# ColorSync at Work

**ColorSync**

Apple ColorSync is a universal color translator—it's the answer to every creative professional's goal of gaining color control at all levels of production, from design to prepress to multimedia to printing. The industry-standard software for managing color, ColorSync delivers consistent, predictable, and reproducible color from screen to finished product. More than 100 hardware and software products now support ColorSync, encouraging companies, large and small, to discover its power. Find ColorSync intriguing, but aren't sure how it will benefit your workflow? Read how three diverse companies use ColorSync to gain control over color—and save time and money along the way.

## PhotoDisc
### Supports Customers with ColorSync Profiles

How does one of the world's largest providers of digital stock images help customers achieve excellent results? PhotoDisc supplies 24-hour customer support, a CD on color management, and source profiles for the images on its web site. This approach assures customers that the images they buy will meet their expectations in any and every medium, whether in print, over the Web, or on CD.

Gary Hawkey, production manager, says that PhotoDisc first brought scanning in-house and implemented a ColorSync workflow to address the problem of color inconsistency from catalog to catalog. "Even though the images were the same, the image quality per catalog varied from the U.S. to Germany to Japan to the U.K.," he recalls. All that has changed. "Today, we produce our printed materials using a color-managed environment. The quality of our images is consistent no matter who prints them or where they are printed."

**Huge Cost Savings**
PhotoDisc found that ColorSync resulted in huge cost savings, too. "We used to do two or three rounds of proofs for each version of each catalog," says Hawkey. "Now we're getting it right the first time. We've cut time and costs substantially and have a better product as a result!"

PhotoDisc became a true ColorSync champion when they saw how the technology could improve customer service. According to Hawkey, "All our images are scanned in LAB color and delivered in RGB with a ColorSync profile for preview or print. That means customers using ColorSync start out with a much larger color gamut and can see images the way PhotoDisc and our photographers intended. We never limit the color available to our users—this is especially advantageous for customers who use the images in multiple ways."

**The Monitor's Like a Lightbox**
Today, that's practically everybody. Designers and art directors want to use images in all media, from print to Web to CD. With ColorSync, it is easy to maintain color and quality consistency, despite differences in color spaces. "As an industry, it's important that we use a ColorSync monitor in the same way we use a lightbox. A digital image can have the same color integrity as a transparency," says Hawkey.

Color accuracy has become an important brand distinction for PhotoDisc, which is why the company is a member of the International Color Consortium (ICC), the organization responsible for setting standards for digital color.

So what does the future hold for PhotoDisc? They will keep looking for more inventive ways to help their customers. Just take a look at their web site, www.photodisc.com, where you are able to buy high-quality images all day, every day.

## Prentice Hall
### Soft-Proofs with ColorSync

At Prentice Hall, currently part of Simon & Schuster, ColorSync is proving its worth to textbook editors and designers faced with tight deadlines, hundreds of color images to proof, and no time to make trusted Matchprint or Cromalin proofs. ColorSync lets them soft-proof images on a calibrated display, previewing in simulated CMYK how images will look in print. The process has proven accurate enough to make color decisions and give final approvals.

"I'm sold that the technology is viable," says David Riccardi, Assistant Vice President/Director of Production and Manufacturing for PH Engineering, Science and Math Textbooks. Although editors and designers are just getting acquainted with ColorSync-based color management, he predicts, "By this time next year, hard-copy proofing will be drastically reduced to about 20 percent of current usage."

**ColorSync at Work** continued…

### The Proof's in Reducing Proofs

The economics of reducing hard-copy proofing cycles are compelling. Todd Ware, Associate Director of Digital Imaging, says that a typical 400-page, four-color textbook might have an average of 400 color images. "If images are ganged 24 to a sheet and proofed, we would need 16 Matchprints and 10 to 12 staff hours to produce them. At about $250 apiece, we're looking at a cost of $4,000. With ColorSync, we soft-proof many images and do a random sample of 25 images on a single Iris for a total of only $11 for the inside of the book."

### How Prentice Hall Started

At Prentice Hall, ColorSync was integrated into the publishing workflow one segment at a time. About six years ago, its ESL and Career & Technology Divisions started down the road to color control by questioning the quality of scanned images it received from service providers. With prepress experience, the division felt it could deliver comparable in-house scans. Starting with gray-scale photos, the publisher optimized photos digitally to get good gray-scale tone reproduction on press. The next challenge was scanning color images and getting predictable results in print.

### Getting It Right with Profiles

Today ColorSync and more than 100 related products make color predictability more attainable and straightforward. Simon & Schuster's Corporate Digital Archive, operating digital imaging and spearheading the color management initiative, enlisted the help of a consultant to begin making profiles of its scanner, AppleVision and PressView displays, an Iris proofer, and the Matchprint process of service providers. Linearizing the devices every five days keeps profiles valid. But periodically, Simon & Schuster makes a new profile using its own spectrophotometer and ColorBlind software from Color Solutions.

Ware adds that there were some early naysayers who refused to have anything to do with ColorSync because color on the display was very close but not an exact match to a proof. "The benefits come after realizing that it is well within tolerance and that you can make color decisions based on it."

### New Directions

Now that ColorSync has proven its print-based capabilities, its future looks bright for CD and web publishing. Says Riccardi, "Color accuracy is often overlooked in new-media CDs and on the Internet. This will change in the future, especially with significant growth in electronic commerce, and we hope to be prepared."

# SACO Foods
## Saves Costs While Improving Packaging Quality

SACO Foods, a Wisconsin marketer of specialty foods, has used ColorSync to reduce package design costs by nearly 90 percent. Plus it managed to recoup its initial $10,000 investment—in a scanner, spectrophotometer, self-calibrating display, and ICC profiling software—on its first project.

More than cost savings, SACO Vice President and Art Director Anthony Sanna appreciates gaining greater quality control. Previously, he had used service bureaus and engravers to handle scanning, color separations, and proofs on proprietary systems—a time-consuming and expensive process. A small color change in a chocolate-dipped strawberry, for instance, meant talking to the engraver's salesperson, who then passed the instructions to the Scitex operator, who was left to interpret the inexact request for "a little deeper red." New film and Cromalins were made, returned by the salesperson, and invariably marked up with new instructions for the engraver's color crew. This frustrating cycle of revisions pushed typical costs to $15,000 for scans, selective color corrections, film, and proofs on a single food package design. "We're going from the design stage to plates for under $2,000 now," Sanna stated, "with greater control and creativity than in the old days."

ColorSync also helped to resolve another vexing situation. As output options for print expanded beyond the four-color, sheetfed press, color consistency in finished pieces had become a continuous problem. Printed samples from a Heidelberg DI often did not compare favorably with previous film-to-plate jobs, and archived images used for trade show banners rendered poorly on large-format ink- jet printers. Using ColorSync, Sanna found he could control color quality and minimize outside variables. "Instead of being forced to accept lower quality on press or discarding unusable printed pieces, we can focus on creative issues," says Sanna.

### How SACO Started

Sanna turned to Camera & Darkroom Digital in Santa Fe for help in selecting hardware and software to solve his color problems. He also spent several days learning from Andrew Rodney and other experts at Camera & Darkroom Digital. Additions to his Macintosh system included a Radius PressView display and graphics card capable of measuring its characteristics via a colorimeter, as well as a Digital Swatchbook spectrophotometer by X-Rite and Linotype-Hell's PrintOpen software to make ICC profiles for printing devices. A new Saphir Ultra scanner from Linotype-Hell and software upgrades to Photoshop and Apple ColorSync completed the package.

### Getting Started for Less

SACO's configuration is more robust than many designers need. It's easy to reduce initial costs by using outside vendors who own and operate expensive measuring instruments required to generate a few necessary profiles. This cuts equipment overhead. Sanna suggests that creative professionals could start with the Apple 17-inch ColorSync Display and get a few profiles from a consultant for a total cost of $1,200. Not included in this estimate are the scanner and Photoshop 5, which Sanna considers to be tools that most professionals already own.

# ColorSync and Photoshop

While Adobe Photoshop® 5 brings the benefits of ColorSync color management into the mainstream, some initial input to the Photoshop default settings is required to customize it for design and print publishing. To avoid complications, follow the steps at right before opening or creating your first file.
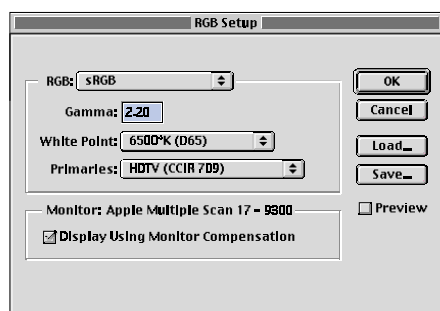
Start by selecting Color Settings from the File menu. The following four steps progress in the order of the Photoshop Color Settings options–RGB Setup, CMYK Setup, Grayscale Setup, and Profile Setup.

With these few steps, you can make device-independent color management part of your daily work life. Photoshop 5 will automatically embed, or write, ColorSync/ICC profiles in image files and establish a known "working" color space for each one. You'll be able to count on color that looks the same on different workstations and across platforms.
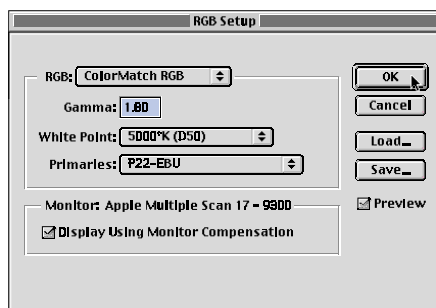
## Four Easy Steps

## 1. RGB Setup

With this release, Adobe has included predefined, device-independent RGB color spaces in which to work. In earlier versions, your RGB working space was your monitor, which led to color shifts between work-stations and unpredictable results in print.
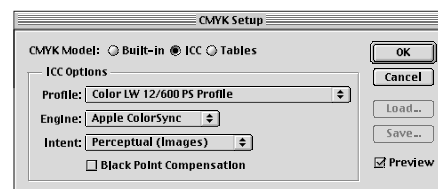
The default setting for RGB is "sRGB." It is the native color space for some scanners, ink-jet printers, and PC monitors. Because of its smaller gamut, it is not recommended for the print publishing community.

• Select ColorMatch RGB or Apple RGB not sRGB, for print. ColorMatch RGB is based on the Radius PressView display and currently best fits the range of color reproducible in print and displayable on the monitor. If you prefer to use the same setting Adobe Photoshop 4 used as its default RGB working space, choose Apple RGB.

• Gamma, White Point, and Primaries automatically change to those shown.

• Check the box for Monitor Compensation so that real-time color conversion between the Photoshop working space and the monitor is in effect.

Provided that the people who are editing images keep their displays calibrated and use the same RGB working space, they will see the same color. Notice that Apple Multiple Scan 17-9300 is shown under Monitor. Photoshop provides for the con-version between ColorMatch RGB and the signal sent to your monitor, identified by the profile seen in your Monitors & Sound control panel.

## 2. CMYK Setup

• Select CMYK Setup.

• The default dialog box assumes you will use Photoshop separation tables when changing color modes from RGB to CMYK for print. Experienced users can make adjustments here.

• Beginners can get professional results using the ICC button.

For the Profile, select the actual printing device to account for color reproduction.

• Engine stands for the CMM (color management module) used to do a trans-formation; CMMs from Linotype, Agfa, Kodak, and Built-in (Adobe) are possible choices. Select ColorSync for conversions to CMYK; the choice is subjective.

• Intent stands for "rendering intent." It should be left at Perceptual for color images.

• Until hardware and software allow users to find and set their monitor's black point, leave Black Point Compensation unchecked or it might clip your gamut.
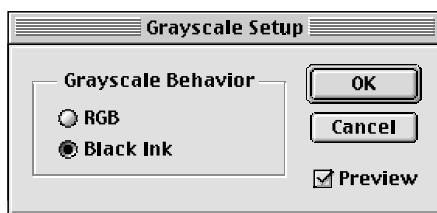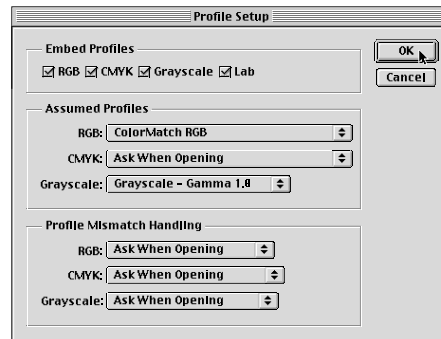
**ColorSync and Photoshop** continued…

## 3. Grayscale Setup

- Select Grayscale Setup.
- RGB Grayscale provides a composite gray, made up of equal amounts of red, green, and blue signals. There is no compensation for dot gain. It is the setting to use when images will appear on the Web.
- Black Ink Grayscale is based on Photoshop separation tables. Its gray behaves like the black plate of a CMYK file, including compensation for dot gain. It is the preferred setting when images will be printed.

**Grayscale Setup**

Grayscale Behavior
- ○ RGB
- ● Black Ink

[OK] [Cancel] ☑ Preview

## 4. Profile Setup

Photoshop must be told when you want it to embed profiles, if at all, and how to account for missing or different color profiles when an image is opened.

**Profile Setup**

Embed Profiles
☑ RGB ☑ CMYK ☑ Grayscale ☑ Lab

Assumed Profiles
- RGB: ColorMatch RGB
- CMYK: Ask When Opening
- Grayscale: Grayscale – Gamma 1.8

Profile Mismatch Handling
- RGB: Ask When Opening
- CMYK: Ask When Opening
- Grayscale: Ask When Opening

[OK] [Cancel]

Choose to embed profiles for all color spaces in the top region of the dialog box—RGB, CMYK, Grayscale, and LAB (CIE L*a*b*). Check all boxes under Embed Profiles. Exceptions to the "always embed" rule include the following:

- Images that will exist in a user interface that requires very specific colors
- Pictures bound for the Web that use a limited palette of colors
- Test targets used for calibrating and characterizing color capture and output devices

### Get ColorSync Free

**ColorSync is free with every Macintosh computer. Download the latest version—along with sample profiles, plug-ins, and sample AppleScripts from the ColorSync web site at www.apple.com/colorsync.**
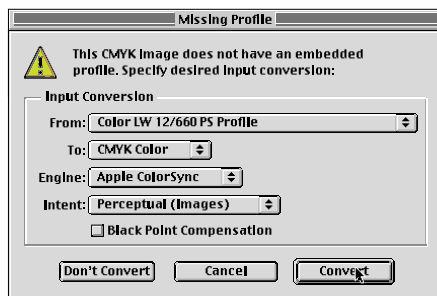
### Get More Details

**For a more detailed explanation of new color management features in Photoshop 5, visit the Adobe web site: www.adobe.com/supportservice/custsupport/techguide/pshop/main.html.**

## Profile Exceptions

**Opening Images Without Profiles**
When opening images without an embedded profile, Photoshop gives you two choices for tagging images in the Assumed Profiles interface. Either set the Profile Setup to automatically tag and convert untagged images if you know where they were last edited, or select Ask When Opening to decide on a case-by-case basis. The Ask When Opening option posts the following dialog box when you open an untagged image.

**Missing Profile**

⚠ This CMYK image does not have an embedded profile. Specify desired input conversion:

Input Conversion
- From: Color LW 12/660 PS Profile
- To: CMYK Color
- Engine: Apple ColorSync
- Intent: Perceptual (Images)
- ☐ Black Point Compensation
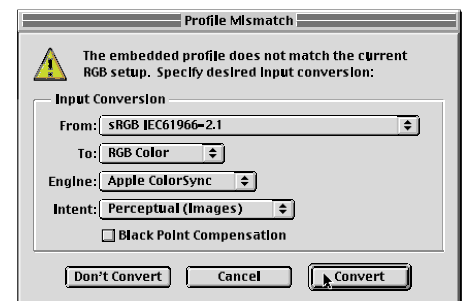
[Don't Convert] [Cancel] [Convert]

- Set the From value to show the last device that displayed or printed the image.
- Set the To value to show the color space in which you will open the image. Your settings for RGB and CMYK Setups take effect.

- Engine, or color management module (CMM), is the method used for the conversion. Start with ColorSync.
- Intent should be left at Perceptual for color images.
- Do not check the Black Point Compensation box.

**Opening an Image with a Profile Mismatch**
When you open a tagged image for which the last user had a different working color space, there is a Profile Mismatch. Tell Photoshop how to handle this situation for RGB, CMYK, and Grayscale images. The default setting is to convert automatically to the current RGB working space; this is not recommended. The Ask When Opening option gives you a chance to see the previous working space and make an informed choice when the following dialog box appears.

- The From value shows the image's current working space, sRGB.

**Profile Mismatch**

⚠ The embedded profile does not match the current RGB setup. Specify desired input conversion:

Input Conversion
- From: sRGB IEC61966-2.1
- To: RGB Color
- Engine: Apple ColorSync
- Intent: Perceptual (Images)
- ☐ Black Point Compensation

[Don't Convert] [Cancel] [Convert]

- Set the To value to your chosen working space for RGB, CMYK, or Grayscale.
- Set the Engine to ColorSync.
- Set the Intent to Perceptual.
- Do not check the Black Point Compensation box.

**Caution**
When performing a profile-to-profile conversion on an image, such as one tagged for Matchprint CMYK going to Color LaserWriter CMYK, work with a copy of an original file. Currently, the tag that specifies the origin is not preserved in the conversion, and you might experience some variance in color.

# ColorSync Workflow

**ColorSync**

At the heart of the ColorSync technology are special files called device profiles, which describe the capabilities of each component in a color workflow. Once displays and devices have been profiled, ColorSync makes working with color transparent and automatic to all users—no matter where they are in the color publishing process.

## From Input to Output

### Image Input

Scanners and cameras, even those of the same make and model, have different ranges of color sensitivity. The range is described in a ColorSync profile, which resides in the System Folder. Profiles are created by special software that measures color values of known color patches that have been scanned or photographed.
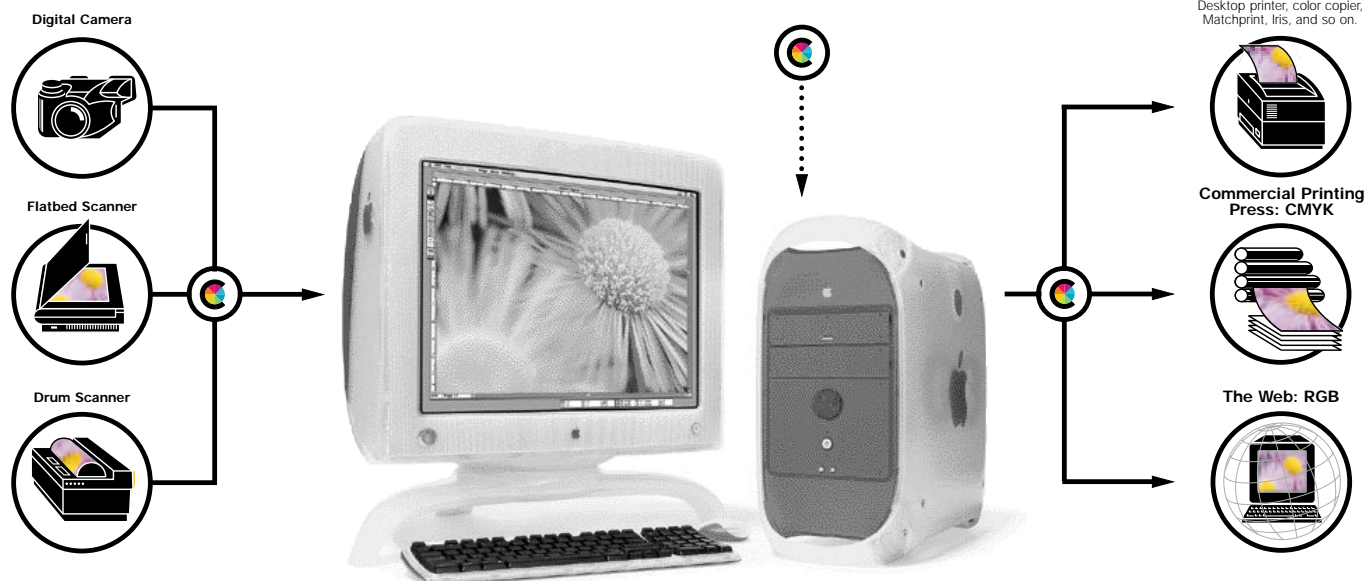
### Image Files

ColorSync is a system-level way of communicating the physical color capabilities of a specific device—whether it is a display, a scanner, a camera, or a printer. This is accomplished with files called profiles—there's one per device. They reside in a ColorSync Profiles folder inside the System Folder on your Macintosh.

ColorSync-savvy applications embed profiles in image files when they are saved. They use profiles to understand the source of images and properly display them depending on where you will print. All of the communication takes place behind the scenes on the Macintosh. The instructions for displays and printing devices are automatically adjusted, based on information in profiles, so that users get color they expect from display to print—or from display to display.

### Image Output

CMYK: CMYK output types— such as process proofs and printed pieces—have individual ranges of color reproduction based on the paper, pigments, method of printing, and even environmental factors. A ColorSync profile captures this range and communicates it to supporting applications so that what you get in print is what you expect.

RGB: In the case of the Web, browsers that support ColorSync read profiles within image files and adjust the viewer's RGB display on the fly, making color communication a reality across platforms and around the world.

**Digital Camera**

**Flatbed Scanner**

**Drum Scanner**

**Four-Color Process Proof : CMYK**
Desktop printer, color copier, Matchprint, Iris, and so on.

**Commercial Printing Press: CMYK**

**The Web: RGB**

# ColorSync Glossary

Many of the following terms and definitions are taken with permission from a new book on color management, *The GATF Practical Guide to Color Management,* by Richard M. Adams II and Joshua Weisberg. For more information on this book or color management training, contact the Graphic Arts Technical Foundation. On the Internet, go to www.gatf.org.

**Calibration**
The process of ensuring that all color production devices (scanners, monitors, printers) conform to an established state, specified by the manufacturer, user, or an industrywide specification or standard.

**Characterization**
The process of determining the output of a system in response to a known input. Characterization provides a way of deriving the color gamut and reproduction characteristics of a device.

**CIE L\*a\*b\***
A three-dimensional, mathematical color model based on human sensitivity to the visual spectrum of light; L\* = lightness, a\* = red-green axis of the space, b\* = blue-yellow axis of the space.

**CMM**
Refers to color management module, a color transformation algorithm that accepts color data and translates it to another color space referencing color profiles.

**Colorimeter**
A three-color instrument for measuring light reflected from a surface or transmitted by an object, relating reflectance or transmittance to a mathematical model of human vision. A colorimeter is used for calibration/characterization of monitors and characterization of printers.

**Color space**
The three-dimensional range of color coordinates that mathematically defines the hues and shades a device can print or display.

**Conversion**
Translating a color image from the color space of one device to that of another. Also known as color transformation.

**Delta E (∆E)**
Distance in CIE L\*a\*b\* color space between two colors. Delta E is used to indicate total color difference and establish quantitative color tolerances.

**Densitometer**
A black-and-white or four-color instrument for reading the amount of light reflected by a surface or transmitted by an object. Reflection densitometers are used to read the density of process-color inks on press, as well as to calculate other values such as dot gain, ink trap, and hue error. Transmission densitometers are used to read density of black-and-white film.

**Dot gain**
Net percent increase in halftone dot size (or tone value) throughout the tone scale or at a specified percentage. A dot gain of 20%, then, signifies that a 50% tint reproduces at 70% apparent dot area.

**ICC**
International Color Consortium, an internationally accredited committee that sets standards for color profiles. See "Profile."

**Linearization**
A specific type of calibration in which an output device is adjusted to deliver a straight-line relationship between input and output. For example, an imagesetter is linearized to output halftone dot values within a certain tolerance of those input.

**Profile or ICC Profile**
Developed by the ICC and introduced in 1995, a profile is a standard file format that communicates measured color output of a system or device in response to a known input. Its data describes a device's characterization to applications and operating systems that support the format.

**Spectrophotometer**
An instrument for reading reflectance or transmittance of light at specified increments throughout the visible spectrum. Spectrophotometric data can be used to calculate densitometric and colorimetric variables.

# ColorSync Products

More than 100 products, from page-layout software to printers, support ColorSync. For a complete list, see www.apple.com/colorsync.

## Products that Build a ColorSync Workflow

### Displays

**Apple Computer, Inc.**
ColorSync Displays
www.apple.com

**Radius, Inc.**
PressView Systems, ColorMatch Separation Lab, ProSense Display Calibrator
www.radius.com

### ColorSync/ICC-Based Software

**Apple Computer, Inc.**
ColorSync
www.apple.com

**Heidelberg**
ScanOpen ICC, ViewOpen ICC, PrintOpen ICC
www.heidelberg.com

**Eastman Kodak**
Kodak Professional Colorflow Solutions
www.kodak.com/go/colorflow

**Agfa Gevaert NV**
ColorTune
www.agfa.com

**Imation Corp.**
www.imation.com

**Candela Ltd.**
ColorSynergy
www.candelacolor.com

**Color Solutions**
(Imaging Technologies Corporation)
ColorBlind Professional,
ColorBlind Edit, ColorBlind Parachute,
ColorBlind ICC Viewer
www.color.com

**Monaco Systems**
MonacoMATCH, MonacoPROFILER,
MonacoCOLOR, MonacoBATCH
www.monacosys.com

**Praxisoft, Inc.**
CompassLink
www.praxisoft.com

**Sonnetech, Inc.**
Colorific
www.sonnetech.com

### Color Measurement Instruments and Related Software

**Color Partnership, Inc.**
OptiCal
www.colorpartnership.com

**Color Savvy Systems Limited**
ColorMouseToo!, ProfileScanner,
ProfileMonitor, ProfilePrinter
www.colorsavvy.com

**Gretag-Macbeth**
Color-Eye spectrophotometers,
Spectrolino, SpectroScan
www.gretagmacbeth.com

**Pantone, Inc.**
Pantone Personal Calibrator, Pantone
Color Reference Card, ColorDrive
www.pantone.com

**X-Rite, Inc.**
DTP 41, DTP 92, ColorTron,
Digital Swatchbook, Colorshop
www.xrite.com

### Choice in CMMs

ColorSync has always been an open solution for color conversion from one color space to another; RGB to CMYK, for example. Several major developers have their own methods for performing these conversions, which are called "color management modules," "CMMs," and sometimes "Engines." With ColorSync 2.5.1, you have a choice in CMMs. Heidelberg (Linotype) and Kodak CMMs are included. Agfa and Imation CMMs are available from their respective companies.

**HEIDELBERG** PREPRESS

**Kodak** *ds* digital science
**Color Management Software**

**AGFA** *Agfa*

**IMATION**

## IFRA ColorSync Training

ColorSync is recognized as the standard for color management in the newspaper industry worldwide. To address the need for expertise in the field, IFRA, the world's leading association for newspaper and media technology, will soon offer training programs leading to Apple ColorSync Consultant certification in its Darmstadt, Germany, facility. In a partnership with Apple, the IFRA training center will provide access to Power Macintosh G3 computers and 17-inch ColorSync Displays. For more information, contact the IFRA Training Manager, Frank Wolfraum, at wolfraum@ifra.com.

# GoLive CyberStudio

In the world of electronic commerce, color accuracy can make the difference between a satisfied customer and a product return. In fact, most online catalog returns are due to false color expectations.

GoLive CyberStudio 3.1 is the first web editor to support Apple ColorSync. With CyberStudio, designers can preview and use images with embedded ColorSync profiles. The result: Consumers who use a browser that supports ColorSync (such as Microsoft Internet Explorer 4.01) will see product colors as intended by the web designer and the online retailer.

The benefits: More satisfied online customers. Fewer product returns. Less aggravation all around.

## Bringing Color Accuracy to the Web



**Without ColorSync**
The color-adjusted image is displayed below in an application that doesn't support ColorSync. Notice how much brighter it looks than the images on the left. The application does not display color consistently because it does not recognize the ColorSync profile.
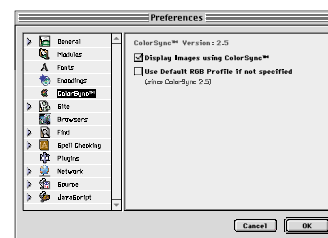
**With ColorSync**
When this shirt photograph (left) was scanned, a ColorSync profile describing the scanner was embedded into the resulting digital image. The image was then adjusted in Photoshop 5 *(see ColorSync and Photoshop article)* to match the color of the original. The CyberStudio window (above) accurately displays the color because it recognizes ColorSync profiles.

**How to Start**
To make sure CyberStudio 3.1 acknowledges profiles, you must have ColorSync turned on. Go to the Edit menu and select Preferences. In the Preferences window select the ColorSync icon. Check the box that says Display Images using ColorSync. To see the name of the ColorSync profile used to display the image correctly, simply select the image and look in the Embedded text field of the Image Inspector.

That's all there is to it. Now when you display images with ColorSync profiles, you'll get the color quality you expect.

**To find out more about e-commerce solutions from GoLive, visit www.golive.com.**