ColorSync
Colour Management

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www.apple.com/colorsync

ColorSync is the industry standard tool for managing colour across input, display and output devices. Built into the Mac operating system, this system software works with scanners, digital cameras, monitors, printers, copiers, proofers and presses. ColorSync is also supported in all leading image-editing and page layout applications.

ColorSync also includes a powerful monitor calibration system which corrects any irregularities in the monitor's age, phosphor set, ambient light, white point or monitor type. ColorSync calibrates the monitor so that colours of a displayed image correspond to the original photograph or digital image. Images can be viewed as they would appear on different paper stock or output devices.

Monitors and most scanners produce colours by mixing red, green and blue light. This is called RGB colour. Most printers produce colour by mixing cyan (a shade of blue), magenta (a bright pink), yellow and black ink. This colour system is called CMYK. Since monitors, printers and scanners have different colour capabilities, they cannot reproduce each other's colour exactly.

Colour Conversion
Colour conversion is the process of translating colours from one colour space to another.

Different imaging devices (scanners, displays, printers etc.) work in different colour spaces and each can have a different *gamut*, or range of colours that can be generated. For example, colour monitors from different manufacturers all use RGB colours but may have different RGB gamuts. Printers that work in CMYK space vary drastically in their gamuts, especially if they use different technologies. Even a single printer's gamut can vary significantly with the ink or type of paper it uses.

Colour matching is the process of adjusting converted colours to achieve maximum similarity from the gamut of one colour space to another.

It is easy to see that conversion from RGB colours on an individual display to CMYK colours on an individual printer using a particular paper type can lead to unpredictable results!

How ColorSync Works
When a TIFF, JPEG or EPS is created using a program that makes use of ColorSync, a ColorSync 'profile' is embedded or saved in the file.

The profile contains information about the colour capabilities of the equipment that is being used to create the image file. For example the profile describes the lightest and darkest possible tones (white point and black point) that the equipment can produce. Also the maximum supported densities for red, green, blue, cyan, magenta and yellow. together these values identify the colour gamut (or range) that the equipment can display, capture or reproduce.

When an image file has an embedded ColorSync profile, ColorSync identifies the colours that the monitor can reproduce by examining the profile selected as the ColorSync system profile. It compares the monitor's capabilities with the capabilities of the equipment used to create the image and then selects the appropriate matching colours.

When an image is printed, Colorsync compares the capabilities of the monitor with the capabilities described in the printer's profile and picks printed colours that most closely match what appears on the monitor.

Dot Gain Settings Cannot Be Included In The Colour Profile
When using CMYK color profiles, dot gain settings cannot be customised. The transfer function in Photoshop can be used to compensate for miscalibrated imagesetter. Transfer functions enable compensation for dot gain between the image and film.

To adjust transfer function values:

1 Use a transmission densitometer to record the density values at the appropriate steps in the image on film.

2 Choose File /Print Options

3 Select: Show More Options, and choose Output from the pop-up menu.

4 Click: Transfer button.

5 Calculate the required adjustment, and enter the values (as percentages) in the transfer functions dialog box.

For example, if there is a 50% dot, and the imagesetter prints it at 58%, an 8% dot gain occurs in the midtones. To compensate for this gain, enter 42% (50% - 8%) in the 50% text box of the transfer functions dialog box. The imagesetter then prints the 50% dot that is required.

When entering transfer function values, keep in mind the density range of the imagesetter. On a given imagesetter, a very small highlight dot may be too small to hold ink. Beyond a certain density level, the shadow dots may fill as solid black, removing all detail in shadow areas.

Using ColorSync With Application On The Computer
To get the best possible colour reproduction, ColorSync needs to be used throughout the image capture, editing and printing process. The following needs to be considered:

Before using a scanner or digital camera make sure that a profile for the device has been created and that it has been loaded into the ColorSync Profiles folder in the System Folder.

If a there is not a profile, look at the manufacturer's website and download one if it is available. Profiles can also be created by using tools available from a number of companies.

Visit www.apple.com/colorsync to see a partial list.

Creating A Colour Profile Using ColorSync
To create a profile:
System Folder/Control Panel/ColorSync

Profiles for standard devices can be loaded:
Input: Generic RGB Profile
Display: Studio Display 21 inches
Output: Generic CMYK Profile
Proofer: Generic RGB Profile

CMM: Colour matching method can either be:
Automatic or Heidelberg CMM

The above example illustrates the information that can be used for a colour profile.

LOADING COLOUR PROFILES INTO AN APPLICATION

PHOTOSHOP 6.0
Edit/Colour Settings

Below is a list of information that can be used to create a profile in Photoshop:

Settings
Various standards can be entered or customised

Working Spaces
RGB
CMY
Gray
Spot

Colour Management Policies
RGB
CMYK
Gray

Conversion Options
Engine
Intent

Advanced Controls
Desaturate monitor colours by:
Blend RGB colours using gamma:

In Photoshop it is possible to convert colours to another profile.
This is found in:
Image /Mode: Convert to profile
or
Image/Mode: Assign profile

ILLUSTRATOR
File/Colour Settings
Create profiles:
- Monitor
- Printer

QUARKXPRESS

Edit/Colour Management Preferences

Create profiles:

- Monitor
- Composite printer
- Separation printer

QUESTIONS ON COLORSYNC COLOUR MANAGEMENT

(1) Which operating system is ColorSync Colour Management built into?

(2) What is the function of ColorSync Colour Management?

(3) When a TIFF, JPEG or EPS is created using a program that makes use of ColorSync, what happens to the file?

(4) What cannot be embedded into a colour profile?

(5) How can dot gain settings be embedded into a file?

(6) Where is the ColorSync file found on a Mac?

(7) What are the 3 main areas in ColorSync where colour prolfiles can be loaded?

(8) Where are the colour settings found in Photoshop for loading or amending a colour prolfile?

(9) Where are the colour settings found in QuarkXPress for loading or amending a colour profile?