

An Efficient, Eigital Way to Produce Ink Drawdowns

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Abstract

Spot colors are an important way for the brand owner to communicate the spirit and quality of their brand to the customer. As a result, brands spend a tremendous amount of time and effort in selecting colors that define their brand and protecting those colors as they are reproduced across the supply chain.

Spot colors used in packaging are a critical component of how a brand connects to its customers. Who doesn't know Coke red, the Reese's orange, or Pampers' teal? On the printed package, those spot colors are often reproduced using a spot ink, which is an ink that is specially-formulated to recreate that particular spot color on the printed package. In today's supply chain, it is increasingly common for brands to specify these ink colors to their printers and include the tolerances (range of difference) that they are willing to accept during the print production process. The sharing and qualification of how that color will be printed is typically called the "color approval" process.

Approving and printing spot colors

We can separate the process of approving and printing spot colors into 3 steps:

In **step 1** of the process, the brand needs to **accurately communicate** the color expectation to the printer. The best practice for this communication is to share a spectral definition of the color. The most common way to share digital spectral data is using a CxF (color exchange format) file. A CxF file typically contains spectral data and can be sourced from a number of different places: a brand's own private library containing custom-developed colors; a published Pantone library such as the Pantone Coated or Uncoated library; or electronic libraries like PantoneLIVE, containing master and dependent color standards. Whatever the source, CxF files give the brand a way to define exactly what the target color is.

GMG Americas; InterTech Award Recipient

In addition to exchanging electronic information about the target color via CxF, the best practice includes exchanging a visual representation of what the color should look like. Historically, brands and printers have exchanged analog “drawdowns” for this exact reason.

Today, printers and brands can digitize that process to reduce the cost, increase the speed, and make the visual communication more accurate and repeatable. GMG ColorCard gives printers a streamlined solution to create a precise visual reference so that, during color matching and print production, all partners have a clear understanding of what the brand’s visual color expectation is.

Step 2 is the request for a **color match**. The ‘color’ is effectively the property of the brand. Ink and materials are the property of the printer. Per the brand’s requirements, the printer needs to combine their inks and materials to best replicate the color that the brand wants. That process is called a color match. Many times we use the expression, ‘drawdown’, but drawdowns are actually used in two different cases: a ‘color match’ is the process of matching a color the first time to create a formula; and a ‘reprint’ is the process of making additional color copies from an existing formula. In both cases, drawdowns are an important part of the process.

Reprint drawdowns are historically created using an analog process that requires mixing a small batch of ink and applying it to the intended printing substrate in a controlled way. It represents how the materials will combine to define the color that the printer will produce during print production. Effectively, this color becomes the ‘center line’ of what the brand should expect from the printer.

It is important that a printer has a mechanism to communicate the appearance of their ink and substrate as effectively as possible back to the brand. Of course, a printer can and should share a CxF file. However, printers should also share a visual example of the ink and substrate appearance. This is where drawdowns have typically been used.

The brand will then compare the printer’s color match or reprint drawdown to the original standard. Sometimes, the two can match very closely...within 1 or even 0.5 dE. Sometimes, however, there can be a greater difference between the original brand color and the drawdown. The gap between the original color and the reproduction of the color using the printer’s own materials is called ‘deviation’. The brand must then consider whether or not the deviation is reasonable and decide if the color is approved.

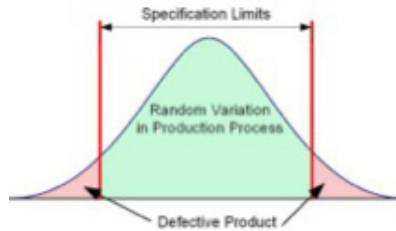
Following the brand’s request, the printer’s response, and the brand’s approval, the job is ready to go to print. **Step 3** is the final step of **going to production**. While it sounds simple and obvious, this part is sometimes missed. To achieve the

expected color on press, the process should be locked down with no changes made between approval and production. The purpose of the brand approval is to both clearly set the brand expectation and to set a feasible target that the printer can reliably produce when it comes time to print. Setting clear expectations around feasible targets positions both the brand and their printer for successful print.

A word about tolerances

Tolerances are manufacturing limits that relate to cost and acceptability. Of course, the brand would like the color to be perfect (0 dE), but the brand also recognizes that the print process is imperfect and that perfection is a very expensive goal. As a result, brands will give printers a tolerance to ensure that the result will be acceptable, providing enough latitude for the printer to produce the job at a reasonable cost. Some brands have different requirements for process colors versus spot colors. It is common to at least set acceptability tolerances around spot colors, as they are critically important to the brand.

A brand may propose that the printer is allowed to produce “within 2 dE of their brand color”. In this case, when the approved deviation of the color is (for example) 1 dE, the acceptable variation during print production may be reduced by half. That means that the printer will need to produce within a much tighter window for the job to meet the brand’s requirement. This may result in an extra cost for the printer—and even failure to meet the target requirements. To remedy this, the best practice is to set tolerances around the printer’s color match, which incorporates the approved deviation (if any) from the target color.



When a brand expresses that the printer must produce a color within 2 dE, if the drawdown is 1 dE away from that color, perhaps it is acceptable because the press is going to run differently, anyway. Remember that the analog set of tools used to produce these drawdowns is a miniature replication of a press—not the actual production machine running at full speed, at the temperature it’s going to run at.

However, it could also be that the inks and substrates are only capable of matching the color within 1 dE. It is in this case that the deviation from the brand color will reduce the allowable variation when using the brand’s color as the target. When this happens, both the cost to produce and the ability to meet requirements are

put at risk. In some cases, the deviation may even exceed the allowable variation prescribed by the brand.

Having the right tools and practices can help brands and their partners handle all of these conditions. The right tools can show both the deviation and the variation from it, so that the brand can properly visualize both the target color and the allowable visual difference related to the brand’s expressed tolerance.

Because of limitations with the analog drawdown tools and process, it has been next to impossible to create a comprehensive visual communication that handles all of these issues properly. This is where a digital approach can offer more. Using a digital visual communication process, the printer can accurately communicate both their precise visual color match and the allowable visual variation that relates to the brand’s tolerances, all at once on the same card. With a digital approach, brands can see the full picture and printers can leverage the full tolerance allowed by the brand to print more consistently within the spec.

A new approach vs. the old approach

Today, printers and brands can digitize that process to reduce the cost, increase the speed, and make the visual communication more accurate and repeatable. GMG ColorCard gives printers a streamlined solution to create a precise visual reference so that, during color matching and print production, all partners have a clear understanding of what the brand’s visual color expectation is. Using GMG ColorCard, brands are empowered to make more reliable approval of color upstream, ensuring that printers can successfully produce expected colors on the package.

GMG ColorCard produces the digital equivalent of an analog reprint drawdown. Instead of using specialized ink formulation tools, looking up a formula, mixing a small batch of ink, and finally inking up drawdown equipment to make another drawdown—GMG ColorCard creates an accurate digital version of the drawdown, using an inkjet printer, in just a few clicks. Because it is digital, GMG ColorCard can also do things that normal drawdowns can’t: print color-accurate light and dark variations based on the brand’s tolerances; print barcodes in color; and print tint ramps in the same exact print condition as the solid. Using digital technology, GMG ColorCard can deliver new features based on the evolving needs of the supply chain, providing new ways to work that reduce the total cost and timeline of the packaging lifecycle.

The ‘Tolerance’ feature illustrates exactly what the color on an ink will look like, at the limits of the brand’s tolerance, in both high and low density directions. Pictured below, the top and lower boxes on left side of this GMG ColorCard illustrate the high and low density colors, respectively. Performing the same task using a conventional analog process would be extremely tedious and costly to do.

It would require specialized techniques with several rounds of iterations for each high and low-density version. However, by using spectral modeling and inkjet technology, it is simple. The GMG ColorCard user simply picks the template including the ‘Tolerance’ feature and clicks ‘Print’. No matter what the selected feature set is, it takes the same amount of time to print a color card: about three minutes. Now the printer has a way to share the result of their color match (the deviation from the brand color) and the appearance with the brand’s tolerance (variation) at the same time, with a few clicks.



GMG ColorCard does not replace the need for ink formulation. Even with ink formulation tools, printers need to go through the color matching process with their inks and materials to determine how closely they can physically match the color. There is no replacing that. However, after that color has been matched, if a copy of the color is required, there is no need to ink up the rollers. With GMG ColorCard, the printer can print the color card quickly, utilizing inkjet technology, on a selection of different inkjet substrates. While the inkjet substrate is not the actual production material, GMG ColorCard emulates the texture of the production material to ensure that the appearance is as close as possible. Printers can select different proofing materials with different gloss levels, to best simulate the gloss quality of a material or varnish—including matte, semi-matte, or gloss. By considering managing the color accuracy, material surface quality and texture, and choosing a proofing material with the gloss level that best matches the production material, GMG ColorCard provides a total appearance match to the conventional analog drawdown..

Another benefit of GMG ColorCard’s digitized inkjet process is that printing with different features does not change the productivity of the solution. In fact, compared to analog processes, adding features increases productivity as time savings, compared to the analog processes, multiply. GMG ColorCard produces a single reference with multiple features, whereas different analog processes often

require multiple prints. To create an analog Light/Standard/Dark (LSD) reprint requires two drawdowns in addition to the standard. With GMG ColorCard, it is all printed on one card.

Creating tone scales is another challenging application for analog drawdowns. In many cases, especially with flexo printing, it requires changing equipment to produce separate drawdowns for both the solid and the tints. Changing the equipment can also result in mismatches between the density of the solid print and the density of the tone ramp print. With GMG ColorCard, none of this is a problem. The process is just easy, digital, and all on one card. It is designed to optimize color communication across the supply chain, from a brand to a printer, a printer to a brand, and across all the partners that touch color.

Analog drawdowns: how they work.

Whether creating analog or digital drawdowns, the color must be matched first. When making reprints using analog drawdowns the printer has follow a series of steps. The printer must first locate the color the wish to reprint in their ink formulation system and retrieve the formula. The formula tells the printer how many grams are required of each ink color. The printer then gets a scale (for weighing) and a cup (probably Styrofoam). The printer then finds the ingredients specified in the formula, weighs out the proper amounts of material according to the formula, and mixes the ingredients in the cup to create a small batch of ink. Once that is done, the ink is applied to a substrate using a roller. In cases when the production print process uses tooling that influences ink delivery (e.g. flexo anilox), the printer also needs to prepare their manual or automatic drawdown machine to produce the same ink film. Once everything is set up properly, the ink is rolled onto the substrate.

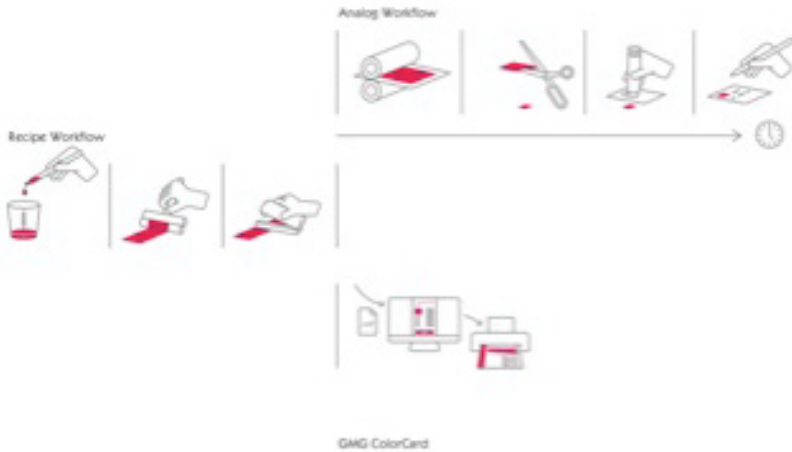


The process, however, is still not done. After the ink applied to the substrate, it must be finished—usually cutting the sample to a specific brand-specified size. It is important that the drawdown is in the ‘language of the brand’. That means that the folder size may be different and the sample cut size may be different. For analog drawdowns, some assembly is required. If there are different finishing options, those samples must be finished. Sometimes a gloss varnish or a matte varnish is required. Once the final assembly is complete, there is a final check against the color. This entire process could take up to sixty minutes. In a lab environment, where an ink company creates color matches and reprints repeatedly—the times can be slightly reduced. However, ink companies report

that this process does often take up to an hour—and even much longer when special features are required.

Changing to the digital route.

Once the color is matched, the final match is recorded digitally using a spectrophotometer and may be saved digitally to a CxF file. At that time, if the printer would like to make additional prints, additional prints can be made. However, after the color match is done and the equipment cleaned, the formula must be reused to mix a new batch of ink from which drawdowns can be made, after which the reprint can be finished. In the last step, technical and business notes are typically written on the analog reprint. With GMG ColorCard, the CxF information is input into the GMG ColorCard software, a few selections are made, and then the ‘print’ button is pushed. The drawdown is completed three minutes later. It is a complete change of process efficiency and process repeatability.



The digitized process is instant and repeatable using inkjet technology with precise calibration and recalibration technology. GMG ColorCard currently supports Epson P series printers with a violet ink. Combined with GMG proof media, this delivers an extremely wide gamut that is capable of reproducing 99% of Pantone V4 colors. That means a given spot color is highly likely to be ‘in-gamut’ so that it can be printed accurately. GMG ColorCard uses GMG’s OpenColor spectral modeling technology to assure that the color matches as closely as possible. With spectral modeling, algorithms better understand the behavior of the color print, including both the presses that jobs will be printed on, and the inkjet proofing technology that color cards are printed with. Epson P-series printers are available with an inline measurement capability to verify and optimize the colors, too. That means that the inkjet printer can automatically measure and precisely correct printed output—similar to how an ink formula is measured and iterated, using ink formulation tools during the color matching process.

When it comes to finishing, there is no need to cut samples to different sizes, as the color sample is printed directly on the color card. When it comes to technical notes, no pencil or pen is required. In GMG ColorCard, the user can configure the size, shape, and placement of the color sample on the color card and electronically print any required technical information. GMG ColorCard lets users further personalize the card by including either the printer's or the brand's logos—or both. In this way, GMG makes color communication more personalized and more identifiable as a focused communication between partners.

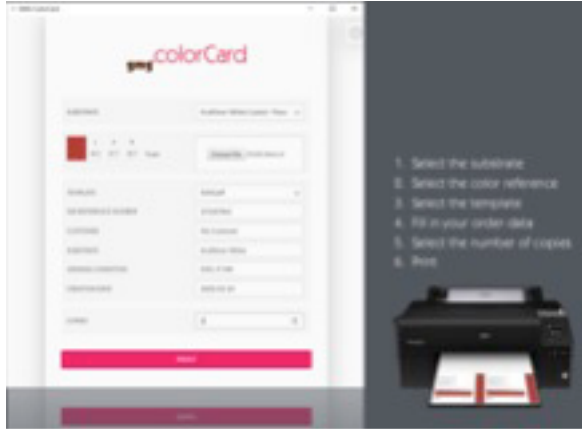
Full disclosure

High and low density sample rendering is powered by GMG OpenColor technology. A user can enter different brand-specified tolerances into GMG ColorCard, allowing them to customize the cards for use with different brands and/or different types of work. GMG OpenColor technology understands how a color will look at these different densities, helping to accurately reproduce both high- and low-density versions of the sample. In this way, the brand can fully disclose its expectation, including visual expectations related to tolerance, to the printer. In response, using GMG ColorCard, the printer can provide a complete communication back to the brand for approval. Everything is communicated clearly and, with the approval from the brand, the printer is set up to print within the acceptable tolerances and budget, assuring success on the press run.



In developing GMG ColorCard, GMG wanted to make it simple so that different users, with different skill sets, could get the same exact result. The result is a streamlined interface, offering a few basic choices, and nothing else. While GMG ColorCard is made by a company known for its proofing solutions, GMG ColorCard does not provide all of the controls and complexity that users face with classic proofing solutions. Instead, it requires just a few clicks to select the color, the substrate type, and the template. The user then enters the number of copies and clicks 'print'. The operator does not need to know anything about formulation software, or spectrophotometers, or proofing. With an inline measurement device on an Epson P-series printer, GMG ColorCard is fully automatic. Whoever is using it will get the same consistent result. That means, the solution can be

operated by many different types of users within the supply chain—at the brand, the pre-media company, or the printer. Anybody can use GMG ColorCard.



About color guides and references

Color guides are often used to evaluate color selection and color compliance. They are very helpful because they are so widely available and commonly used. Color guides are especially effective for expressing a color idea because color can be difficult to talk about in a specific and meaningful (needs to be ‘bolder’ or ‘snappier’). Unfortunately, color guides are not printed on the materials that a job is likely to be printed on and they are not printed using the inks that a printer is using. Although these guides do offer a useful visualization for spot colors, they are not really an indication of exactly what the brand wants, nor do they represent the color that the printer will actually print. That is because, in addition to the difference in printing conditions, guide books are always printed in large quantities and are subject to their own acceptable variation. Because brands need their colors to be precise and reputable, they need precise and repeatable color references to set clear expectations across the supply chain.

A GMG ColorCard is genuinely a color reference. It simulates the exact color that was matched to the brand’s request. It delivers a precise reproduction what that color is. It can even be visualized with the variation, based on the brand’s requirements, and with a substrate simulation. It also physically looks like the material that would have been used to produce an analog drawdown, including the texture of that material. If there is a coarse or grainy texture on the analog drawdown, GMG ColorCard will incorporate that same effect while keeping the color accurate. GMG ColorCard is engineered to emulate the total appearance of the drawdown.

Color cards made by GMG are the first truly viable replacement, color-wise and appearance-wise, to traditional analog drawdowns. Beyond that, GMG ColorCard

provides customizable fields to express all the technical information and brand information. Every piece of required communication is on a GMG color card.



GMG ColorCard provides feature richness and productivity that analog tools and processes cannot. No matter which of these features are selected, GMG ColorCard produces an accurate, customized result in just three minutes. Also, because GMG ColorCard is fully digital, it can evolve easily with other industry technologies and best practices.

Instant gratification

Perhaps one of the more significant benefits of GMG ColorCard is that the cards can be produced anywhere. Using an analog process, when a brand wants a color, it must be made in a special room where all the special software and equipment are set up. That means, to create an analog drawdown, the printer must schedule a resource to visit the ink room, set up the system, and produce the drawdown. Next, that person must take the hour it requires to make the color reprint. Once complete, the printer has to package and ship the sample to the brand. Finally, the drawdown spends time in post before it reaches the brand. GMG ColorCard is a web based solution that lets the user print from anywhere to anywhere. That means any computer and calibrated printer tied to a GMG ColorCard account can print a color card—anywhere in the world. GMG ColorCard can print color cards in an ink room, on the print production floor, in the design boardroom, at the prepress house, or directly in the offices at the brand. In other words, if a brand manager is on the phone with a printer and asks them to send a drawdown, it can be in the hands of the brand manager before the phone call is over.

GMG ColorCard is about digital transformation: taking slow, inflexible analog processes and shifting them to digital. GMG ColorCard changes how the supply chain works. GMG ColorCard optimizes color communications across all parties including design, prepress, and printers. CxF files and spectral data are helpful, but nothing explains the story like an accurate, visual representation of the color. GMG ColorCard delivers electronic repeatability with a feature rich system that allows brands and their partners to communicate color in a robust, reliable way. It not only precisely digitizes color and appearance of an ink drawdown, but it significantly reduces time to communicate and helps brands and their partners drive innovation faster.