The Digital Edge

LAZER INCORPORATED
CREATIVE GRAPHIC SOLUTIONS

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Color got you down?

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Managing Color

You spent hours tweaking the layout, retouching images, proofreading copy, double-checking the printer's specs, and carefully preparing PDFs. You sent the job out, and now that it's back, the color appears nothing like what you expected – nothing like what you saw on your monitor or what came off your desktop printer. Sound familiar?

These surprises can happen to anyone. Getting colors to match is a tougher challenge than most people realize, because cameras, scanners, monitors, proofing devices, and printers all reproduce color differently – fortunately, 'off-color' surprises can be prevented.

The solution is color management. Color management makes it easier to achieve predictable, accurate color results. Color management saves time and money, eliminating wasted proofs and prints.

What is Color Management?

The term Color Management (CM) came into vogue in early 1990s, as the industry began moving toward vendor-neutral, cross-platform color standardization, led by the International Color Consortium (ICC). In basic terms, color management is a process that maximizes both the accuracy and the consistency of color reproduction, through all stages of graphic production.

The graphic production process requires a number of different devices. These typically include input devices (digital cameras and scanners), display devices (LCD and CRT monitors), and output devices (inkjet and toner-based printers, printing presses, film recorders, and plate-setters). Understanding and measuring how devices reproduce color is the basis of CM.

The process of color management begins with device calibration. Calibration ensures that a device is operating within the manufacturers' specifications. This must be done before it can be color managed. Once the device is properly calibrated, it can be characterized.

Characterization, or profiling, measures how a device reproduces a series of known color targets. Just as an eye exam enables the optometrist to determine an individual's eyeglass prescription, characterization uses spectrophotometric measurements to determine a device's color space. The result is a device profile, a computer file that contains the numeric results of the measurement process.

Most current devices ship with generic device profiles. Generic profiles represent the average color characteristics of a number of similar devices under controlled conditions. A generic color profile could be compared to a generic eyeglass prescription based on averaged measurements from a group of "similar" people, and not specific to your eyes.

The age and condition of a device, manufacturing variations, and external variables, such as the choice of paper and ink, will all influence how it reproduces color. While generic device profiles will provide relative color accuracy, profiling your specific devices is the best way to maximize color reproduction.

Color conversion is the process of transforming color data from one device's color space (source) to another's (destination) – for example, from a digital camera (input) to a desktop printer (output). Using device characterizations (profiles), color management software converts the data, while maintaining the visual appearance of the color.

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Color Management System (CMS):
Color management software tools used to make color device-independent.

Color Space:
A specific range of available colors for a particular color model, such as RGB, Lab, or CMYK.

Color Gamut:
All colors that can be reproduced on a particular device or with a particular set of inks and paper stock.

ICC Device Profile:
A file that describes how a specific device reproduces color. Profiles can be generic or custom.

Proofing Device:
An output device, such as an inkjet printer, configured to simulate the color characteristics of another device, such as a commercial printing press. Proofing is an inexpensive way to check the color quality of a piece without actually printing it.

Spectrophotometer:
A photometric device used to measure a color's lightness, chroma, and hue, and assign the color a unique numeric value for comparative purposes.

Working Space Profiles:
These common, widely accepted profiles represent device-independent color spaces (i.e., Adobe RGB or sRGB), in which images can be manipulated without altering the original device profile's color range.

Getting Started

Color management involves multiple disciplines – imaging, color science, and physics. But a full understanding of these subjects is not essential to effective color management. Most modern graphics – software, scanners, digital cameras, monitors, and printers – can be color managed. With proper planning, training, calibration, characterization, and process controls, anyone can achieve predictable, accurate color results.

Start by mapping your workflow, from image capture to final output, identifying all the points where color management might be applied. Review each device manufacturer's recommendations for proper calibration. Then characterize each device and create color profiles. Check your imaging and page-layout software, making sure color management settings are correct and consistent across all workstations.

Next, be sure the lighting conditions in your work environment are as consistent and color-neutral as possible; maintaining proper viewing conditions is essential to color management. Keep the shades down and blinds closed, and work in a room with neutral-colored walls and ceiling. Fluorescent lights add a blue-green cast to a room, while incandescent home lighting creates a strong yellow cast. Installing D50 lighting can eliminate unwanted casts. The mathematical representation of direct daylight at 5000 degrees Kelvin (5000K), D50, is the standard illuminant used in the graphics arts industry for evaluating color uniformity and quality.

Other factors that can affect the way color appears on screen once it is properly calibrated include reflected clothing colors and colorful or busy desktop patterns (neutral gray is best). Higher quality monitors often come with viewing hoods that extend out beyond the screen, to reduce unwanted reflections from objects and lighting in the surrounding environment.

Finally, evaluate color proofs and printed materials in a light booth or other controlled viewing environment, illuminated with D50 lighting. Have the lighting checked periodically to ensure it is producing the correct temperature illumination.

Resources

Plenty of color management resources are available to assist you – books, articles, seminars, equipment vendors, and graphic services providers. The latter often help customers with their color management challenges. The following is a list of Web sites with valuable information on CM:

Apple ColorSync
www.apple.com/macosx/features/colorsync

GretagMacbeth
www.gretagmacbeth.com

GTI Graphic Technology, Inc.
www.gtilite.com

Microsoft Image Color Management
www.microsoft.com/whdc/device/display/color

Monaco Systems
www.monacosys.com

Pantone
www.pantone.com

The International Color Consortium (ICC)
www.color.org

X-Rite
www.xrite.com

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