



Printing Good **CO**LO**R**



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Big Systems is a value-added reseller and integrator of a wide range of wide format printers, inks, workflow software and supplies.

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Color is one of the most effective ways to convey a message or get a prospect's attention. Color is the visual component people remember most about a brand, followed closely by shapes and symbols, then numbers and finally words. Roughly 6 in 10 people will decide if they are attracted or not to a message based purely on color. Moreover, color increases brand and mark recognition by up to 80%.

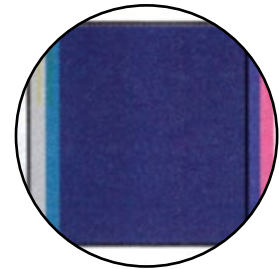
Anyone who has a color printer is faced with the challenges of producing consistent, accurate color on a wide range of materials. A number of factors can affect color print quality; some are simple and others more involved. In either case, we can help you improve your color. Here are several common problems you should be aware of:

Print Quality

Common printer wear and tear can dramatically affect print quality. Misaligned, clogged or worn printheads, mottled patterns and banding are problems every printer user has seen from time to time. If this has become the norm rather than the exception, it's time to take some action to fix the problem.

Printhead Misalignment

If your printhead alignment is off, areas of softness and different colors extending around the edges of type, photos and other objects may appear. The problem is most noticeable when printing bi-directional (when your printer jets ink moving the carriage from right to left as well as left to right). Most printers have a built in utility to adjust for this. Certain models of solvent, eco-solvent, and UV-curable printers may require a service technician to fix this.

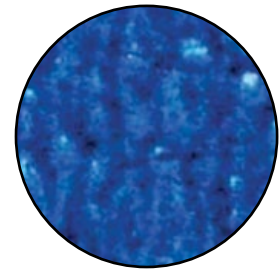


What Can You Do?

- If you see misaligned colors in your output, run an alignment test
- Have the printer perform a realignment calibration

Mottling

If your print quality is low, and is showing these kinds of artifacts, there are several possible causes. Most mottling is caused by improper ink restrictions in the selected color profile on the media used. Laying down too much fresh ink over existing layers of it can create puddled areas of color and edges which begin to bleed into other areas of color. When the print finally dries, those areas will also have an odd look, sheen or texture.

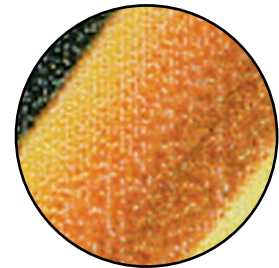


What Can You Do?

- Verify you are using the correct media selection or color profile matched to what is loaded in your printer
- Avoid low-quality or very thin media types that cannot hold the volume of ink desired

Speckled Patterns

If your output is exhibiting noticeable speckled patterns in colored areas, there are several possible causes: Old printheads with many clogged or expired nozzles are not firing the proper amount of ink to the page. A simple printhead test pattern (usually sent from a printer utility or built into the printer) should be performed. This will help you determine if your printheads are firing properly.



Sometimes the issue isn't that the printhead nozzles are clogged; it may be that the speed mode selected does not permit smooth color to be applied properly. If this is the case, adjust your printer's quality mode up a notch.

What Can You Do?

- Perform a printhead nozzle test pattern check
- Replace old, poorly performing printheads
- Increase your print quality mode to improve your color accuracy

Banding

If there are lines or bands in your print output, you usually have missing jets on the printhead or the advance of the media is not set correctly. Do a nozzle check to verify which printhead may have missing or deflected jets. On many printers, you can also control the advance rate of the media. Use your printer's media advance calibration settings.



What Can You Do?

- Perform a printhead nozzle test pattern check
- Replace old, poorly performing printheads
- Test and adjust your media advance calibration settings

Application Settings May Be Incorrect

Your design software application (CorelDraw, Adobe Illustrator, Adobe Photoshop, Adobe InDesign, FlexiSign, etc.) products, in conjunction with your RIP software, may not have the correct color spaces set. There are two color spaces that are important: CMYK and RGB. The color space you need to design in is CMYK. This is the standard for the print industry.



Object Types and Color Spaces

There are two types of objects that you use to convey color: Raster images (bitmaps like JPG and TIFF) and vector objects (these are scalable drawing elements like fonts, lines, polygons and even logos). Bitmaps are made up of pixels, and each one contains specific color data and bit depth.

JPG files are RGB and each pixel can contain a specific value for RGB in a range from 0 to 255, making it a 24-bit color image. TIFF files can be either RGB or CMYK; they contain color values for CMYK in a range from 0 to 100, making it a 32-bit color image. Since your printer prints with CMYK inks, working in that color space will provide better, more predictable results. RGB images will be re-mapped and converted by your driver or RIP to the printer's color space.

Vector objects have the advantage of being scalable with superior image quality and no resolution loss. Brand logos that are drawn EPS, for example, are made up of many shapes with vector points and specific colors. These attributes are also included in other drawing objects such as fonts, lines, polygons, rectangles and circles. They are typically, but not always, expressed as CMYK values. Vector objects may be CMYK, RGB or even spot colors such as Pantone.

When printing your design files, they get sent to the RIP or print driver, and should be tagged with a profile from your design software (these are called output profiles). The RIP software needs to know

what input profile it is going to use (this is the output profile from your design software). These are set individually as CMYK Vector, CMYK image or RGB image. Proper color gets output when the settings are saved correctly.

What Can You Do?

- Set the default output settings in your design application for the correct color spaces
- For RGB, select Adobe 1998 or sRGB
- For CMYK, set to SWOP US v2 Coated
- Make sure your RIP or driver input settings are consistent with what you set above

RIP Workflow Software Recommended

What is a RIP? A RIP, or Raster Image Processor, is software used in a printing workflow. It produces a raster image (also known as a bitmap) from a graphics description language such as PostScript, Portable Document Format (PDF), XPS or another bitmap of higher or lower resolution than the output device. The bitmap is then sent to a printing device for output.

In some cases you might not have a RIP at all. Instead, you may rely on a printer driver to allow the originating application to communicate with the destination printing device. This may be fine if you are printing documents that are relatively simple. But if you are producing complex documents, you will probably need a RIP.

Even if you just want added functionality, you may still also want a RIP.

If you are currently printing using only the manufacturer's printer drivers, you may be missing out on several key advantages. The feature set of most out-of-the-box printer drivers is rather limited. They don't offer many options for selecting paper, color modes and sizing.

Using a RIP is one of the most important elements to a successful printing operation. The RIP "speaks" the printer's native language, called PostScript. It contains much more graphical data - everything from information about fonts, coordinates of vector objects (like shapes and logos), line weights, placed images, transparency, masked objects, color data and more.

A RIP can collect and process a group of print jobs (called a queue) and batch process them while freeing up your computer to do other creative work. Offloading this task will keep your computer from slowing down while you design and also keep your printer from slowing down while waiting for data. Having a managed print queue enables you to print to multiple printers simultaneously.

In addition to saving time, using a RIP with the proper color profile can also save considerably on ink costs. Most printer manufacturers provide drivers that are designed to print RGB color from a digital capture, camera, file or scan. This is then sent for CMYK output. These drivers are typically designed to produce eye-pleasing and rich saturated color (not necessarily accurate color). Using a RIP with dedicated color profiles ensures superior color accuracy, and in many cases can save from 15% to 30% or more on ink usage. This single aspect usually offsets the cost of RIP software alone.

What Can You Do?

Adding a RIP to your workflow will provide you with these significant advantages:

- Control all devices from a single “command center” application
- Accurate control over Pantone and other spot colors
- Handle files with multiple color spaces (CMYK or RGB)
- Ability to calibrate and profile your printer on a specific media for higher color accuracy
- Easy file positioning (scaling, cropping, and rotating)
- Using a RIP helps make your fonts and typefaces print correctly
- Manual or automatic placement of multiple files on a single sheet
- Creates a more efficient printing process with multiple print queues for different media
- Saves on ink costs, time and provides unattended printing

What Can You Avoid?

You can also eliminate or minimize revenue loss from:

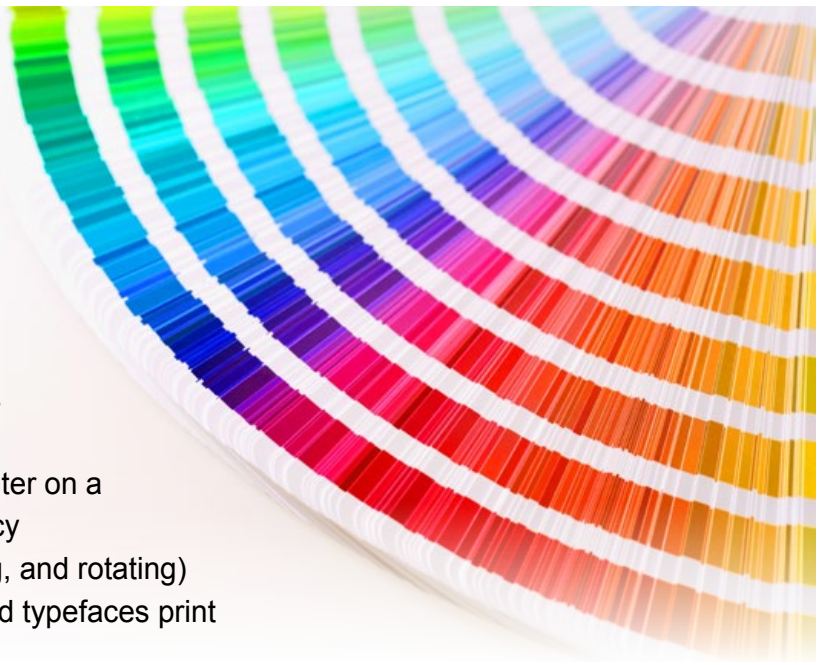
- The cost of prints thrown away or rejected
- The cost of reprinting
- Time spent reworking files
- Time spent ganging or compiling files for multi-up printing

Media White Point

“Media White Point” describes the color of the unprinted paper, when it is illuminated by a 5000K light source (daylight).

The type of media makes a difference, and is one of the most overlooked variables in printing. How a printed image looks is directly affected by the color, brightness, finish, coating, opacity, weight and absorbency of the media on which it is printed.

If your job is printed on a media substrate with different color or brightness than one with a neutral bright white surface (also called a white point, color cast or paper shade), the resulting output will not look like the desired colors. For example, if the media has a cooler blue shade, the printed colors will also look more bluish. Likewise, if the media has a warmer yellow shade, the printed colors will also look more yellowish. Differences in paper color or brightness will tend to be more noticeable in lighter tones and clean, pastel colors.



Many of today's papers are enhanced with Optical Brightening Additives, or OBAs, to make them appear brighter. OBAs typically consist of materials which fluoresce under UV wavelengths (like daylight). This causes issues in color measurement and color management.

For example, UV enhancers sometimes make the paper appear more blue, but only in certain types of light. Most UV-based additives fade upon exposure to light, in some cases causing paper to change color after just a few days. This affects the color of the printed piece.

Ironically, printed images typically look very similar on brightened and non-brightened papers when viewed apart from each other, even though they look different adjacent to each other. The selection of paper is a crucial factor in accurate color reproduction.

What Can You Do?

- Use media that has a good white point. Grayish dull material will produce duller color output.
- Use RIP software rather than your printer's drivers to handle color management
- Use the correct media profile for your specific media

Profile Your Media

If the media selection in your printer driver or the media profile in your RIP software aren't providing accurate color, you may need to replace the option with a different selection, or create a new media profile.

ICC profiles describe the characteristics of a linearized printer (exactly what colors a printer can print on a given media) and act as a translator for color. An ICC profile is specific to a printer, substrate, print mode resolution, print direction, etc.

You will need a few things to get started, namely profile generation software (typically available in advanced RIP software) and a color measurement device called a spectrophotometer. Certain printer models, such as HP DesignJet Z-Series and HP Latex printers, have built-in spectrophotometers.

Printer ICC color profiles are essential for a professional print shop to produce outstanding output and consistent quality prints. The information and colors in your design file are what RIP software relies on to translate color information or values from the source (typically RGB) to the printer's color profile (CMYK) smoothly and efficiently.

The bundled information takes into account the variables associated with the printer and ink performance, shop environmental conditions and media performance. Printing without printer profiles will result in prints that do not resemble the original design file; some of the common failures you're likely to see are banding, ink pooling or inaccurate colors.

Your printer is a technical instrument, and profile re-calibration should be done to ensure consistency (as needed) based on the printer conditions, available profile and current media.

What Can You Do?

- Make sure your printer has been linearized
- Make sure you are using the correct ICC profile for your printer (ink and media)
- Consider using a RIP for superior color consistency rather than printer drivers
- Contact your printer specialist if you need help building a new profile



Linearize Your Media

Linearization (sometimes referred to as calibration), is not a media profile. Rather, linearization is an analysis, measurement and adjustment to the way your printer prints levels of color.

Linearization sets the printer on a given media to a known and repeatable state. It is an adjustment to the amount of ink printed for each color channel based on how much ink the media can hold. Performing a re-linearization will bring a printer back to the initial linearization state, compensating for any printing variation over time.

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To develop an initial baseline, the linearization process normally reads a series of patches of each color of ink. Each patch is printed in small percentage increments. If your printer has “light colors” such as light cyan and light magenta, transitional crossovers are also taken into account. A measuring device that can read color values from the visible spectrum (called a spectrophotometer) is used to read these patches. The device verifies that each color patch reads the correct color values.

These values now need to be adjusted to produce an even range of values. A curve is built to compensate for existing values, and then is applied to your media profile. This process is a “snapshot” of how your printer is currently printing on this media at this time.

Subtle changes (such as media roll to another media roll) or significant changes (such as a printhead replacement) can vary these results. Even two printers the same make, model and age, using the same media, will have somewhat different linearization results. As printheads age, nozzles wear. This causes the amount and size of ink droplets fired by them to decline. When you replace a printhead, that functionality is restored to when the printer was new. Always re-linearize after replacing printheads.

Linearizing your printer requires RIP software that supports this process. You cannot apply linearization adjustments to standard print drivers. The process also requires a measurement device. Some printers, such as HP DesignJet Z-Series and Latex printers, have built in spectrophotometers to make it easier to linearize.

What Can You Do?

- Use your RIP software to linearize your printer
- If you notice your color looks “off” perform a re-linearization
- Always perform a linearization when changing printheads

Do You Still Need Help With Print Color?

If you’re struggling with color, call us and we’ll have one of our specialists work with you to achieve better and consistent results!



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