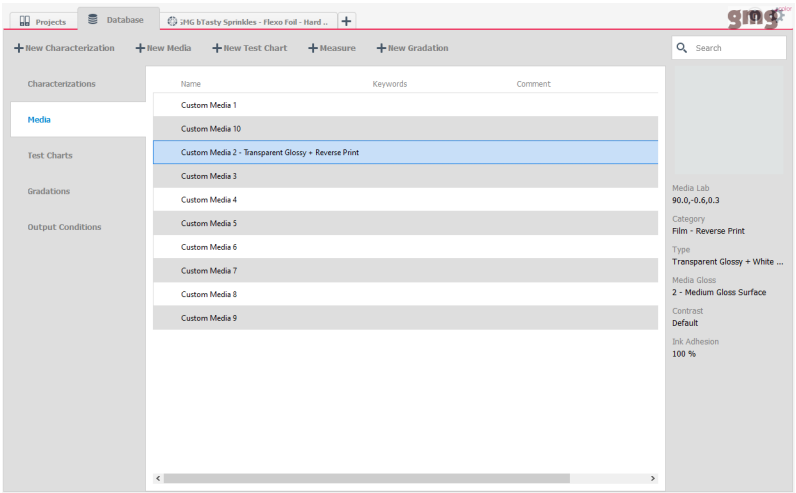


Fig. 29 Editing the Paper Tint.

The media type defined in the characterization is displayed as **Target Media Type** (4) with the dependent media settings (5). You can change these settings if required, but for most cases it is recommended to profile with the default values (see "Advanced Media Settings" on page 38).

The custom medium will be available for later use in other projects using the same media type. It will be shown in the **Database** form under **Media**.



See also:

- "Spot Colors and Paper Tint / White Point" on page 42

5.3 Correcting the Target Color and the Tone Value Curve

The target color of an ink describes how the ink will be printed (and measured) in the print production using the production material, and is as such the reference for the proof.

You can correct the target value of the solid ink as well as the tone value curve in the characterization. Properties of the characterization are handled as defaults for all projects using this characterization. Those properties can be changed on the project level. These changes apply only to this project and all separation rules created from this project.

How to correct the target color

1. From a **Characterization** or **Project**, on the **Tools & Actions** panel, click **Color Corrections**.
2. From the ink list on the left, select any ink.
3. Optional: You can also hold down the CTRL button to select multiple inks.
4. Change the **Target Mode**. Select **Custom** to directly edit the target value.

The target value of the selected inks will be changed accordingly and the preview will be updated.

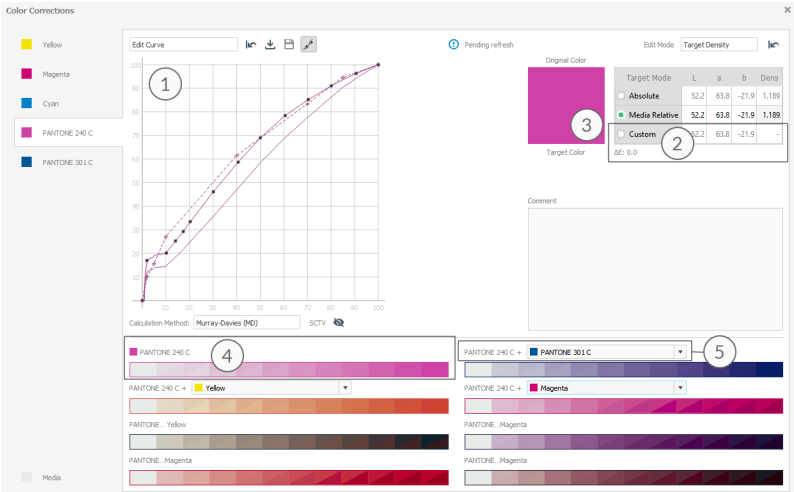


Fig. 30 Editing the Target Color.

In the screenshot, a single ink "PANTONE 240 C" is selected.

The graph (1) shows the **tone value behavior** of the selected ink (see "Tone value curve" on page 54).

You can change the **Target Mode** and directly enter a custom target value (2) for the solid ink (see "Target Mode" on page 53). The preview of the solid ink (3) and the tone value behavior (4) will be updated accordingly. For each color tone, the preview shows both the color values from the **characterization** (top left) and the color values that will be used in the **profile** (bottom right). You can select additional inks to show the overprint behavior (5). This way, you can easily see how color corrections will affect the profile.

Target Mode

The **Target Mode** can be set in the characterization. The mode set in the characterization is handled as a default value for all input projects using this characterization. It can then be changed in the input project. This change applies only to this project and all separation rules created from this project.

Option	*Description*
Absolute	This is the best option for most applications. The target full tone (100%) from the characterization will be preserved. Changes in the print medium used in the project will be ignored. The printed spot color will match the swatch book.
Media Relative	The target color will be recalculated to simulate the print results on the print medium used in the project. The **Density** value can still be changed, to reflect last minute changes during the final printing process.
Custom	You can enter a custom **Lab** or **Density** value as the target value for the selected color.

Tone value curve

In the graph, you can see three tone value curves as explained in the following table. The **Calculation Method** used to calculate the curves is shown in the drop-down list. You can switch the method as long as you do not have manually edited the curve or loaded a gradation curve. The graph will be updated accordingly.

	Line	*Shown data*
	Dashed line in ink color	**Original** tone value behavior derived from the characterization.
	Solid line in ink color	**Actually used** tone value behavior which will be simulated in the proof. The application calculates this curve from the **original** and **target** curve. If you are working in **Murray-Davies (MD)** mode, you can click the eye button to show and hide the **SCTV** curve and vice versa.
	Dashed gray line, black data points	Loaded **target** gradation curve. On the drop-down list, you can click **Load Curve** to load a gradation curve from the database. On the drop-down list, you can click **Edit Curve** and then click the line to add or move data points. As the line is usually partially overlaid with the actually used tone value curve, it might be difficult to see the dashed gray line in the graph.

How to change the tone value curve

If you want to simulate a printing condition with a different ink behavior, you can change the tone value curve of one or multiple inks in the project.

Note It is **not** possible to change the **Calculation Method** after you have manually edited the curve or loaded a gradation curve. If you want to switch to another **Calculation Method**, you will need to reset the curve. However, GMG OpenColor allows you to view a Murray-Davies curve in SCTV mode and vice versa, so that you can see how it would look like.

1. From a **Characterization** or **Project**, on the **Tools & Actions** panel, click **Color Corrections**.
2. From the ink list on the left, select any ink.
3. From the drop-down list, select **Load Curve**.
   The **Select Gradation from Database** dialog box will be displayed. It will show only gradations of the type **Tonecurve**.
4. Select a gradation from the list and confirm with **OK**.
   —OR—
5. Click the **Import** button to import a text file.
   The graph and the preview will be updated accordingly.

See also:

- "Inks" on page 39
- "Spot Colors and Paper Tint / White Point" on page 42
- "About Gradation Curves" on page 44
- "Target Mode" on page 55

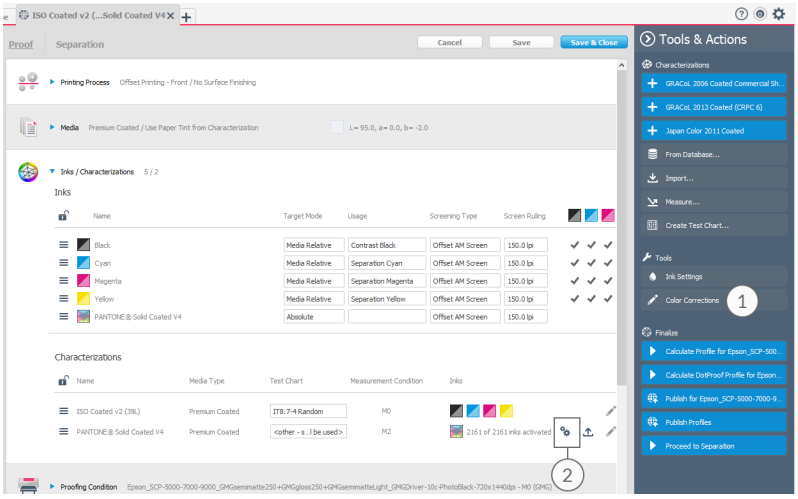
5.4 Target Mode

The **Target Mode** can be set in the characterization. The mode set in the characterization is handled as a default value for all input projects using this characterization. It can then be changed in the input project. This change applies only to this project and all separation rules created from this project.

Option	*Description*
Absolute	This is the best option for most applications. The target full tone (100%) from the characterization will be preserved. Changes in the print medium used in the project will be ignored. The printed spot color will match the swatch book.
Media Relative	The target color will be recalculated to simulate the print results on the print medium used in the project. The **Density** value can still be changed, to reflect last minute changes during the final printing process.
Custom	You can enter a custom **Lab** or **Density** value as the target value for the selected color.

Change the Target Mode in a project

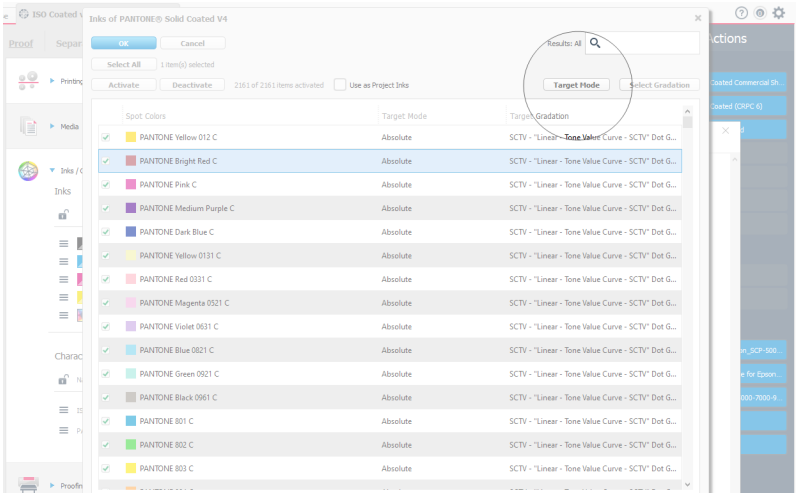
In the input project, you use **project inks** and you might also use a **spot color library**. Both can be found under **Inks / Characterizations**.



To edit the project inks, you click the **Color Corrections** button (1) on the **Tools & Actions** panel. To edit the spot color library, you click the gearwheel button (2).

Change the Target Mode for a color in a spot color library

Select the color you want to change and then click the **Target Mode** button. Then select the appropriate **Target Mode** from the list.



Change the Target Mode in a characterization

Please follow the link for more information: "Correcting the Target Color and the Tone Value Curve" on page 53

6. Proofing

6.1 I'm an Experienced GMG ColorProof User–What's the New Proofing Strategy?

Basically, the working procedure in GMG ColorProof is the same, whether you are using standard CMYK or OpenColor proof profiles: You create a manual job or workflow and select a proof standard or profile.

The following table lists all **differences** between working with standard CMYK and OpenColor profiles.

Feature	*GMG ColorProof*	*GMG OpenColor*
Color management	CMYK profile + **spot color set**	Multichannel profile
	CMYK process colors are mapped to CMYK profile channels. Spot color channels are mapped to matching spot colors defined in spot color sets.	All image channels (CMYK, spots) are mapped to OpenColor profile channels.
Number of profile channels	**4**	Up to **15**
Characterization data	**Lab** target values	**Spectral** characterization data
Printing processes	**Standardized** printing processes such as ISO Coated v2	**Non**-standardized printing processes
Process specific profiling	Printing process related information is not taken into account. The same spot color set can be used together with any proof standard.	Various process specific parameters are taken into account such as process and media characteristics and surface finishing effects.
Overprint simulation	Simple overprint algorithm (**Choose** / **Define Spot Color** > **Multiply Channels**)	Complex and precise overprint prediction based on spectral overprint information and process relevant prediction models
Supported proof printers and media types	Wide range supported	Printers with extended color space in combination with GMG ProofMedia
Reuse of characterization data	1-to-1 ratio: Each profile requires its own set of measurement data.	1-to-many ratio: Measurement data can be flexibly combined to create multiple profiles.
Printing ink sequence	You cannot change the print order of CMYK inks.	You can flexibly create a profile for **any** combination of printing inks, including changing the **print order**.
GMG FlexoProof	**Paper texture simulation** supported	Paper texture simulation **not** supported
Profiling	You can create and edit CMYK profiles in GMG ProfileEditor. Custom spot colors can be created and edited in GMG SpotColor Editor, or optimized with the Spot Color Optimization wizard in GMG ColorProof.	You can create and edit **multichannel** profiles in GMG OpenColor using various editing tools. Contone profiles can be created almost automatically, on-the-fly. Halftone (DotProof) proof profiles can be created manually only.

What are the differences in DotProof profiling?

Feature	*GMG ColorProof / GMG ProfileEditor*	*GMG OpenColor*
RIP parameters	**DotProof** CMYK profiles take the RIP compensation curve into account.	Multichannel **DotProof** profiles created in GMG OpenColor take the RIP resolution, screen ruling and angles, and the RIP compensation curve into account.
Ink usage	-	The profiling is very precise due to a defined ink usage.
Iteration test chart	To optimize the profile, a standard test chart is used	Test charts for optimizing the profile are generated individually for each profile.
Spot color dot gain	To simulate the dot gain of spot colors, you need to define gradation corrections in GMG SpotColor Editor.	The dot gain of spot colors is part of the measurement and does not need to be created separately via gradation corrections.

6.2 Supported Proof Printers, Proof Media, and Print Modes

To ensure reproducible high profile quality, only a suitable range of printer and media combinations are supported for dedicated print modes. These proofing conditions are the standard recommendation of GMG for the packaging industry.

Supported Proofing Conditions (Contone)

Printer	*Media*	*Print Mode*
Epson SC-Px000 (with violet ink setup)	GMG ProofMedia premium semimatte 250 GMG ProofMedia premium gloss 250 GMG ProofPaper semimatte light GMG ProofMedia premium OBA semimatte 250 GMG ProofMedia studio OBA semiMatte 200 GMG ProofMedia studio OBA matte 150	720x1440 dpi 10c Photo Black
Epson SC-Px000 (with violet ink setup)	GMG ProofPaper matte 140 GMG ProofMedia studio OBA matte 150	720x1440 dpi 10c Matte Black
Epson SC-Px000 LLK (with LLK ink setup)	GMG ProofMedia premium semimatte 250 GMG ProofMedia premium gloss 250 GMG ProofPaper semimatte light GMG ProofMedia premium OBA semimatte 250 GMG ProofMedia studio OBA semiMatte 200 GMG ProofMedia studio OBA matte 150	720x1440 dpi 10c Photo Black
Epson SC-Px500	GMG ProofMedia premium semimatte 250 GMG ProofMedia premium gloss 250 GMG ProofPaper semimatte light GMG ProofMedia premium OBA semimatte 250 GMG ProofMedia studio OBA semiMatte 200	1200x1200 dpi 11c Photo Black
Epson SC-Px500	GMG ProofPaper matte 140 GMG ProofMedia studio OBA matte 150	1200x1200 dpi 11c Matte Black
Epson SC-S80600	JetComp 8502 Clear Poly Film	720x1440 dpi 9c W Reverse Print
Epson SC-S80600	JetComp 8502 Clear Poly Film JetComp 8503 White Cavitated Poly Film JetComp 8508 Metallized Polypropylene JetComp 8510 White Poly Label JetComp 8515 White LDPE Freezer Bag Film Custom media available via Calibration Creation Wizard. **GMG OpenColor Profiler Base Profiler** license plus **Profiling Prototype Proofing** option are required. (see "Available GMG OpenColor Licenses" on page 10)	720x1440 dpi 9c W (supports White ink printing) Custom print modes available via Calibration Creation Wizard. **GMG OpenColor Profiler Base Profiler** license plus **Profiling Prototype Proofing** option are required. (see "Available GMG OpenColor Licenses" on page 10)
Epson Stylus Pro x900	GMG ProofMedia premium semimatte 250 GMG ProofMedia premium gloss 250 GMG ProofMedia premium OBA semimatte 250 GMG ProofMedia studio OBA semiMatte 200 GMG ProofMedia studio OBA matte 150 GMG ProofPaper semimatte light	720x1440 dpi 10c Photo Black
Epson Stylus Pro x900	GMG ProofPaper matte 140 GMG ProofMedia studio OBA matte 150	720x1440 dpi 10c Matte Black
Epson Stylus Pro WT	GMG ProofMedia premium semimatte 250 Epson ClearProof Film Epson ClearProof Thin Film Epson MetallicProof Film	720x1440 dpi 6c+OG Photo Black Reverse print (supports White ink printing on film)
HP Designjet Z3200	GMG ProofMedia premium semimatte 250 GMG ProofMedia premium gloss 250 GMG ProofPaper semimatte light	1200 dpi 10c Photo Black

HP Designjet Z3200	GMG ProofPaper matte 140	1200 dpi 10c Matte Black
Canon imagePROGRAF x350, x450	GMG ProofMedia premium semimatte 250 GMG ProofMedia premium gloss 250 GMG ProofMedia premium OBA semimatte 250 GMG ProofMedia studio OBA semiMatte 200 GMG ProofPaper semimatte light	2400x1200 dpi 11c
Roland VersaUV LEC2-300 Roland VersaUV LEC2-330 Roland VersaUV LEC2-640	Custom media available via Calibration Creation Wizard. **GMG OpenColor Profiler Base Profiler** license plus **Profiling Prototype Proofing** option are required. (see "Available GMG OpenColor Licenses" on page 10)	Custom print modes available via Calibration Creation Wizard. **GMG OpenColor Profiler Base Profiler** license plus **Profiling Prototype Proofing** option are required. (see "Available GMG OpenColor Licenses" on page 10)

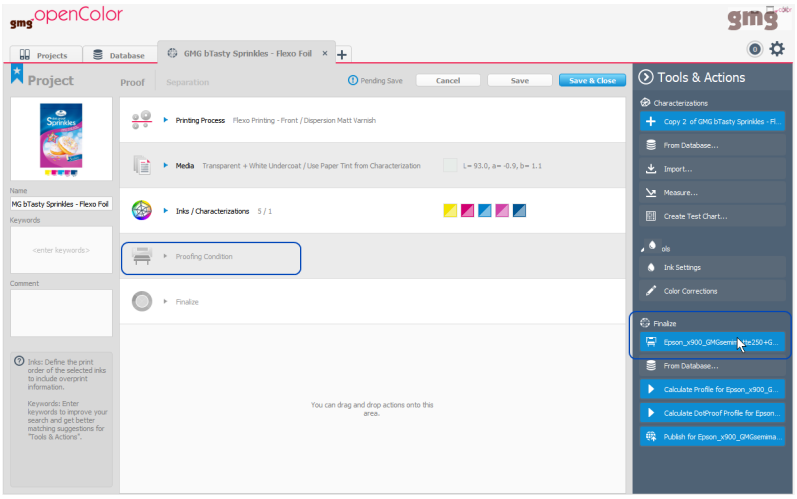
Supported Proofing Conditions (DotProof)

Printer	*Media*	*Print Mode*
Epson SC-Px500	GMG ProofMedia premium semimatte 250 GMG ProofMedia premium gloss 250 GMG ProofPaper semimatte light GMG ProofMedia premium OBA semimatte 250 GMG ProofMedia studio OBA semiMatte 200	1200x1200 dpi 11c Photo Black
Epson SC-Px500	GMG ProofPaper matte 140 GMG ProofMedia studio OBA matte 150	1200x1200 dpi 11c Matte Black
Epson SC-P7000 (with violet ink setup)	GMG ProofMedia premium semimatte 250 GMG ProofMedia premium gloss 250 GMG ProofPaper semimatte light	720x1440 dpi 10c Photo Black
Epson SC-S80600	JetComp 8502 Clear Poly Film	720x1440 dpi 9c W Reverse Print (supports White ink printing)
Epson SC-S80600	JetComp 8502 Clear Poly Film JetComp 8503 White Cavitated Poly Film JetComp 8508 Metallized Polypropylene JetComp 8510 White Poly Label JetComp 8515 White LDPE Freezer Bag Film	720x1440 dpi 9c W (supports White ink printing)
Epson Stylus Pro x900	GMG ProofMedia premium semimatte 250 GMG ProofMedia premium gloss 250 GMG ProofPaper semimatte light	720x1440 dpi 10c Photo Black
Epson Stylus Pro WT	GMG ProofMedia premium semimatte 250 Epson ClearProof Film Epson ClearProof Thin Film Epson MetallicProof Film	720x1440 dpi 6c+OG Photo Black Reverse print (supports White ink printing on film)

6.3 Proofing Condition

The **Proofing Condition** describes the color space of the used proof printer, proof media, and print mode, used in GMG ColorProof to print the proof.

→ Open a project and select a **Proofing Condition** on the **Tools & Actions** panel.



You can select a **default** proofing condition in the **Preferences** (which is then available in the **Tools & Actions** panel for every project you set up), or select one from the **Database**.

The name of the **Proofing Condition** is made up of the following components:
<printer type><media><print mode>

Example: Epson_x900_GMGsemimatte250_GMGDriver-10c-PhotoBlack-720x1440dpi refers to an Epson Stylus Pro x900 printer in combination with GMG ProofPaper semimatte 250 and a GMG 10c print mode with a resolution of 720 x 1440 dpi.

In GMG ColorProof, you need to select a matching **calibration set** with an equivalent resolution, for our example that would be GMG Driver - 10c - Photo Black - 720x1440 dpi - Bidir - V1. If you, for example, select an 8c print mode instead, the OpenColor proof standard will not be available.

Note Not all print modes can be used for **DotProof** profiles, (see "Supported Proof Printers, Proof Media, and Print Modes" on page 58).

Measurement Condition

The **Measurement Condition** refers to the light source, the observer angle, and the geometry the measuring device will be using when a control strip printed together with the proof will be measured. GMG ColorProof will check that the **Measurement Condition** set for **Proof Verification** in the proof standard is matching to the **Measurement Condition** set in the GMG OpenColor project or profile.

See also:

- "Profile Settings" on page 12
- "Prototype Proofing" on page 61

6.3.1 Noise and Missing Dots

→ In a **Proofing Condition**, you can activate the advanced simulation features **Noise** and **Missing Dots**.

Noise Settings

Generally, the default values will provide you with good results, but you can also define (more precise) custom settings. The **Noise** settings are automatically applied according to the associated **Media** and **Printing Process**.

When simulating Flexo printing, the proofs might appear "**too smooth**" if compared to the original print. With the **Noise** option (**Printing Process** > **Use 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.

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.

Missing Dots Settings (only used for contone profiles)

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.

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 can be defined according to the screen frequency used in the plate-making process. You can also adjust the size of missing dots according to the visual appearance of the proof by adjusting the **Screen Ruling** parameter.

6.3.2 White Ink Printing

How do I create an OpenColor profile with a white channel?

→ Set up a **Proofing Condition** with activated **Use White Ink** option.

→ Optionally enter further **Alias Names for White**.
The alias names are used for the automatic channel mapping in GMG ColorProof.

→ Activate **Reverse Printing** if the reference print is printed reverse.

GMG OpenColor will add a white channel (MXN white) to the proof profile. GMG ColorProof will recognize the white channel and automatically map it to the white channel of the input file.

Can I print a white undercoat with OpenColor profiles that have no white channel?

Yes, you can use GMG OpenColor profiles **without** a white channel and still proof an undercoat which is not defined in an image by adding a coating channel in GMG ColorProof and assigning MXN white to this additional channel.

For further information on how to add and use a coating channel in GMG ColorProof, please refer to the GMG ColorProof helpcenter: https://gmgcolor.com/support/help/colorproof/

See also:

- "Supported Proof Printers, Proof Media, and Print Modes" on page 58
- "Prototype Proofing" on page 61

6.3.3 Prototype Proofing

In GMG OpenColor, you can create proof profiles with White for prototype proofing in GMG ColorProof. You simply define the purpose of the White ink in the **Proofing Condition** of the project.

White Undercoat options

Available options	*Description*
None	The proof profile will not contain a White channel.
Use Undercoat	The proof profile will contain a White channel, for printers with white ink capabilities. You can map a white spot color to this channel in GMG ColorProof. You can also use the channel in GMG ColorProof to print an undercoat, mainly used on clear film. You can tune the opacity of the White ink with the **White Ink Level**. It defines how much ink will be applied for the undercoat or spot color channel when the corresponding image channel is set to 100% in GMG ColorProof. That means, if the channel is set to 30% in the proof job and the **White Ink Level** is set to 50%, a total of 15% White will be printed. The minimum value of the **White Ink Level** is 10%, as there is no substantial difference between 1% and 10%. The **White Ink Level** affects only white channels mapped to MXN/MXD in GMG ColorProof. Image channels mapped to a db3 spot color or a custom spot color will not be affected.
For Metallic Ink Simulation	Select this option if you want to simulate metallic inks by printing standard inks on a metallic foil on an Epson SureColor SC-S80600. You will be able to simulate any metallic color such as PANTONE® Metallics or any custom color. Less metallic colors are simulated by printing a white undercoat. By applying the right amount of white ink, you can control the metallic effect and shininess specifically for each color in the **Start Profile Calculation** dialog box. **Metallic Gloss Level (All Inks)** defines the default value for all colors in the profile. Please follow the link for more information: https://g-mgcolor.com/support/help/colorproof/prototype-proofing/cp-simulate-metallic-inks.htm
For Opaque Ink Simulation	Select this option if you want to simulate metallic substrate printing by printing standard inks on a metallic foil on an Epson SureColor SC-S80600. The opacity of a printed color is simulated by printing a white undercoat. The higher the opacity will be in the target print production, the more white is printed. You can define the opacity specifically for each color in the **Start Profile Calculation** dialog box. **Opacity Level (All Inks)** defines the default value for all colors in the profile. You can also define the **Metallic Gloss Level (Substrate)**. For example, if the substrate you want to simulate is really shiny, you will set it to 100%. If the substrate has a more matte appearance, you can lower the value accordingly. Please follow the link for more information: https://g-mgcolor.com/support/help/colorproof/prototype-proofing/cp-simulate-metallic-substrate.htm

Edit the colors of an existing profile

Once you have a profile, you can change the settings easily without recalculation.

1. Under **Finalize**, click the **Edit** button on the right side of the profile.
2. Click the **Adjust White**, **Metallic Gloss Level**, or **Adjust Opacity** tabbed page, depending on the **White Undercoat** mode selected under **Proofing Condition**.
3. Adjust the values and click the **Save** button.

See also:

- "Proofing Condition" on page 59

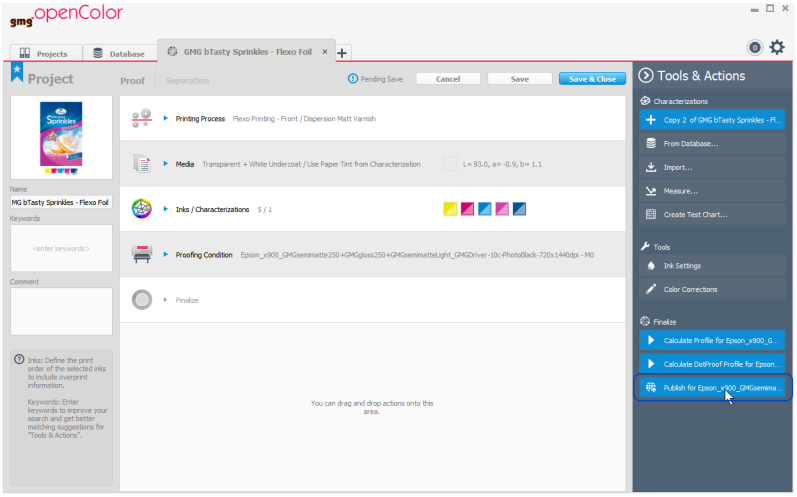
6.4 Creating Proof Profiles

6.4.1 Dynamic Profiling

Note Only supported for contone proof profiles.

The **dynamic** profiling option **automates** the proof calculation process for you. It works "on demand" from GMG ColorProof, that is, an image is loaded in GMG ColorProof with an OpenColor proof standard, and the application checks whether there is a profile already available in the profile cache. If this is the case, it is used in the proof job right away. If there is no appropriate profile, the application automatically starts the calculation and uses the new profile when it is ready.

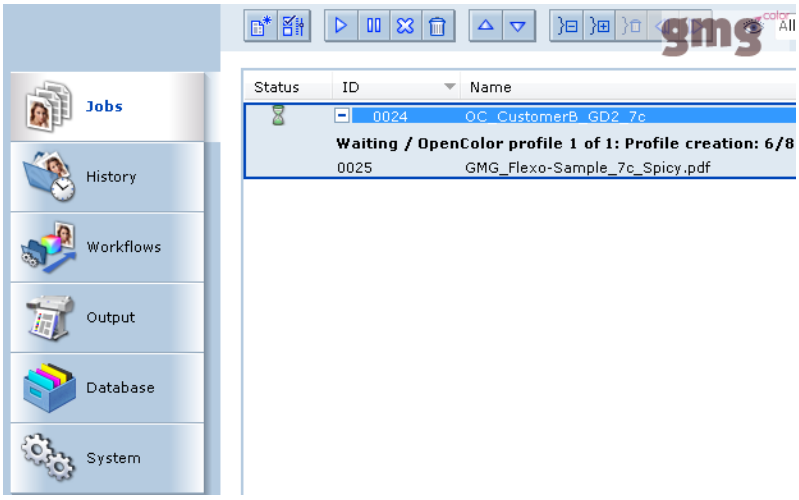
→ In a **Project**, click **Publish** to make the project data available for dynamic profiling in GMG ColorProof.



The dynamic profiling information will show up in the **Proof Standards** list for the defined proofing condition (i. e. printer-medium combination) in GMG ColorProof. If this is not the case, you can synchronize GMG ColorProof with GMG OpenColor by clicking the **Database** menu > **Download** > **From GMG OpenColor**.

You can then create a proof job (either manually or via a hotfolder) using color channels that are defined as output inks in the project. When creating a manual job, you can also manually assign an output ink from the GMG OpenColor project to any image channel.

When the proof job has been created, GMG ColorProof automatically searches the profile cache for a profile with matching output inks. If **no** appropriate proof profile is available, a new profile will be requested by GMG ColorProof and the current job will be paused until the new profile will be ready. The progress of the profile calculation is shown in the GMG ColorProof job list.



The job will then be ripped immediately as soon as the profile is ready. The new profile will be added to the profile cache and thus be available for all future jobs with matching color channel configurations.

When exactly will a new profile be created?

A new profile is created each time you load an input file with a combination of image channels for which no matching profile can be found. For example, if you load a PDF with two images containing CMYK + Orange and CMYK + Orange + Green, a 6c profile will be created for CMYK + Orange + Green and then be applied to both images. If then another file is added to the job containing the same image channels plus another channel, for example "Blue", a new profile will be created. The profile calculation starts as soon as the job goes into status **Ready** (after **Nesting**).

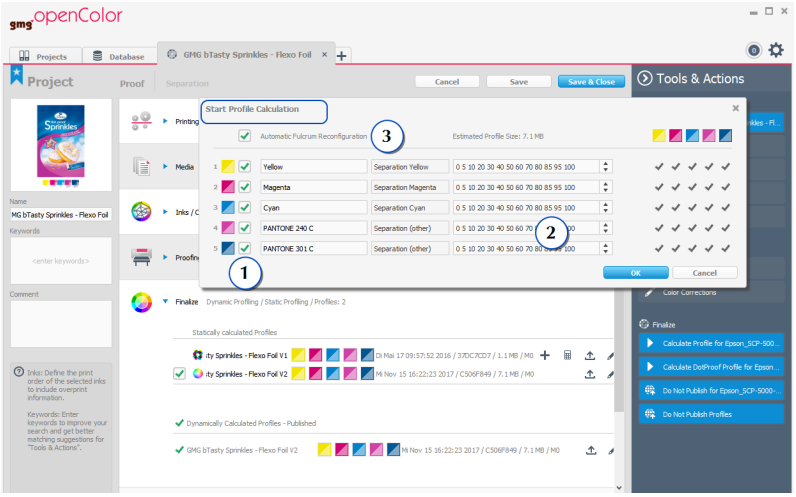
Change management: When you edit the **Printing Process**, **Media**, **Output Inks**, or **Characterization** used in the project, all profiles affected by those changes will be automatically removed from the profile cache and **recalculated** the next time this specific ink combination will be requested by GMG ColorProof. If a specific profile in the cache is not affected by those changes, for example, because the changes are applied to an output ink that is not used in this profile, the profile will not be removed from the cache. This behavior efficiently prevents that GMG ColorProof uses an outdated profile while minimizing the profile calculation time and resulting delay.

Note If you are printing a job from the **History** list after changing settings in GMG OpenColor, these changes will not be reflected in the job. The same profile will be applied that was applied when printing the job for the first time.

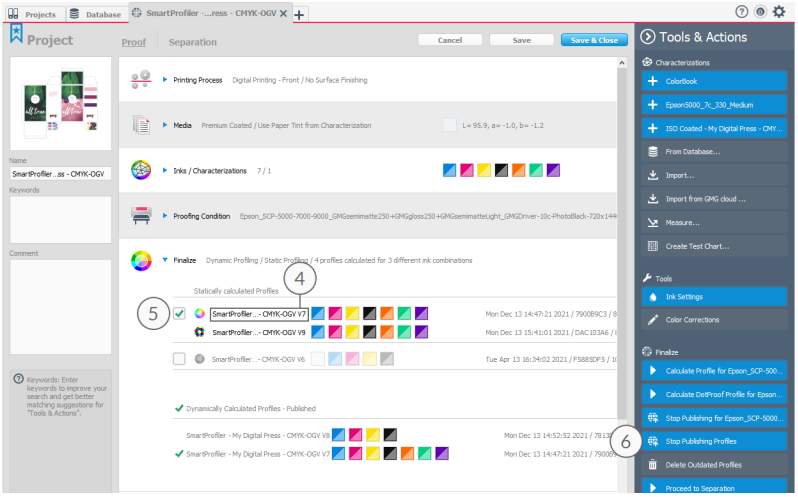
6.4.2 Static Profiling

The **static** profiling is a manual profiling process and allows for more direct control, for example, you can directly increase or decrease the number of fulcrums in the profile. A static profile can either be exported and selected in the proof job or it can be linked to an **OpenColor Proof Standard** in GMG ColorProof.

→ In a **Project**, click **Calculate Profile** to manually start the profile calculation for your **Proofing Condition**.



Before the calculation is initiated, you can modify the number of inks to be profiled (1), the ink names, and the fulcrums (2) of the profile. If you are deactivating a channel for profiling, it is recommended to use the **Automatic Fulcrum Reconfiguration** (3), as this option automatically reconfigures the fulcrums of the other channels, adding more fulcrums to increase the profile quality.



As soon as the profile calculation is finished, the profile is listed in the **Finalize** section. The profile name (4) is automatically derived from the project name plus a version number. As there can be several profiles in a project, you need to **activate** one profile (5) to let the software know which profile to use in GMG ColorProof. Finally, you need to **publish** the calculated profile (6), thereby allowing it to be selectable in an OpenColor proof standard.

Change management

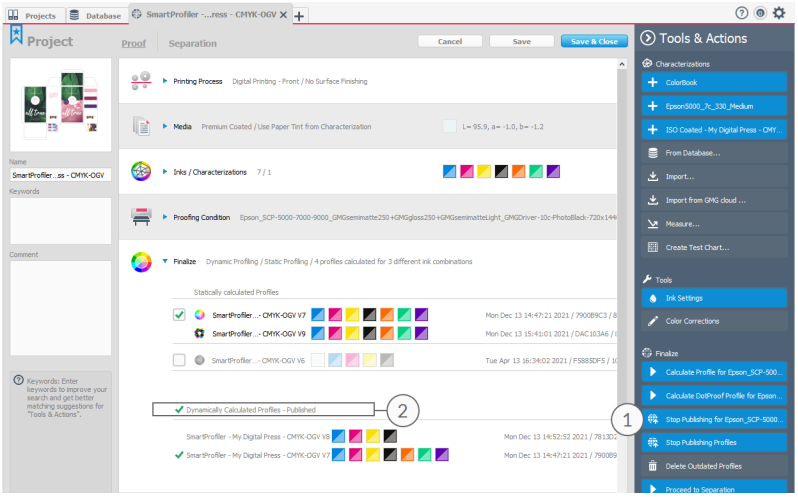
As the profile calculation process is not automated, outdated profiles will also **not** be removed automatically when you apply changes to the **Printing Process**, **Media**, **Output Inks**, or **Characterization** used in the project. All profiles affected by those changes will be marked as outdated. You can still use them, or manually remove and recalculate them as you see fit.

6.4.3 Publishing Projects and Profiles

All data in GMG OpenColor will not be available to GMG ColorProof until it has been published.

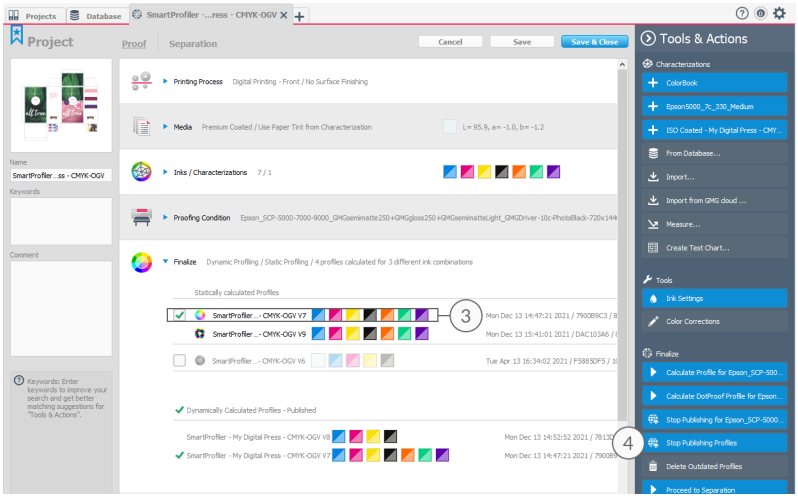
Note DotProof profiles cannot be published and need to be manually exported and imported into GMG ColorProof.

Dynamic publishing



To make a **project** available for dynamic profiling in GMG ColorProof, you need to **publish** it for the selected **proofing condition** (1). All calculated profiles are listed in the **Finalize** section (2).

Static publishing



To make a **manually** calculated **profile** available in GMG ColorProof, you need to **activate** (3) and **publish** it (4). An activated and published profile can be selected in an OpenColor proof standard as a static profile.

6.4.4 Adding Spots That Are Not Used in Overprints

If the design uses one or more spot colors that are not overprinting with any other colors, it will be unnecessary to include those colors in an n-channel OpenColor profile. It will not hurt, of course, and works perfectly fine if you are using dynamic profiling. If you prefer static profiling, it means that you will need to create a specific profile for each new job with a new spot color. Instead, you can create "standard" proof profiles that you can use for multiple jobs and flexibly add spot colors in GMG ColorProof. If you are working with traditional spot color printing, you can use a factory-default proof standard or a custom 4-channel proof profile in combination with the spots. If you are working with a fixed ink configuration / ECG, you will need to create only one OpenColor profile per output ink and media combination and add the spots.

Advanced Info Technically, you could do this also by manually creating a spot color profile in GMG SpotColor Editor. If you are using GMG OpenColor to calculate the spot color profile for you, you will not only save time, but you can also greatly benefit from the capabilities available in GMG OpenColor. For example, you can adjust the characterization to your actual printing condition such as the media type, apply manual corrections to the solid or gradation, and so on.

How export and use spot color definitions in GMG ColorProof

You will need to manually export the spot colors as a spot color database (db3) file and import the file into a custom **Spot Color Set** in GMG ColorProof. You can then add the spots flexibly to a manual job or you can assign the spot color sets to a workflow, so that they are automatically used when an input document uses the corresponding color channel.

Note The exported spot color database uses the gamut from the **Proofing Condition** defined in the project and should be used **only** with a matching proof printer, media type, and print mode. Make sure to link the spot color set to a matching calibration set. Otherwise, the proofed colors might not be correct.

Advanced Info The **gamut** file (with the file name extension "csc") corresponding to the proofing condition will be exported to the same target location as the db3 file. This file is for your information only. You will not need it for proofing.

1. From a **Project**, in the **Inks / Characterization** group, in the **Characterizations** list, select the spot color library you want to export.
2. Optional: If you want to export a subset of spot colors instead of the entire library, you can click the **Usage** button on the right side and activate only the spot colors you want to export. Please note that the deactivation of spot colors will also affect the project, so be careful when saving the project after the export.
3. Click the **Export Spot Colors as DB3** button on the right side.
4. Browse your folders and select a target location for the exported file.
   GMG OpenColor will export the **activated** spot colors of the selected spot color library to a single db3 file. The **Tasks** dialog box shows the target location and the progress. Depending on the number of spot colors, exporting the db3 file might take some time.
5. Optional: You can close the **Tasks** dialog box without interrupting the export. You can reopen the dialog box any time by clicking the **Tasks** button on the top right of the main window.
6. When the export is finished, import the spot color database (db3) file into a **Custom Spot Color Set** in GMG ColorProof and link it to a calibration set matching the proofing condition from GMG OpenColor. (Create a new **Spot Color Set** if required.) See the GMG ColorProof documentation for details on **Spot Color Sets**.
   The spot color set is now ready to use with **any** proof standard linked to the same **calibration set**. When an input document uses a spot color channel with the same name as a spot color in the spot color set and you selected the correct calibration set in the job, the corresponding spot color definition will be used automatically. If the input document uses a different channel name, you can still manually assign the correct spot color (or define rules for an automatic assignment). See the GMG ColorProof documentation for details.

6.4.5 Change Management

What happens if you already created proof profiles and then make changes to the project, for example, because the process has been changed or if you need to tweak the colors? GMG OpenColor ensures that you work with up-to-date profiles. The profile cache dynamically generated by requests from GMG ColorProof will be automatically **cleaned up**. For profiles created manually by a user, you can decide whether you want to keep them or not. If you keep them, they will be marked as **outdated**. If you later decide to clean up outdated profiles, you can use the action **Delete Outdated Profiles**.

The change management regards changes to the **Printing Process**, **Media**, **Inks**, **Color Corrections**, or **Characterization** that will actually affect the profile. When you are making changes to a **Characterization** that is used in one or more projects, GMG OpenColor will notify you and you can choose whether you really want to apply the changes to the **Characterization** (and thus the **linked** projects) or whether you want to keep the linked **Characterization** unchanged, and instead create save the edited **Characterization** as a **copy**. This copy will not be linked to any project and you can create new projects from it.

Note If you decide to change all linked projects, the dynamically generated profile cache will be cleaned up for all changed projects. Manually calculated profiles will be marked as outdated.

Changes applied to the **Noise**, **Missing Dot**, and **White Ink** settings of the **Proofing Condition** and applied to the **Ink Settings** will always be ignored. This way, you can still keep multiple proof profile variants, for example, when playing around with the **Noise** settings.

The change management ensures data consistency also when gradation files are changed.

Example:

Consider a case where a manual color correction is applied to an ink, for example "Pantone 301 C". If there are static profiles affected by those changes, i. e. that are using "Pantone 301 C" as an ink, GMG OpenColor will inform you that there are outdated profiles and ask you whether you want to remove those profiles immediately. If you respond with **No**, those profiles will be marked as outdated, but you can still use them.

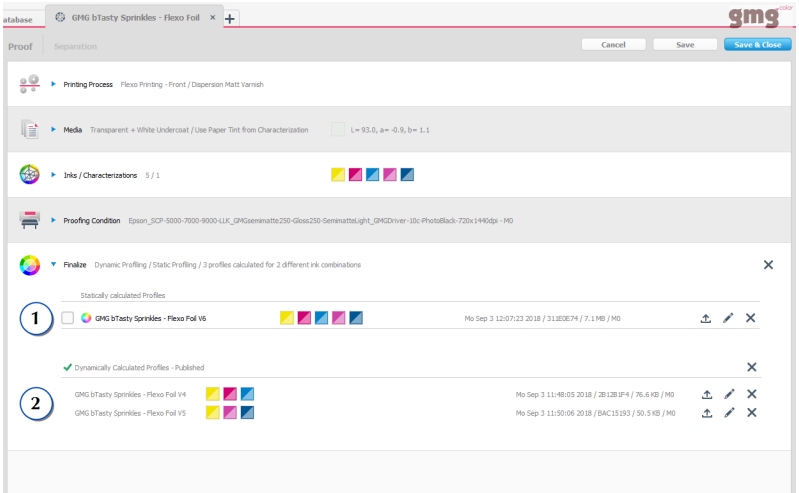


Fig. 31 Example project before editing the project.

In this example project, one profile has been calculated statically by the user (1) and two profiles are available in the dynamically generated profile cache (2). You can see that the first profile in the cache, V4, uses a different ink set than the V5 profile.

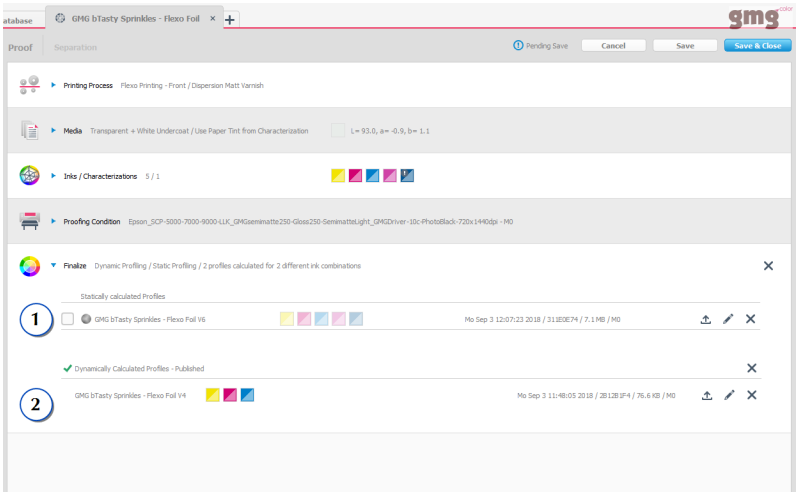


Fig. 32 Change management after editing an output ink.

In this example, the user applied a color correction to the blue Pantone 301 C output ink.

As the statically calculated profile (1) uses this ink, the gray color indicates that the profile is outdated. The user can still use this profile.

The dynamically generated profile cache (2) was automatically cleaned up by the application. The V5 profile used Pantone 301 C and was thus removed from the cache. If the user prints a proof job in GMG ColorProof that has the same color channel configuration as the V5 profile, a new up-to-date profile will be calculated automatically. The V4 profile does not use Pantone 301 C and therefore the change does not affect this profile. Accordingly, the profile is still available in the cache.

6.4.6 Profile Calculation Time

How long does the profile calculation take?

The profile calculation time depends on the following parameters:

- Processing power (CPU)
- Number of channels
- Color information (single ink or full characterization)
- Number of fulcrums
- **Reverse print** increases the calculation time.
- Use of **Surface Finishing** increases the calculation time.

On one of our test systems, we observed the following calculation times, based on the default settings (**Preferences** > **Default Profile Settings**). Adding more fulcrums increases the calculation time.

Inks	*Front print*		*Reverse print / Surface Finishing*	
	Contone	*DotProof*	*Contone*	*DotProof*
4	10-20 seconds	1-2 min	10-20 seconds	1-2 min
5	30-40 seconds	4-6 min	40-50 seconds	4-6 min
6	1–2 min	6-8 min	2–3 min	7-9 min
7	2–3 min	6-9 min	2-4 min	6-10 min

6.4.7 Profile Quality and Profile Size

As in general, the profile quality is depending on the quality of the characterization data: the more consistent and harmonic characterization data you feed the system with, the better the optimization and thus overprint simulation. Further quality factors include the number of profile fulcrums, and the **Proofing Condition**.

Color accuracy

The color accuracy and the visual impression of a proof depend on the quality of the characterization data and how well the printing process itself is standardized. It will be difficult to provide a perfect match of print and proof if print runs already show significant deviations.

The color accuracy is technically limited to the color space of the proofer, represented by the **Proofing Condition**. This is the reason why GMG OpenColor supports only multi-ink proofers with an extended color space.

Tip You can easily check whether all printing inks used in the printing process are in-gamut by printing a spot color control strip together with the proof job in GMG ColorProof (see "Verifying Spot Colors" on page 84).

Number of fulcrums and profile size

The number of fulcrums in a profile is based on the number of patches in the test charts used for profiling. The higher the number, the more information is included in the profile and the higher is the file size.

You can choose to not use all available patches if you want to reduce the file size. Depending on the **Maximal Profile Size** (**Options** > **Preferences**), the number of fulcrums is automatically reduced by the software, but can be edited in the manual profile creation.

6.4.8 Profile Editing

You can edit the paper tint value to tailor the proof profile to the white point of your current media, modify the color curves, for example to make a proof look more saturated in certain areas, and even change or modify the proofing condition.

→ In a **Project**, select a profile and click the **Edit** button next to the profile name.

Profile editing options

Option	*Description*	*See also*
Paper Tint	You can change the paper tint for **visually** adapting the media white to the media white of the final print product. For example, if you created a profile for a premium coated media and now want to use the same profile for a **similar**, but slightly more yellowish media, you can add 2% Yellow and use the same profile for the more yellowish media. The original paper tint values, which the profile has been calculated with, can always be retrieved from the **Original** column. The paper tint can be changed in CMYK and is calculated into the profile (changing all color values).	
Dot Gain Corrections	If you are not satisfied with the proof result, you can correct your curves accordingly. The corrections apply to all colors of the modified index values and can be entered into the table on the right side or made in the **graphic view** by directly manipulating the curves. The target values will be changed accordingly. → Add fulcrums by left-clicking the corresponding points on the visualized curve. → Remove fulcrums by right-clicking on a fulcrum. For example, if the proof is not blue enough, add a 50% fulcrum in the Cyan curve and raise the curve a bit by clicking on the fulcrum and dragging it. This change will affect all colors with 50% Cyan. We recommend to check your corrections by proofing smooth gradients from 0% to 100% for all primary inks of the profile before running production jobs.	
Proofing	On the **Proofing** tab, you can adapt the profile to changed proofing conditions such as a different proof printer or media. Select your new proofing condition from the drop-down list and have the profile converted to the new output color space. If you want to add other simulation options such as **Missing Dots** or **Noise**, activate the respective option and edit the displayed default values.	"Profile Quality and Profile Size" on page 69 "Noise and Missing Dots" on page 60

6.4.9 Halftone (DotProof) Proof Profiles

Note Requires an extra license.

Note Currently, only **static** profiles support DotProof, i. e. GMG ColorProof is not able to request DotProof profiles from GMG OpenColor. This means you will need to calculate DotProof profiles in GMG OpenColor and export them for use in GMG ColorProof.

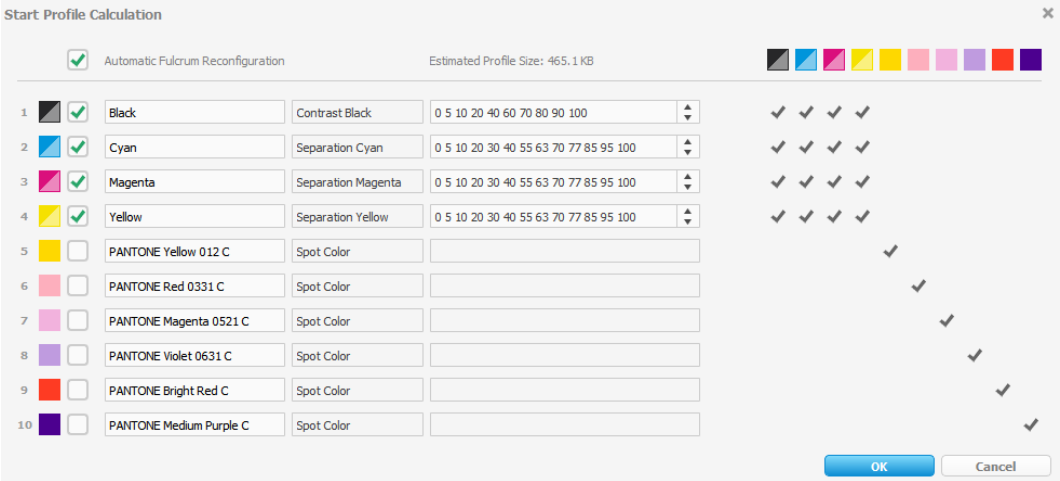
In addition to n-channel contone proof profiles, you can also create n-channel **halftone** proof profiles for use in GMG DotProof or GMG FlexoProof. The profiles are calculated with the same prediction engine and are based on the same color assets as the contone proof profiles, thus easy to calculate on top of already existing data. To meet all quality requirements, the profiles can be optimized in a few simple steps.

Before starting with a DotProof profile, it is recommended that you first finalize a **contone** proof profile, apply all changes to your project such as **Color Corrections** until you approve the printed proof.

Note The **Calculate DotProof Profile** action is available **only** if the proofing condition, i. e. the proof printer, proof media, and print mode, supports DotProof in GMG OpenColor.

Tip As you can flexibly add inks later, it is advisable to create and optimize a common profile that can be used in multiple jobs. This way, you only need to optimize a profile once and then derive profile variants for specific proof jobs from it.

1. Check the **Ink Settings**, especially screen angles, for all relevant channels.
2. On the **Tools & Actions** panel, click **Calculate DotProof Profile**.
3. Select all channels you want to include in the profile and click **OK** to start the profile calculation.



4. Optional: To improve the profile quality, click the **Iterate** button next to the profile name.
5. Optional: To manually edit the color curves of the profile, click the **Edit** button next to the profile name. (**Dot Gain Corrections** have an impact on the target values. Further optimization cycles (step 4) after **Dot Gain Corrections** are generally not required, but possible.)
6. Optional: To export a finished profile, click the **Export** button next to the profile name.

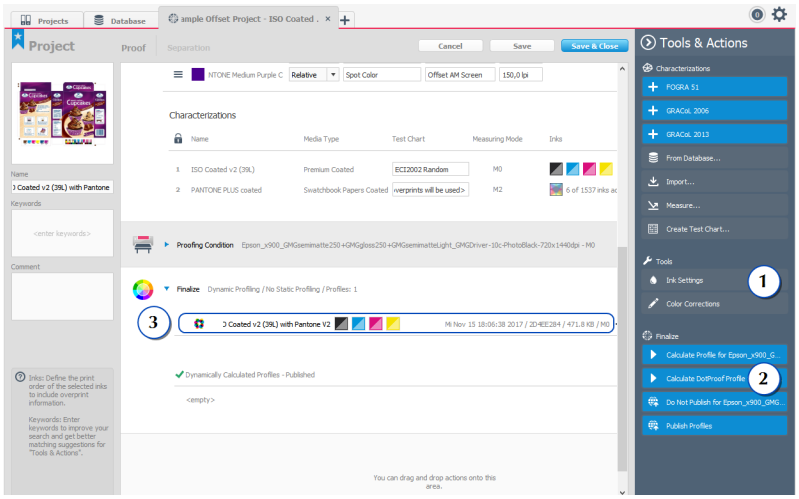


Fig. 33 Calculated DotProof profile.

Before calculating the profile, please check and complete the **Ink Settings** (1, please see "Ink Settings" on page 93). After the **Ink Settings** are complete, you can start the profile calculation by clicking the **Calculate DotProof Profile** button on the **Tools & Actions** panel (2).

As soon as the profile calculation is finished, the profile is listed in the **Finalize** section (3). The profile name is automatically derived from the project name plus a version number. Halftone proof profiles are marked with an icon and have the file name extension *.mxd.

Tip We recommend to first create a contone proof profile and print a proof with it as a **color check**. If the proof quality meets your requirements, you can also create a DotProof profile. If the raster proof quality is not satisfactory, you can **optimize** the profile by printing and measuring a test chart generated by GMG OpenColor. 2–3 optimization cycles might be required to achieve the highest profile quality.

See also:

- "Supported Proof Printers, Proof Media, and Print Modes" on page 58

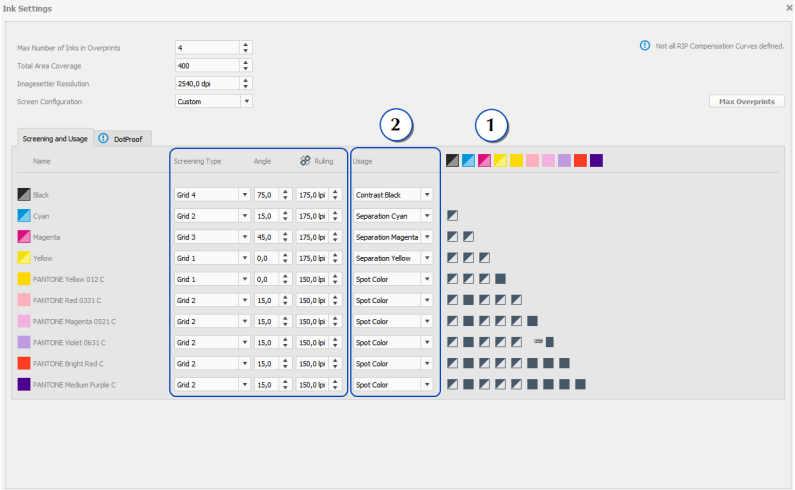
Ink Settings

The ink settings are required for **DotProof** and **separation profiles**. For ContoneProof profiles, the ink settings are not relevant.

The **Ink Settings** are available on **Characterization** and **Project** level.

In a project, the **Ink Settings** button is available on the **Proof** and **Separation** tabbed page. On the **Proof** page, you can edit the ink settings of all colors used in the project. On the **Separation** page, you can edit only the actual output colors as defined by the **Target Color Space**.

→ Click **Ink Settings** on the **Tools & Actions** panel to edit the ink settings.



Screening Settings (1).

These settings are mandatory for calculating **DotProof** and **separation** profiles. Including the imagesetter resolution, the screening settings should match the actual target printing conditions you want to simulate, e.g. as used for creating the 1-bit files of the iteration chart (see "Optimizing the Profile Quality" on page 74).

Different screening grids serve to avoid moiré patterns. If you want to print with more than four inks, you can use the same grid for complementary colors, as complementary colors normally do not overprint. For example, Red can have the same grid as Cyan, and Green the same as Magenta. If the colors strongly differ in lightness, however, they should use different screening grids.

The screen angles of the separate channels should be shifted at least by 15° towards each other for avoiding moiré effects. Instead of defining each angle separately, you can use one of the typical presets (> **Screen Configuration**).

Tip If the screening settings used when producing the 1-bit files differ from the ones in the characterization (e.g. when using 1-Bit Creator in GMG ColorProof), the first ones should be used.

Usage (2).

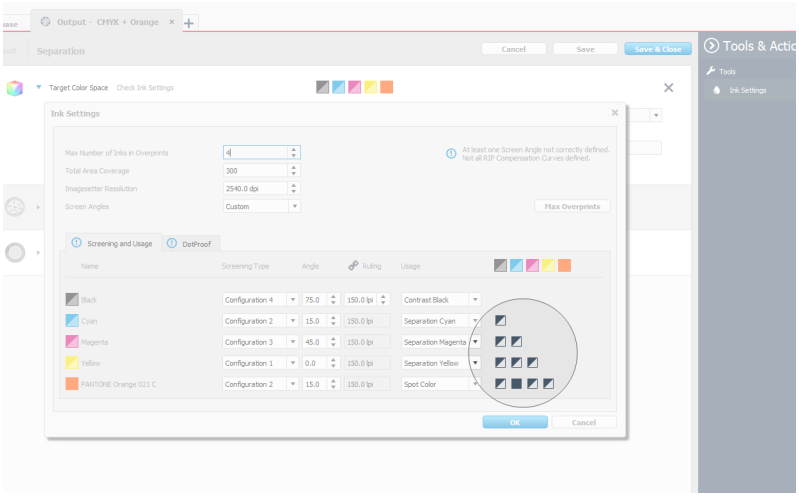
The **Ink Usage** defines how a color will be handled during profile calculation. It also influences the choice of patches and the total number of patches in **iteration** test charts used for **DotProof** profiling.

Ink Usage

Option	*Description*
Separation (Cyan, Magenta, Yellow, other)	Select this option for image separations and important colors (including spot colors) that need to be reproduced in a detailed way. Inks that are defined as separations are profiled with all overprint information available in the characterization. When calculating a separation profile, all **output inks** need to be defined as **Separation** except **Contrast (Black)**.
Contrast (Black)	Use this option for shadow-enhancing colors such as black.
Spot Color	Select this option for colors that are used only as typical spots and are **not** part of the image separation.
Solid Only	Use this option for all colors that are used only as full tone.
Color Database	GMG OpenColor will use this **Usage** type if you are adding a whole spot color library to a project as an "ink". You can do this if you are using a project to dynamically generate proof profiles from a fixed set of colors plus colors from a spot color library, for example, CMYK + a spot color library.

Overprint behavior

The overprint behavior depends on the **Screening and Usage** settings in the **Ink Settings** dialog box.



Colors set to the same **Screening Type** will overprint only with solids. For example, if Cyan and Orange are set to **Configuration 2**, Cyan will only print with solid Orange and vice versa. This is indicated by the filled square icon in the overprint preview on the right.

You can click the icons in the overprint preview to change the overprint behavior. For example, you could set the overprint behavior of Cyan and Orange to **No Overprint**. This would be indicated by a dash icon.

When calculating separation rules, the **Total Area Coverage** and the overprint behavior defined in the project are taken into account. This prevents overinking and moiré effects in the print production.

See also:

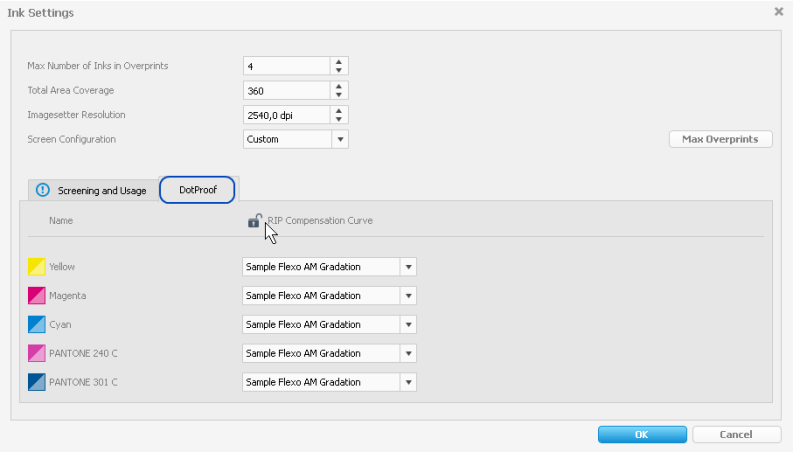
"Creating Color Definitions" on page 88

RIP Compensation Curves

The compensation curve applied by an imagesetter or CTP RIP ensures that a requested 40% color value equals a 40% halftone dot delivered by the plate.

For raster proofing, these corrections are in so far relevant, as the 1-bit files you want to proof have already been **modified** by the imagesetter or CTP RIP. Thus, you need to provide the software with the differences between the **original** color values (before going through your RIP) and the **modified** color values (after going through your RIP).

1. On a **Characterization** or **Project** tabbed page, click **Ink Settings** on the **Tools & Actions** panel and then navigate to the **DotProof** tabbed page.
2. Select a gradation from the **RIP Compensation Curve** drop-down list. The list shows only gradations of the type **RIP Compensation Curve**. To use the same compensation curve for all inks, click the lock icon as shown in the following screenshot.



RIP Compensation Curves are stored as **Gradations** in the **Database** of GMG OpenColor (see "About Gradation Curves" on page 44).

Optimizing the Profile Quality

If you want to improve the profile quality, you can do so by repetitive printing and measuring of a test chart. After each optimization cycle, the profile needs to be exported again for the next test chart print in GMG ColorProof.

→ In a **Project**, select a halftone proof profile and click the **Iterate** button on the **Actions** bar.

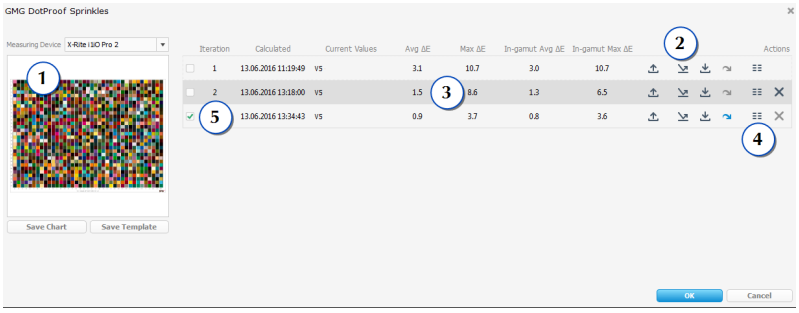


Fig. 34 Iteration dialog box.

The application will show you a preview of the test chart (1) and a list of the iteration cycle results. The integrated test chart generator helps you to find the best patch configuration by **automatically** selecting the relevant patches for your printing process, inks, and measuring device.

To optimize the profile, you will need to save the test chart as a PDF and process it in your imagesetter RIP. Print the resulting 1-bit files in GMG ColorProof with the exported DotProof profile, as described below.

Then, open this dialog box again and click the **Measure Chart** button (2) to measure directly in GMG OpenColor. Alternatively, you can measure in 3rd party software and **import** the measurement.

Measurement values are listed as **Current Values** with average and maximum Delta E (3). A detailed list with all values can be displayed by clicking the **Statistics** button (4).

Repeat this procedure until you are satisfied with the results. In case of several iterations, select the iteration you want to use by marking it with a green check mark (5).

Printing the 1-Bit Test Chart Files

Note The 1-bit TIFF files of the test chart should be produced under exactly the same target printing conditions you want to simulate.

How to create the job in GMG ColorProof for printing the 1-Bit test chart files

1. Start GMG ColorProof.
2. Create a new job in GMG ColorProof and load the 1-bit TIFF files of the test chart, marking all four separations.
3. Under **Merge files**, select a recognition pattern (for example **Generic 1-bit**).
4. Ignore the other options in this dialog box and click **Open** to edit the job in the **Manual Job Manager**.
5. **Job** > **Printer Settings** > **Printer**: From the **Printer** list, select your printer.
6. **Job** > **Printer Settings** > **Printer**: From the **Medium** list, select the loaded medium.
7. **Job** > **Printer Settings** > **Printer**: Under **Calibration Set**, select the calibration set with the print mode you will use for printing the proofs later.
8. **Image** > **Color Management** > **Proof Output**: From the **Proof Standard** list, select **Custom**. As **Proof Profile**, select the MXD DotProof profile you are creating.
   (Each iteration changes the profile, please make sure to always use the latest profile for test chart printing.)
9. Click the **Print** button on the toolbar to print the job.

Adding New Inks to a Project

You can flexibly add inks from existing **characterizations** or **spot color libraries** to a project. If the inks you want to use are not in the GMG OpenColor database yet, you will first need to measure test charts and create a characterization from it.

How to add a spot color library to the project

The procedure described in the following is very similar if you want to add an ink from a characterization instead of a spot color library.

1. In the project, on the **Tools & Actions** panel, under **Characterizations**, click **From Database**.
   The **Select Characterization** dialog box will be displayed.
2. Select a spot color library, for example, PANTONE PLUS coated.

The application will add the spot color library as a **Color Database** to your project. If you want to use the colors as project inks, for example, to calculate a DotProof profile, you will then need to select project inks from the library.

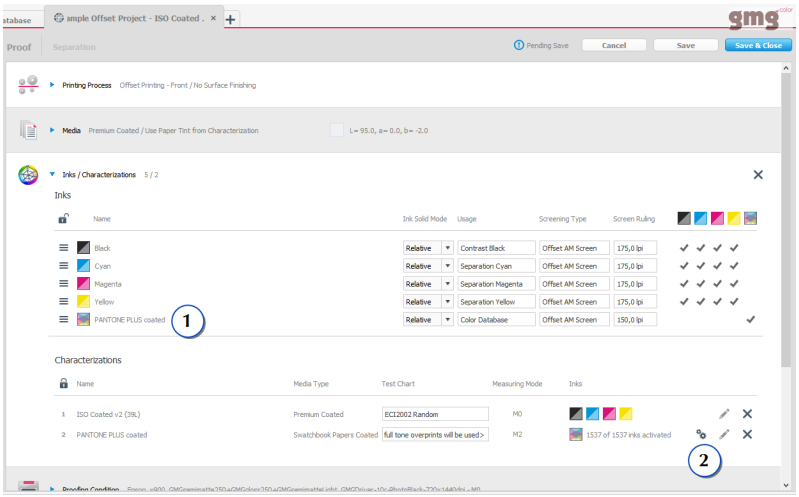


Fig. 35 Spot color library added to a project.

After the spot color library has been added to the project, it will be shown as a **Color Database** in the **Inks** list (1). You will need to click the **Usage** button (**2**) to select project inks from the library.

How to add a new ink from a spot color library

1. Click the **Usage** button next to the spot color library.
   The **Inks of PANTONE PLUS coated** dialog box will be displayed. As you can add only up to 15 inks to a project, you will need to select the inks you want to use.
2. Click **Deactivate All** to deselect all inks.
3. Select the inks you want to use, up to 15.
4. Add a check mark to the **Use as Project Inks** check box.
5. Confirm by clicking **OK**.

The selected inks will be added to the project.

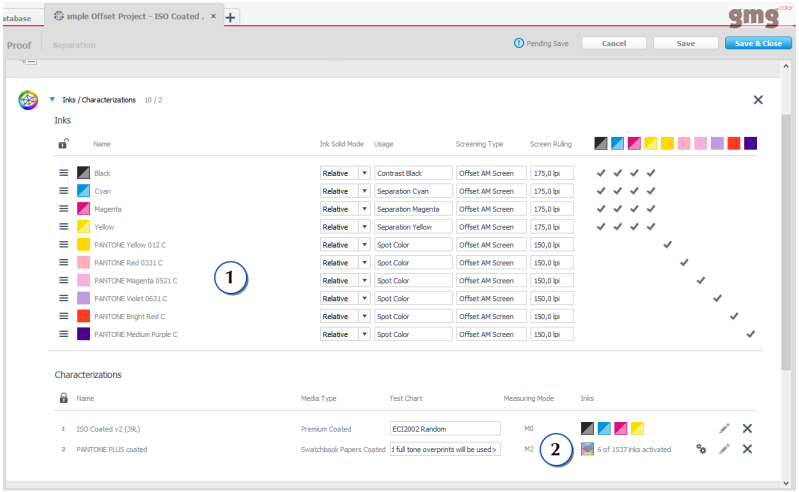


Fig. 36 Project inks from a spot color library added to a project.

After the project inks have been selected, they will be shown as **Spot Color** in the **Inks** list (1). The **Inks** column (2) will show how many inks, i. e. 6, from the library are used in the project.

See also:

- "Adding Project Inks to an Existing DotProof Profile" on page 76

Adding Project Inks to an Existing DotProof Profile

You can add **job specific** inks to an existing MXD **DotProof** profile, without additional printing and measuring of test charts.

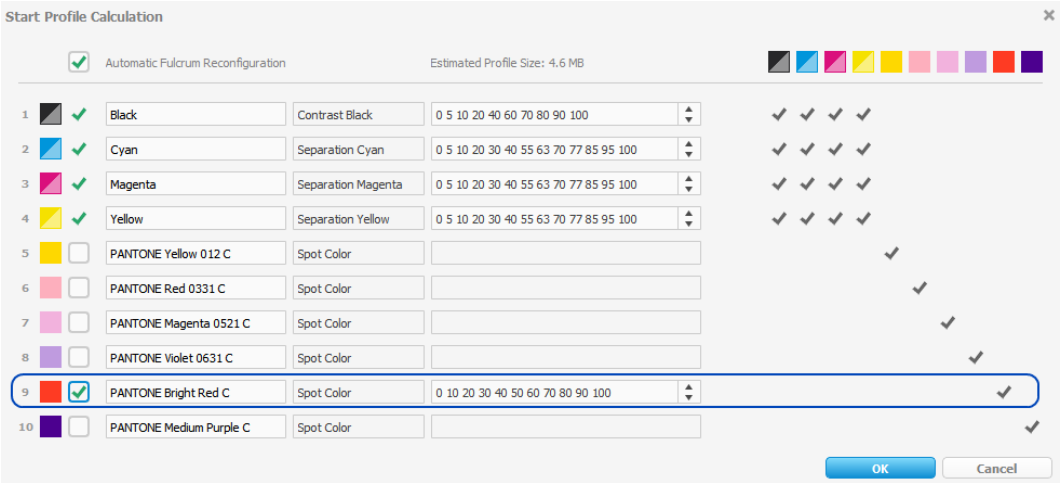
Using MXD profiles for DotProof, you can use more than four channels. The profile can be optimized in iteration cycles to achieve the highest possible match of proof to print. Job specific spot colors can then be flexibly added **after** the optimization, thus creating new profile variants. Printing and measuring of test charts **after** adding the inks is **not** required. Even when the original MXD profile will be optimized later, those changes will be **automatically** carried over to the dependent profiles, without any further work from your side.

Usually the main profile contains the color channels that are used for separation, i. e. for the common process colors used in the printing process such as CMYK. You will then create dependent variants with additional spot color channels that are used for specific objects/jobs that might also overprint with other objects, but are not used for image separation.

How to create new profile variants with additional inks

Tip Using MXD technology, you are not limited to four channels anymore. You could add more channels to the main profile. To have a maximum of flexibility, it is recommended to create an MXD profile with only the basic **common** colors and then derive a profile variant from it by adding the colors required to proof a specific document. For the next proof job that uses a different color channel set, you will create another profile variant, and so on. Please keep in mind you cannot deactivate channels to create new profile variants; you can only **add** channels.

1. Create a DotProof profile in GMG OpenColor or select an existing MXD profile.
2. Click the **Add** button next to the profile name to add one or more inks to the profile. You can choose inks from all **Spot Colors** used in the current project (but not from spot color libraries).



3. Export the proof profile and use it in GMG ColorProof. As it already contains all spots required for printing the document, you do not need to add further spots from a spot color set (db3).

GMG OpenColor calculated a new dependent profile variant with the additional inks, for example "PANTONE Bright Red C" in the screenshot.

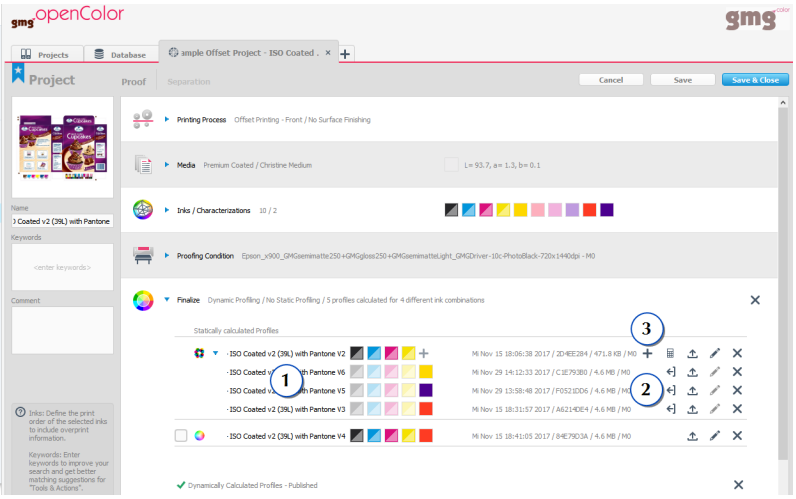


Fig. 37 DotProof profile with variant.

The main DotProof profile "Sample Offset Project - ISO Coated v2 (39L) with Pantone V2" has a profile variant "Sample Offset Project - ISO Coated v2 (39L) with Pantone V3" (1) with one additional channel "PANTONE Bright Red C", which is highlighted in the list. You can use the **Duplicate** button (2) to create an independent copy of the profile variant. You can use the **Add** button (3) to create further variants from the main profile.

Dependency between the main profile and derived profile variants

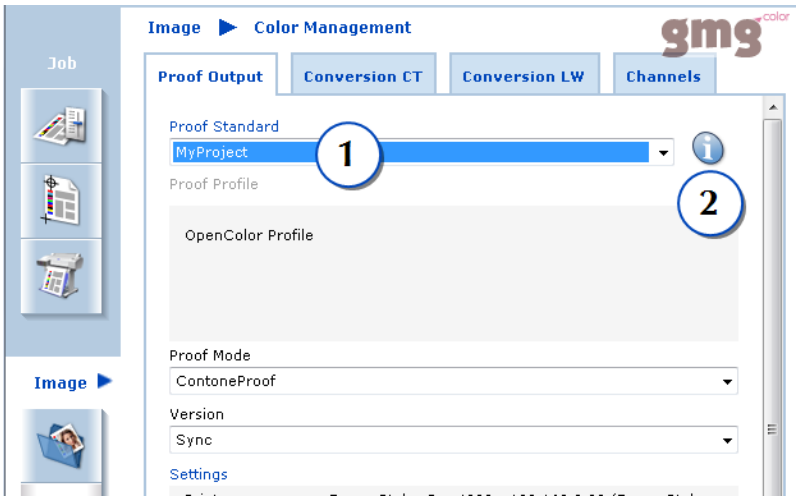
- **Recalculations** and **optimizations** applied to the main profile are **automatically** applied to all profiles derived from it. (Manual profile corrections are applied only to the edited profile.)
- You **cannot** optimize dependent profile variants.
- You can create a copy of a profile variant and make it **independent**, including the ability to edit and optimize it independently and to derive new profile variants from it.

See also:

- "Halftone (DotProof) Proof Profiles" on page 70
- "Optimizing the Profile Quality" on page 74
- "Adding New Inks to a Project" on page 75

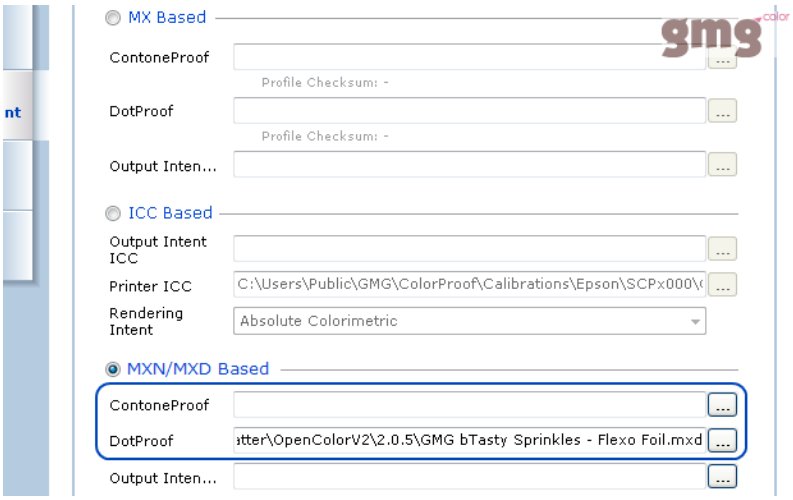
6.5 Printing Proofs with GMG ColorProof

Contone proofs



For printing multichannel **contone** proofs in GMG ColorProof, you need an OpenColor proof standard. This proof standard is different from the regular proof standard as it maintains a live-connection to GMG OpenColor, either referencing a specific project (1), or a static profile that has been calculated within GMG OpenColor. OpenColor proof standards are prerequisite for dynamic profiling (see "Dynamic Profiling" on page 62). Click the info button (2) to show more information on the selected proof standard or profile. The data exchange is based on a **web service** which you can activate or deactivate in the **Preferences** dialog of GMG OpenColor (see "Connecting GMG OpenColor with GMG ColorProof" on page 9).
As an alternative to using OpenColor proof standards, you can also use a regular proof standard linked to a specific MXN profile (as shown on the below screen shot for halftone proofs) or directly select an MXN profile for custom proofing in a job or workflow.

Halftone proofs



For printing multichannel **halftone** proofs in GMG ColorProof, you can either use a regular proof standard linked to a specific MXD profile (> **MXN/MXD Based**), or directly select an MXD profile for custom proofing in a job or workflow.

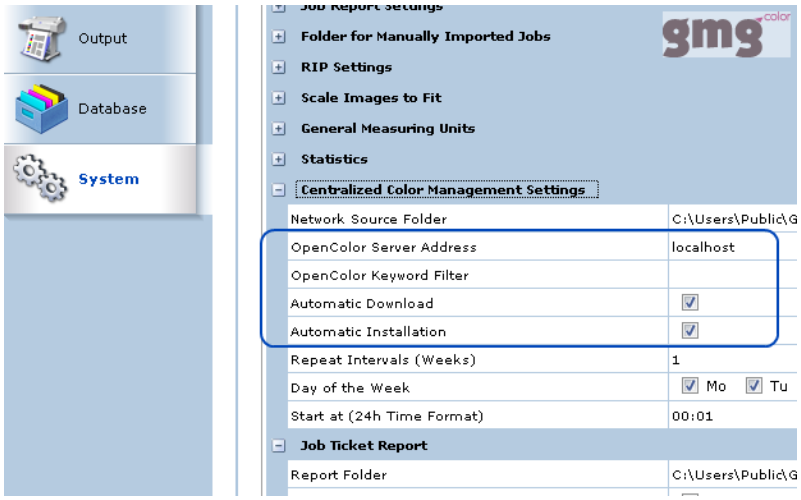
6.6 OpenColor Proof Standards

OpenColor proof standards can be created **manually**, like normal proof standards, or **automatically**, by scheduling a download of new OpenColor projects.

Note OpenColor proof standards support only GMG ProofMedia. You can reference only calibration sets that use GMG media types. OpenColor proof standards do **not** support custom media types.

How to automatically create an OpenColor proof standard

1. In GMG OpenColor, create a new project.
2. In GMG ColorProof, **System** view > **General** > **Centralized Color Management Settings**: **OpenColor Server Address**: Enter the **IP address** of the computer GMG OpenColor is running on.
3. Optional: **OpenColor Keyword Filter**: Enter keywords as a filter to download only projects that include the defined keywords.
4. Activate the option **Automatic Download** and schedule the update.
5. Activate the option **Automatic Installation**.
   Any new or changed projects are downloaded, automatically generating a matching OpenColor proof standard.



How to manually create an OpenColor proof standard

1. On the **Database** menu, point to **Proof Standards**, and click **New**.
   The New OpenColor Proof Standard dialog is displayed.
2. **Properties**: Enter a name for the proof standard.
3. Enter a **Version** number.
   The version number serves as a unique identifier if you have several versions of the same proof standard. It is recommended to use a naming convention, for example, V1, V2, V3.
4. **Database Connection**: Enter the **IP Address** of the computer GMG OpenColor is running on.
   (Please note that the connection requires the Web Service defined in the **Preferences** of GMG OpenColor.)
5. **Printing Process**: Select a **Project** from the drop-down list.
   (The Project list contains all projects that have been published.)
6. Optional: **Available Printing Inks**: Check to ensure all inks you need are listed and available for profiling.
7. **Calibration Sets**: On the toolbar, click the **+** button to link a calibration set to the proof standard.
   It is recommended to use the **Custom Filter** to show **Calibration Sets for Installed Printers Only** and select the recommended calibration set for the printer-medium combination you are using.
8. Click **OK** to confirm your choice.

6.6.1 Recommended Calibration Sets

It is strongly recommended to use a calibration set that corresponds to the respective **Proofing Condition** in GMG OpenColor. Using a calibration set with fewer colors or less resolution would be compromising the proof quality GMG OpenColor can achieve.

- Epson SC-P7000,9000: GMG Driver - 10c – Photo Black – 720 x 1440 dpi – Unidir – V1 GMG
- Epson Stylus Pro x900: GMG Driver - 10c – Photo Black – 720 x 1440 dpi – Unidir – V1 GMG
- Epson Stylus Pro WT7900: GMG Driver – 6c + OG – Reverse Print – 720 x 1440 dpi - Unidir - V1 GMG
- HP Designjet Zx200: GMG Driver - 10c – PhotoBlack – 1200 dpi – 14 Pass – Bidir – V1 GMG
- Canon imagePROGRAF iPF x3x0, x4x0: GMG Driver - 11c – 2400 x 1200 dpi – Bidir – Higher Quality (Fast) – Canon LUCIA EX Ink – V1 GMG

6.6.2 Proofing of Documents with Embedded CxF/X-4 Spectral Data

You can proof documents with spectral data embedded as CxF/X-4 using GMG ColorProof version 5.10.1 or higher.

GMG ColorProof automatically reads out spot color definitions from the document, which can be used in combination with a GMG OpenColor proof standard (see "OpenColor Proof Standards" on page 79). The spectral data definitions are recalculated by taking the proofing condition into account.

Please follow the link for more information:

https://www.gmgcolor.com/support/help/colorproof/GMG_Text/ColorProof/Image%20Settings/Image%20Color%20Management/Spots.htm#cxfProof

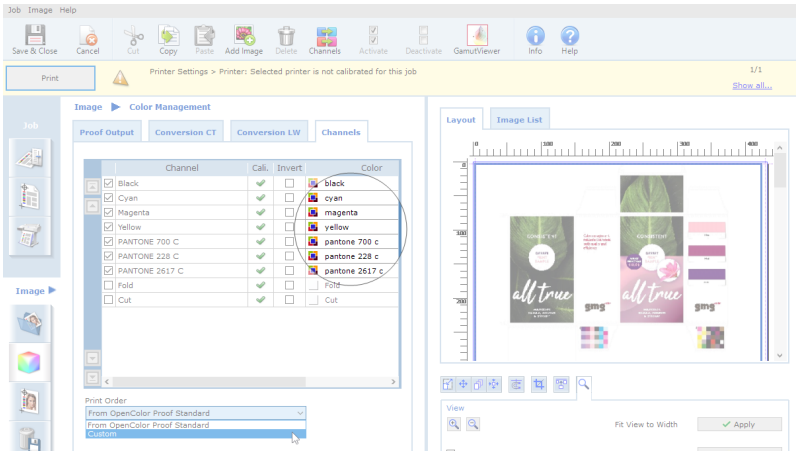
6.7 Creating a Manual Job for Proofing with OpenColor

This chapter deals with the processing of a typical multicolor proof job and helps you defining the relevant GMG OpenColor settings in GMG ColorProof.

How to create a manual job for proofing with OpenColor

The following shows the key steps for proofing a 7c image with CMYK and 3 spot colors.

1. In GMG ColorProof, download or manually set up an OpenColor proof standard with a **Project** that references the required printing inks, or set up a regular proof standard linked to an MXN/MXD profile.
2. **Manual Job Manager** > **Printer Settings** > **Printer** tab: Select one of the recommended calibration sets. (Otherwise the OpenColor proof standard you want to use might not be available).
3. **Color Management** > **Proof Output** tab > **Proof Standard**: Select the OpenColor proof standard from step 1, or directly select an MXN or MXD profile (> **Custom**).
4. **Color Management** > **Channels** tab: Check to ensure all image channels have been correctly assigned by the software as shown in the below screen shot.
   (Non-color-critical channels such as cut paths can be deactivated, mapped to db3 spot colors, or defined as a custom color.)



5. Optional: **Image Label/Strips** > **Image Control Strip**: Select a **Control Strip** and the desired **Control Strip Type**.
6. Click **Print** to print the job.
   (OpenColor proof standard: If **no** profile is available, a new one is demanded from GMG OpenColor and the current job will be paused for the calculation time. The calculation progress can be tracked in the **Jobs** list. As soon as the profile is ready, the job will be automatically printed.)

Tip If an image channel name does not match with the ink name of the associated measurement, you can manually assign the correct ink in the **Color** list (**Color Management** > **Channels** tab).

6.7.1 Changing the Print Order in the Manual Job Manager in GMG ColorProof

To make OpenColor proof standards more dynamic and flexible to use, you can configure the print order of the inks in the **Manual Job Manager**. This flexibility is mainly intended to be used for characterizations based on **single ink** measurements. Single ink measurements are compatible with any print order, so you can use one proof standard for simulating various ink sequences without having to set up a separate project for each job.

Measurements with **overprints**, however, are compatible with only one print order. If a different print order for such a measurement is defined, **all** overprint patches will be ignored and the profile will be calculated only with single ink information, the paper tint of the media, and a gradation curve.

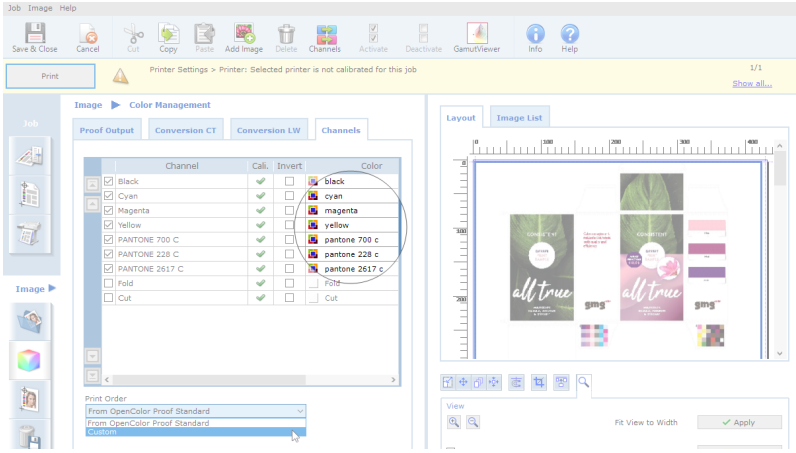


Fig. 38 Changing the Print Order in the Manual Job Manager.

Print Order options

Option	*Description*
Custom	The print order can be freely defined by selecting a color channel and clicking the arrow buttons on the left side to move the channel up or down in the list. When using a custom print order, the print order of the associated **Printing Process** will be ignored.
From OpenColor Proof Standard	Uses the print order of the associated **Printing Process**.

6.8 Creating a Workflow for Proofing with OpenColor

Creating a workflow with an OpenColor proof standard or profile is like setting up a conventional CMYK workflow. The basic procedure is described in detail in the documentation of GMG ColorProof. This chapter deals with the differences by listing the key steps of this process.

→ Select an OpenColor proof standard (**Color Management** > **Proof Output** tab) or a regular proof standard with an MXN/MXD profile for the workflow. GMG ColorProof automatically activates / deactivates the available printer-medium combinations for load balancing.

→ You need one workflow for each **Project** or profile you are using. **Projects** are defined in GMG OpenColor and can be selected in GMG ColorProof in an OpenColor proof standard. You do **not** need a separate workflow for each combination of image channels.

→ When using an OpenColor proof standard, GMG ColorProof automatically requests a profile from GMG OpenColor based on the available ink measurements and the selected printer-medium combination. The job is printed as soon as the profile is calculated. If no measurement data can be found for a certain image channel, the job is put on hold and an error message is displayed in the **Jobs** list.

6.9 Remote Proofing

Jobs that use OpenColor proof standards and profiles can be used in remote proofing scenarios just as other jobs with CMYK proof standards.

Jobs that use an OpenColor proof standard or profile, must, however, be transferred **to a remote site** in **read-only** mode (> **Color Management**: **Embed Color Profiles (Read-Only Job)**). This will convert the otherwise dynamic OpenColor proof standard to a static MXN profile that is embedded into the job archive.

Note The remote site must have a GMG OpenColor processing licenses. For further information on the required licenses, please see "Available GMG OpenColor Licenses" on page 10. For further information on remote proofing, please see the GMG ColorProof documentation.

6.10 Verifying Spot Colors

If you want to know how well spot colors printed in an image match the reference values, you can add a spot color control strip to your image in GMG ColorProof (> **Image Control Strips**).

With an **integrated** measuring device and a GMG ProofControl Inline license, all patches are automatically measured and a verification label is printed on the proof. For measuring the strip with an **external** measuring device, you can use GMG ProofControl.

When validating spot colors from **spot color databases**, GMG ColorProof compares the measured values of the fulcrums with the Lab target values from the db3. GMG OpenColor spot colors are validated by comparing the measured values against the Lab target values from the **multicolor** profile. In both cases, the Delta E values are printed in a label, showing you which spot colors can be reproduced by your printer-medium combination and which colors are out-of-gamut. You can optionally define **tolerances** for a pass/-fail verification of the spot colors.

Available spot color control strips

- The **GMG Spot Color Strip - Full Tone** uses only 100% full tone patches and has a fixed size of 10 patches. GMG ColorProof assigns the first 10 spot color channels found in the image to the 10 channels of the control strip. The strip contains one full-tone patch (100% fulcrum) for each spot. If the image contains more than 10 spot colors, exceeding spots will be ignored.
- The **GMG OpenColor Control Strip** uses full tone patches **plus** additional spot color **tints** for the verification process. Only spot color tints with corresponding measurements in the GMG OpenColor database can be validated. Only available for printers with **integrated** measuring device in combination with GMG ProofControl Inline.

How to verify spot colors with an integrated measuring device

1. On the navigation panel on the left of the main program window, click **System**.
2. Click the GMG ProofControl Inline tab.
3. In the **Proofer Supporting Direct Label Printing** group, from the **Print Label Automatically on Proofer** list, select **Always** or **Only if Verification Passed** to directly print the label on the proof.
4. Optional: Define **Tolerances for Spot Colors** if you want to verify according to specific thresholds.
5. Create a job for an image with spot colors.
6. **Image** > **Label/Strips/Marks** > **Image Control Strips**: Select the option **Control Strip 1** (or 2).
7. From the **Measuring Device** list, select the **integrated** measuring device you are using.
8. Under **Control Strip Type**, select a **spot color control strip** and determine where to place the strip.
9. Print the job.
   GMG ColorProof prints the job with the control strip. The color patches will be automatically measured by the integrated measuring device. The print medium will be rolled back and the GMG ProofControl Inline label will be printed next to the control strip.

How to verify spot colors with an external measuring device

Note Verification of spot color control strips in GMG ProofControl is supported only for the X-Rite i1 measuring device.

1. Start GMG ProofControl.
2. Under **Options** > **Hotfolder**, select the option **Use Automated Measurement Import**. Browse your folders and select the folder where the measurement jobs are saved (default path: *<installation path>\GMG\ColorProof05\ProofControl Output*).
3. Create a job in GMG ColorProof using an image with spot colors.
4. **Image** > **Label/Strips/Marks** > **Image Control Strips**: Select the option **Control Strip 1** (or 2).
5. From the **Measuring Device** list, select i1.
6. Under **Control Strip Type**, select **GMG Spot Color Control Strip - Full Tone** and determine where to place the strip.
7. Print the job.
   GMG ColorProof prints the job with the control strip. The job is automatically exported to the GMG ProofControl **Hotfolder** defined in step 2 and displayed in the main view in the **Jobs** list.
8. Switch to GMG ProofControl and select the measurement job in the **Jobs** list.
9. Measure the strip with an i1.
10. Click on the **Print Label** button on the toolbar to print a label with the verification results.

7. Separation

7.1 About Separation Profiles

Note Requires an extra license.

In GMG OpenColor, you can create separation profiles for conventional and digital printing techniques.

Separation profiles created in GMG OpenColor can be used in GMG applications such as GMG ColorPlugin and GMG ColorServer and the third party application PACKZ to separate documents into the target color space. The following movie shows a practical example.

Fig. 39 This video shows how you can define your spot colors in GMG OpenColor using **Separation Rules**. See how easily you can control the used color separations and other options. It also shows how you can apply the defined separations to your printing PDF, using GMG ColorServer, GMG ColorPlugin, or Hybrid PACKZ.

To do so, you will need to characterize both the input color spaces (from the document) and the target color space in GMG OpenColor. You will then need to **publish** the separation profiles to make the project available to the GMG ColorPlugin. You may, but you do not need to, precalculate separation profiles in GMG OpenColor. You also do not need to export the profiles. GMG ColorPlugin and PACKZ connect to GMG OpenColor and request the needed profiles on-the-fly.

Input color spaces

You will most likely need multiple input color spaces per project. For example, a PDF object might be an RGB image, another a CMYK image, and there might be additional multicolor objects within the same PDF. Depending on the color space type, you can characterize the input color space by importing an ICC file or by using an existing GMG OpenColor project.

- Define a CMYK input color space by an ICC profile or by an GMG OpenColor project.
- Define RGB input color spaces only by ICC.
- Define multicolor input color spaces only by an GMG OpenColor project. (This ensures the required quality of the input profile.)

Target color space / Output inks

The output color space is defined by the target printing process (as characterized in GMG OpenColor and defined in the simulation space of the proof profile).

The output color space can be CMYK or multicolor (n c). As there is a physical limitation of the number of the channels that can be screened—generally 3 or 4—you will need to split the PDF or Photoshop document up into multiple objects or areas/layers. You can then select up to 4 output channels for each object or area/layer. The document will then be separated into the final n, for example 7, channel output color space. The **final** document can use **any** number of output channels.

If you are using a conventional printing process with additional Red or Orange, Green, and Blue or Violet inks to **extend** the color space of your printing system, you can create separation profiles that will get the most out of the color space, resulting in brilliant and colorful images.

Multicolor printing

The application supports the following methods for **multicolor** printing:

- **Custom** ink setup / spot color printing: In this more traditional method, formulated spot colors are added as job specific inks to the print run.
- **Fixed** ink setup / ECG: Any spot color from the original design will be reproduced by a standardized ink set. This method allows for a virtually unlimited number of colors in the design and also for nesting print jobs with different color channels, without changing the ink configuration of the printing machine.

Supported color spaces and applications

The following table provides an overview which color spaces are supported and in which application.

Input color space	*Output color space*	*Input*	*Applications*
CMYK	CMYK	ICC, OC	GMG ColorPlugin, GMG ColorServer
RGB	CMYK	ICC	GMG ColorPlugin, GMG ColorServer
Multicolor	CMYK	OC	GMG ColorPlugin, PACKZ
Multicolor	Multicolor	OC	GMG ColorPlugin, GMG ColorServer, PACKZ
CMYK	Multicolor	ICC, OC	GMG ColorPlugin, GMG ColorServer
RGB	Extended Color Gamut (ECG)	ICC	GMG ColorPlugin, PACKZ

Tip Export profiles in MX4 format for use in GMG ColorServer 4.x and MX4x for GMG ColorPlugin or GMG ColorServer 5.x.

7.2 Creating Separation Profiles

Note Requires an extra license.

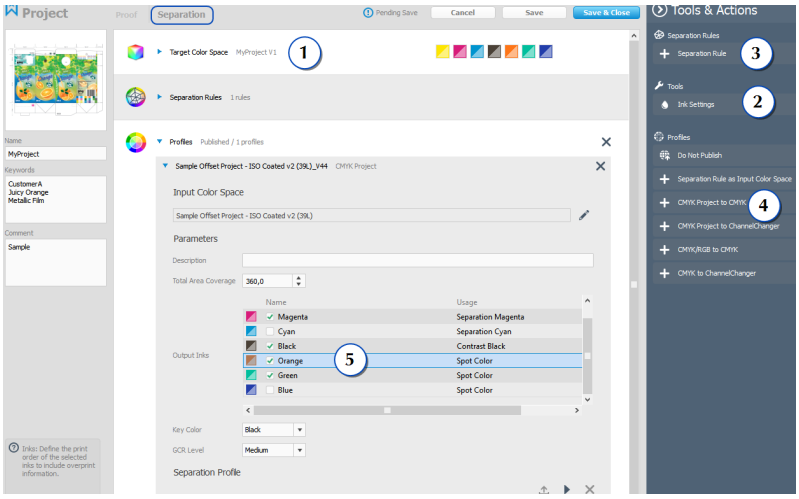


Fig. 40 Project settings for separation.

Select a **target color space** by clicking on one of the listed proof profiles of your current project (1).

Before defining the input color space, please check and complete the **Ink Settings** (2), please see "Ink Settings" on page 93). Unless the **Ink Settings** are complete, you will not be able to access the settings for the input color space.

Advanced Info **Separation Rules** (3) allow you to define how input colors defined in your GMG OpenColor project will be separated to your target color space (please see "Creating Color Definitions" on page 88 required for using "Separation in PACKZ" on page 100).

How to create a separation profile

1. Click the corresponding button on the **Tools & Actions** panel.
2. Select an input color space matching the the color space of the document you want to edit or convert.
3. In case you defined a **ChannelChanger** profile, select a maximum of four output inks.
4. To **start** the profile calculation, click the **Calculate** button.
5. Click the **Publish** button to make all profiles available in the connected application such as GMG ColorPlugin.
6. To **export** finished profiles, click the **Export** button at the bottom of the separation settings. If you have established a connection between GMG OpenColor and the application in which you want to use the profile, you will not need to export the profile.

You can also create GMG OpenColor Separation profiles based on a GMG OpenColor **Separation Rule** in PACKZ (please see "Separation in PACKZ" on page 100).

See also:

- "About Separation Profiles" on page 86
- "Expanded Color Gamut (ECG)" on page 95

7.2.1 Creating Color Definitions

Note Requires an additional license.

In GMG OpenColor, **Separation Rules** are used to define color separations for a **fixed** ink setup / ECG. The rules are basically a lookup table of **input colors** (spot colors) from the document and define how the input colors should be separated into the **output inks** of the separation target color space as defined in the project.

You can use the color definitions for multiple purposes:

- For manual separations in **any third-party application**: Simply manually transfer percentage values from the **Separation Rules** to your image editor. You do not need to waste time playing around with different output ink configurations and percentage values anymore, but you can see right away the color definition that will provide the **best match** and the expected delta E.
- For automatic or semi-automatic separations in the third party application **PACKZ**: PACKZ uses the **Separation Rules** as default settings for separations. You will still be able to finetune the separation in PACKZ, but the **Separation Rules** allow you to use consistent color definitions and to save time as you can reuse existing definitions.
- For automatic separations in GMG ColorServer.
- For **statistical** purposes, for example, to check the color match and look for out-of-gamut colors: You can export the color definition table and import it into a spread-sheet editor.

How does it work?

Per default, GMG OpenColor uses a **best match algorithm** for creating a color definition, that means, the application calculates the color definition with the lowest possible delta E (compared with the target values of the input colors). However, you can customize the separation rules to your needs, for example, you can remove inks with a very low percentage or limit the total number of inks used, or manually edit the percentage values.

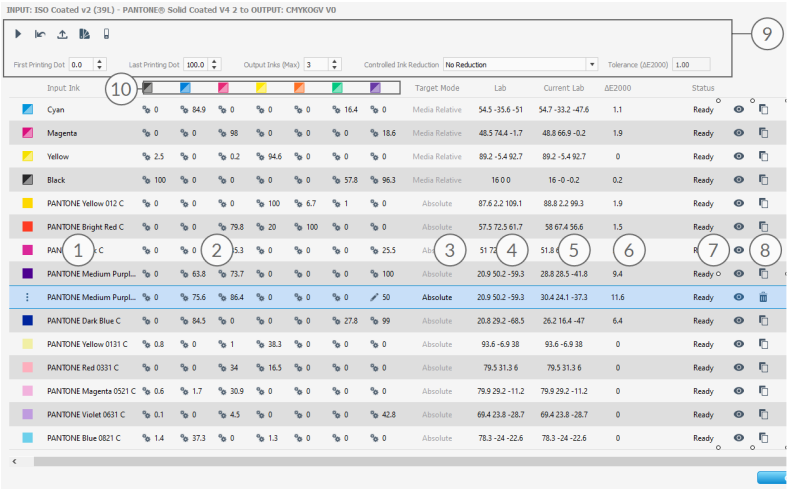


Fig. 41 **Separation Rules** dialog box.

The matrix shows the following values:

	Description
1	**Input** color (as it appears in the document you want to separate)
2	**Output** inks in percent (how the input color will be separated)
3	**Target Mode** (from the input project, see "Correcting the Target Color and the Tone Value Curve" on page 53) Use **Absolute** if the printed spot color should match the swatch book as closely as possible. **Absolute** is the best option for most applications.
4	**Target** Lab values (from the input project, how the input color would ideally be printed)
5	**Current** Lab values (actual printed color)
6	**Delta E** values (difference between the target color and the actual printed color)
7	Status of the color definition. When manually editing output inks, you will need to recalculate the color definition.
8	**Color variant**: You can add new color variants by clicking the **Add Ink Variant** button on the right side. In the example screenshot, a variant for PANTONE 228 C, which uses Violet and Yellow instead of CMK, has been created. To **remove** an output ink from the separation, click the icon next to the percentage value in the list until the cross icon appears. The ink will not be used. To **enable** the output ink again, click the icon until the gearwheel icon appears. To enter a **fixed percentage value** for an output ink, click the icon until the edit icon appears. Enter a custom percentage value. This value will be used for the separation of the solid color.
9	You can click the **Calculate** button to start the calculation of new or edited color definitions (that are in status **Pending Calculation**). Colors in status **Ready** will **not** be recalculated. You can change the calculation options above the list, for example, the **Max Number of Output Inks** before starting a new calculation. (These settings are applied **only** when a new calculation is started. Colors in status **Ready** will not be changed.) If you want to **recalculate** the entire color list, for example, because you changed a calculation option such as the number of output inks, you can reset the list by clicking the **Reset Calculation** button. Custom values will be preserved. In the **Separation Rules** window, you will be notified if the separation rules are not synchronized with the input project, i.e. if input colors have been changed without recalculating the color list. The message **Show Changes** and the number of different input colors will be displayed (see "Changing colors" on page 92). You can click the **Save data and jump to input project** button to navigate directly to the input project to change the input colors. You can export a **Separation Rule** as a .txt file to analyze it in a spreadsheet application such as Microsoft Excel, e.g. to detect "out of gamut" colors. You can export it as a **db3** spot color database for use in GMG ColorServer. You can click the **Generate ColorBook** button to create a ColorBook PDF and then print it directly on your press (see "Print a ColorBook to Show the Full Potential of Your Printing Capabilities").
10	**Ink priorities**: The preference to use an output ink over the other is indicated by the order of sequence from left to right. You can change the ink priority by drag-and-drop. In the example screenshot, the CMYK inks have a higher priority than the additional inks. Of course, GMG OpenColor still prefers an ink with a lower priority if a better match with the target values can be found.

Note When saving **Separation Rules**, make sure that **all** color definitions are in status **Ready**. Otherwise, you will not be able to select or use the Separation Rules in PACKZ.

How to create separation rules

Note Make sure you have selected **a Target Color Space** and fully defined **Ink Settings** for the separation. Otherwise, no separation actions will be available on the **Tools & Actions** panel.

1. In a **Project**, click **Separation** on the main panel.
2. Click **Separation Rule** on the **Tools & Actions** panel.
   The **Select Project** dialog box lists all projects that are available as **input color spaces**. You can define only one **Separation Rule** per input and output project combination. Therefore, projects that are already used in a **Separation Rule** for the currently active project will not be shown in this list. (To edit an existing **Separation Rule**, click the **Edit** button on the right side.)
3. Select the **input color space**.
   The shown **Separation Rules** matrix defines the **relationship** between the input inks on the left and the output inks on the right.
4. **Start** the calculation.
   GMG OpenColor will calculate best match values for each input/output combination, i. e. find the best match with the target value as defined in the characterization of the input color space. This means, the input inks will be reproduced as good as technically possible in the target printing process.

TAC and overprint behavior

You can define the **Total Area Coverage** and the overprint behavior under **Screening and Usage** in the **Ink Settings** dialog box in the project.

Note Existing separation rules will **not** be updated when the **Total Area Coverage** or overprint behavior in the **Ink Settings** are changed. There will be no information on inconsistencies. You will need to update separation rules manually by clicking the **Reset Calculation** button in the **Edit Separation Rules** dialog box.

See also:

"Ink Settings" on page 93

Calculation settings

Available options	*Description*
First Printing Dot	Affects the **Separation Rules** calculation. Output channel values below this percentage value will be set to 0%. Helps to avoid Min Dot problems in flexo printing.
Last Printing Dot	Affects the **Separation Rules** calculation. Output channel values above this percentage value will be set to 100%.
Output Inks (Max)	Defines the maximum number (between 1 and 4) of output inks that will be used in the separation of the input color. The priority of the output inks is defined by the order of sequence from left to right and can be changed by the user. For example, if you have 5 output inks available in the separation **Target Color Space**, you can enter the number "3" to use only 3 inks per input color. Limiting the number of output inks can be a requirement for special packaging applications. It also can enhance the stability of the printing process and save money, because less inks are used. On the other hand, this means a compromise on matching the input color as defined by the designer. GMG OpenColor shows you the expected deviation in delta E and helps you to make the best decision for your specific project.

Available options	*Description*
Ink Control	Under **Ink Control**, you can basically choose between low **delta E** and reduced **number of output inks**. If **Best Match for Solids** is selected, the number of output inks will be limited only by **Output Inks (Max)**. GMG OpenColor will use a **best match algorithm** for calculating the **solids**, that means, the application calculates the color definition with the lowest possible delta E (compared with the target values of the input colors). For the tints, the same output colors will be used as for its parent solid, even if this is not the best match. If the option **Best Match for Solids and Tints** is selected, GMG OpenColor uses the best match algorithm to calculate the tints as well. The application will add Cyan, Magenta, and/or Yellow if this will significantly reduce the delta E. (Black or other colors will not be added.) With the following options, you can reduce the number of output inks. This will generally result in a higher delta E. Use the option **Generate Preferably CMYK** to separate colors into CMYK if the color deviation is not bigger than the set tolerance. Only if the deviation is bigger than the entered delta E, GMG OpenColor will use all available output inks. **Generate Preferably CMYK** saves costs, but decreases color accuracy. **Generate Preferably CMYK** supersedes the ink priority. If this option is selected, CMYK will be used preferably even if, for example, Blue has the highest priority. However, if the priority is set to KCMY, K will have the highest priority. If you selected **Custom Reduction**, GMG OpenColor will check for each color, whether it is possible to reduce the number of output inks without exceeding the set delta E tolerance. Example: If **Custom Reduction** is selected and the tolerance is set to 1.00, GMG OpenColor will check whether the number of inks can be reduced to 1. If the predicted color difference is below 1.00 delta E, only 1 output ink will be used. If this is not the case, GMG OpenColor checks next whether the number of inks can be reduced to 2. If the predicted color difference is below 1.00 delta E, only 2 output inks will be used. And so on.

Customizing output inks

You can use the context menu (right mouse button) or click the icon next to the percentage value in the list to toggle the edit modes as described in the following.

Icon	*Output Ink Usage*	*Description*
	Automatic (best match)	GMG OpenColor will calculate the percentage value of this ink to achieve a best match with the target color.
	Disabled	This output ink will not be used for the separation of the input color.
	Fixed custom value	The custom percentage value will be used for the separation of the solid input color. You can use this feature to fix or manually change the current percentage value. When recalculating the color definition, fixed values will not be changed. (Of course the color definition needs to be adapted when a tint of the input color is going to be separated.)

Actions

Icon	*Action*	*Description*
	Show tints	Shows the tints of the color.
	Add ink alternative	Adds a new variant (with alternative output ink values) of the color.

Changing colors

You might want to do the following after the color definitions have been initially calculated:

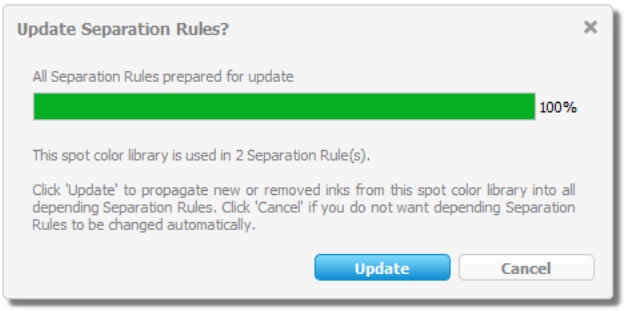
a. Change the scope of available spot colors in the spot color library (on characterization level), i.e. **add** a new spot color, **delete** a spot color, **activate** and **deactivate** a spot color.
b. Apply **Color Corrections** to spot colors (on characterization or project level).
c. Edit the **Inks** list in the **input** project.
d. Change the ink set (output inks) your press is using in the **output** project.

All colors affected by those changes need to be recalculated. In case (a), i.e. editing the spot colors in a spot color library, GMG OpenColor will automatically update all depending separation rules (see "Automatic update of Separation Rules" on page 92). In all other cases, you will need to open all separation rules using this spot color library as input color space and **manually** start the update (see "Manually updating Separation Rules" on page 92).

Automatic update of Separation Rules

When a spot color has been **added** to, **deleted** from, **activated** or **deactivated** within a spot color library, GMG OpenColor will automatically update all depending **Separation Rules**.

GMG OpenColor will notify you with the option to **Update** if the spot color library is used in at least one set of **Separation Rules**.



After you clicked **Update**, GMG OpenColor will automatically recalculate all depending **Separation Rules**.

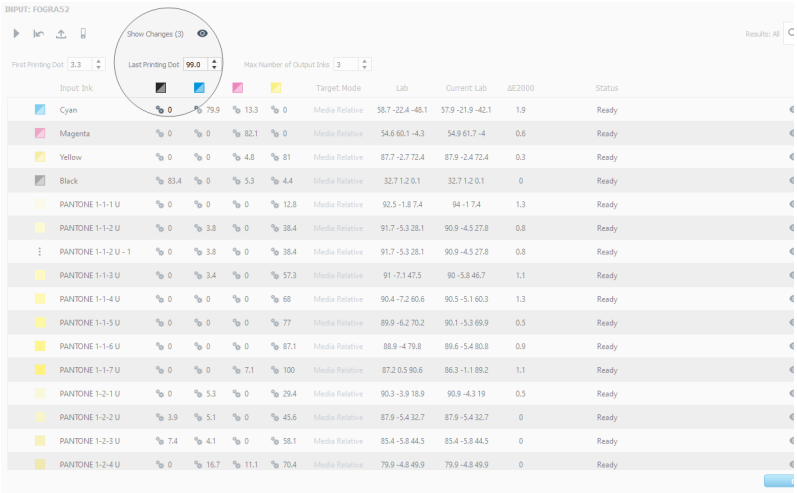
Note After you clicked the **Cancel** button, you will not be able to trigger the automatic update anymore. You will need to open all separation rules using this spot color library as input color space and **manually** start the update (see "Manually updating Separation Rules" on page 92).

Waiting and ongoing recalculations are listed in the **Tasks** dialog box. The affected sets of **Separation Rules** will be locked for editing until the update will have been finished. GMG ColorServer will automatically synchronize all depending spot color libraries (in case the automatic synchronization has been activated in GMG ColorServer) after the update will have been finished.

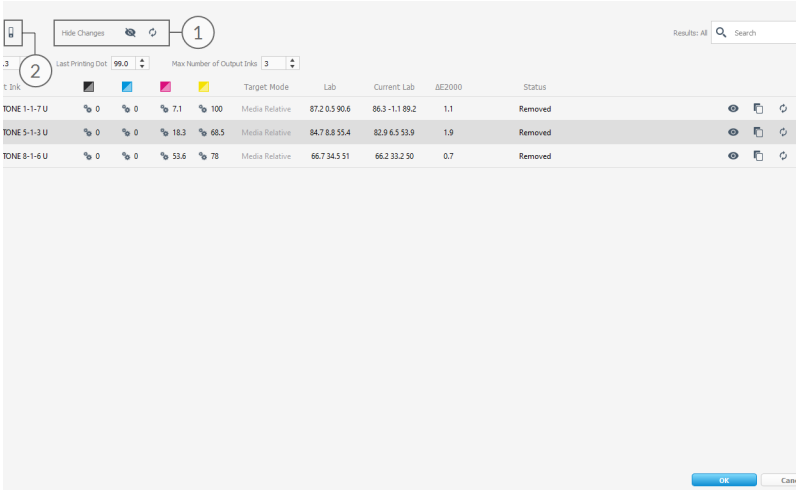
Manually updating Separation Rules

You can manually update the **Separation Rules** list by opening it from the output project.

In the **Separation Rules** window, you will be notified if the separation rules are not synchronized with the input project, i.e. if input colors have been changed without recalculating the color list. The message **Show Changes** and the number of different input colors will be displayed.



You can click the eye button to show only the differences between the current list and the input project.



In the differences view, you can you can click the **Sync with input project** button to update the entire color list. You can also pick a specific color and update only this color.

Input colors that are not available anymore, because they have been removed or deactivated in the project used as input color space will be removed from the **Separation Rule** list. New input colors will be added to the list. Changes to the target Lab values coming from changes applied to the **Media** or as a result of **Color Corrections** on the **Project** level will be applied. Your target values will be up-to-date and in line with the target values of the proof profile created from this project.

You can also click the **Save data and jump to input project** button (2) to navigate directly to the input project, to change the input colors there.

All custom values will be kept when a recalculation takes place.

See also:

- "Separation in PACKZ" on page 100

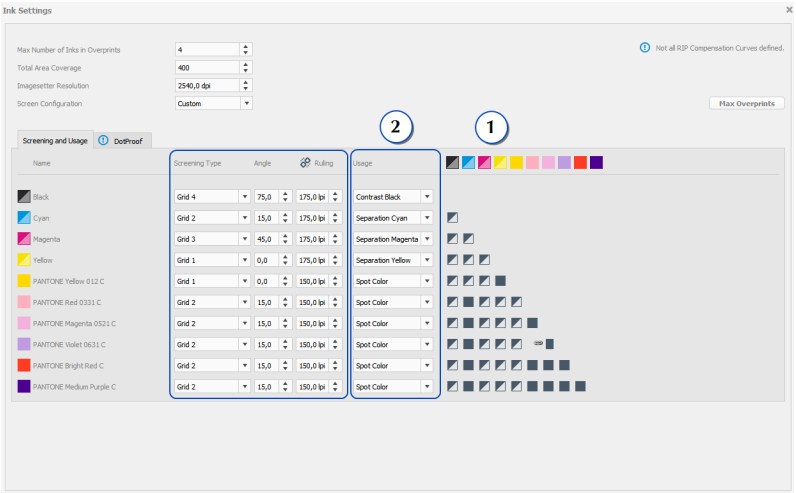
7.2.2 Ink Settings

The ink settings are required for **DotProof** and **separation profiles**. For ContoneProof profiles, the ink settings are not relevant.

The **Ink Settings** are available on **Characterization** and **Project** level.

In a project, the **Ink Settings** button is available on the **Proof** and **Separation** tabbed page. On the **Proof** page, you can edit the ink settings of all colors used in the project. On the **Separation** page, you can edit only the actual output colors as defined by the **Target Color Space**.

→ Click **Ink Settings** on the **Tools & Actions** panel to edit the ink settings.



Screening Settings (1)**.**

These settings are mandatory for calculating **DotProof** and **separation** profiles. Including the imagesetter resolution, the screening settings should match the actual target printing conditions you want to simulate, e.g. as used for creating the 1-bit files of the iteration chart (see "Optimizing the Profile Quality" on page 74).

Different screening grids serve to avoid moiré patterns. If you want to print with more than four inks, you can use the same grid for complementary colors, as complementary colors normally do not overprint. For example, Red can have the same grid as Cyan, and Green the same as Magenta. If the colors strongly differ in lightness, however, they should use different screening grids.

The screen angles of the separate channels should be shifted at least by 15° towards each other for avoiding moiré effects. Instead of defining each angle separately, you can use one of the typical presets (> **Screen Configuration**).

Tip If the screening settings used when producing the 1-bit files differ from the ones in the characterization (e.g. when using 1-Bit Creator in GMG ColorProof), the first ones should be used.

Usage (2)**.**

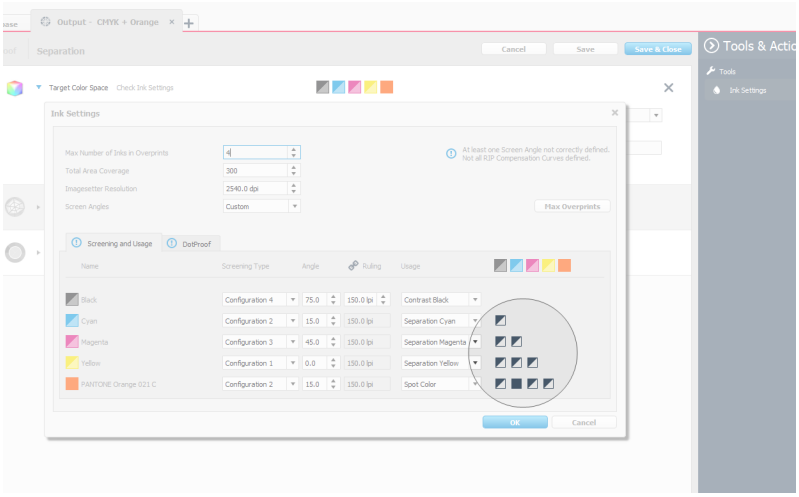
The **Ink Usage** defines how a color will be handled during profile calculation. It also influences the choice of patches and the total number of patches in **iteration** test charts used for **DotProof** profiling.

Ink Usage

Option	*Description*
Separation (Cyan, Magenta, Yellow, other)	Select this option for image separations and important colors (including spot colors) that need to be reproduced in a detailed way. Inks that are defined as separations are profiled with all overprint information available in the characterization. When calculating a separation profile, all **output inks** need to be defined as **Separation** except **Contrast (Black)**.
Contrast (Black)	Use this option for shadow-enhancing colors such as black.
Spot Color	Select this option for colors that are used only as typical spots and are **not** part of the image separation.
Solid Only	Use this option for all colors that are used only as full tone.
Color Database	GMG OpenColor will use this **Usage** type if you are adding a whole spot color library to a project as an "ink". You can do this if you are using a project to dynamically generate proof profiles from a fixed set of colors plus colors from a spot color library, for example, CMYK + a spot color library.

Overprint behavior

The overprint behavior depends on the **Screening and Usage** settings in the **Ink Settings** dialog box.



Colors set to the same **Screening Type** will overprint only with solids. For example, if Cyan and Orange are set to **Configuration 2**, Cyan will only print with solid Orange and vice versa. This is indicated by the filled square icon in the overprint preview on the right.

You can click the icons in the overprint preview to change the overprint behavior. For example, you could set the overprint behavior of Cyan and Orange to **No Overprint**. This would be indicated by a dash icon.

When calculating separation rules, the **Total Area Coverage** and the overprint behavior defined in the project are taken into account. This prevents overinking and moiré effects in the print production.

See also:

- "Creating Color Definitions" on page 88

7.2.3 Expanded Color Gamut (ECG)

Expanded Color Gamut (ECG) printing, also referred to as **Fixed Color Palette** printing, uses a standardized ink set enhancing the color space to reproduce any color used in the design. In the plugin, up to three additional inks can be used. The inks need to be **between** the CMYK process colors, i. e. **Red** or **Orange**, **Green**, and/or **Blue** or **Violet**.

This method allows for a virtually unlimited number of colors in the design and also for nesting print jobs with different color channels, without changing the ink configuration of the printing machine.

Using ECG, design can be more eye-catching, resulting in highly saturated colors. The print result is closer to the original RGB design. As the ink setup is standardized, printers are saving on make-ready and ink costs.

As the profile calculation takes a considerable amount of time, GMG OpenColor calculates the required separation profiles **in advance** and provides them to the plugin on request via a direct connection.

- Separate **RGB** images to your custom **ECG** ink setup with up to **7 output channels**.
- You can use Red or Orange, Green, and Blue or Violet inks.
- To **avoid Moiré effects**, the inks that are used in addition to CMYK will be used only in the respective area of the color space. For example, Orange is used only in the RMYK area. This means there will be no overprinting between complementary colors such as Cyan and Red or Orange.
- To **preserve the gray balance**, the inks that are used in addition to CMYK are not used in image areas with a low saturation.

Prerequisites

To create a **ChannelExtender** separation profile, the GMG OpenColor project needs to meet the following requirements. Otherwise, the **RGB to ChannelExtender** action will not be available. Please check the **Ink Settings** accordingly.

- Input color space: Needs to be an **RGB ICC profile** matching the color space of the document you want to edit in Adobe Photoshop.
- Output inks: CMYK + 1 to 3 additional inks. CMYK inks must have the appropriate **Usage** parameter (**Separation Cyan**, **Separation Magenta**, **Separation Yellow**, **Contrast Black**). Additional output inks need to be defined as **Separation (other)** or **Contrast (other)**.
- **Color** of additional output inks (referring to the LCH color model):
  - **Hue (H)**: Consider which CMYK process colors are **neighboring** the additional output ink in the color wheel. The hue angle of the additional output ink needs to be **in-between** the hue angles of these two colors (regarding the minor sector of the wheel). The hue must also keep a **minimum distance of 10°** to the hue of these two colors.
    Example: If the additional ink is **Orange**, the next neighbors are **Magenta** and **Yellow**. Let us assume we have the following output inks defined as LCH: **Magenta** 49 L, 75 C, 360° H; **Yellow** 89 L, 93 C, 93° H; **PANTONE Orange 021 C** 61 L, 108 C, 52° H.
    We then check the hue angles: Magenta has 360° and Yellow 93°. PANTONE Orange 021 C has a hue of 52°, which is between 360° and 93°. Concerning the minimum hue distance, the hue of Orange must be between 10° (distance from 360°) and 83°. As this is also true, PANTONE Orange 021 C fulfills the hue requirements for an additional output ink in this ink setup.
  - **Chroma (C)**: The chroma of an additional output ink must be at least **75%** of the chroma of the neighboring process color with the higher chroma value.
    Example: Let us consider the same inks we used in the example above. If Magenta has a chroma of 75 and Yellow of 93, the additional output ink Orange needs to have a saturation equal to 70 or higher (75% of the higher value, i.e. 93.) The chroma of PANTONE Orange 021 C is actually higher than that of the process colors so this requirement is met.
- **Screen angle**: **Complementary** colors must use the **same** angle. For example, Red and Cyan must use the same screen angle.

Using a ChannelExtender profile in GMG ColorPlugin or PACKZ

As the profile calculation takes a considerable amount of time, you will need to **precalculate** profiles with all possible channel combinations in GMG OpenColor before using it in the target application. The application will then automatically request the appropriate profile.

Calculating ChannelExtender profiles

When using an ECG target color space, GMG OpenColor will automatically calculate **all** profile variants with all combinations of output inks so that you can flexibly use any combination in GMG ColorPlugin. If you prefer to calculate a single profile with all output inks, you can select the option **Calculate Single Profile**.

Tip If you want to separate the whole document into one fixed ink setup, select the option **Calculate Single Profile**. This saves profile calculation time and the profile will be available after a short moment in the plugin. You will need the profile variants only if you want to separate objects or selections using different ink setups.

See also:

- "Creating Separation Profiles" on page 87

7.2.4 Separation Settings

Rendering intents for CMYK-to-CMYK separation profiles

Rendering Intent	*Description*
Auto-Optimization	Recommended and suitable for most requirements, this rendering intent automatically detects the differences between the color spaces and selects the best fitting calculation parameters, keeping colors as far as possible **relative** while using perceptual algorithms where necessary.

Rendering Intent	*Description*
Best Color Accuracy – Relative Colorimetric	Only available for CMYK-to-CMYK profiles, this rendering intent aims at achieving the highest **color accuracy**. In-gamut colors are reproduced in a color-accurate manner in the output color space. Higher saturated (out-of-gamut) colors are **clipped**. Optimal for color conversions where the input color space is almost identical to the output color space.
Best Visual Impression – Perceptual	This rendering intent aims at preserving the **visual impression** of the original image, including saturation and detail, in the limited output color space, and is thus optimal for RGB-to-CMYK separations.
No Gamut Mapping – Absolute Colorimetric	Creating a profile without gamut mapping has a similar meaning than using an absolute colorimetric rendering intent for ICC based color management. In-gamut colors are color-accurately reproduced and out-of-gamut colors are clipped. Without gamut mapping, it might not be possible to reproduce all source colors in the target color space.

Purify color options for CMYK-to-CMYK separation profiles

It is highly recommended to use the option **Keep Color Pure** as it provides a good balance between preserving pure colors and preserving the color impression as intended by the designer or creator of the document. Each following option will be more strict on preserving pure colors, on the cost of higher deviations from the original document color space.

Option	*Description*
Keep Color Pure	Automatically purifies all colors that are only slightly contaminated by other colors.
Keep Pure (No ΔE Limit)	Purifies all colors even if the resulting deviation from the characterization is high. 100% solid colors are kept pure, but the 100% value might not be preserved and might be separated to 98%, for example, unless you also select the option **Keep Pure Solids (CMY)**.
Keep Pure Solids (CMY)	This option forces 100% solid colors (C, M, Y, not K) and two color overprints, i. e. CM, CY, MY, to remain at 100%. A solid color overprinting with Black is excluded unless you also select the option **Keep Pure Solids (Overprints with Black)**.
Keep Pure Solids (Overprints with Black)	This option is only available if you have selected **Keep Pure Solids (CMY)**. 100% solid colors (C, M, Y) overprinting with black are kept at 100%.
Pure Black	Keeps the black axis pure. 100% Black is kept at 100% Black and will not be supplemented with or replaced by CMY.

Further options for CMYK-to-CMYK and RGB-to-CMYK separation profiles

Option	*Description*
TAC	Total Area Coverage. Adjusts the maximum amount of CMYK in percent.
Separation Mode	◥ **New Separation**: Reseparates the black channel to achieve a consistent Black separation over the complete color space. ◥ **Keep Black Separation**: Preserves the black channel and the key axis across the entire color space, that is, color values without K will remain without K.
Black Start	Percentage at which Black ink is starting to be used.
Black Width	Defines how much black ink is used in saturated colors. We recommend a value between 80-100%.
UCR **Light** **Midtone** **Shadow**	Under color removal (UCR) is a technique to reduce the amount of CMY in neutral areas while increasing the amount of Black. Thus, the image areas with reduced CMY can dry faster between each printing unit on a printing press. For profiling, you can determine the Black amount in the highlights, the midtones and the shadows.

Further options for Multicolor Project to Multicolor separation profiles

The following options are available only for **Multicolor Project to Multicolor** profiles. The action **Multicolor Project to Multicolor** is available for CMYK-to-CMYK, CMYK-to-Multicolor, Multicolor-to-Multicolor, and Multicolor-to-CMYK profiles, but only if **Separation Rules** are used in the project.

Option	*Description*
GCR Level (CMYK)	The **Separation Rules** define how much Black will be used. **GCR Level (CMYK)** lets you increase the GCR level. It will affect only CMYK inks, not any additional inks that might be part of the ink configuration. Gray component replacement (GCR) is a technique to reduce the amount of CMY in gray areas while increasing the amount of Black. Thus, less ink can be used and the resulting output is less sensitive to changes in the printing variables. If the GCR level is set to 0, the total Black ink will be the sum of the Black ink usage for single colors as defined in the **Separation Rules**.

Option	*Description*
Black Start (CMYK)	The **Separation Rules** define the black start, i.e. the percentage at which Black ink is starting to be used. **Black Start (CMYK)** lets you use a higher black start. It will affect only CMYK inks, not any additional inks that might be part of the ink configuration.
Allow Additional Inks in Overprints	This option defines how strict the ink splitting defined for single colors in the **Separation Rules** will be applied to **overprinting** colors. If this option is selected, the **Separation Rules** are still regarded for overprints, but GMG OpenColor might also use additional inks if it makes sense to do so. **Allow Additional Inks in Overprints** is especially useful in cases where the resulting color will be substantially different than the individual colors, for example, when blue is overprinted with yellow. You might not want to use the output ink Green in blue areas and also not in yellow areas. But when blue is overprinted with yellow, resulting in a green color, it makes sense to use Green.

Learn more about Allow Additional Inks in Overprints

Example: The **Separation Rules** define that the output ink Green must not be used to print a specific blue spot color. If **Allow Additional Inks in Overprints** is selected, Green will be used in overprints with the blue spot color, for example, in overprints with a yellow color.

To ensure smooth gradations, the amount of Green will be limited automatically by GMG OpenColor. The amount of ink depends on the limits for the single colors. If the single color does not use the ink at all, the overprinted color will not use a high amount. You can increase the amount by defining a higher ink usage for the single color, as explained in the following example.

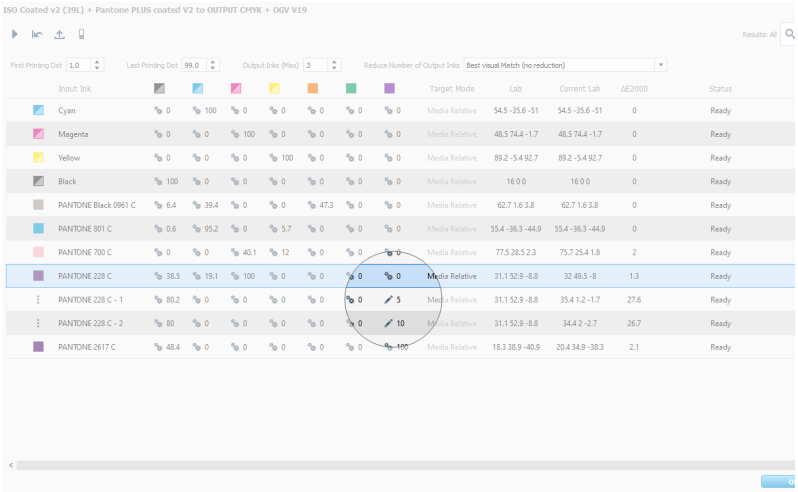


Fig. 42 The screenshot shows three ink variants of Pantone 228 C.

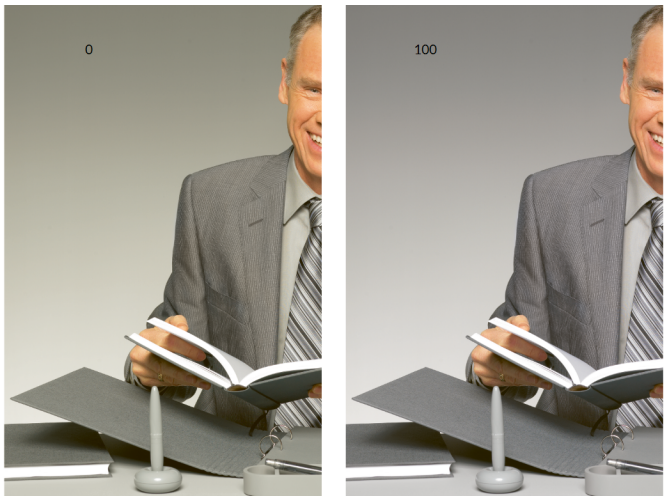
The first ink variant uses only CMK. The second one uses 5% of Violet, and the third one 10%.

If **Allow Additional Inks in Overprints** is **deselected**, the first ink variant will not use Violet at all. The second ink variant will use exactly 5% of Violet, regardless whether it is used as a single color or in an overprint.

If **Allow Additional Inks in Overprints** is **selected**, the first ink variant will use Violet only in overprints, but a lesser amount than ink variant 2. Ink variant 2 will use 5% of Violet in single color prints, but a higher amount of Violet in overprints. Ink variant 3 will use the highest amount of Violet in overprints.

Gamut Mapping

GMG OpenColor applies **Gamut Mapping** settings in a smart way: If the difference between source and target color space (target printing condition), i.e. paper tint, black point, size and form of the color space, is small, **Gamut Mapping** will not be applied regardless of the set level.

Option	*Description*
Gray Adjustment to Target Media	The **Gray Adjustment to Target Media** is important in cases where the target printing condition uses a substrate with a different white point than the output intent of the document. **Gray Adjustment to Target Media** defines how much the paper tint of the target print medium will affect the printed colors. It mainly affects the gray balance and less saturated colors. → Move the slider to the left to preserve the original colors, thus "ignoring" the new paper tint. → If you move the slider to the right, the new paper tint will have more effect on the colors, especially on the highlights and on the gray balance. **Learn more about Gray Adjustment to Target Media** If the **Gray Adjustment to Target Media** is set to **0**, the separation profile will preserve the original gray axis as best as possible. The design will keep the original color impression of the input document. GMG OpenColor takes care of the smoothness and avoid visible breaks between the paper tint and very light areas. A low value is the right choice if the final design needs to be as close to the original design as possible, for example, to ensure consistency whenever print products of the same campaign are printed under different printing conditions. In most cases, 30 is the ideal value to ensure a harmonic visual appearance. Please note that especially in the highlights, a prominent paper tint in the target color space such as Yellowish cannot be fully compensated. For example, a pure white color will be out of gamut. If the **Gray Adjustment to Target Media** is set to **100**, the gray axis will be perceptually mapped to the output color space. The design will be adapted to the target paper tint. For more or less gray designs and motives, a high value can be useful to avoid colors suddenly appearing in a gray area, for example, in a screws catalog. Example: In a separation from ISO Coated v2 (39L) to PSO Uncoated v3 (52), the white point of PSO Uncoated v3 (52) is much more blueish. If the **Gray Adjustment to Target Media** is set to **0**, the design will keep the more yellowish appearance. If it is set to **100**, the design will be adapted to the more blueish gray balance.  Fig. 43 Roman 16 test image separated from ISO Coated v2 (39L) to PSO Uncoated v3 (52), demonstrating both extreme **Gray Adjustment to Target Media** settings.
Black Point Compensation	→ You can increase the **Black Point Compensation** (BPC) level by moving the slider to the right. It preserves image detail in the shadows by **minimizing** clipping in the **shadows**. Thus, the full dynamic range of the output color space in the shadows can be used. In most cases, BPC will also lead to a general decrease in saturation. If the black point of the target color space is darker than the black point of the source, BPC might increase the saturation. ◀ If no **Black Point Compensation** is used by moving the slider to the left side, changes to in-gamut colors in the shadows are minimized, though detail might be lost. Saturation is higher. Deactivate **Black Point Compensation** if you need a color as deep black as possible or to avoid color shifts. For most Packaging applications, it is recommended to decrease BPC or set it to 0 to avoid any change of saturated or dark colors (with the risk of clipping). We recommend to use a **high** value for CMYK-to-CMYK separations of image data. Use a **low** value for packaging printed on coated media.

Option	*Description*
Gamut Expansion	Use **Gamut Expansion** to exploit the full available color space of your printer**. Gamut Expansion** is useful for all printers with a large color space, with CMYK only or with additional inks. Colors will be boosted to the edge of the available printer color space. Colors might be drastically changed, while the gray balance remains unchanged. Color boosting is technically possible only if the target color space is significantly larger than the source. If your printer uses additional inks, also select the option **Allow Additional Inks in Overprints** (see "Allow Additional Inks in Overprints " on page 98) for a maximum effect.

Further options for ChannelChanger separation profiles

Option	*Description*
Select Inks	Select maximal four output inks for your separation.
Key Color	In case of four output colors you can define the key color of your separation.
GCR Level	Grey component replacement (GCR) is a technique to reduce the amount of CMY in grey areas while increasing the amount of Black. Thus, less ink can be used and the resulting output is less susceptible to changes in the printing variables. The GCR level determines the amount of GCR regarding your separation.

Further options for ChannelExtender separation profiles

Option	*Description*
Calculate Single Profile	Calculates a single profile with **all** output inks instead of multiple profile variants with all combinations of output inks.
Extended Ink Start	Ink start for the additional inks used to extend the color space.

7.3 Separation in PACKZ

PACKZ users can use GMG OpenColor **Separation Profiles** and **Separation Rules** in PACKZ to **separate** entire files or selected color objects into the target color space of their choice. After choosing **OpenColor** as color conversion method and selecting a GMG OpenColor **Project** in PACKZ, you will be able to use **published** profiles and separation rules. **Separation Rules** can be edited in PACKZ like in GMG OpenColor (please see "Creating Color Definitions" on page 88).

The **Accurate Preview** of PACKZ provides a real-time soft proof of your color conversion.

8. ColorBook for Digital Printing

8.1 Show the Full Potential of Your Digital Press

A swatch book printed on your digital press, with your ink configuration, and with the print mode and on the substrate actually used in print production, illustrates the range of colors the machine can produce better than anything else.

GMG ColorBook offers you just that: use it to easily create ColorBooks from your non-PANTONE spot color libraries. Each ColorBook uses the color definitions that have been made specifically for the target printing condition.

- Show a true and reliable reference to your customers.
- Decide which press and which substrate are best suited for a job.
- Use the ColorBook for process control in the press room.
- Optimize the print quality in line with the capabilities of each machine.

8.2 Required Applications and Licenses

This tutorial requires the following applications and additional licenses. Please check that you have everything you need. Please contact your local sales partner or the GMG order team if you have further questions or if you want to purchase an additional license.

- GMG ColorServer Digital or GMG ColorServer Multicolor version 5.2.30 or higher
- GMG OpenColor version 2.4.3 or higher
- GMG OpenColor ColorBook option

8.3 Profile Your Digital Press in GMG ColorServer

To define the target printing condition and to generate color definitions specifically for this condition, you first need to profile your digital press in GMG SmartProfiler. If you already have a GMG OpenColor project describing the target printing condition, you can skip this step.

GMG SmartProfiler, included in the GMG ColorServer Digital and GMG ColorServer Multicolor solution bundles, helps you to create printer calibrations and color profiles for digital and large format printers.

In GMG ColorServer, go to the **Resources** tabbed page > **SmartProfiler**, and click **New** to create a new profile specifically for your printer and substrate. Follow the procedure in the GMG SmartProfiler form step-by-step.

In the **Color Management** step, select one of the sample projects as **Input Color Space**.

Do the last step, **Finalize & Publish**. GMG SmartProfiler will now create a hotfolder, which you can use later to drop input documents.

In the background, GMG OpenColor will serve as a profiling client and will automatically provide the printer calibration files and color profiles to GMG ColorServer.

8.4 Look up the Colors in GMG OpenColor

All resources created by GMG SmartProfiler will be named after the **Project Name** you entered. So in GMG OpenColor, you go to the **Projects** page and look for this name. You can use the **Search** box in the upper right corner.

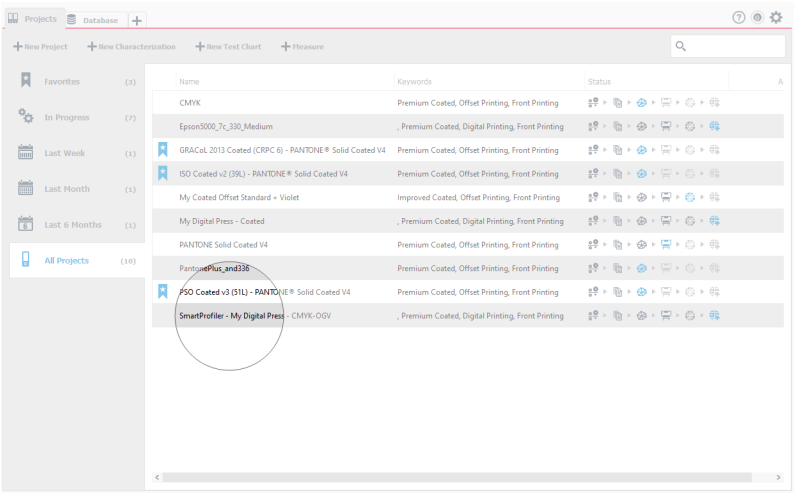


Fig. 44 Project created by GMG SmartProfiler in GMG OpenColor.

This project defines the output color space, that is, how the input colors will be separated into the printer color space. Open the project and click the **Separation** tabbed page. Expand the **Separation Rules** group. You will see the color separation table. Click the **Edit** button.

GMG OpenColor opens the **Separation Rules** window. It shows the color definitions calculated by GMG OpenColor specifically for this output condition.

The color definitions are a best match with ISO Coated v2 for CMYK and the original spot colors. You can also see the expected delta E as a measure for how close the printed spot color will be to the original. A delta E of 0 means there is no measurable difference.

Now click the **Generate ColorBook** button on the toolbar.

GMG OpenColor opens a new window with ColorBook options.

If you have no access to imposition software, you can activate the option **Use Grid Layout (Imposition)**.

8.5 Generate the ColorBook in GMG OpenColor

When you click the **Generate** button, GMG OpenColor will create a ColorBook in PDF format from the colors defined in the **Separation Rules**.

You can then simply put the ColorBook PDF in your printer's RIP and print it.

Make sure that no further color management is applied in the RIP and do not use the hotfolder in GMG ColorServer. The ColorBook has already undergone color management for the target printing condition as defined in the output project.

Note Print the ColorBook **only** using the same target printing condition you used when creating the characterization in the output project. Printing on another machine or another substrate will lead to wrong colors. Do not apply any color management.

ColorBook options

Available options	*Description*
Custom ColorBook	A separate ColorBook PDF with all non-PANTONE spot colors will be generated. The ColorBook will include CMYK and all spot colors, including color variants, without "PANTONE" in the name used in the separation rules.
Use Grid Layout (Imposition)	If you have no access to imposition software, you can use this option to define the dimensions and spacing of the ColorBook according to the paper width of your press. You can set the page size and margins, as well as gutter for the swatches. This function is not intended to replace an imposition software, which you will need to print and cut a ColorBook in a real book format. It helps you to print the ColorBook pages on a large sheet of cardboard, for example.

8.6 Reprint a ColorBook

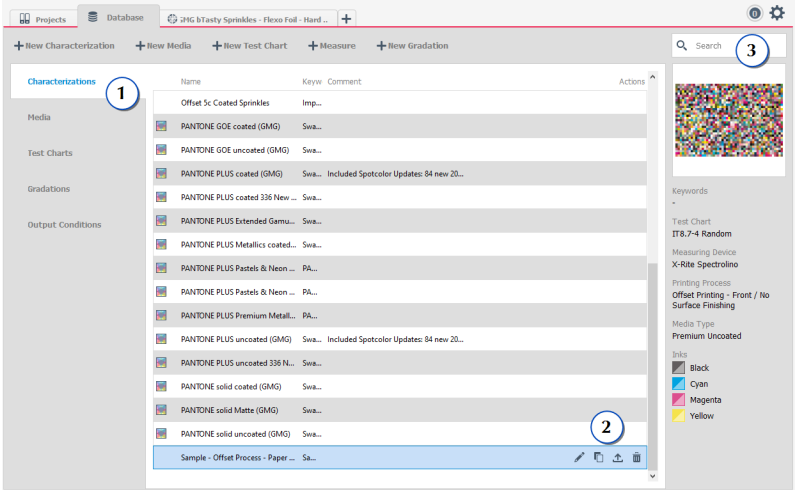
You can reprint an existing ColorBook at a later point in time.

If you applied the printer calibration file by using a hotfolder in GMG ColorServer, the final ColorBook PDF is valid only as long as the printer is in a calibrated state. After recalibration, you will need to apply the new version of the printer calibration to the PDF by putting the **original** ColorBook PDF into the hot-folder again. You will then get exactly the same colors as when you printed the ColorBook for the first time.

9. Database

9.1 Database

The central core of GMG OpenColor is a database for the measurement data from which your proof profiles will be created.



All measurement data is filed under **Characterizations** (1), and can be edited, duplicated, exported, or deleted (2). Profiles are not stored in the **Database**, but in the **Projects** they have been created for.

Use the full-text **Search** function (3) to filter the content.

Factory-default data

GMG OpenColor comes with official spectral data for Pantone colors from X-Rite for all printing processes and media types.

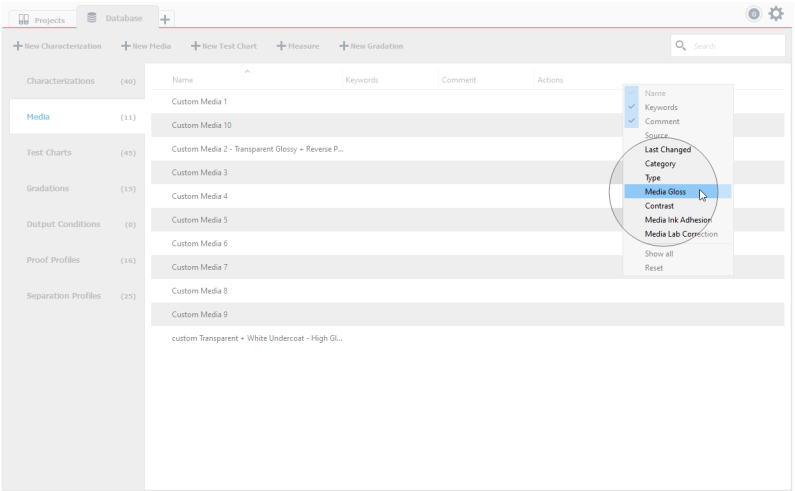
Tip The proof will be closer to the target print if you use your own measurements taken from strips or test charts that have been printed with your actual printing condition and ink, including ink ramps or overprinting information.

9.2 Customizing Columns

Get a better overview and find items faster by customizing the columns in the **Database** view.

How to customize columns

For each data type, you can individually select which columns you want to see and which not. Just hover the mouse pointer over the list header and click with the right mouse button to open the context menu. From there, add or remove a check mark to show or hide a column. You can also rearrange columns via drag-and-drop.



The search includes only visible information. That means, by deselecting columns you can also filter your search results. For example, if you deselect the **Category** and **Media Gloss** columns in the **Media** view and search for "Coated", you will find only media with "Coated" in the name. Found matches are highlighted in the list.

You cannot deselect or move the **Name** column. The **Name** column always remains the first column.

Clicking **Reset** resets the columns (including the order and width of columns) to the factory defaults.

9.3 Sharing Data

Except profiles, all your custom GMG OpenColor data such as projects, characterizations, and media can be exported and imported in the form of an archive file. You can use this feature to share data between multiple instances of the GMG OpenColor application, or to preserve a specific version of an item.

Note Make sure all source and target applications you share data with have the same version number. You will not be able to import data from an application with a **higher** version number to an application with a lower version number.

How to export

Select an item from the list. In the **Actions** column, click the **Export** button.

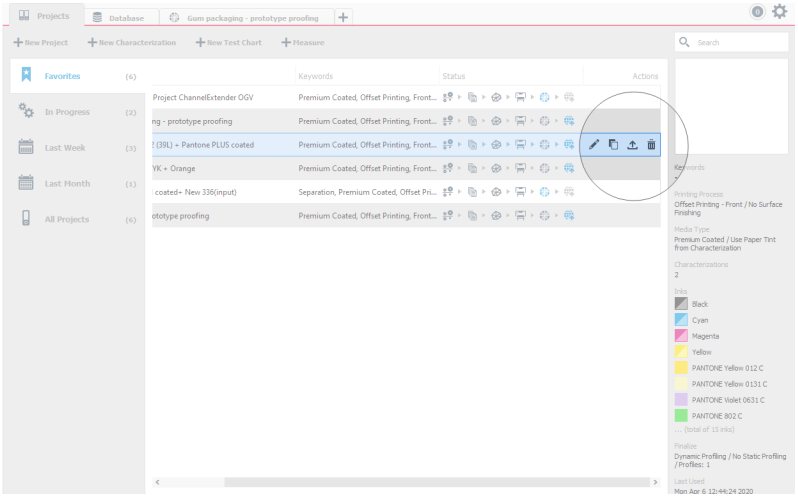


Fig. 45 Exporting a project.

The exported archive will include all linked custom items. For example, when exporting a project, all project related data such as characterizations, spot color libraries, and output conditions will be included. Pre-installed factory-default data (labeled as "GMG") is not included as you can expect it to be present on the target system.

How to import

Import an archive by clicking the gearwheel icon in the upper right corner of the main window, and then click **Import Archive**.

An automatic validation during the import will ensure data consistency. GMG OpenColor will show you how the items included in the archive will be handled. If the archive includes an item already existing in the database (with matching ID), you can choose between the version in the target database (option **Use existing**) or the version from the archive (option **Overwrite**).

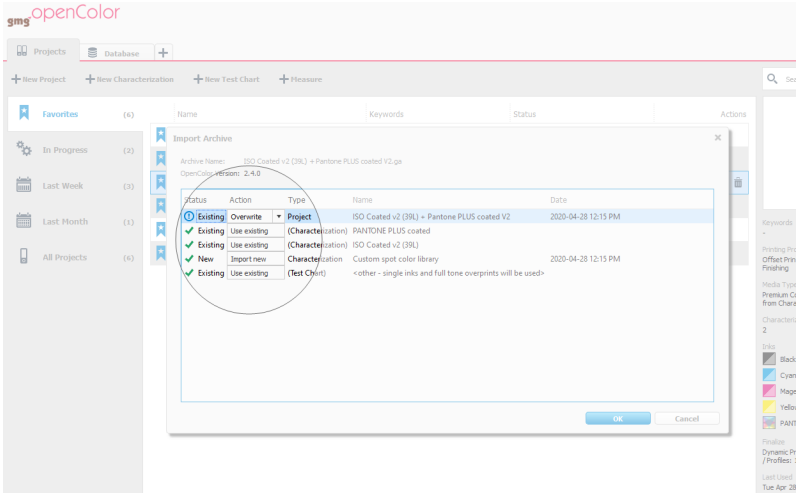


Fig. 46 Importing a project. The project is already available on the target system. As the option **Overwrite** has been chosen, the project in the target database will be overwritten by the project from the archive. This project uses a GMG characterization and a GMG spot color library. As factory-default items are not included in the archive, the versions of the target system will be used. The item "Custom spot color library" is not available on the target system and will be imported (status **New**).

9.4 Environment Backup

You can create a backup for the entire GMG OpenColor instance including database, projects, characterizations, measurements, and calculated profiles. The environment backup can be created on one computer and restored on another, for example, to set up the program on a **new computer**.

If you follow a very strict security protocol in your company, it might also be worth considering to use the **Restore Backup** feature for restoring the settings at the begin of each working day, to make sure that no unintended changes will be applied.

To avoid data loss, especially when having a larger number of projects, we recommend that an administrator saves a backup on a **regular** basis (for example, once a month) and/or each time **before** performing a software update.

How to save a backup

1. On the **Options** menu, point to **Backup**, and click **Create**.
2. Browse to the desired folder and enter a file name.
3. Close the application and restart it.
   The application will create the backup file and save it in the target location.

How to restore a backup

Note As critical system parameters might be changed from software version to software version, it cannot be guaranteed that an environment backup from a previous version can be restored on a newer installation. Restore an environment backup **only** from the **same** software version you have used when creating the backup.

1. On the **Options** menu, point to **Backup**, and click **Restore**.
2. Browse your folders and select a backup file.
3. Close the application and restart it.
   The application will restore the selected backup file.

10. RemoteClient

10.1 Access your Project Data over the Browser Using GMG OpenColor RemoteClient

With the browser based GMG OpenColor RemoteClient, you can access GMG OpenColor projects from any computer in your local network.

- The **Projects** tabbed page shows all finalized and **published** projects. You can export Lab target values as CGATS from here.
- The **Separations** tabbed page shows all projects with a finalized and **published** separation. You can check spot color separation values from here.
- The **Queue** tabbed page shows all profile calculations currently in progress. You can use this page to estimate how long it will take until a profile is available. You can also cancel a profile calculation, for example, when you need another profile very urgently.

Open GMG OpenColor RemoteClient in your browser

Type the following address into the address bar of your browser. Please make sure that GMG OpenColor is running and access to the address is not prohibited by your IT security policy.

http://[IP of the computer running GMG OpenColor]:[port number]/remoteClient/

You can make your first try on the computer running GMG OpenColor:

http://localhost:8080/remoteClient/

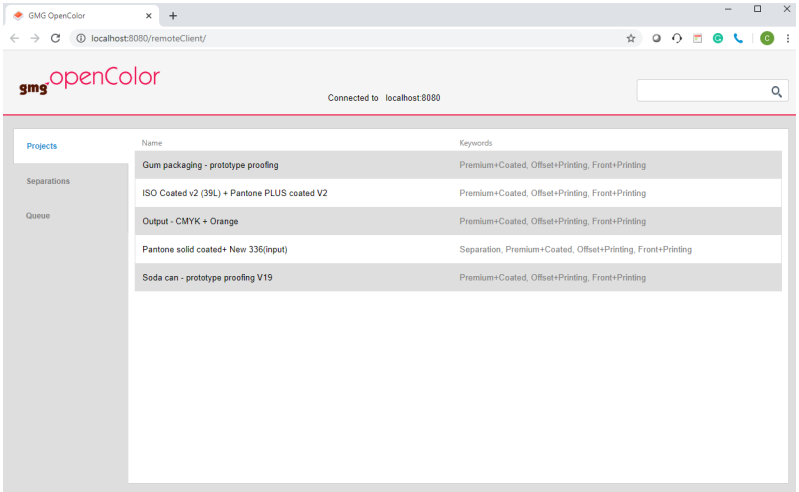


Fig. 47 GMG OpenColor RemoteClient in a browser. You can use the search bar to find a specific project.

10.2 Export Lab Target Values

Using this feature requires an additional license. Please follow the link for more information: "Available GMG OpenColor Licenses" on page 10

With the GMG OpenColor RemoteClient, you can export Lab target values for any color space defined in your GMG OpenColor database in the standard exchange format CGATS (txt file format). You can use the exported data to create a print control strip in a third-party application such as MeasureColor from Colorware, for example.

Select your project and a custom CGATS template file. GMG OpenColor RemoteClient will request the data points as defined in the template file from the published proof profile within the selected project in GMG OpenColor.

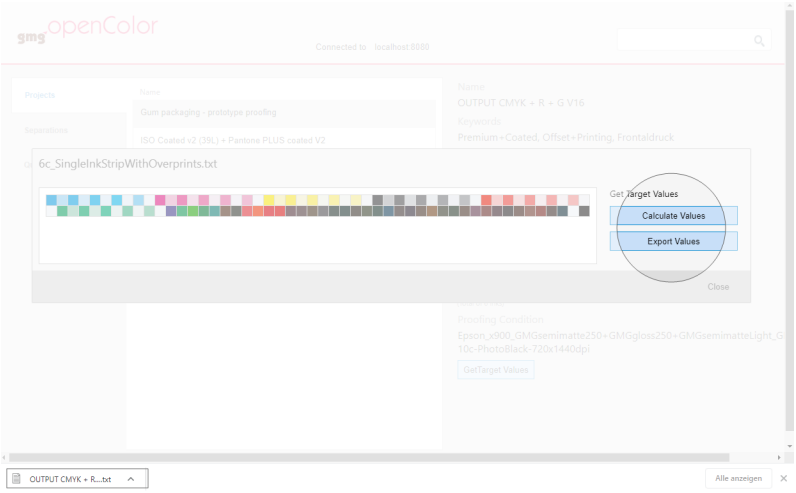


Fig. 48 Exporting the target values for a 6c color strip.

When the **Export Values** button is clicked, the file is downloaded via your browser.

Note This feature requires a **Proofing Profiling** license and is available only for projects containing a **published** proof profile.

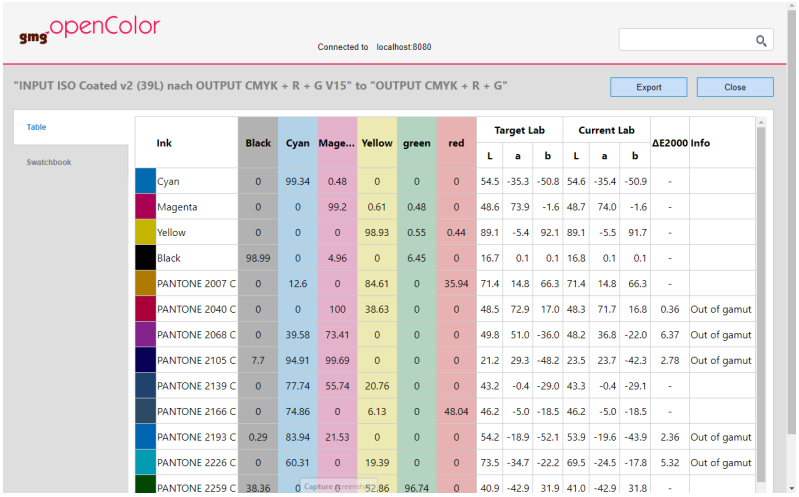
10.3 Check Spot Color Separation Values

With the GMG OpenColor RemoteClient, you can easily share spot color separation values.

Fig. 49 Watch this video to see how you can view the inks required to reproduce a specific spot color in GMG OpenColor RemoteClient. You can use this information, for example, to define a color in the vector graphics application of your choice.

Keeping colors consistent throughout the entire creation and printing process is always a challenge for everyone involved, especially when spot colors are used in the design. Particularly in Expanded Color Gamut (ECG) or digital printing, an accurate separation of the print data is important. GMG OpenColor calculates the color definition that will provide the best match for each printing condition and with GMG OpenColor RemoteClient, all persons involved in the process can easily access that information.

All employees involved in the print job order management process can see exactly which inks are required to reproduce a specific spot color. Color matches and out-of-gamut colors, which cannot be accurately reproduced in the target printing process, can easily be checked and communicated upfront. Prepress operators can simply transfer percentage values from the **Separation Rules** defined in the project to their artwork editor and printers can use exported target values of a project to use them in their press room tools for color control.



Ink	Black	Cyan	Mage...	Yellow	green	red	Target Lab			Current Lab			ΔE2000	Info
							L	a	b	L	a	b		
Cyan	0	99.34	0.48	0	0	0	54.5	-35.3	-50.8	54.6	-35.4	-50.9	-	
Magenta	0	0	99.2	0.61	0.48	0	48.6	73.9	-1.6	48.7	74.0	-1.6	-	
Yellow	0	0	0	98.93	0.55	0.44	89.1	-5.4	92.1	89.1	-5.5	91.7	-	
Black	98.99	0	4.96	0	6.45	0	16.7	0.1	0.1	16.8	0.1	0.1	-	
PANTONE 2007 C	0	12.6	0	84.61	0	35.94	71.4	14.8	66.3	71.4	14.8	66.3	-	
PANTONE 2040 C	0	0	100	38.63	0	0	48.5	72.9	17.0	48.3	71.7	16.8	0.36	Out of gamut
PANTONE 2068 C	0	39.58	73.41	0	0	0	49.8	51.0	-36.0	48.2	36.8	-22.0	6.37	Out of gamut
PANTONE 2105 C	7.7	94.91	99.69	0	0	0	21.2	29.3	-48.2	23.5	23.7	-42.3	2.78	Out of gamut
PANTONE 2139 C	0	77.74	55.74	20.76	0	0	43.2	-0.4	-29.0	43.3	-0.4	-29.1	-	
PANTONE 2166 C	0	74.86	0	6.13	0	48.04	46.2	-5.0	-18.5	46.2	-5.0	-18.5	-	
PANTONE 2193 C	0.29	83.94	21.53	0	0	0	54.2	-18.9	-52.1	53.9	-19.6	-43.9	2.36	Out of gamut
PANTONE 2226 C	0	60.31	0	19.39	0	0	73.5	-34.7	-22.2	69.5	-24.5	-17.8	5.32	Out of gamut
PANTONE 2259 C	38.36	0	[illegible]	52.86	96.74	0	40.9	-42.9	31.9	41.0	-42.9	31.8	-	

Fig. 50 Separation table of CMYK and spot colors into 6c CMYKRG.

Note This feature is available for projects with a **published** target color space for separation.

11. Third Party Applications

11.1 Using the GMG OpenColor Connector with MeasureColor

Minimum requirements

- GMG OpenColor 2.4.2.21
- GMG OpenColor Connector License for all licensed MC seats
- MeasureColor 21.1.1

Please follow the link for more information: "Available GMG OpenColor Licenses" on page 10

The GMG OpenColor Connector enables MeasureColor software to import GMG OpenColor project colors including both process color (project inks) and spot color libraries. Imported colors may be saved in the MeasureColor libraries and used across multiple jobs where those colors will be measured in order to manage the quality of the print run.

Benefits:

- Use the same targets for proofing and print production control to ensure consistent and reliable print results.
- No extra work—target values are extracted from already existing profiles or spot color libraries.
- Save time and avoid error prone workarounds such as measuring target values from a proof.

Depending on the ink configuration of the used printing technology, MeasureColor will use the relevant project inks and/or spot color libraries from GMG OpenColor.

Process colors

For printers using in-house CMYK process colors (characterization or “fingerprint” data from their press), GMG OpenColor will extract the target values (**solids** and **overprints** of published **project inks**) from a proof profile or separation profile. This means any smoothing or correction that was done as part of the profile creation will be applied to the color targets that MeasureColor will import, creating a precise color alignment between the two systems. Typically, proofs are made in advance of job setup in MeasureColor, including all profile processing. In cases where import is done in advance of the proof, GMG OpenColor will calculate new profiles on-the-fly.

MeasureColor will import solids, tints, substrate, and a series of process color overprints used for most print quality applications.

For extended process color printing where extra inks are used to extend the printing (“ECG”, “CMYKOGV”, “Multichannel”, etc.), GMG OpenColor will process the additional inks and include the extra solids and overprints in the MeasureColor color set.

Spot colors

For GMG OpenColor projects that contain spot color books, MeasureColor can also import those libraries. As with process colors, GMG OpenColor will use a profile that incorporates all project settings (paper tint mapping, smoothing, etc.) to process the spot color data.

For each color, GMG OpenColor will create a solid value with 10% tints from 0-100% ink.

Note GMG OpenColor will build a profile for each spot color in the selected set, so processing time may increase when importing many spot colors at once.

See how it works in MeasureColor

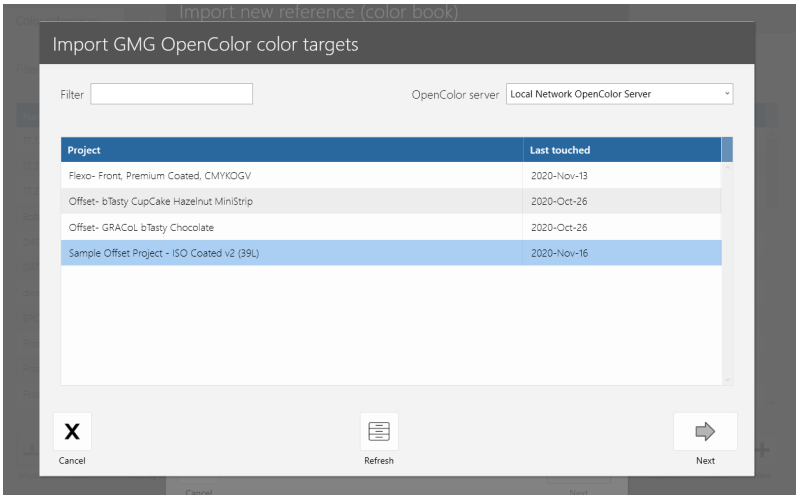


Fig. 51 List of projects on the connected (and selected) GMG OpenColor server in MeasureColor.

Fig. 52

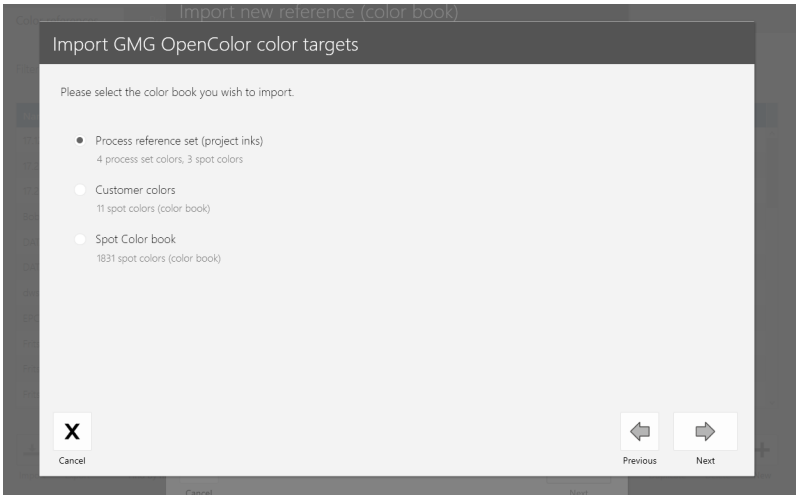


Fig. 53 Project options, showing the available project inks and spot color libraries.

Fig. 54

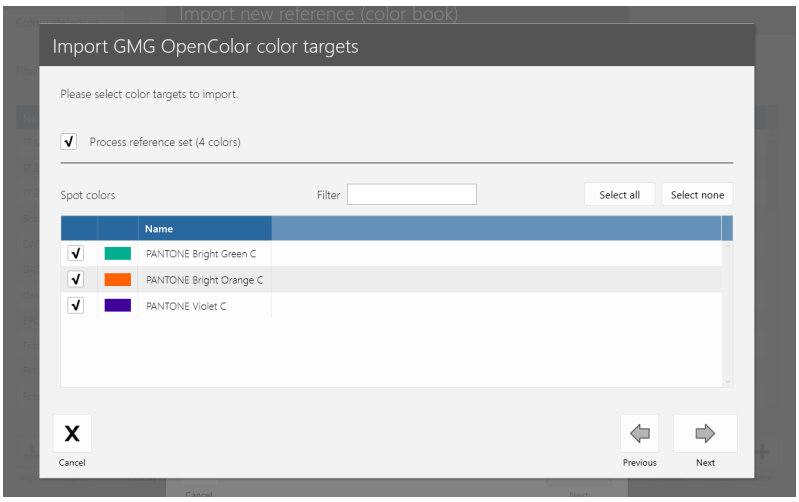


Fig. 55 Project with additional project inks. If this ink combination was not already used in a proof or separation profile, GMG OpenColor will calculate a new profile and send the target values to MeasureColor automatically.

Fig. 56

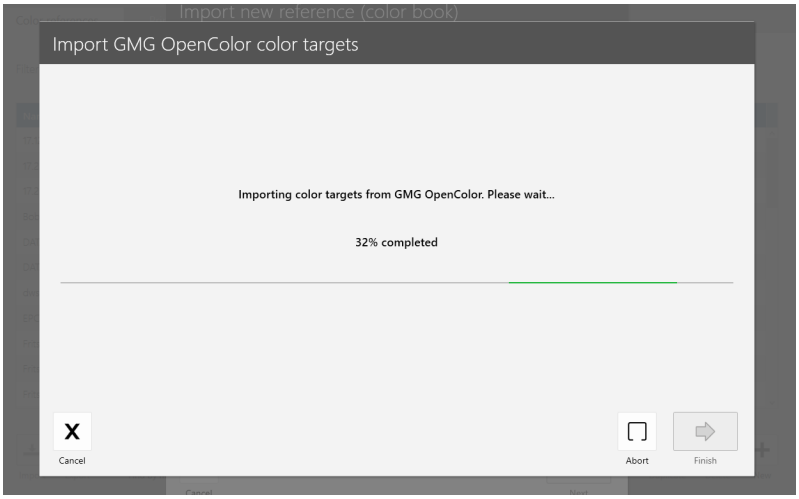


Fig. 57 When selecting a spot color book, MeasureColor downloads a list of solids, tints, and paper tint from GMG OpenColor.

Please follow the link for more information:

https://www.measurecolor.com/documentation/dokuwiki/doku.php?id=importing_opencolor_reference_targets_into_measurecolor