

Color Management for the CorelDRAW Graphics Suite X8

Corel Only Solutions
Paint Shop Pro X8
Aftershot Pro 3
PhotoZoom Pro 4 Plugin



Printing
Photography
Engraving
Grand Format Printing
Vehicle Wraps
Signs

Coordinating Color
With Adobe



David Milisock

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The Corel Solution

Regardless of the line of graphics work that you're in you will find that CorelDRAW X8 is not only a valuable tool but in many cases the most valuable tool in your software tool box. The high resolution display support positions CorelDRAW solidly for the next 20 years.

I was introduced to CorelDRAW late into the version 3 cycle by a friend and vendor Eric Whitmore and I actually bought version 4. I have never regretted one moment.

My graphics experience started in 1975 long before desktop publishing and continues to this day, with work ranging in scale from a business card to a 20,000 pound granite monument sign.

When I first got CorelDRAW version 4, I considered it a valuable tool. Now as my career has progressed and with the range of work continuing to expand, with the release of version X8, I consider CorelDRAW X8 to be one of the most valuable graphics software I use, however as the business climate has changed I now prefer to use Corel only solutions.

AfterShot Pro 3, PaintShop Pro X8 and the CorelDRAW Graphics Suite X8 produce state of the art quality in compliance with all graphic technologies at a cost that allows designers to be profitable.



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The Corel Solution

The Corel solution is a productive mind set encompassing the use of a comprehensive set of software packages designed to make you productive and profitable.

1. AfterShot Pro3

Professional level RAW conversion for the critical photographer and graphics professional

2. PaintShop Pro X8

Application color managed mid level image editing, with a filter set designed to manage modern fast paced images from professional and non-professional digital sources

3. The CorelDRAW Graphics Suite X8

CorelDRAW - state of the art vector graphics - page layout - with an extensive importation and exportation filter set

Corel Photo-PAINT - fully integrated professional level image editing, RGB, Grayscale, CMYK, LAB and spot color support

Trace - integrated CorelDRAW application, image to vector conversions

Corel Font Manager - a professional level font manager fully integrated with CorelDRAW

Corel Capture - a screen capture utility for sharing processes from your screen, between users

Corel Connect - an indispensable online resource sharing application

Plug - in, PhotoZoom Pro 4 - a professional level utility for up sampling images

The CorelDRAW Graphics Suite X8 is the cream of the crop of graphic application packages for professional and general graphic design and output. Professional document level color management and exportation filters allowing for output to all modern devices making the application perfect for:

1. Short documents (1 to 16 pages) professional printing press as well as all digital printing.
2. Exceptional tool set, (transparency, blends, integrated image handling) capabilities for complex graphics for wide and grand format printing
 - A. Banner Stands
 - B. Vehicle Wraps, cut vinyl lettering and wall graphics
 - C. Dye sublimation textile output for table cloths
3. The ultimate sign application with a 150 foot x 150 foot page capability
4. Laser engraving of steel, glass, wood and many other media
5. Automated dimensional cutting and routing of steel, glass, wood and many other media
6. Exceptional tool set for the creation of web graphics and state of the art web exportation filters

The Corel set of graphic and image applications allows for universal compatibility of professional level graphic files at an unheard of cost. Vector graphics, RAW converting, image editing and online sharing that will not on a monthly basis break your checkbook nor compromise your quality and your profitability.

That's the Corel Solution!

A handwritten signature in black ink that reads 'David Milisock'.

Profile Use for Color Management

Use

the files embedded profile
to properly view and edit the file in its color space
(no change in color or display)

Convert

a file with an embedded profile into your documents color space
(a proper color conversion, a possible shift in color and display,
specifically from a wide gamut color to a narrow color gamut)

Assign

a file with or without an embedded profile your document color
space
(a color shift may occur)

When properly configured the CorelDRAW X8 Color Management interface will ask or automate the process of answering these three questions. This publication will teach you how to understand and how to answer those questions.

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Forward;

The information contained in this publication is **REQUIRED READING**, contained herein is an over view of basic color management terms in an easy to understand laymen terms, all the information required to provide reliable and consistent color reproduction of your CorelDRAW X8 Graphics Suite file for the internet/office/presentation, laser engraving traditional print, expanded gamut large and grand format output.

CorelDRAW X8 has been released with little change in color management since X5, that change specifically is the default setting of preserve pure black in the color tab of the print dialog, however users of X4 and older versions will find these changes add significant improvements for the users of CorelDRAW X4 and older versions. Please read (Matching X8 to X4 preset color management settings) section that appears later in this publication.

For those who have kept going forward with The CorelDRAW Graphics Suite Since version X5 the reality of color management has evolved into something simple, it simply works. As mentioned earlier in this publication you **USE, CONVERT or ASSIGN** profiles.

Use the embedded profile to properly view and edit a file. Color numbers and display remain the same.

Convert the color space of a file that you're importing into your CorelDRAW if it does not match your document. Color numbers will change and the display may also change.

Assign your document profile to an imported or opened file specifically if it has no profile. The color numbers will remain the same, the display may change.

With CMYK files that are destined for the printing press you may want to consider always assigning your document profile instead of converting as this will maintain the CMYK numbers and allow the press RIP to do the conversion.

CorelDRAW X8 provides you with a professional level color platform for your creations, the goal of the publication is to provide the user with enough information to make educated choices on how to configure those settings to allow you to recreate your color management settings from previous versions of CorelDRAW as closely as possible and to allow you to utilize the enhanced features.

Color management between X5, X6, X7 and X8 is virtually identical so absolute matches between the four applications is possible. With X4 and older versions of CorelDRAW absolute color matches may not be possible due to non ICC compliant issues in those versions of CorelDRAW.



About the Author

David Milisock has been professional in the graphics industry since 1975, supporting professional output from CorelDRAW since version 4 as Custom Printers. The support for CorelDRAW as well as other graphic applications started as output only but quickly evolved into support for postscript compliant file creation, at first only for established clients of Custom Printers. As word of mouth spread training services were offered to new customers and another company was formed, Custom Graphic Technologies Inc.. This company offered software support, this quickly evolved into the building of custom configured graphic workstations, and then into network support. As the companies evolution continued Custom Printers was absorbed into Custom Graphic Technologies Inc..

Today Custom Graphic Technologies Inc., while still offering training for graphic applications, workstation and network support, has evolved to offer state of the art Color Management Support, Technical Systems Development, Signage in all formats specializing in medium scale construction projects and high voltage to low voltage electric sign conversions.

A handwritten signature in black ink that reads "David Milisock". The signature is written in a cursive, flowing style.

Definitions and Overviews

You do not need to know how to color calibrate a multi-million dollar output system, however you do need to know a few basic terms and what they mean so that you can make an educated choice when the software requires you to select a setting. These are laymen definitions for the general user.

CMYK

Cyan, Magenta, Yellow and Black. The four base colors used in process printing. An absolute color space with a color limit of 100 for each color a total limit of 400 with identical meaning in all CMYK color spaces.

Color Calibration

In terms of the CorelDRAW Graphics Suite, it is using the features of the suite to print and or display specific target files in an un-color managed manner, reading the results with a spectrophotometer, creating device specific profiles, loading those profiles and maintaining a working environment that is conducive to utilizing the calibrated system.

Calibration for displaying Web, Presentation and Office work requires
A white point of 6,500 Kelvin
Gamma of 2.2
Internal RGB color space of sRGB (standard, red, green and blue)

Calibrations for Printing Press work requires
A white point of 5,000 kelvin
Gamma of 1.8 or 2.2
No standard RGB color space but Adobe RGB 1998 is most often used, in North America, consult your output provider

Calibration for expanded gamut ink jet reproduction has no standard at this time, consult your output provider

A Color Calibrated work environment requires attention to details, ambient lighting temperature, the decor of the environment, regular monitor calibrations. It also requires the user to adhere to some specific work habits, opening a file in its residing color space, proper conversion and file export methods.

Color calibration is like a mosaic, it is only complete when you have all the pieces in place!

Do not assume that your output provider will have their output calibrated.

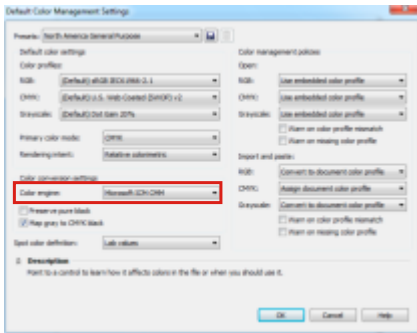
For printing press work postscript color managed process is still used, however many companies are using ICC controlled processes . Which means TAGGED CMYK color profiles for exported files only! **Consult your provider FIRST!**

All editing for RGB and CMYK requires that the objects or images color profile be used during the editing process.

For all composite digital printer devices you will need to embed your RGB and or CMYK profiles.

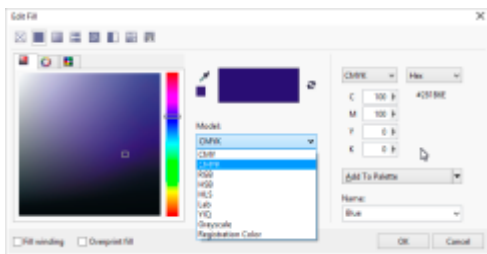
Definitions and Overviews

Color Management Module



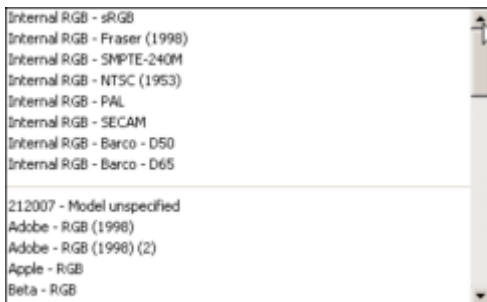
This is the software that allows the operating system, your graphics applications and your output devices to communicate the color functions of your file to one another. You will find this in CorelDRAW and Photo-PAINT under the tools menu/color management. Enclosed in the Red Rectangle, note that XP (CDGS X6 and older versions only) users will support MS ICM CMM 2 and Adobe Color Management Module (a third party engine that you must down load and install). Vista and Windows 7, 8 and 10 users will have the ability to use MS ICM CMM 3, WCS (Windows Color System), LCMS, **there is no 64bit Adobe CMM.** **Look for a note concerning profiles and color engines in the profile section.**

Color Model



This is a system so spaces and numbers can be assigned to the colors. Examples of color models are easily found in the **Fill Dialog** under the model drop down in CorelDRAW as seen to the left. There are many times less correctly referred to as color spaces, in either case it is imperative that you control the color model and the color space of your images. **Remember color spaces exist inside color models.**

Color Space



A color space exists inside of a color model and is a theoretical 3D representation of all the colors that can exist in a color space within a color model. They have a profile file that is used to activate the color space inside an application so it can be used. However a color space is not always associated with a device. The **capture to the left** shows the drop down list from the internal RGB Icon in the **Corel Color Management Dialog in X4**. These color spaces do not represent any specific device unless noted. An example of a device color space would be **a monitor profile this is a device specific profile** because it was created to correct errors in how this specific monitor displays color.

The confusion with the numbers used in RGB color spaces arises because different RGB color spaces have different sizes, (the ability to utilize more dense or brilliant hues). However the distances between dark to light colors in any RGB channel are always assigned a maximum of 256 shades.

What results is that the RGB numbers of one RGB color space do not always translate directly to another RGB color space. This is why it is imperative that you embed the profiles of your files. Grayscale and CMKY images have similar issues and also require profile embedding .

Definitions and Overviews

Color Rendering Dictionary (CRD)

In Postscript Color Management the CRD is equal to the destination profile in ICC Profile color management and is a part of all postscript work flows. The CRD provides the destination color information for the final conversion from your file to the plate or film curve via the postscript interpreter. (This takes place automatically in the background and you will need to understand this term later in the book as we discuss CMYK press output and Postscript Color Management.)

Color Space Array (CSA)

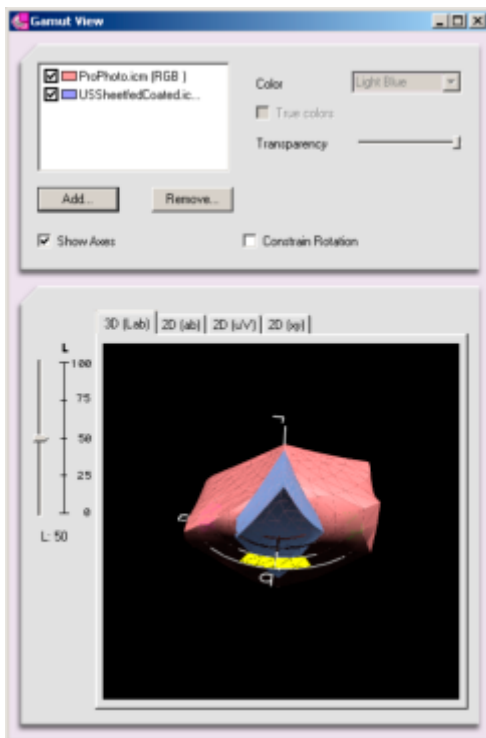
The CSA is incorrectly said to be equal to the source profile in ICC Profile color management, this is also part of all postscript work flows. The CSA is the apparatus that transfers the color numbers but not the color space from the objects or images in your file to the postscript interpreter which contains the CRD. This results many times in improper color conversions due to the destination device not knowing what color space the source file is from. (This takes place automatically in the background and you will need to understand this term later in the book as we discuss CMYK press output and Postscript Color Management.)

Gamma

The degree to which a color space is non-linear, this is chosen in the calibration software when one runs a calibration sequence. A gamma of 1.8 or 2.2 for press and 2.2 for web. **Corel X5 through X8 now allows you to choose your gray scale gamma**

Gamut

The range of colors of a color space. The range of colors and densities reproducible on an output device. **As shown in the screen capture from a profile editing application to the left.** The pink represents the range of colors reproducible in the Prophoto color space and the blue represents the range of colors reproducible in the U.S. Coated Sheet Fed CMYK profile.

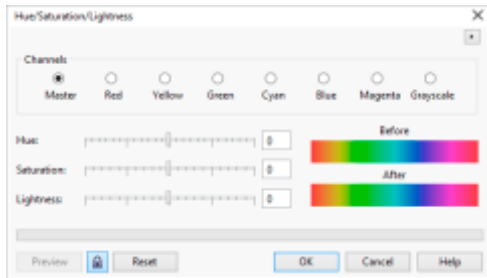


Gamut Mapping

The process of making the a larger color space (like the Prophoto color space in pink) in the capture to the left fit into the smaller U.S. Coated Sheet Fed CMYK color space in blue in the capture to the left.

Definitions and Overviews

Hue



The property of a light source from which we perceive its dominant wavelength.

Always used in conjunction with **Saturation** and **Lightness** so for purposes of ease we will discuss all three here. To the left you will see a capture of the Hue/Saturation/lightness dialog on Corel Photo-PAINT, it is found under the adjust menu in Photo-PAINT.

Saturation

The property of light from a light source from where we perceive the most pure, (single wavelength) light.

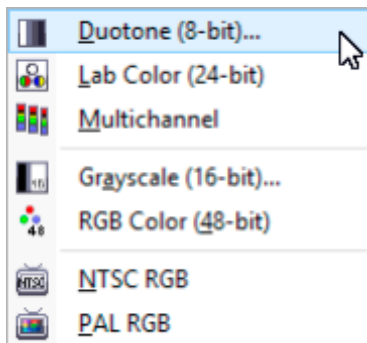
Lightness

The brightness of a light source when compared to a calibration standard

Kelvin

A scientific unit of measurement to describe temperature with the scale starting at absolute zero. Used as a measurement of the white point of a device profile as in a monitor calibration, 5,000 or 6,500 Kelvin.

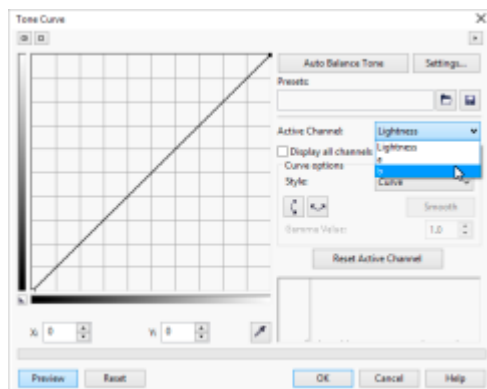
LAB



Also known as CIE LAB it is a color space used as a profile connection space for conversions from one color space to another. It is also a device independent space used for color correction. The space is comprised of the L channel, A channel and the B channel. **L** refers to the lightness value, **A** refers to the red/green value and **B** refers to the blue/yellow value.

To the left you see the convert to menu that is accessed in Photo-PAINT under the image menu/convert to, note that we can convert to Duotone or other color spaces here.

It is important that you understand that LAB and another connection space XYZ are used anytime a color space conversion takes place. You will also read more about LAB when we discuss work flows which will include conversion methods to improve efficiency and quality.



LAB is the one color space we can convert our images to that will allow us to view them simultaneously and make critical color editing decisions before converting to a commercial color space. LAB has a yellow channel which allows balanced Red/Green (yellow) adjustments unlike RGB.

Lightness

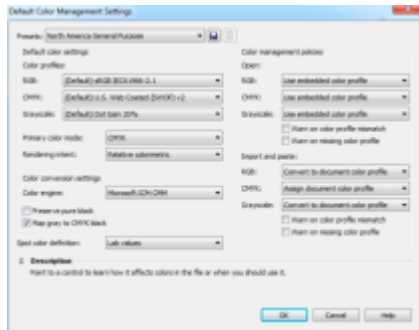
See Hue

Definitions and Overviews

Profile

A properly prepared profile is a file that contains all the required information to allow a Color Management Module to convert colors into or out of any color space.

A working understanding of profiles is so important to the CorelDRAW user that I will break with the alphabetized order of our definitions to provide an inclusive look at the profile information a user needs so you don't have to jump around the book. Including independent, device, source, destination, rendering intents, embedding and extracting of profiles.



The capture left is the main color management and profile control in CorelDRAW. It is accessed under the tools menu/color management/default. All the features of Corel color management revolve around understanding what the setting in the dialog and other CM dialogs do and what are the best choices for your needs. You load/unload or control the other functions of using a profile through here. **Understanding profiles and rendering intents is the first step!**

Independent

An independent profile is most commonly referred to just as a color space, examples are Adobe RGB 1998, IEC sRGB, EIC RGB and CIE RGB, these color space have no affiliation with any device. These color spaces are most commonly used as the **Internal or working RGB for graphic applications. The **Internal RGB in CorelDRAW** is called the **working RGB in Adobe.****

Device

As the name implies these types of profiles contain color control information specific for a device. They can be RGB or CMYK depending on the type of device the profile was created for.

Source

The source profile is the color space of any file that you would open in CorelDRAW or Photo-PAINT. It in most cases will be the color space of residence for the file. It is also the beginning profile of a color space in a conversion, for example, your Adobe RGB image is being converted to CMYK. **The source profile is Adobe RGB.**

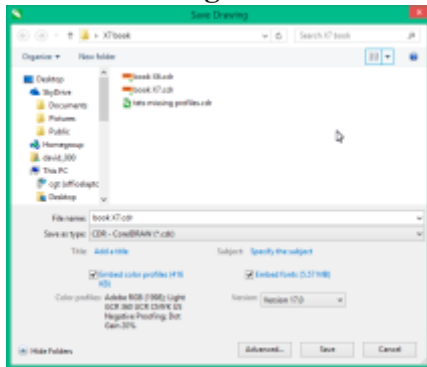
Destination

As the name implies it is the profile that controls the color space to which you are converting a file to. They can be RGB or CMYK depending on the type of device the profile was created for. For example, your Adobe RGB image is being converted to U.S. coated CMYK. Then U.S coated CMYK is the destination Color profile.

Definitions and Overviews

Profile Continued

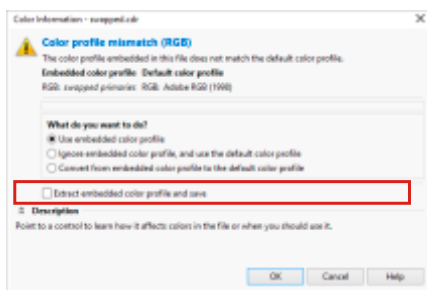
Embedding a Profile



The concept of attaching a profile to a file. Embedding a profile is done so the color profile travels with the file so color integrity can be maintained. Using the embedded profile for properly opening, editing or outputting a file is called **honoring the profile**. CorelDRAW X8 supports honoring an images embedded profiles, RGB, Grayscale and CMYK.

The capture to the left shows the check box in the save dialog that embeds the RGB, Gray scale and CMYK profiles for the document by default.

Extracting of a Profile



Extracting but not removing a profile from an image or file is done so it can be loaded on your system.

CorelDRAW is one of the few applications that supports profile extraction, you will need to do this for multiple reasons, the capture to left shows the checkbox in the profile mismatch dialog that allows this process. This dialog box will only appear if you attempt to open a file with an embedded profile which is not installed on your system. If you hover your mouse over this area it will tell you where it will save the profile, generally the Corel user file location usually the local drive c:\user (Vista/Windows 7, 8 & 10) username\application data\Corel\CorelDRAW Graphics Suite X8\user color.

If you're a Photoshop user you must have CorelDRAW Graphics Suite X8 so that you can extract a profile. If you open a file convert it to the LAB color model for editing in Photoshop you cannot then convert it back to the original color space in Photoshop, Corel Photo-PAINT X7 will allow this function but I recommend that any time this dialog appears you should extract the profile and save it for future needs.

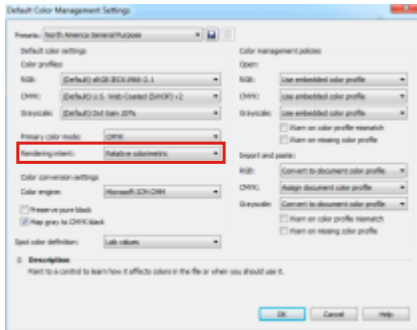
A Note About Color Profiles and Color Engines

For CoewlDRAW users in Windows Vista through Windows 10 you have a choice of MS ICM CMM 3, LCMS (Little Color management System) and WCS (Windows Color System) color engines. I personally recommend the WCS as it has performed extremely well for me, it has had rock solid performance with conversions very similar to the Kodak engine used in previous versions of CorelDRAW, please understand that with WCS all conversions to CMYK are handled by MS ICM CMM 3. Type 4 ICC profile support is provided in Windows Vista through Windows 10.

Definitions and Overviews

Profiles Continued

Profile Rendering Intents



Absolute Colorimetric

The conversion of color relative to (attempting to reproduce) the source colors white point with an exact match of the colors of the source that are within the destination profiles gamut. Colors from the source that are out of gamut for the destination are mapped to there nearest equivalent.

Many times used in proofing when trying to match the white point of a magazine or newspaper on a different proofing paper. This will produce a window pane effect on the proofing paper which is caused by the attempt to print what the intent sees as the white point of the original paper.

Relative Colorimetric

The conversion of color with a remapping of the source colors white point to the destinations white point, with an exact match of the colors of the source that are within the destination profiles gamut. Colors from the source that are out of gamut for the destination are mapped to there nearest equivalent.

Most often used in proofing general commercial work and in basic RIP or driver set up. **An extremely poor choice for converting large gamut color spaces to small gamut color spaces.**

Perceptual

The conversion of color that tries to preserve the perceptual relationship of color. All colors in the source, both those that are in and out of gamut for the destination profile are manipulated to maintain the perceptual relationship, (the feel) of the colors from one space to another.

Most often used in images when converting RGB files that are significantly out of the CMYK gamut. My choice for all editing.

Saturation

The conversion of color that tries to preserve the saturation properties (color depth) of color, even at the expense of hue accuracy.

Most often used in signs or the reproduction of maps, the least accurate of the rendering intents but with significant value in some processes.

Black Point Compensation

Black Point Compensation is an Adobe invention, relative colorimetric rendering with BPC turned on is their default. It is not an ICC compliant workflow and effectively it changes the relative colorimetric rendering intent to simulate the perceptual rendering intent. I understand why they did this however in my opinion it has caused more issues then it has fixed. BPC does not function with perceptual rendering.

Definitions and Overviews

Profiles Continued

Profile Connection Space	When a color space is converted it is done via a connection space that connection space is a theoretical space and by design it is LAB or XYZ also known as CIE XYZ. What happens is that the source (original) color space is converted to the theoretical space and then that space is converted to the destination color space. This is done to facilitate the process as it is only required to compute the changes from the source or to the destination in one space LAB.
Color Space of Residence	The intended color space of creation of an image. Example: If you create or capture an image in Adobe RGB whether or not you embed a profile the image is said to reside in the Adobe RGB color space . An image editor or output device that has its color controls for the source color space set to the images color space of residence will have the correct source information required to view, display or output this file correctly. As this publication will deal with work flows it is important to understand this one important aspect of profiles. Some output devices now require an embedded profile and no longer support assumed color space work flows.
False Profile	The process of assigning a profile to an image other than the profile that matches its color space of residence. This is usually done to cause a color shift in the output, not recommended.

This Ends the sections on Profiles

RAW	Is a file format that is proprietary to the camera manufacturer. They are linear-gamma, grayscale images from digital color filter arrays. All these files require processing by a RAW converter to convert them to an RGB image. Corel Photo-PAINT X8 supports many RAW camera formats and converts your RAW file to the internal RGB color space.
RIP	Raster Image Processor, it is the software and or hardware device that will rasterize (converts to image) the interpreted postscript file.
Saturation	See Hue.
Soft Proof	Editing a file in one color space but viewing it in another.
sRGB	Standard RGB color space designed for default use (assumed color space) of computer systems and the internet.
Tagging a Document	The act of embedding a profile with an image or document, an image with no embedded profile is called untagged
Total Ink Limit	Also known as total ink coverage. The total amount of all inks used at one time to reproduce (D_{MAX}) maximum density. CMYK profiles can very efficiently be referred to by the total ink coverage. For example: a TIC 360 CMYK profile.

The Color Management Interface

The color management interface of X8 has continued the professional level of color management for CorelDRAW and is a serious departure from previous versions of CorelDRAW specifically those prior to X5, it has been configured to compete and operate with professional and novice level ICC compliant applications. Users of X5 through X7 will have no learning curve for color management as the interface is identical.

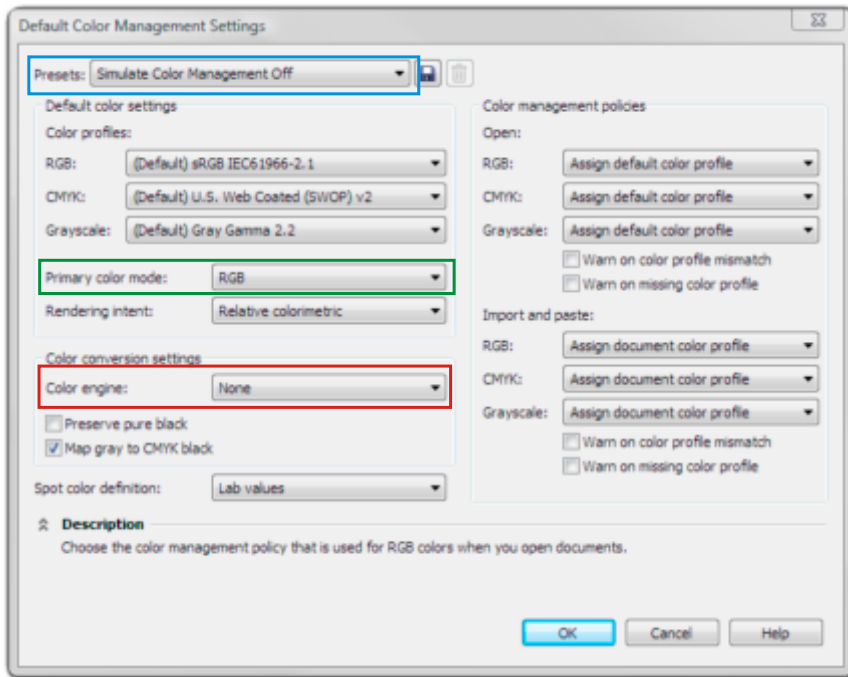
The application itself has basic default settings which are commercially compatible except for the use of relative colorimetric rendering, **I suggest that the user change to perceptual rendering to more easily be compatible with other applications.** The interface controls how the applications react to creating new documents, opening, importing and pasting files and file elements into current documents. With that said each and every document, including those which are open simultaneously can have their own color management settings while they can individually display and print accurately.

This may at first sound confusing however it is not, it is how professional level color managed applications must function. To help organize ourselves to this type of color management this section of this publication will show you the X7 color management dialogs, describe in detail what the settings in the dialogs are and what they do, these settings are completely compatible with X5 and X6.

In this section of the book I will suggest some settings for some specific types of work flows however very specific instructions for specific work flows especially matching color management settings from CorelDRAW X4 and older versions of CorelDRAW will follow in later sections of the book.

CorelDRAW Graphics Suite X8

The Concept of Color Management Off. (There is No Such Thing!)



Anyone who frequents the Corel public forums knows that this setting is something that needs to be addressed immediately, so I'm doing it on the first page of the color management interface section. Corel has to their credit in X5 through X8 provided a solution for users who have developed work flows based on this concept. Laser engravers use this feature extensively.

THERE IS NO SUCH THING AS COLOR MANAGEMENT OFF PERIOD!

Until I wrote my first book on color management for CorelDRAW there had never been any cognitive collection or any one single source of instruction sets for CorelDRAW color management.

Unfortunately until the time my book was

released the level of understanding of how Corel handled color by the user base was, shall we say interesting. Corel themselves due to changes at the corporation were less than forthcoming causing even more controversy. While CorelDRAW X4 and older versions of the application were capable of producing work in a postscript and ICC compliant manner the fact is that in most writings the author didn't understand how Corel applied the ICC rules or possibly didn't understand the ICC rules at all, this has lead to the development of non-ICC compliant work flow processes for many users in the laser engraving, dye sublimation and embroidery business.

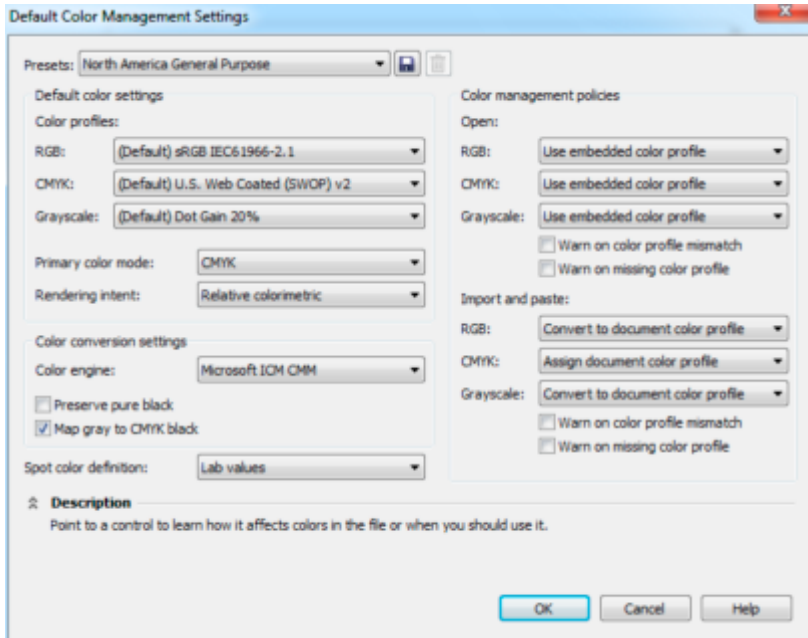
CorelDRAW X4 and older versions managed color through a process called application based color management without the ability to change the applications color setting on the fly. Other shortcomings in the color handling process, such as no support for RGB vectors in postscript and the inability to convert non-RGB file content to the internal RGB color space lead to a very complex instruction set for proper ICC compliant color management from older versions. ICC compliant processes were always possible but the instruction sets were too difficult for many users. CorelDRAW X4 and older versions were best and most easily used in state of the art professional digital front end RIP driven systems which is where most of my experience comes from.

Accessed under the tools menu/color management/ default settings is the application default color management dialog shown in the capture above. The presets (outlined in cyan) have in their alphabetical listing a preset named simulate color management off. What happens is that (outlined in red) we can see the color engine is disengaged and (outlined in green) the primary color mode is set to RGB. **When working in this mode it is imperative for the best color integrity that you build your file with all RGB color model objects and images.** All color conversions from one color space to another will be incorrect, PERIOD! You may have been using older versions of CorelDRAW with the color management off setting and have been happy with your conversions but they are incorrect non-ICC compliant conversions. As Corel has decided to continue to support this work flow conversions in the color mode will continue to be in X5 through X8 non-ICC compliant.

The application will still embed the profiles you see listed but will not use them as the color engine is disengaged. The other features of the default color management dialog are also disengaged. This resolves any legacy file conflicts arising from the use of this color mode however I suggest that users may wish to develop new work flows designed around ICC compliant processes as this will make your Corel work commercially compatible.

CorelDRAW Graphics Suite X8

Default Application Color Management



To the left you see the application default color management dialogs, top is CorelDRAW and bottom is Corel Photo-PAINT. Accessed under the tools menu/color management/default settings. **Please do not take any of the settings shown in these dialogs as suggested color management settings.** The only real difference between the CorelDRAW and Corel Photo-PAINT dialog is the Primary color mode setting in the CorelDRAW dialog, this is because a CorelDRAW document can contain elements from multiple color models, (RGB, Gray Scale and CMYK) Photo-PAINT cannot and this setting is required to instruct CorelDRAW on how to handle special effects rendering, (transparency).

I feel these are critical settings to a smooth user experience, so let me start with the **check boxes labeled Warn on color profile mismatch and Warn on missing color profile,** under the Color Management Policies section of the dialog subsections Open, Import and paste. These check boxes do exactly as they are labeled, when they are checked they give you a warning that allows you to make a choice or when un-checked to rely on a preprogrammed set of instructions. The choice for these setting is up to you based on your work flow needs.

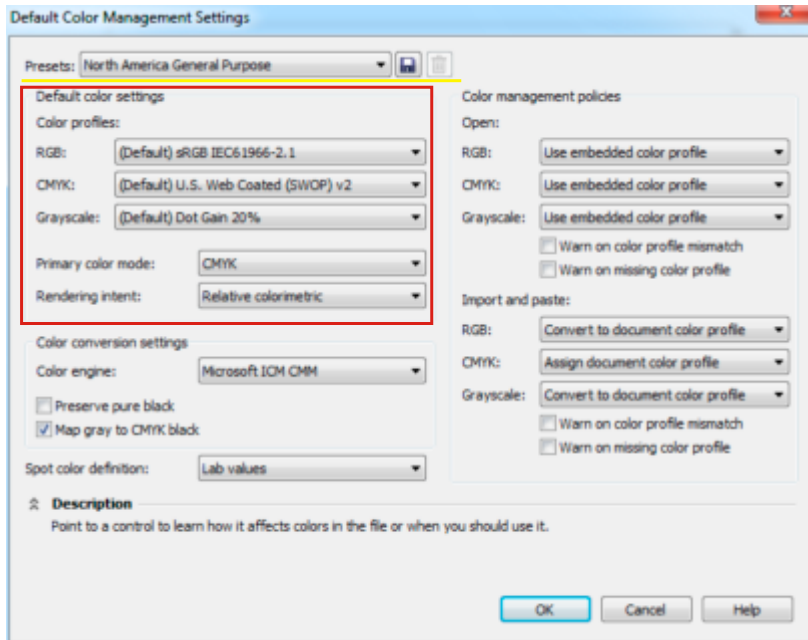
Un-checking these boxes is a reasonable choice for those who have a color work flow that does not vary. The application will automatically upon opening use the embedded profile. Upon importing or pasting it will convert to the document color space all RGB and Gray Scale spaces and then assign the document color space to the CMYK color. The problem with this type of work flow is that any image or file that does not have an embedded profile simply opens or imports into your document and assumes the documents color

space, right or wrong with no way of knowing. This is significant because most Corel users have many files without embedded profiles. There is a solution that is reasonable, look and take note of your color management setting used in your previous version of CorelDRAW and Corel Photo-PAINT, follow the instructions in this publication for duplicating those setting and simply open your file. This can be more complicated if you were using a customized color management setting in X4, due to the nature of how X4 and older versions of CorelDRAW handled color, please refer to my color management book for CorelDRAW X4 and older versions at www.graphicstechnology.com.

If your files come from many varied sources then it is imperative that you check these boxes. When this is done CorelDRAW and Corel Photo-PAINT X8 will ask you to make the decision when a mis-match or missing profile occurs. An example of this would be a Corel user who has the entire suite set up to work as sRGB. This user has a specific job that will not only post on the web but will also print expanded gamut to an inkjet printer. When an RGB image is opened in Corel Photo-PAINT X8 that is not sRGB with these boxes checked Corel will ask what to do. Your choices are to use the embedded profile, convert to the documents color profile or assign the documents profile. A missing profile will allow you to assign a profile and convert to the documents profile. All imported items should be converted to or assigned one of your documents color spaces.

CorelDRAW Graphics Suite X8

Default Application Color Management



To continue with the default color management settings at left notice the presets underlined in yellow. These are default preset color management settings that are commercially compatible. They match those used by the competition. Use the drop down and page through them you may see regional settings that apply to your area.

The default color setting outlined in Red contain the color profile settings, primary color mode for CorelDRAW and rendering intent for the application. Let's look at these first for CorelDRAW, for internet, office or presentation display work. The RGB setting of sRGB 2.1, a CMYK profile that is commonly used in your region and a dot gain of 20% is common. These default setting in PhotoPAINT of sRGB, Adobe RGB 1998 and Prophoto RGB are supported in the RAW converter.

Print work would require an RGB setting that reflects the region in which you live, (I.E. Adobe RGB 1998 in the Western Hemisphere), as well as a regional CMYK color profile. Again the dot gain of the grayscale at 20% is a reasonable choice.

The primary color mode controls how Corel handles special effects and since the (soon to be discussed) document dialog picks up its settings from the application dialog it behooves you to set this to match your dominant work flow. Set RGB if you work primarily for the web or presentations and CMYK if primarily for print. Those of you who will be working with expanded gamut ink jet output can experiment for yourself but my experience has been that CMYK mode has worked best for me in this workflow.

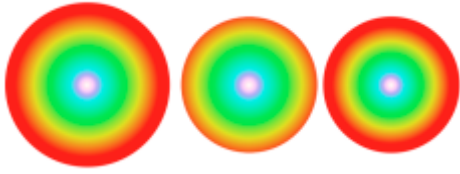
The rendering intent setting allows you to choose which rendering intent you want to use, earlier in this publication I gave you a laymen's definition of the four intents. Absolute colorimetric and saturation have specific uses and as such will not be discussed here. To make a reasoned decision at this stage of the game requires a bit more information, choosing a rendering intent depends on what color space your converting from (source) and what color space your converting to (destination).

CorelDRAW X8 has a proofing docker (which we will discuss later in detail) for your proofs that will allow a choice of a profile and a rendering intent, so choosing one intent one place and a different one in another place makes sense if you understand how the process works, with that said let's take a look.

First off we have to understand that while color has no actual physical size, the only way to theorize about it and to create applications to function with it you have to give color a property that can be measured. That property is a three dimensional color model and a gamut (a physical size) within that model and then an X, Y coordinates within that gamut to identify and measure that color. WOW! THAT'S WAY TOO HARD!

CorelDRAW Graphics Suite X8

Rendering Intents in Short



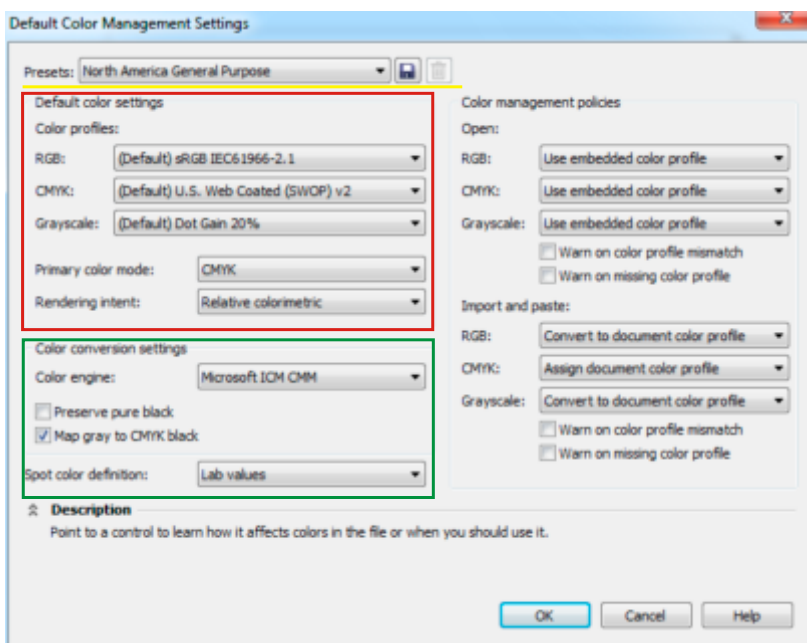
To our left we see three circles, the far left circle is physically larger than the other two, its size represents a large color space and the colors you see in that circle represent that color space's ability to display color. The two smaller circles represent a smaller color space in which we have to convert the larger circle's color space into. The difference in physical size and dispersion of the color between the two smaller circles represents what happens when we use different rendering intents to convert the larger space to a smaller color space.

THIS IS NOT SCIENTIFIC, it is an attempt to place a layman's understanding to a difficult concept. The circle in the middle represents what happens when we convert a larger color space into a smaller color space using relative colorimetric rendering. Note how the space is the same size of the circle on the far right but the many of the red colors that existed on the outside edge of the space are gone or altered. Plus the white center is the same physical size as the larger circle. This is what happens by definition; **“The conversion of color with a remapping of the source colors white point to the destination's white point, with an exact match of the colors of the source that are within the destination profile's gamut. Colors from the source that are out of gamut for the destination are mapped to their nearest equivalent.”**

The circle on the right represents what happens when we use perceptual rendering to convert a larger color space into a smaller color space. Note how the perceived relationship of the colors is similar. NOT THE SAME, but similar enough that the perception of the two is very similar. We have the darkest red of the outer edge and the physical size of the white center is slightly smaller. By definition what takes place is; **“The conversion of color that tries to preserve the perceptual relationship of color. All colors in the source, both those that are in and out of gamut for the destination profile are manipulated to maintain the perceptual relationship, (the feel) of the colors from one space to another.”**

What this means is that there is no correct way to convert a large color space into a small color space, PERIOD! It's a judgement call, perceptual rendering keeps the overall feel (perception) of the colors so it is my choice for all conversions from a large gamut to a small gamut. Relative colorimetric simulates the white point and only changes the colors that are out of gamut for the destination color space, however all RGB color spaces are significantly larger than destination CMYK color spaces, making relative colorimetric a poor choice for RGB to CMYK conversions. With that said relative colorimetric is a great proofing rendering intent for files

that already reside in a small color space and are to be proofed in an equally sized or larger color space. For example a CorelDRAW file that is already converted to CMYK being proofed on an inkjet or match print device. I hope I've given you enough information to make a choice between the two rendering intents. I've ignored saturation and absolute colorimetric as I see them as very specific and those who want them have a definition to guide them and the ability to select these profiles. The default color management settings dialog allows you to make your choices and to save them so this is a once and done deal for a very large percentage of Corel users.

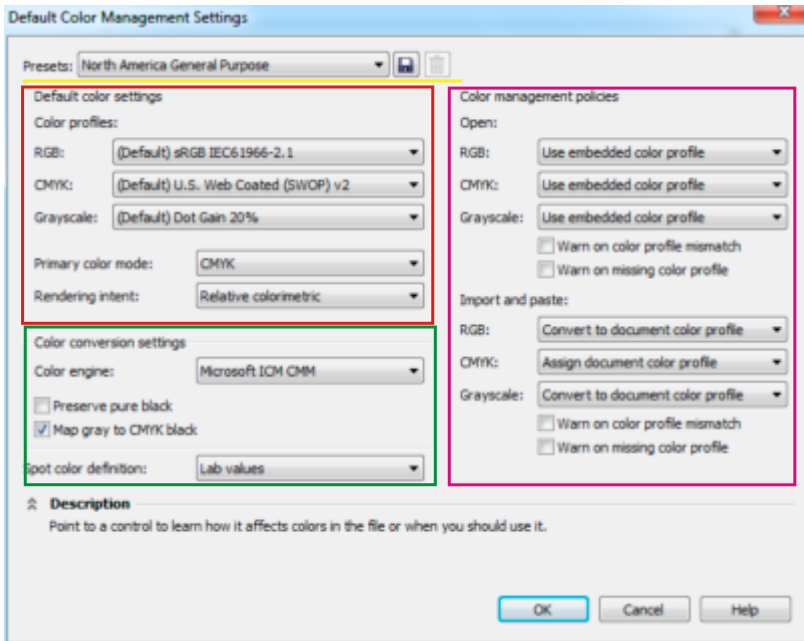


The color conversion settings outlined in green allow you to choose your color engine. Corel supports the Adobe Color Management Module if you have downloaded it and installed it on all supported operating systems.

Vista thru 10 users may use MS ICM CMM 3, LCMS and WCS (Windows Color System) Color Engines.

CorelDRAW Graphics Suite X8

Default Application Color Management



The color engine you choose is up to you I use Windows 10 now and have been using WCS (Windows Color System) for some time with rock solid results. For users that have migrated to Windows 7 thru 10, WCS is a great choice as the results I get with my conversions very nearly duplicate the Kodak color engine used in previous versions of CorelDRAW. All CMYK conversions with WCS are handled by ICM CMM 3.

The settings to preserve pure black and map grey to CMYK black are your choice, users of previous versions will see less issues with the map gray to black settings. **Preserve pure black will give errors from some images and in my opinion should not be used.** However this setting duplicated Adobe Illustrators rasterization conversion and can be useful when you need to convert complex vectors to grayscale raster images.

Spot color definition allows Corel to choose how to convert colors for display and conversion to other color spaces. The LAB choice is how Pantone is currently dictating that it be done, RGB is a choice that will duplicate CorelDRAW X4 or older versions.

Color management policies are outlined in magenta. The default settings for open as well as import and paste you see in this capture. Your choices are use embedded profile, convert to document color profile or assign document profile. We'll assume that the warn check boxes are checked. This will be discussed in detail when we cover the mismatched and missing ICC profile dialog.

The default color work flow

(This discussion assumes the warning check boxes are unchecked)

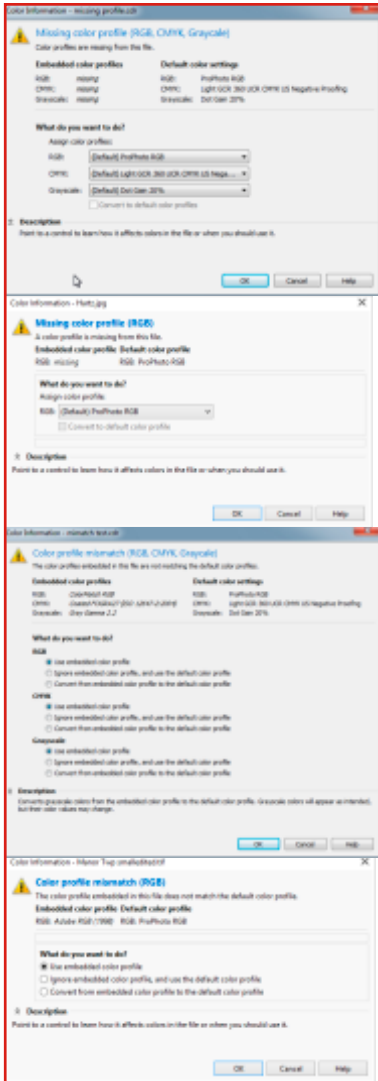
Open file, if the file has an embedded profile the file opens properly. When the file's color space does not match the application default, the application converts the document to the application color spaces. If the document's color profiles are missing the application assigns the document's color profile and a color shift may happen.

Importing or pasting files is just as simple except Corel looks at the document settings not the application default. If the file's color profiles match the document the file imports properly. If the file's profiles do not match the document the file's color spaces are converted to the document. If the file is missing a profile the document's profile is assigned the document's color spaces a color shift may happen. CMYK files by default have the document's color space assigned meaning that the CMYK numbers remain, output to ICC controlled devices will shift but to Postscript color managed devices the output will remain the same as the source.

To change a CorelDRAW or Corel Photo-PAINT document's color space or spaces one should use the document color management dialog, under the tools menu/color management which we will discuss later.

CorelDRAW Graphics Suite X8

Mismatch and Missing Color Profile Dialogs



To the left the 4 captures outlined in red we see the missing profile and profile mismatch dialogs from Corel Photo-PAINT and CorelDRAW, note that the profile mismatch and missing profile dialogs from both applications are identical to each other. I show them to you anyway so you're not concerned that we missed something.

To use these dialogs one must first come to grips with the interaction with the application default color management settings. These dialogs are only active if you choose them to be in the default color management dialog. For this discussion the default color management dialog controls the rendering intent, the primary color mode and if the mismatched and missing profile dialogs display or not and that is it.

These dialogs appear when the previously mentioned *application color management dialogs* have the warn on missing or mismatched profiles check boxes checked and here is where you make the choices on how to handle your color. As stated earlier in this publication your choices are always USE, ASSIGN or CONVERT. With the aforementioned setting in the default color management dialog selected these missing or mismatched dialogs will not appear if you open or import a file with a profile that matches your documents profile.

In the case of missing profiles Corel default setting is for you choose to assign the documents spaces to the file, this can result in a shift. You also can choose to select a source color space or spaces for the imported or newly opened file and then to convert to the DOCUMENT DEFAULTS, you need to check the convert to default profile. This is the correct procedure as it converts to your documents profiles only if you are reasonably certain of the source color spaces. Be aware that if you choose a source space that is incorrect a severe color shift may happen.

In the case of a mismatched profiles you can open the file in its embedded color spaces, ignore the profile mismatch opening it in the default color spaces causing color shifts or convert the document to the default color spaces with proper ICC conversions.

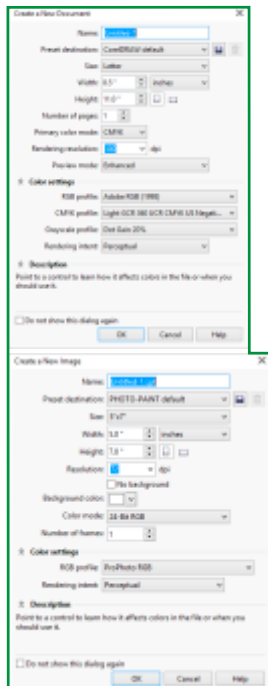
New Document Color Controls.

A new document color space is controlled by the create a new document dialog in CorelDRAW and create a new image dialog in Corel Photo-PAINT, shown respectively as the captures outlined in green to the left. You can always change a documents color spaces later, under the tools menu/color management/document settings.

The differences between the dialogs is that in CorelDRAW you choose 3 profiles, RGB, Gray Scale, CMYK because any CorelDRAW document can contain objects and images from multiple color space. A primary color mode to control effects rendering and the preview mode, simple wire frame, wire frame, draft, normal. enhanced and pixels.

In Corel Photo-PAINT you have controls for no background and for number of frames for animations.

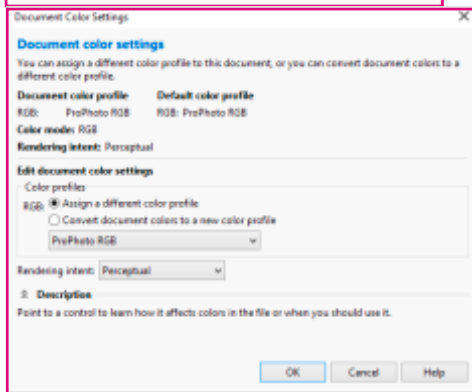
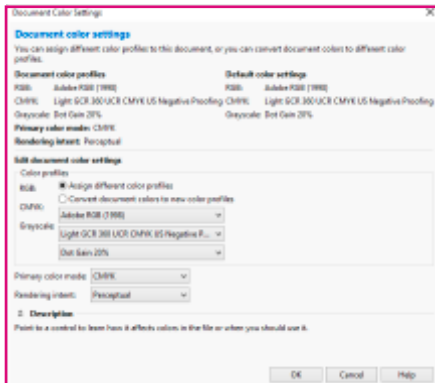
Both application dialogs have a check box so that you can start them without showing the dialog. This is handy for those who regularly work with the same color space and document settings. There is a check box in DRAW and Photo-PAINT under the tools menu/options and then by selecting the general button to reactive the dialogs when starting new documents or images.



CorelDRAW Graphics Suite X8

Document color controls.

The two captures to the left, outlined in magenta are the document color management dialogs found under the tools menu/color management/document settings. These allow changes to the color management of a document after it has already been created. I suggest you keep the description extended as they are very helpful.



Document Control Verses Application Control.

Document control is exactly that, you control the documents color, there is one issue and that is that the document has to have some interaction with the application via the computer system so within the document you can control conversions and special effects. Otherwise each document is a self contained color managed package.

Application Color Management

In CorelDRAW and Corel Photo-PAINT X5 through X8 the applications requires some basic settings to function. Primary color mode, rendering intents, map grayscale and base color profiles and color engine to use. Without these setting the application could not function and provide basic color service to the user, they provide a frame of reference for the application. This is where the new document/image dialogs go for their base information, what decides which default color palettes display, how (in some cases) transparency is rendered, how conversions are handled. However once the application knows these things you are free to set profiles as you desire for each document and have as many open simultaneously as your

system resources allow. They all will display and print properly.

This is not the case for X4 and older versions, for proper display and editing the application and the documents color setting must match and you cannot display more than one set of color settings at a time.

RAW Converter

Only the RGB color spaces, of sRGB, Adobe RGB 1998 and Prophoto RGB can be used as the application color space for any RAW image converted from RAW to RGB using the RAW LAB of Corel Photo-PAINT X8. If the converted image is to be pasted into another Photo-PAINT or CorelDRAW document you must first set your application to give warnings of profile mismatches or set the application for automatic conversion to document color space to maintain color integrity in the case of Photo-PAINT having a default archival RGB.

This is the extent of the interaction of the application color setting dialog and the documents.

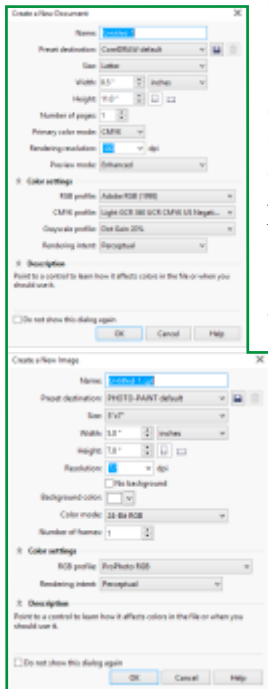
CorelDRAW Graphics Suite X8

The New Document/New Image Document Color Management Dialogs

As mentioned earlier these dialogs start when you want to create a new document or a new image. You can name the document, you can create a preset color set and save it for recall at a later time. This dialog will read the application dialog settings and open with those settings. However you may modify the settings displayed in the dialog as desired.

You select your page size, orientation and units of measurement. You select your primary color mode, this tells CorelDRAW how to render some transparent effects. You also select the rendering intent for color conversions in the document.

Key to remember spot colors are displayed and converted using the spot color definition setting as specified in the **application default color management dialog**, LAB/RGB or CMYK equivalents.

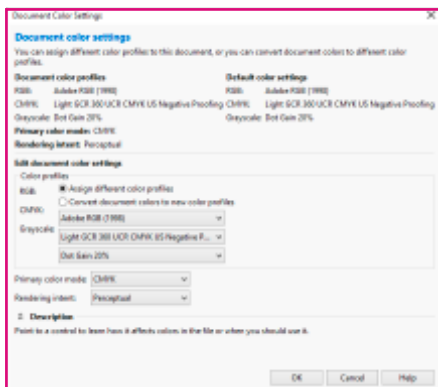


With soft proofing turned off CorelDRAW will display RGB, grayscale and CMYK color elements in the color spaces of the document. This is a significant point for the user who prints ink jets prints for wide or grand format and wants to use expanded gamut techniques. CorelDRAW Graphics Suite X8 supports native color and therefore expanded color in all postscript exportation and driver based postscript files as well as PDF.

CorelDRAW via the new document dialog allows exact document level resolution controls via the rendering resolution setting. CorelDRAW with soft proofing turned off is the only application to have a real time resolution dependent expanded gamut display. This is serious technological advantage for the CorelDRAW user over the competition and will help make the difference between great work or work that's just ok.

You may also select your view for the display, simple wire frame, wireframe, normal, enhanced and pixels.

The **document color management dialogs** allows assigning different profiles or conversions of the documents color profiles after a file is created. A prime example would be a CorelDRAW file created on one set of color spaces that needed to be used in another set of color spaces

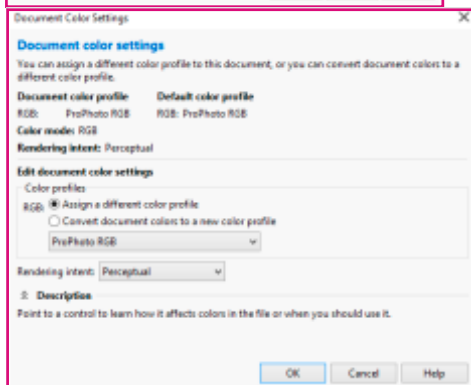


A practical example of this would be a document that was created for print in ECI RGB, and ISO coated V2 CMYK that needed to be converted to a file for the internet.

With a properly created color managed document a print document can be saved in a web version, resized, resolution reduced, CMYK and spot color elements converted to RGB using the press RGB for better conversions, then the entire document converted to sRGB and exported in a web file format for web display.

Another use would be a high TIC profile (total ink coverage) sheet fed cmyk print job converted to a low TIC profile newsprint cmyk print job simply by selecting the dialog and selecting the profiles for conversion, renaming and saving the file, no need to recreate the low TIC version from scratch.

The choice of assigning a profile is allowed but most likely would cause a color shift.



CorelDRAW Graphics Suite X8

The New Document/New Image Color Management Dialogs

The color profiles you select should reflect the needs of the destination and source of your file elements. My suggestion have evolved, for users where the file will be used in many different arenas like professional photography, print and web I suggest that they consider base color spaces of the widest gamut possible. Prophoto RGB, Adobe RGB 1998, ECI RGB and wider gamut CMYK profiles. This allows one file to be created and the use of the document color profile dialog at later dates to convert to smaller color spaces.

The CMYK profile is a choice that unfortunately is very misunderstood especially by those in the print industry. In general there are four basic types, (widest gamut) sheet fed coated and (smaller gamut) sheet fed un-coated. Then (even smaller gamut) web press coated and (smallest gamut) web un-coated, named for the types of press and paper used, glossy or non-glossy paper. Your choice needs to be made on the regional profiles used and the press needs.

There has been a conversion in the print industry to ICC controlled RIPs for the creation of printing plates and specific ICC profiles as a standard. Embedding your color profiles in your files for exportation to press is imperative for those types of work flows.

The unfortunate aspect of the modern print environment is that in the vast number of cases the pre-press technician knows nothing about the equipment they use, they are in general automatons told to use these settings and that's what they do. So any information they give you in general will have little to do with quality and is more about them getting the (GIGO) garbage in garbage out work done. My guideline is a high TIC (total Ink Coverage)

of 360 for high quality coated sheet fed work to a low TIC of 200 for low end news print. Spend time and money finding a good print vendor, it's worth the effort.

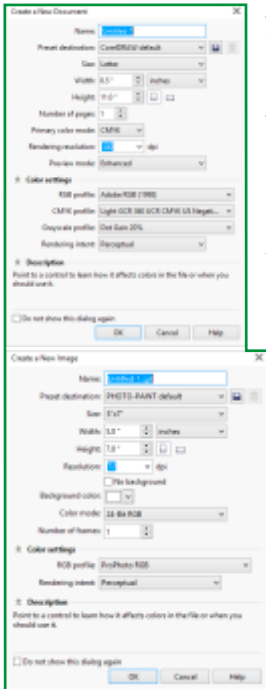
To find out what TIC a profile has create a vector shape in CorelDRAW using a color of R0 G0 B0, convert it to RGB image and then to the CMYK profile of your choice, read the total ink coverage from CorelDRAW or Photo-PAINTs eyedropper tool.

The rendering intent choice selects how conversions are made, refer to the previous definitions. This controls the conversions made only in the menus in the application and do not affect the rendering choice made in the proof docker. I always use perceptual as it maintains the feel of the image and is almost identical to Adobe's relative colorimetric with Black Point Compensation on, Adobe default.

You have an option to check the do not show dialog again check box, this will have your new document starting with the application defaults. To have CorelDRAW X8 show you the dialog again simply go to the tools menu/options under workspace general dialog you'll see a check box to show the new document dialog box. I always leave the dialog on as I never know where a file I'm starting will need to go so I can make the choice as needed.

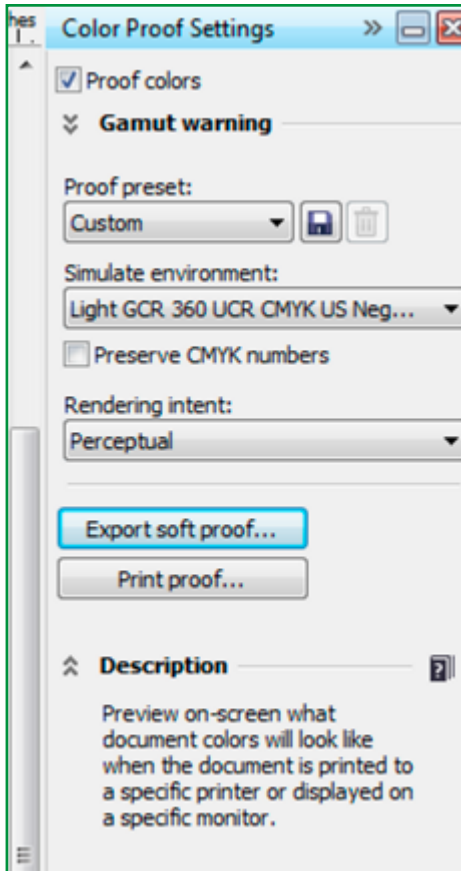
The create a new image dialog for Corel Photo-PAINT X8 is very similar to the one in DRAW except that the choices you have are pertinent to an image. The dialog picks up the application default setting upon startup. Image size allows you to choose from some preset sizes, then there are height and width setting for custom sizes, resolution, you can choose your background, transparent or a specific color. Your color mode and the number of frames for animated images.

The color settings choice will be dependent upon the color mode you choose, again the previous warnings about regional choices apply. The rendering intent again is only for conversions in the import, open and conversions dialogs and other choices are again available in the proof color docker.



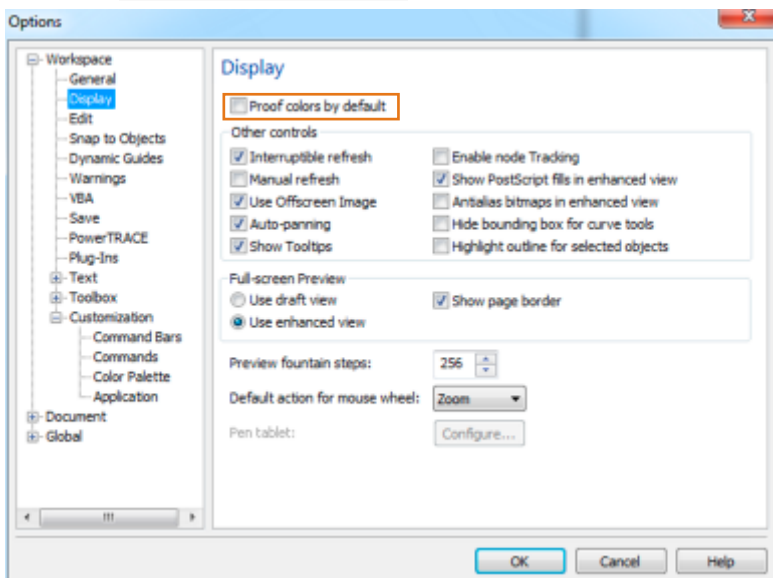
CorelDRAW Graphics Suite X8

The Color Proof Docker



The color proof docker shown outlined in green is accessed via the windows menu, dockers, color proof settings. Directly below the capture of the docker you can see a capture of part of the status bar from X8 that I have circled in red, it is an icon to activate proofs color for the display. Also the bottom capture, accessed via the tools menu, options, display, outlined in orange is the check box to activate the proof colors by default. Checking this box will have the proof colors shown by default based on the settings used in the docker when you open CorelDRAW.

Soft proofing is a term that is used to describe the ability to simulate on your display how the file may look in print or on a different display. The docker allows soft proofing (export soft proof) and hard proofing (print proof), soft proofing is done via the CPT, TIF JPG and PDF file format. Files will be converted to the selected ICC profile and that ICC profile will be embedded in the proof file, PDF will allow spot colors to stay as spot colors and embed all profiles. Hard proofing converts the colors to the destination color space selected in the color proof setting dialog, hard proofing is done via the print dialog. The ability to check the box to maintain CMYK numbers will simulate older versions of CorelDRAW, if you check to maintain CMYK numbers CMYK passes through without any conversion of the files CMYK content. For example if your document CMYK profile is U.S. coated web and you wish to hard proof U.S. coated V2, when you check the maintain CMYK numbers there will be no conversion of the CMYK content. This is useful when proofing small CMYK color spaces on devices with larger CMYK gamuts.



An example of soft proof simulation of a multiple color model file would be for a user to be working in CMYK mode, with Euroscale CMYK selected as the CMYK color space, Adobe RGB as their RGB color space. Placing Adobe RGB and Euroscale CMYK elements in their file and using the color proof settings docker to view the elements as if they would print to a U.S. Coated V2 CMYK profile.

The CorelDRAW X8 display with soft proofing OFF will display properly imported and created RGB elements in the documents RGB color space, CMYK elements in the documents CMYK color profile and properly imported and created gray scale elements in the documents color space. Spot colors are displayed per the setting selected in the default application color management dialog, in either RGB,

LAB or CMYK regardless of the soft proof setting.

The color proof setting docker is a vast improvement over the proof setting in the competition. All the required controls are in one place and in a docker that is accessed with one click of the mouse.

CorelDRAW Graphics Suite X8

The Color Proof Docker

The color proof docker under the windows menu/docker shown outlined in green allows you to simulate for display a specific destination color space and rendering intent. You can set a custom preset so you can recall specific environments to simulate.

At the very top of the color proof settings dialog is the Gamut warning, my views on gamut warning are such that I'm going to address this feature in detail on it's own page, suffice to say I don't use a Gamut warning and in the later discussion I will give you enough information for you to make you own decision.

The other settings in the color proof dialog are self evident, you choose the destination profile based on your (what else) destination. Which may be a different display system, standard press color space or an ink jet or digital printer profile.

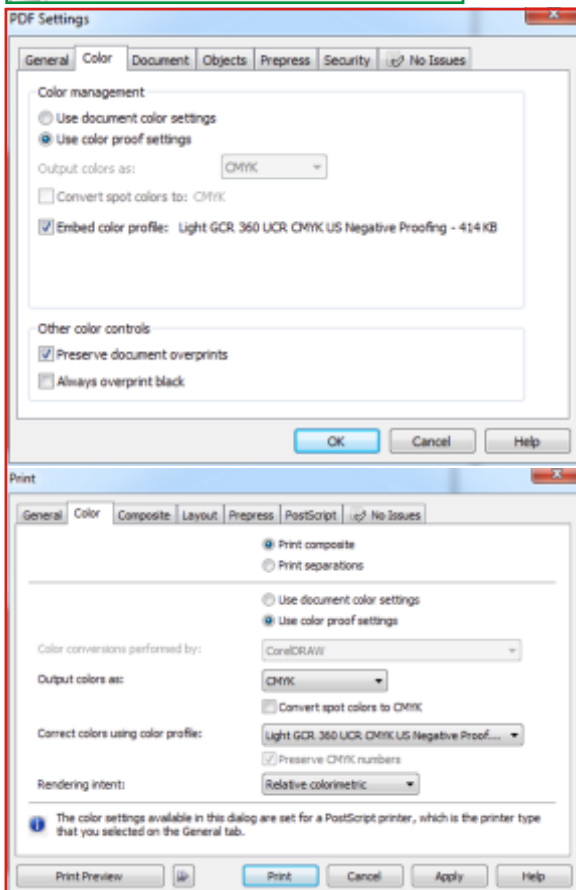
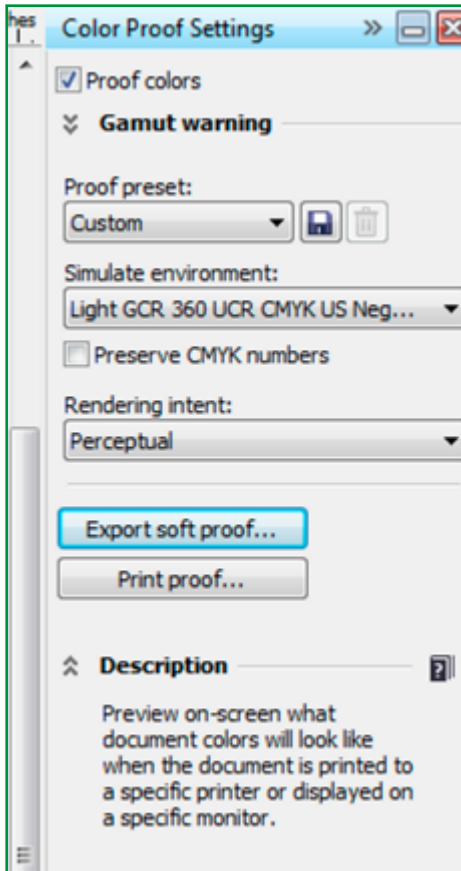
I show the PDF setting dialog to the left, there is a bit of redundancy with the export soft proof specifically when using a PDF soft proof as you use the same PDF dialog as the publish to PDF function. I say that because your soft proof can actually be used as an output file so you may wish to set the resolution in the object tab of the PDF dialog to a resolution too low for output. By checking the preserve CMYK numbers box on the color proof docker your CMYK content travels along the process with the CMYK color integrity intact for all postscript color managed devices (print press plate setters). Leaving this box unchecked is mandatory when sending a file to an ICC profile color managed digital device.

The rendering intent in the color proof settings docker is for the display and for the soft proof. The soft proof PDF dialog to the left does not show a rendering intent because the ICC profile is embedded and the rendering intent is set by the color proof setting docker. In the case of a soft proof colors are converted to the destination color space (except for spot colors unless you decide to check the convert spot colors box and allow the conversion) and the destination color profile is embedded in the file. In the case of soft proof, image file formats, JPG, TIF and CPT all file contents are converted to the destination color space set in the color proof setting docker and a profile is embedded.

The rendering intent selection is accessible in the print proof dialog at the bottom left of this page and is critical because an actual conversion to the proof color space takes place during the printing process. You need to match the rendering intent to your choice set in the color proof setting docker or the conversion will be different then your display. Note that preserve CMYK numbers is grayed out this is standard for all graphics applications.

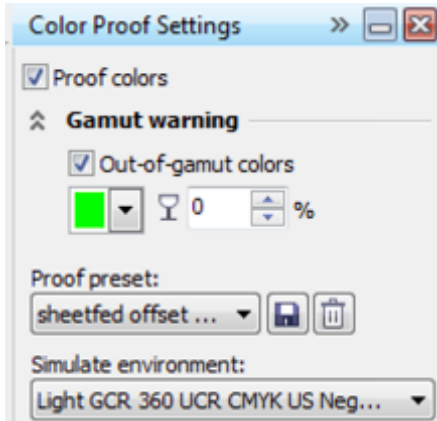
All of these proofing scenarios can be carried out via other methods, the publish to PDF, convert to bitmap features, however CorelDRAW X8 has placed a convenient process in the application

for your use via the color proof setting dialog.



CorelDRAW Graphics Suite X8

The Color Proof Docker (Out of Gamut Alarm)



The color proof docker out of gamut alarm shown activated to the left displays a color over top of an object, image or even a color fill dialog when you choose a color in a color model that's out of gamut for the destination color space set in the color proof docker. Let's examine the theory, the expected results and the real results.

Color to be properly represented in a computer model has to be assigned a theoretical three dimensional space, so every individual color has an X, Y and Z coordinate to represent its location in the color space model. When a larger color space is compared to a smaller color space any colors that cannot be exactly reproduced in the smaller space is said to be out of gamut. For an out of gamut alarm to be of any use the alarm must be keyed on a pattern based on a mathematical representation of the X, Y and Z coordinates of the compared color spaces. What that means in reality is that it does not matter what color we are examining the out of gamut alarm should only review its XYZ relationship of the source color space to the destination space and then send an alarm if needed, whether it be a light or dark color is of no consequence, out of gamut is out of gamut.

In preparation for a previous book that included this subject I had a few casual images taken of myself and a business associate. I specified the clothing that she and I would wear so that the images could be used as



examples in my color management writings. The captures to the left demonstrates the concept, on the right is a capture of the original RGB image converted to CMYK, the left side is a capture of the RGB original with the out of gamut display activated over it. Notice how the green highlights (indicating out of gamut colors) are only placed over the plant in the background to the left in the image. This indicates according to the alarm that

this is the only area of the image that is out of gamut for the destination CMYK color space.



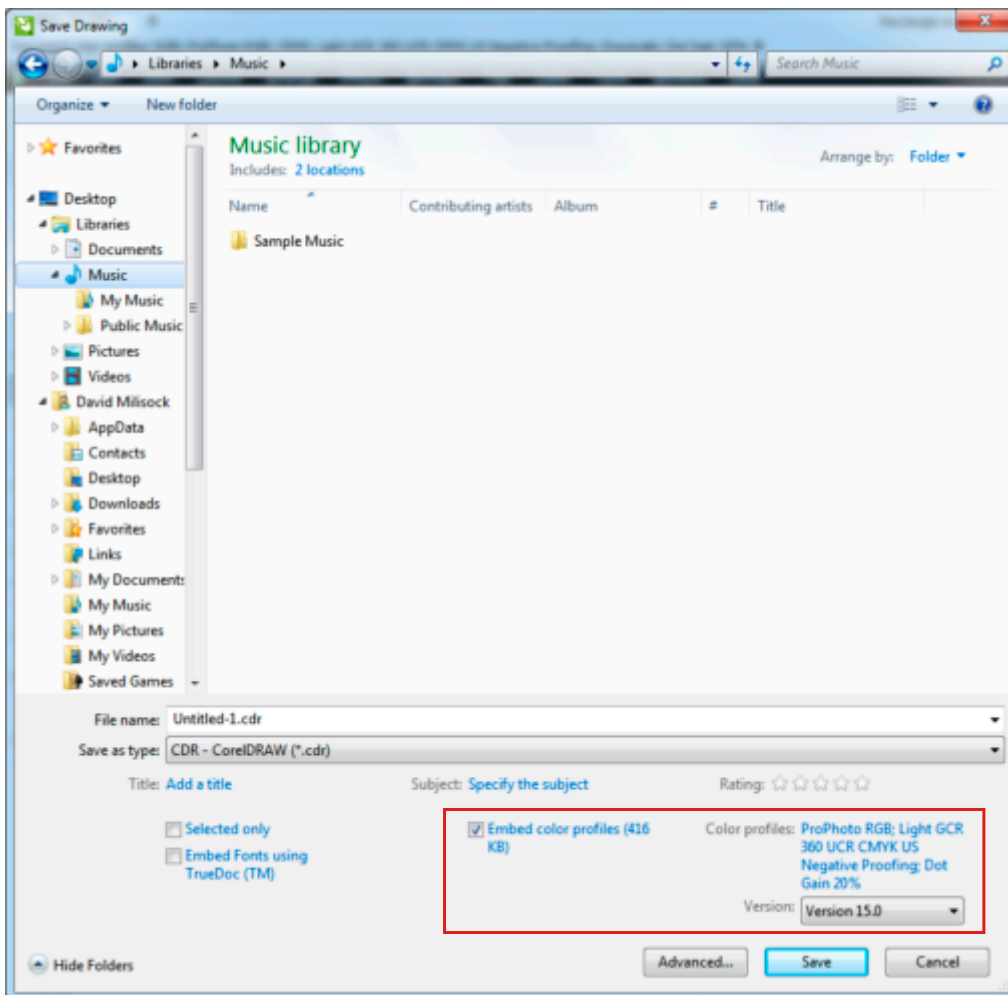
Herein lies the rub, depending on how good your display is you'll notice that in the CMYK version of the image my blue shirt has a color shift and so does the green jacket. This is by design, I specifically picked the clothing color to be out of gamut for CMYK. The enlarged capture to the left demonstrates this more clearly. The out of gamut alarm totally missed this color shift in my shirt, however there is no reason to despair. The soft proof setting in the color proof docker does properly show the out of gamut condition by displaying the color shift in the entire image.

I have examined the out of gamut alarms of every graphics application I have come in contact with and have had the same result. So my argument is this, don't use the out of gamut alarm, use the soft proof display instead. In my case if the color is super critical I use the display with the proper RGB and CMYK profiles used in the document for my destination and edit a duplicate of the original image instead.

The color of the soft proof in the color proof setting docker of CorelDRAW X8 is the best in the graphics world, in my opinion the out of gamut alarm is of no value, you decide.

CorelDRAW Graphics Suite X8

The Save Dialog

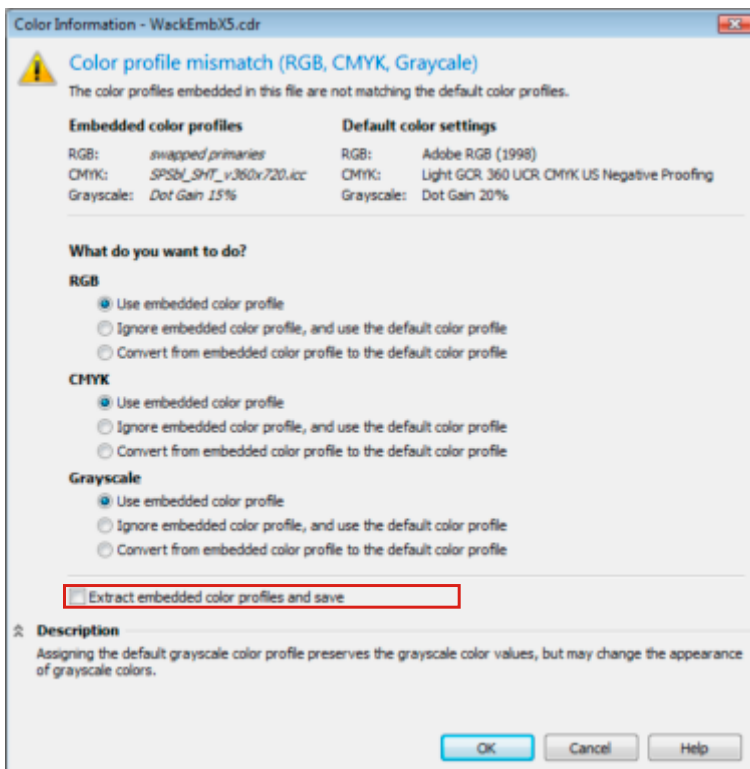


To the left is a capture of the save file dialog, note outlined in red the area of the dialog where by default it embeds the profiles unless you decide not to allow this to happen by un-checking the box.

Extracting of a Profile

Extracting but not removing a profile from an image is done so it can be loaded on your system.

CorelDRAW is one of the few applications that supports profile extraction, you will need to do this for multiple reasons, the capture to lower left shows the checkbox in the open drawing dialog that allows this process. This dialog box will only appear if you attempt to open a file with an embedded profile which is not installed on you system.



If you hover your mouse over this area it will tell you where it will save the profile.

If you're a Photoshop user you must have Photo-PAINT X8 so that you can extract a profile. If you open a file convert it to the LAB color model for editing you cannot then convert it back to the original color space in Photoshop, Corel Photo-PAINT X8 will allow this but I recommend that any time this dialog appears you should extract the profile.

Printing

Printing

Postscript and Non-postscript

Exporting

EPS, PDF, AI, Web and CDR

Scanning

for Proper Color

CorelDRAW Graphics Suite X8

Postscript Printing **It's a Must Understand Technology**

In the graphic world few words have invoked more misunderstandings than the word print! In this section of the book we will concentrate only on postscript printing. Postscript printing is basically handled by two processes, driver based and digital front end systems. Just to make it interesting there are processes that utilize a proprietary driver to create a proprietary PS file for importation into the digital front end, I call these hybrid systems. All of these processes can be either ICC color managed or Postscript Color Managed some can be set to utilize both but never both at one time.

Driver based systems can be singled out by the fact that to use them you go to the file menu and select print, then you select the printer and the proper settings depending on your output requirements, the print dialog will have a postscript tab. The individual scenarios are too numerous to document in this publication.

Even though Acrobat Distiller published PDF can require that you print to a postscript driver to create a PDF it is not a proprietary driver and the resulting PDF is a defacto pre-press standard so I include Distiller published PDF in the digital front end work flows.

Digital front end systems utilize an exported PDF, TIF, EPS, A Distiller crated PDF file or some other file format to place into the digital control software (usually a RIP, raster image processor) for output. The process in general progresses like this, export file goes to a trapping utility, to an imposition utility and then to a RIP for proofing, plate setting or digital print.

The hybrid system unlike driver generated Distiller published PDF requires that you use a proprietary postscript driver supplied by the manufacturer of the specific digital front end. The resulting (PS) postscript file, not a PDF file is then imported into their device for pre-press processing, the digital front end will not accept other PS files. All three of these systems can be color managed via ICC profiles or Postscript Color Management, let's address those color management processes as applied to the print processes.

Postscript Color Management

Postscript Color Management is all that there was before there was an ICC (International Color Consortium) to set the rules for ICC Color Management. The book Real World Color Management by Bruce Fraser, Chris Murphy and Fred Bunting had within it a very small section stating that they didn't really understand Postscript Color Management and someone who did should write a book.

Postscript Color Management is not that hard to understand, first it only works for output within the CMYK color space for film/plate setters. As stated in the definitions section of this book, the PS file contains color space arrays, these are the color numbers of the file content but not the labeling of the color space for postscript color management, it is assumed to be CMYK which is an absolute color space. The PS interpreter contains color rendering dictionaries, these define the color space of the device based on a software interpretation of the ink limit linearization media dot gain curve. A critical error can be made if tested PS files don't contain color space arrays. This is as it was in the past with some exported PS files, what may have happened here was that they may have tested a Quark PS file and (I assume) those doing the testing didn't realize that at that time all RIP manufactures supplied an export plugin for Quark because Quark at that time didn't produce an Adobe conforming postscript file, every RIP manufacturer knew it and provided a fix, Quark later remedied that situation.

Postscript Color Management works because the theoretical three dimensional representation of the CMYK color space for presses is always the same size, four channels with one hundred shades per channel, an absolute color space. Since this is fact a LAB and or XYZ representation of these color spaces can be created allowing the connection between the color space arrays of the postscript file and the color rendering dictionaries of the device. Hence Postscript Color Management.

CorelDRAW Graphics Suite X8

Postscript Printing **It's a Must Understand Technology**

The controlling factor of color management for print is the TIC (total ink coverage) of the output device. That figure is determined through a process of linearization of the film/plate media, I.E. a set of screens are printed onto the plate and the screens are read and adjustments made until all screen percentages reproduce on the plate accurately. These plates are run on the press on a specific paper to the ink manufactures recommended ink density and the resulting printed screens are read for dot gain. A 50% screen may read 55% and then the resulting reading are used to compensate on the plate setter so the resulting printed test sheet reflects proper screens percentages across the full range of shades for the particular paper and ink set. Most high quality plate setter press combinations can handle a range 2% dot and high quality papers can handle up to 90% solids per channel for a TIC of 360. This information, (the ink limit media linearization dot gain curve), becomes through software interpretation the color rendering dictionary information for the plate setter press combination, each combination has one of these TIC curves, specifically for multiple weight gloss, and multiple weights of uncoated paper for example TIC's of 260, 280, 318, 360.

These curves are NOT ICC PROFILES and as such cannot be used to convert non-CMYK color spaces to CMYK. For postscript color management to work in a modern world we use graphic applications that are ICC color managed, we convert all file content to CMYK using an ICC profile that has a TIC that is equal to or less then the TIC of the press paper combination. The CMYK color space arrays in the postscript file will be assigned LAB/XYZ coordinates that have equal values in the devices color rendering dictionaries and the color passes through to the press plates almost identical to the original CMYK document.

What this means is that as long as you convert your document content to a CMYK color space that has a TIC equal to or lower than the TIC of the device you may use any CMYK color space that you like. What it also means is that embedding an ICC profile has no value for Postscript Color Managed work flows. If your application uses a CMYK profile that has a TIC that is greater then the output device the colors that are out of gamut will be clipped.

To establish the TIC of a CMYK profile that is not labeled simply create an object that is in the Adobe RGB color space R0 G0 B0 and convert it to a CMYK image reading the total ink coverage with the image info docker in Corel Photo-PAINT X5.

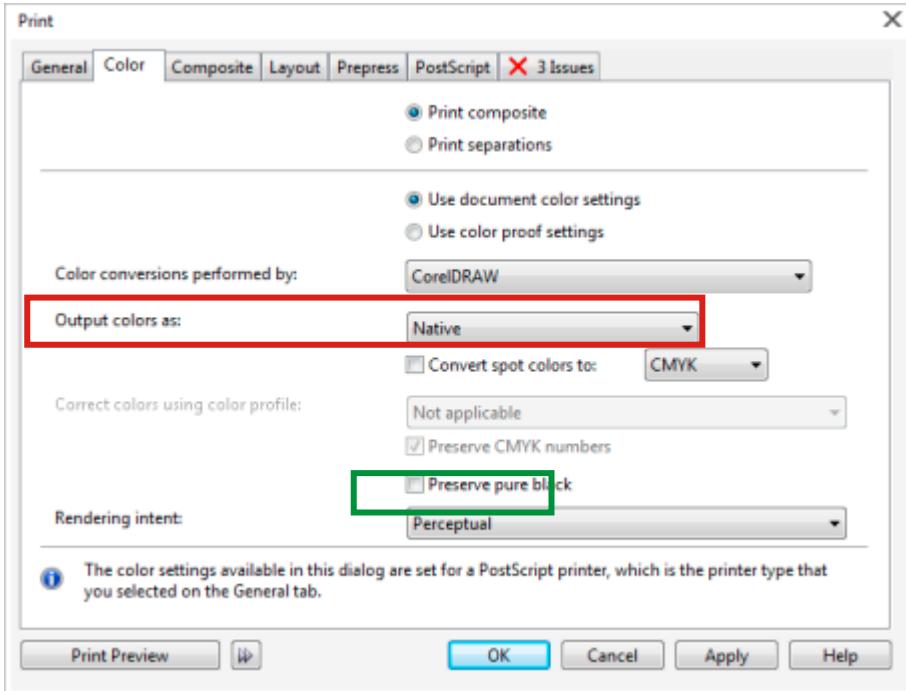
ICC Color Managed Work Flows

ICC color managed devices also all have a media linearization curve it is the very last color conversion that takes during printing, generally the curve is an ICC profile and is generally named for a paper or other media. The difference being that these devices can convert non-CMYK file content to CMYK. All ICC color managed work flows require that you embed an ICC profile with your file. The CorelDRAW X7 graphics suite fully supports embedding all ICC profiles for an ICC color managed workflow so the assumed color space work flow we used in X4 or older versions of CorelDRAW is no longer required and in many cases no longer supported.

CorelDRAW X8 has the ability to support native color in the postscript stream for vectors as well as images. This is a significant improvement for those who wish to utilize the media profile for the final conversion. This allows RGB, Spot color and CMYK elements to exist in one document and to print with the widest gamut possible on digital devices. This is extremely useful any digital printing especially for the large and grand format print business. Prior to X5, CorelDRAW only supported native color output in Corel published PDF files. This feature is still supported in Corel published PDF as well as Distiller published PDF files. With the release of CorelDRAW X5 support for ICC color managed print work flows is now completely commercially compatible and ICC complaint, this continues with the release of CorelDRAW X8.

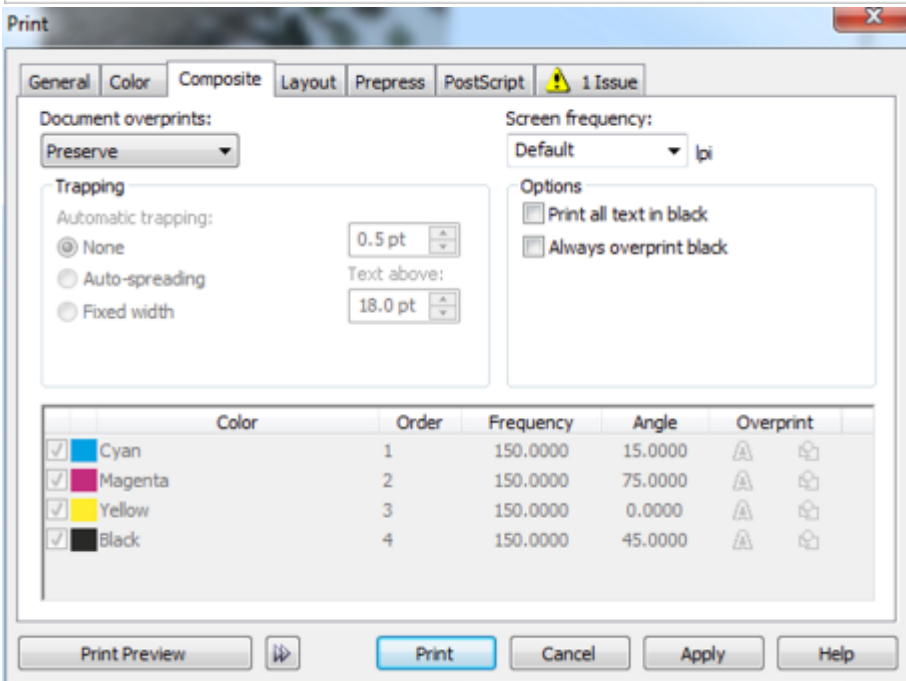
CorelDRAW Graphics Suite X8

Postscript Printing the dialogs



The main print dialog for CorelDRAW X8 shown to the left has two tabs that are significant for our discussion on color. The color tab and the composite tab. The composite tab switches to the separations tab when we choose the print separations radio button under the color tab. Let's discuss composite printing first.

Composite printing under X8 takes on a whole new dimension. X4 and previous versions composite postscript printing only worked easily for files that contained entirely only CMYK or entirely raster (image) RGB content, no mixed content. In X5 through X8 there is an entirely new dimension that needs to be discussed.



I cannot stress how important it is for print press work that you work in the primary color mode of CMYK and that all your file content be in the CMYK color model for CMYK work. Composite printing can then be used to create Distiller published PDF files for digital front end work flows. **Composite printing allows for spot colors to be printed as spot colors when we choose output colors as native.** The selection is shown to the left outlined in Red. I mention this setting first because in my opinion this is an extremely simple method of color managing your work flow. You control your color by selecting the proper color mode during the file creation and choose native color for your composite output of your composite work flows. Then by following some simple rules you control

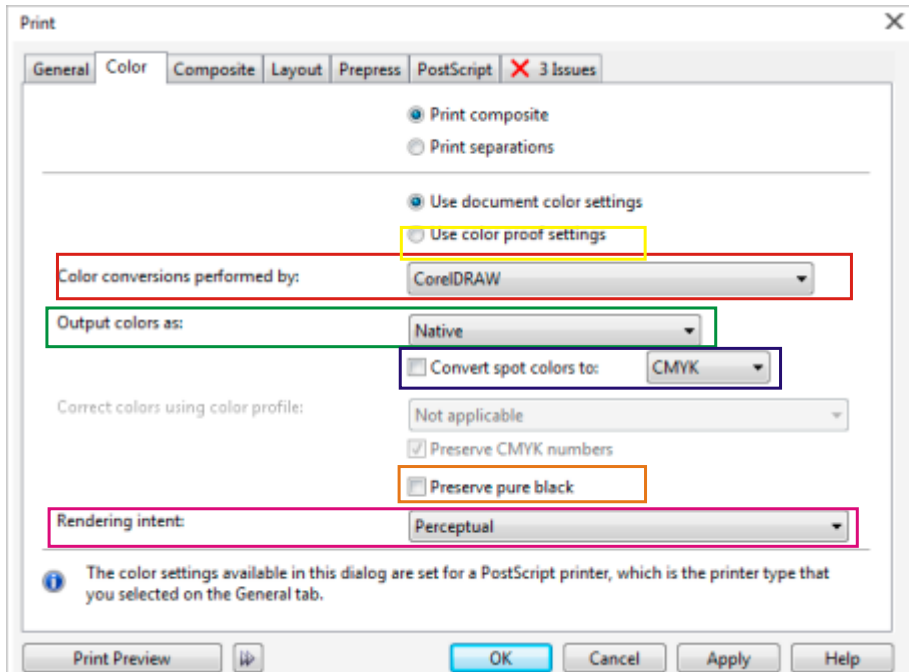
color by building your file correctly. The rules are simple, native color output setting and CorelDRAW handles color conversions in the print dialog and Distiller published PDF:

1. CMYK output uses only CMYK file content.
2. 4 process colors and multiple spot colors as well as grayscale color can be Distilled as native color and will produce proper color separations so the file content can be mixed Spot color and CMYK.
3. Expanded gamut printing (mixed color model file content, RGB, Spot Color and CMYK) printed as composite with the destination device handling the color conversions is for digital print ONLY. Driver based processes do not embed profiles so a digital device requires an assume color space process.

The major change outlined in green is the preserve pure black checkbox which is checked on by default, **this must be UNCHECKED** for a proper color managed workflow.

CorelDRAW Graphics Suite X8

Postscript Printing the dialogs



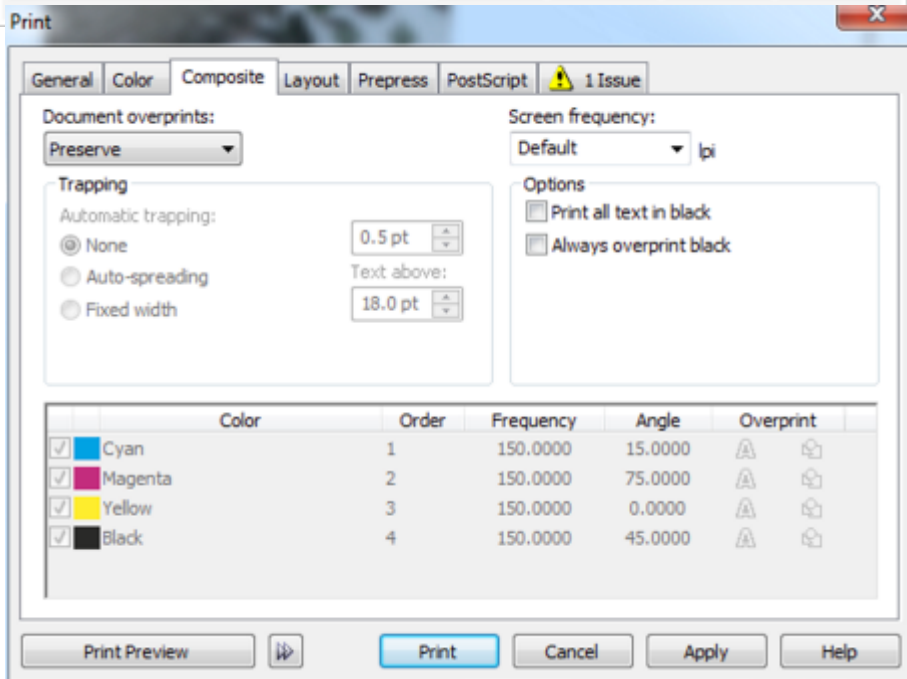
Looking at the color printing tab, left. Selecting use document colors will allow you to choose to let CorelDRAW or the output device handle color conversions in the color conversions performed by drop down outlined in red. When you choose to let the output device handle color the output colors as drop down (outlined in green) becomes grayed out.

If you choose to let CorelDRAW handle color, you can select output colors as native. When you choose RGB, Gray Scale or CMYK the print dialog defaults to the document profiles and converts the files contents to your selection.

You can select to convert spot colors as CMYK (outlined in blue). You can also select the rendering intent for any conversions that you decide to take place (outlined in magenta).

The major change outlined in salmon is the preserve pure black checkbox which is checked on by default, **this must be UNCHECKED** for a proper color managed workflow.

The user can select the radio button so that the settings in the proof color can handle the color conversions (outlined in yellow). If you choose to do this the profile selected in the color proof docker should handle all color conversions. However the rendering intent in the print dialog will over ride the rendering intent in the color proof setting docker.

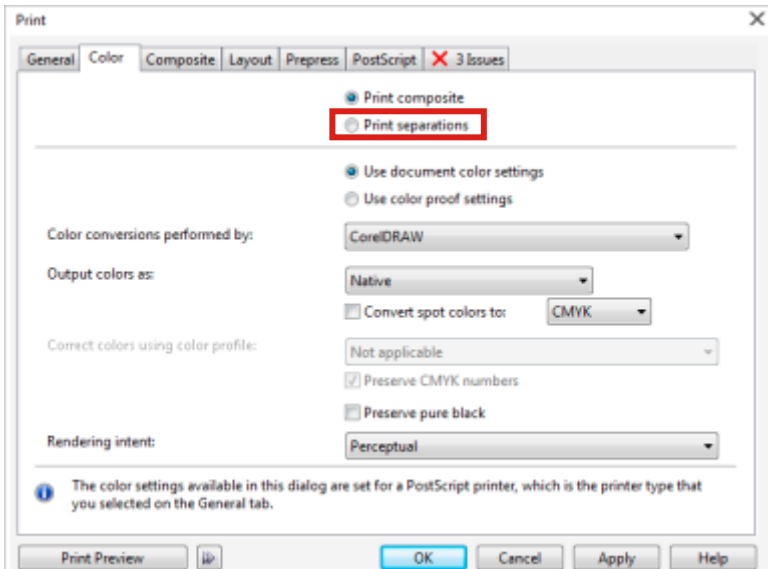


composite tab of the print dialog. The drop down for the document over prints has a default setting of preserve which in my opinion is a great choice. You also get the option to ignore and simulate. Ignore is fairly self explanatory but simulate is for the print preview feature. In my opinion if you're using composite print to generate a PS file to distill into a PDF for digital front end work flows your best choice is to leave the preserve over prints on but to design your document without over prints. Automated trapping and imposition programs are infinitely more sophisticated in terms of their specialized capabilities, you would be best served by letting them handle these tasks.

The screen frequency drop down is set to default for the driver, for composite I suggest letting this alone the output device will handle this.

CorelDRAW Graphics Suite X8

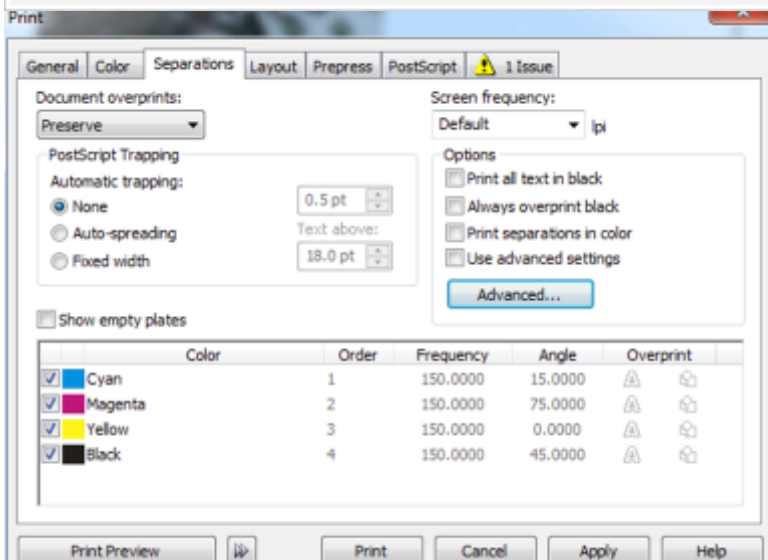
Postscript Printing the dialogs



The print dialog changes when you select the print separations radio button, outlined in red. The composite tab changes to the separations tab and in the separations tab you get an advanced button for advanced separations features.

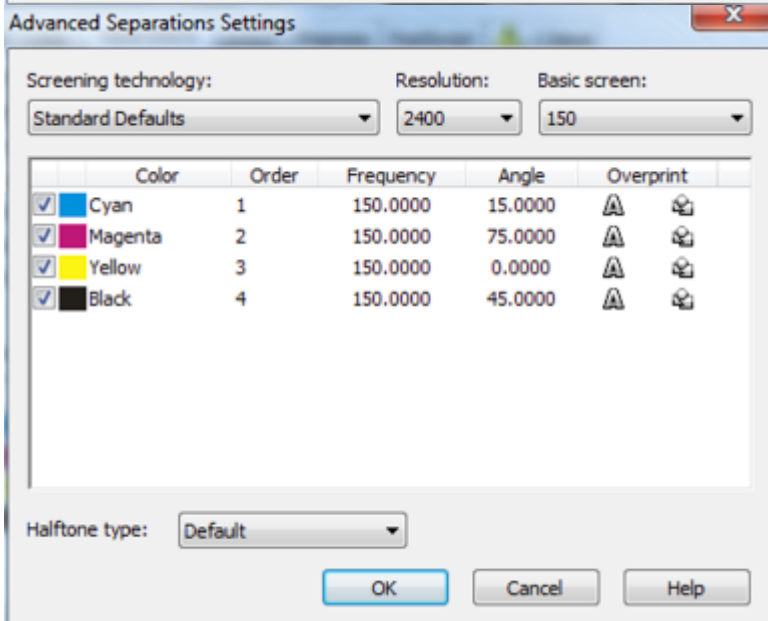
The changes of note are that the use document colors, use proof color settings, the color conversions performed by and output colors as selections are inactive. The document CMYK color profile is set in the correct colors using color profile drop down, this can be changed to another profile is desired.

The preserve CMYK numbers is grayed out and you can select your rendering intent. Remember this will over ride the rendering intent selected in the color proof setting docker.



Only the options on this color tab will affect color of color separated work flows. Changing the profile in the correct colors using color profile drop down to a profile different then the document default will affect a change in the color. Also selecting to convert spot colors to CMYK will most likely affect the color of those objects.

The reality of color is that while I show you the other print tab dialogs the only thing that they can do to affect the color is the over prints. Overprinting will result in a shift in color of the top color because of the under color.



Printing separations in color will print the separations as their base color CMYK, spot colors will be simulated on digital proofing. Spot colors separate on film and plates as individual colors.

None of the settings for screen technology, screen angle, screen resolution or screen frequency will have any affect on color. The unfortunate aspect of the internet is that you may find posting to the contrary however they are totally untrue. These setting may affect the clarity of the reproduction but have no affect on color.

CorelDRAW Graphics Suite X8

Non-Postscript Printing

For users of X5 through X8 I have devised a G (grayscale) color palette available on my web site www.graphicstechnology.com to use for black in non-postscript work flows, **this resolves the issue of 100% black (CMYK black) printing as a gray tint in non-postscript devices.** Please refer to the new work flow section of this publication.

Non-postscript printing from CorelDRAW X5 through X8 has been greatly improved from X4 and previous versions and for those of you who prefer to use non-postscript devices you will see a vast improvement with cross application compatibility. If you work in office environments simply use RGB mode and sRGB as your RGB color space and you will see a vast improvement with color consistency with your office applications.

The printing process for non-postscript devices is one of the fastest growing areas of graphics today due to the proliferation of low cost ink jet devices and of course the old try and true office devices. There is only one piece of advice that I can give a user about these types of devices and that is if you're really serious about professional level color don't buy one. You simply cannot reproduce corporate color and high end sophisticated wide gamut printing with a non-postscript device. I know all the arguments that will arise by making such a statement but they are all hogwash. I do a good deal of consulting and every time I've had to resolve color issues with non-postscript devices when I get to the manufactures highest level technicians they tell me that my clients need to purchase their postscript option. Certainly their salesperson didn't tell my client that when they could have bought the postscript option as an \$600 add on to their new purchase, they hear it when they have to buy the same feature a year later as a \$1,900 accessory.

The process for non-postscript requires that the application convert all color to the document RGB color space, X5 through X8 have the ability to convert all non-RGB file content to the document RGB color space, this is cross application compatible. The print device then converts the RGB print stream data to the media profile which will be some form of CMYK. CorelDRAW X4 and older versions could not convert the non-RGB color model file content to the document RGB in the print stream resulting in a work flow for the user that required that they manually convert all file content to RGB in the application before print if you wanted an ICC compliant color conversion. What ended up usually was some convoluted CMYK to RGB to CMYK conversion. This GDI (graphic device interface) required RGB color space in the print stream has many people confused and they refer to this as RGB printing, or RGB printers, there is no RGB printing, merely a convoluted process for converting file content to the required color space of the GDI (graphic device interface) of Windows. Postscript avoids this GDI process.

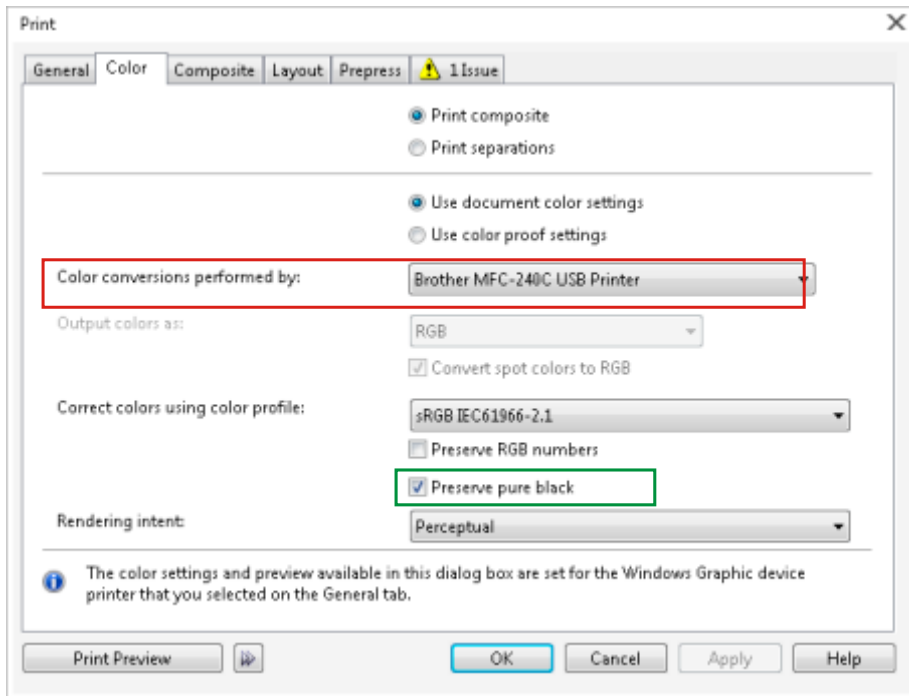
The reality of digital printing postscript or non-postscript is that for accurate (within bounds of the mechanical and software technology) color, a media profile is required for each and every paper or substrate and it must be the last conversion in the progressive line of color conversions. EXAMPLE: file content is from mixed color models printing to non-postscript, file color to RGB to a device simulation profile to the media profile. Or straight from the application color models to RGB to the media profile. This is why postscript is superior, the native colors can go directly to the media profile with no intermediate conversions.

The very best control you can have with non-postscript devices is for you to work in RGB mode, with your final file content converted only into the document RGB color space and to print directly to the media profile for your device. CorelDRAW X5 through X8 allow you to utilize the media profiles from any device that uses ICC media profiles but has no features that allow you to create them. Such profile creating software for print devices is costly about \$5,000 U.S. for quality equipment.

With all this having been said CorelDRAW X5 has made vast strides in making Corel color compatibility with office and other graphic applications vastly more user friendly the same color engine is the basis for CorelDRAW X8's core color technology. In my opinion this alone makes X8 a viable upgrade for those who print to non-postscript devices. The only limitations are now those imposed by the GDI process.

CorelDRAW Graphics Suite X8

Non-Postscript Printing the dialogs



Non-postscript printing from CorelDRAW X8 allows as shown by the capture to the left (outlined in red) the user to have CorelDRAW or the driver to handle color conversions. I strongly suggest using the driver. **Please remember this no matter what the very first conversion will be to the document RGB.** This is a function of the operating system and there is nothing that can be done about it. The rendering intent will in most cases produce a better conversion WHEN CHANGED TO PERCEPTUAL.

If you choose to have the device to handle color conversions, (**my suggested non-postscript workflow**) a different RGB color space may show in the correct colors using profile drop down, since sRGB is the standard for most non-postscript devices you most likely will see

sRGB. In some cases you'll see the document RGB if it's not sRGB. When you choose to use color proof settings the document's RGB color space will appear in the correct colors using profile drop down. You may choose another profile to handle color corrections. In either case Corel or the device handling color conversions the rendering intent in the driver dialog will override any other settings particularly the one chosen in the color proof settings docker.

Outlined in green is the preserve pure black checkbox, this is set on by default and is in my opinion a useful tool albeit an incorrect and non-ICC compliant workflow. When checked this will convert all K 100% (black from the CMYK color model) to R0 G0 B0 and print as a solid black on non-postscript devices. This is great for those who have documents that contain k100 text however it will posterize the shadow content of CMYK images, printing dark grays as black as well as k100. This happens in the printing process or in the application during the conversion from CMYK to RGB process any time the preserve pure black checkbox is active, in the print dialog or the default color management dialog. This is wrong but a useful cheat for low color quality work or black and white work!

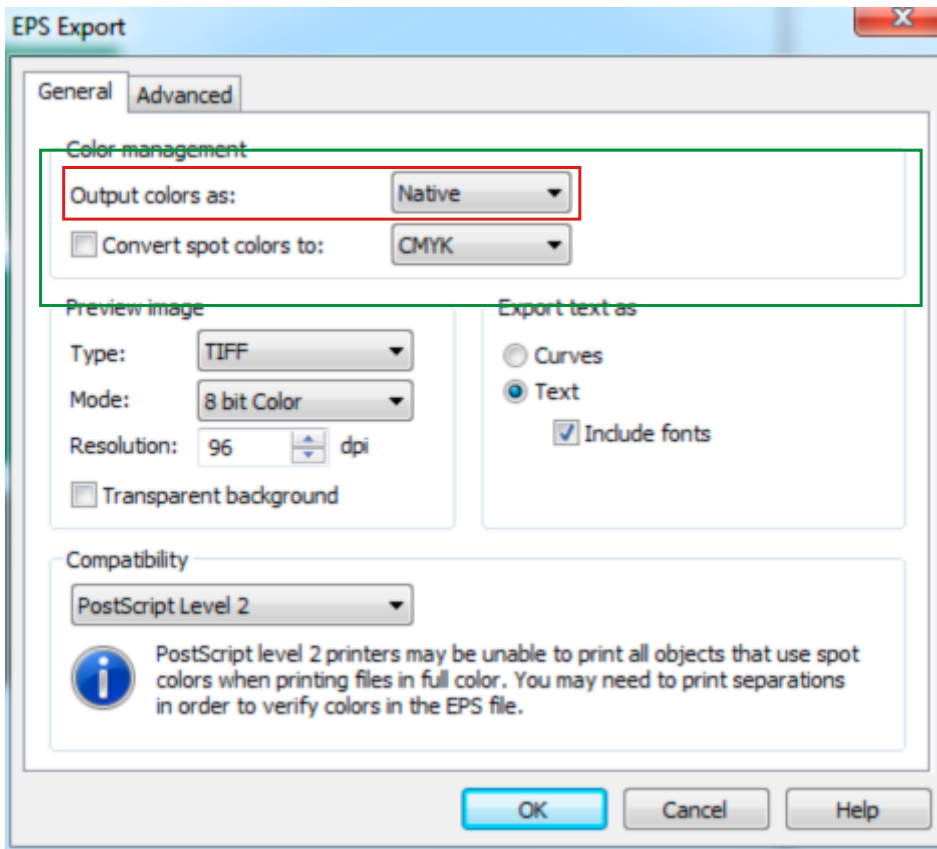
It is imperative that you remember that if you choose to work with non-postscript devices that a default document color mode of RGB will simplify your color control also converting all non RGB document objects to RGB before printing helps.

The composite or the separations tabs (if you choose to select print separations) have no bearing on any color from the device.

Describing color printing for non-postscript devices is complicated by the sheer number of different devices and different interfaces available. Some do not allow you to circumvent the media profile and as such they always have the final conversion. Other devices do allow you to completely turn off the device's color control and still again others allow a composite process of control, some to the application some to the device. It suffices to say that in CorelDRAW X8 you have a state of the art conversion to the document's RGB and the ability to place other profiles in place as your device allows.

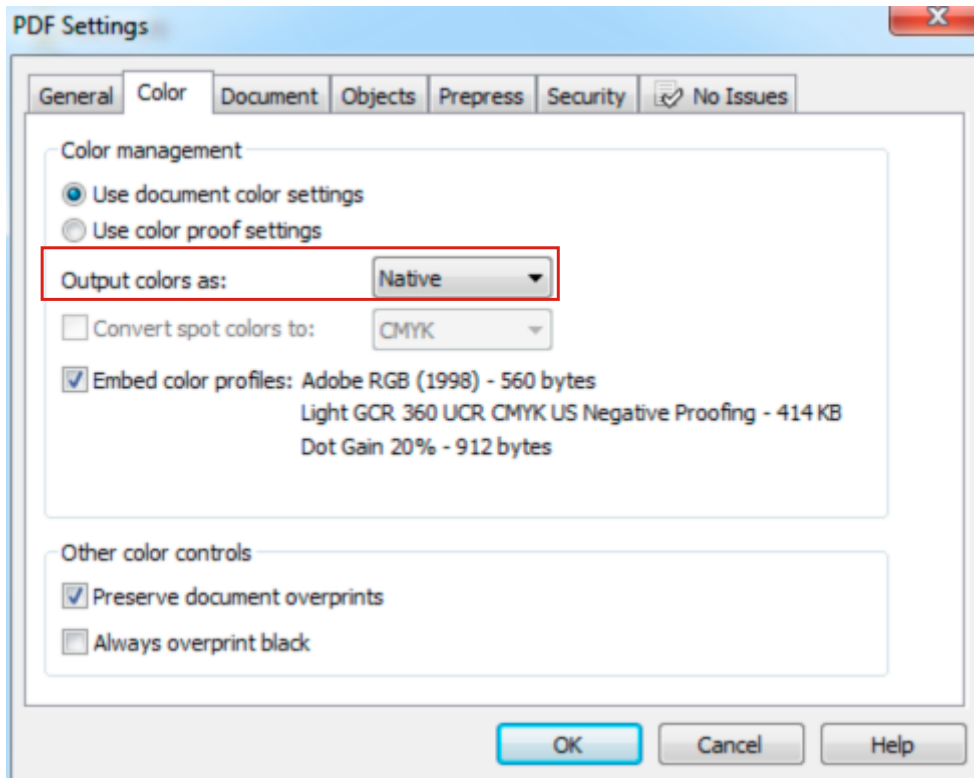
CorelDRAW Graphics Suite X8

Exporting a File



Exporting a file from CorelDRAW X8 (for output) while maintaining the color integrity of the files content is a simple matter. The process is basically set up your document color management, create your content for the proper destination and use native color. You also can allow conversions to take place during exportation, for example files that were originally created for press that need to be displayed on the internet. In this case you would select the dialog to output colors as RGB outlined in red. Your choices are RGB, Grayscale, Native and CMYK

To the left you see the EPS export dialog, the setting shown are native color settings and are an excellent choice allowing the destination device to handle conversions when the EPS is used as an output file format. (Remember Adobe Illustrator cannot utilize more than one color model at a time) so all EPS files for placement in Illustrator have to be RGB or CMYK. Only those settings inside the color management area of the EPS dialog (outlined in green) affect color.



Publishing to PDF is also best done as native color, in which case all required color profiles are embedded. I say this because there are then only four relevant PDF presets, bleed and no bleed, high and low resolution and you control color management by creating the file properly using the correct color content. You can choose to output colors as RGB, Gray Scale or CMYK converted by the documents color profiles outlined in red.

becomes inactive, color conversions will take place to the proof settings profile and the proof settings ICC profile will be embedded in the PDF.

All PDF X formats are CMYK output only!

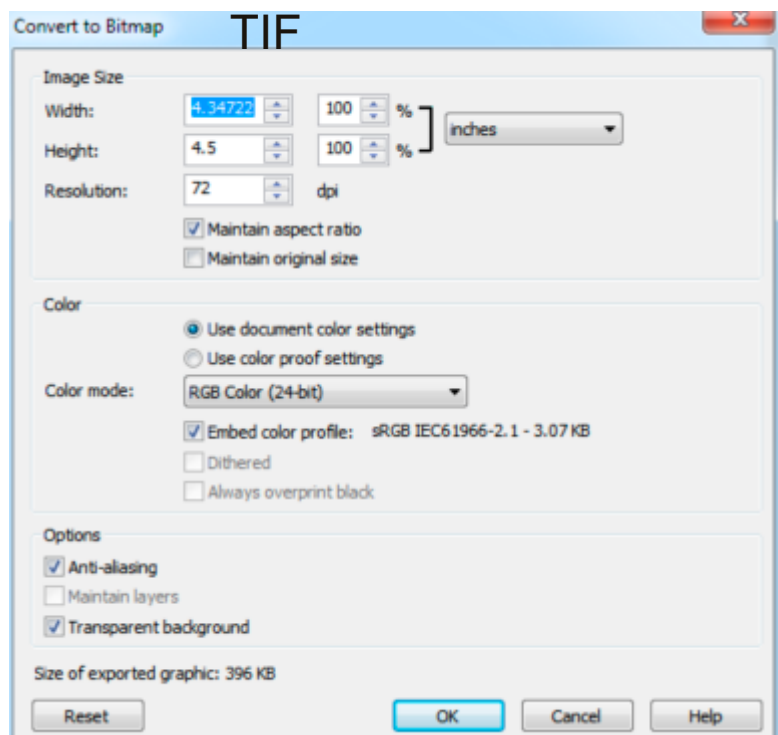
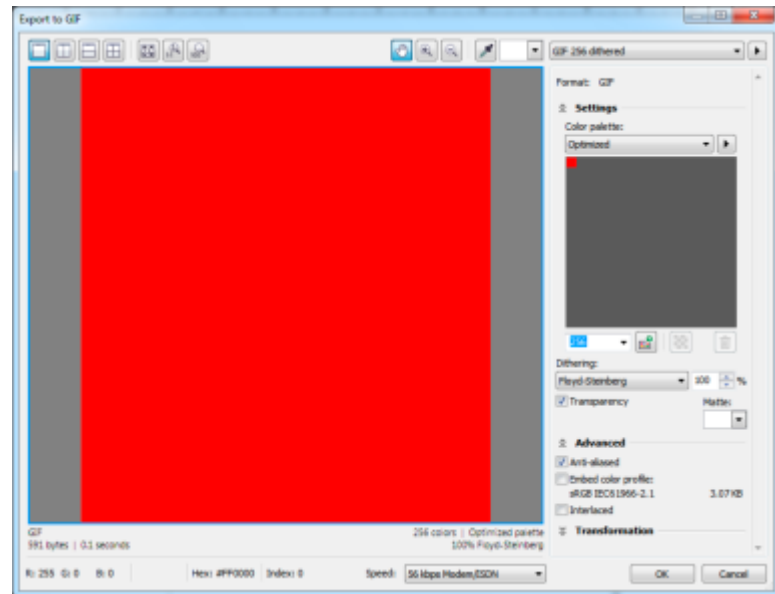
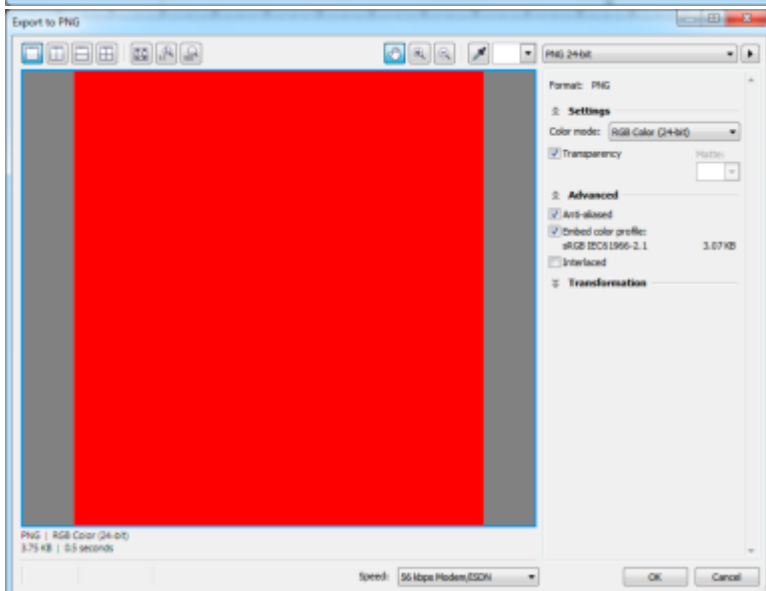
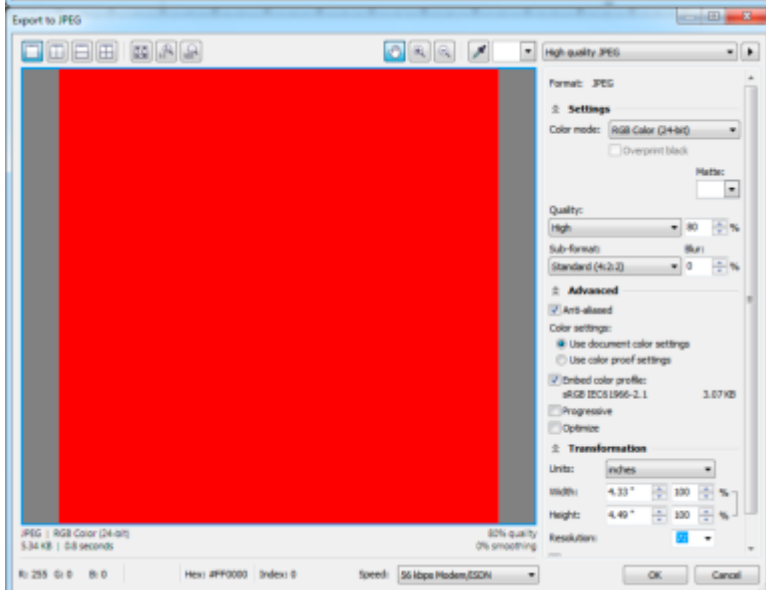
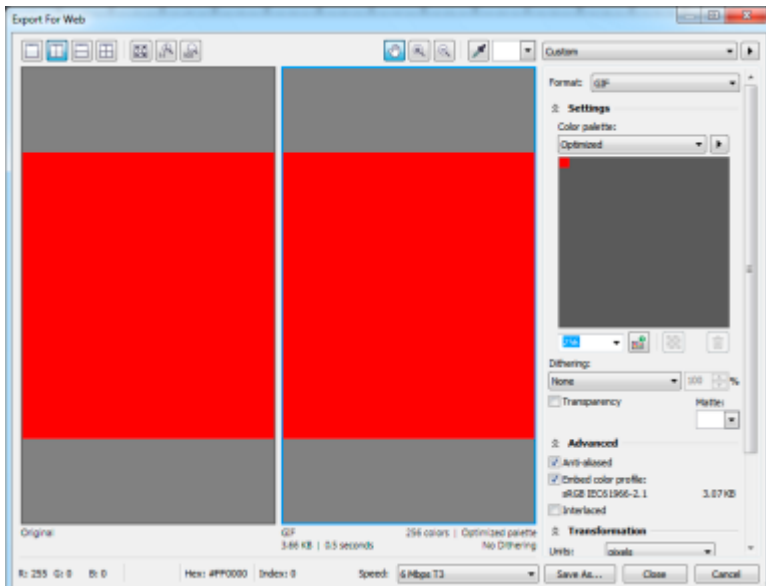
You can also use the color proof settings, output colors as

CorelDRAW Graphics Suite X8

Exporting a File

WEB

Exporting a file for web is simple in terms of color management. The new dialogs allow you to embed an ICC profile, that's it. You can choose to embed a profile or not that discussion takes place in the work flow section of this publication and in general embedding for the web is not recommended. The sRGB profile is 3.07KB and is added to each image.

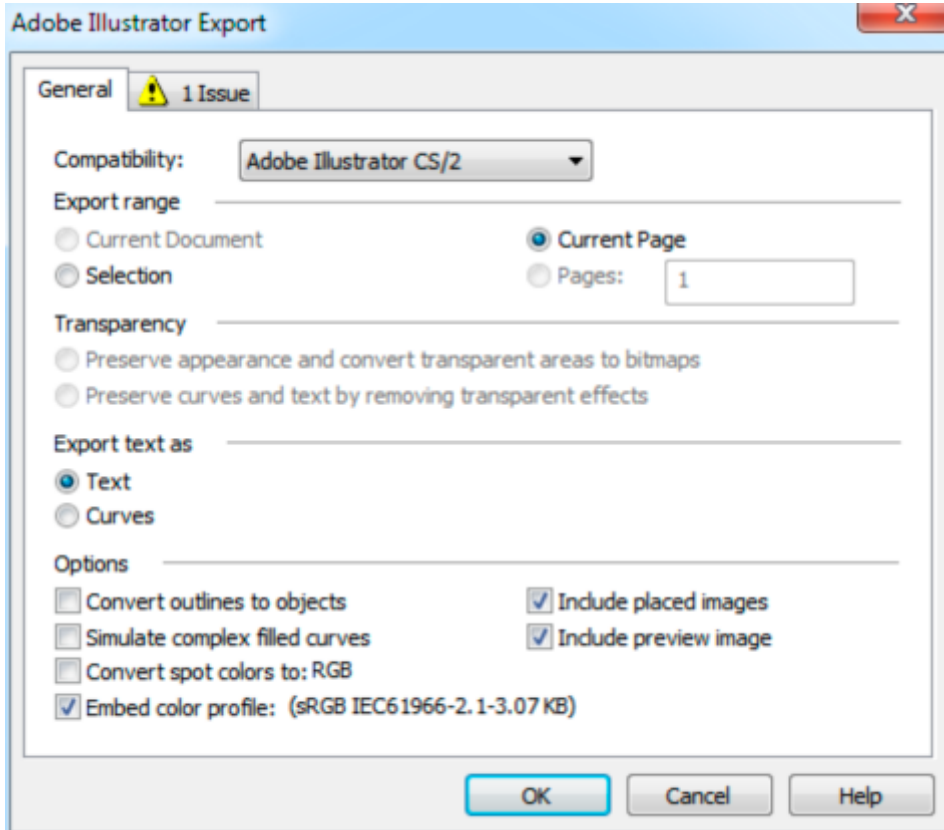


CorelDRAW Graphics Suite X8

Exporting a File for Adobe Illustrator

Exporting a file for Adobe Illustrator is simple in terms of color management. The new Adobe Illustrator Export dialog top left, allows you to embed an ICC profile for CS2 and newer Illustrator formats.

Remember this in terms of color capabilities Adobe Illustrator is not a very sophisticated program, it works in RGB or CMYK not both. If you export for versions of Illustrator older than CS and color is important then you have no choice but to tell the person receiving your files what color management settings you used. Do not expect that any Adobe user will understand this, set your color management to North American Press and relax.

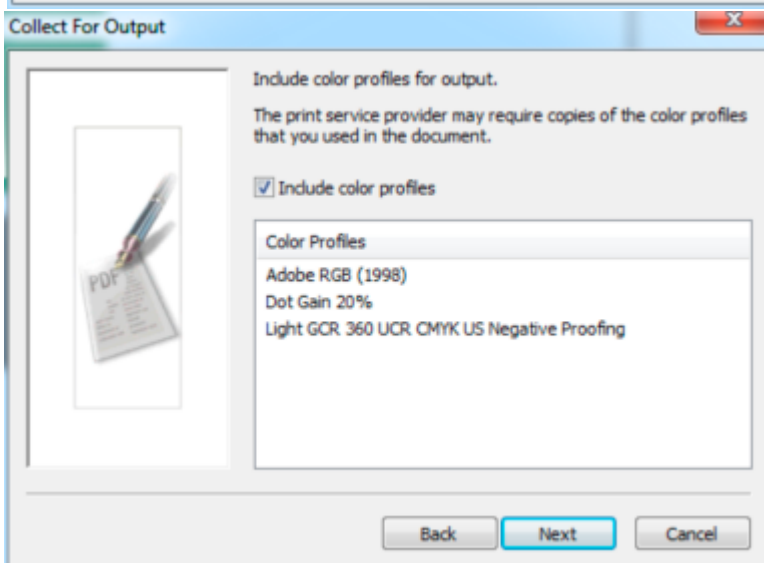


Collect for Output

CorelDRAW X5 has changed the prepare for service bureau commands under the file menu to collect for output, these have continued for X8. The capture bottom left displays the commands.

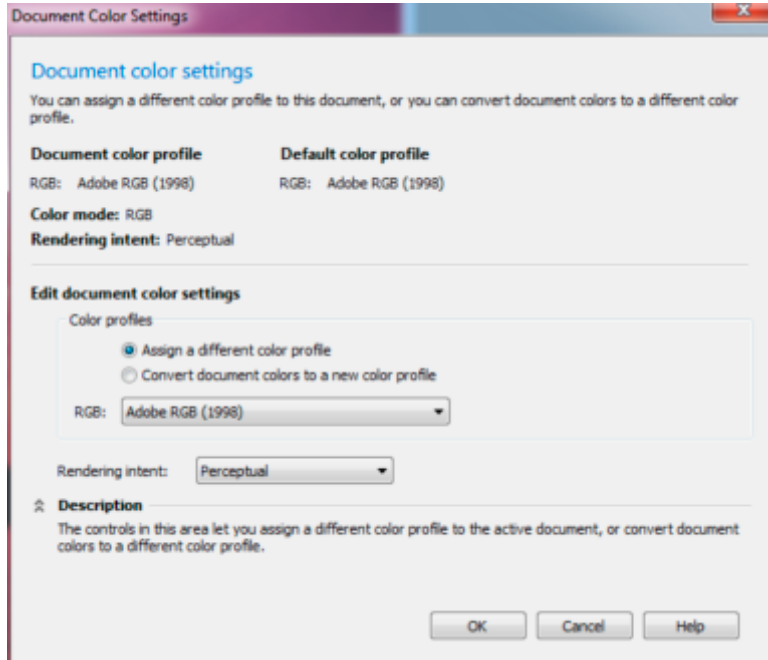
Please understand that color management is about organization, what that means is embedding profiles so the end user has all the information they require to properly process the color of your file regardless of the destination.

That is why you see me recommending native color for export filters that support the feature. This color process allows the user to transmit the full spectrum of color models and the ICC profiles that are required. The collect for output has a dialog that allows you to include the document ICC profiles.

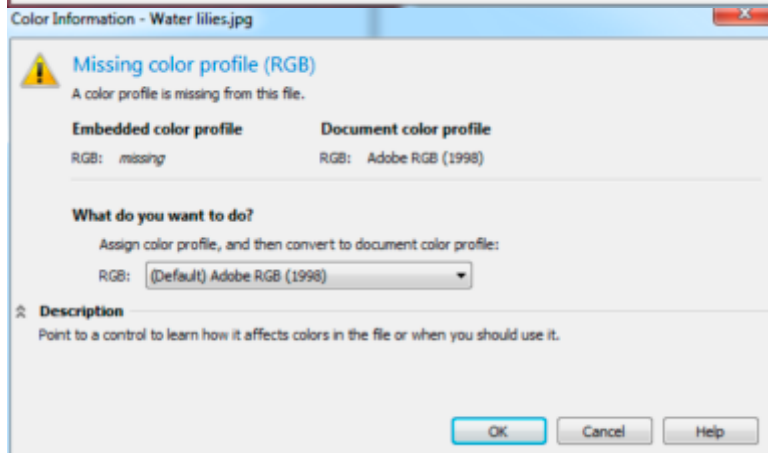


CorelDRAW Graphics Suite X8

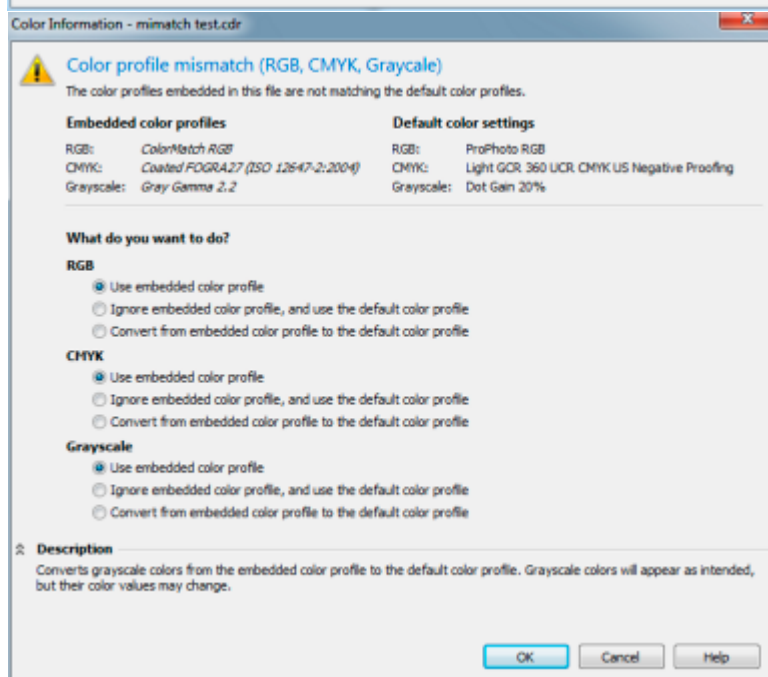
Acquiring an Image via a Scanner



When you scan an image into Corel Photo-PAINT X5 through X8 to create a new document, if the scanner does not embed a profile the new document automatically assumes the default application color setting. (This is where having the missing profile mismatch profile boxes checked in the default color management dialogs really works for you)! To view the scan simply follow the dialogs instructions, if the scanners color profile does not match or if it does not embed a profile. In this dialog **you have to assign the scanner color profile to the file and then convert to the document color.** This must be done for each scan, for the color to be displayed correctly. Almost all low end scanners use sRGB, some upper end scanners have their own profile or allow you to create one so use the scanners profile and convert to the documents profile. An embedded profile opens in the scanners color space.



Scanning an image into CorelDRAW X5 through X8 is another matter. In CorelDRAW to acquire an image you must have a document open, so when you scan an image and place it in CorelDRAW the application will see either a missing profile or a mismatched profile. **In the case of a missing profile, which will be the case for most low cost scanners you will need to assign the scanner color space and then convert to the documents color space.** That is unless the scanners color space matches the documents color space. This will be the case if you work in sRGB and by default the scanner will be use the sRGB color space if you use lower cost scanners.



In the case where the scanner embeds a profile you may get the mismatched color profile dialog and **your selection will be to convert the scanned the image to the documents color space.** The CorelDRAW color profile mismatch dialog shown left (of course only the RGB section would display).

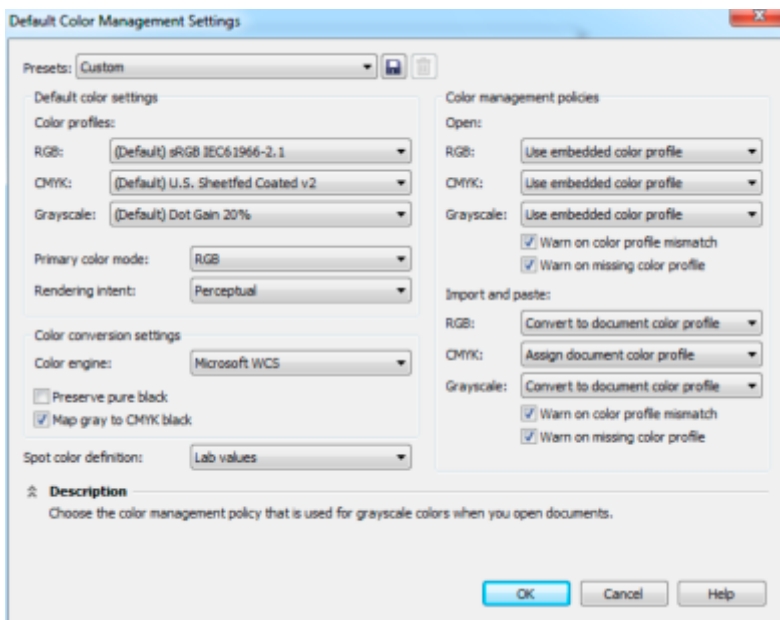
Color Management Settings and Advanced Work Flows

Let's just be up from about this, laser engraving is the only work flow I know of that MUST USE the color management off setting. Clearly that is all that needs to be said about color management in CorelDRAW for laser engravers.

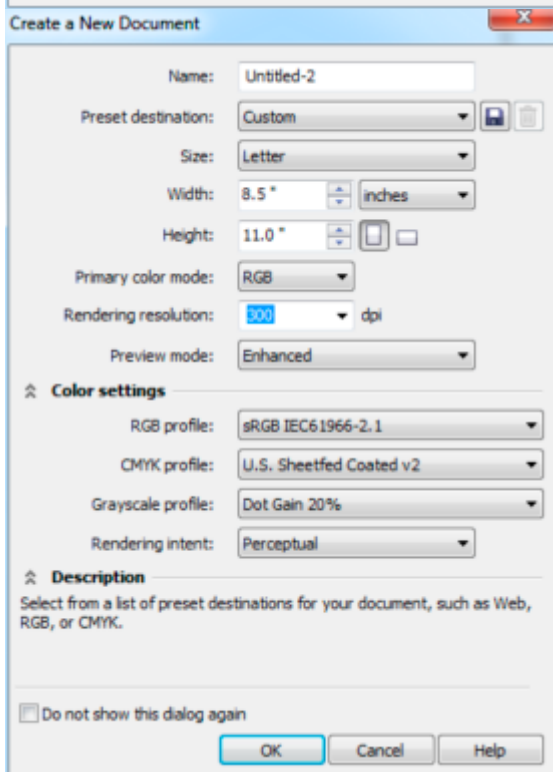
CorelDRAW Graphics Suite X8

Web, Office and Presentation Work

The environment for color in web, office and presentation work is not changing at any rapid pace. Yes you're seeing most web browsers support embedded profiles, you're also seeing projectors utilizing ICC color management but as of yet I have not seen any office applications other than presentation applications adapt ICC controlled color management and even then only as a profile for the projector or monitor, the process assumes sRGB. What this means is that there is a solution for everyone, that solution is the standard assumed sRGB color space. I know that people will offer many opinions on this but the fact that the dominant method works, and uses no embedded color profiles renders all those arguments moot. In fact the argument that embedding color profiles for the web requires too much of an increase in file size is still raging. So let's stick with what we know, first an assumed sRGB is still universally compatible and when this changes CorelDRAW X8 allows for the embedding of profiles. The only choice you have to make is to allow the profile to be embedded or to not allow the profile to be embedded in your file, CorelDRAW allows for such a choice in the export and save dialogs, the choice is yours.



To the left you see the default color management dialog and below it the document color management dialog. The settings you see here are proper for a Western Hemisphere web work flow. The sRGB color space is universally used around the globe, the CMYK is a regional choice, set your to CMYK profile to match your area. Grayscale of 20% is the new Corel default if you wish to match the older default set for gray gamma 1.8, 2.2 is considered the web standard. Using the check boxes for the warnings for mismatched or missing color profiles is simply my choice and is not required. Corel can automate these choices for you as discussed earlier in this publication. The highlighted resolution setting is your choice in general 72 or 96 DPI is proper for web and presentation, 300 is for press work.



Working for this environment is really simple, notice that the primary color mode is set to RGB, this is a fundamental requirement as no web or office application uses any other color model. MS Publisher while sold as an office application is a limited graphics application and does support spot color and CMYK. Create your web/presentation work in the sRGB color space with the RGB color mode at web resolutions and all will be well.

The color management setting seen here with the CMYK setting set to your regional needs allows for you to convert files that were originally created in CMYK mode and press color models for print to the sRGB color space for web and presentation work. Perceptual rendering is used due to the compression of out of sRGB gamut aspects of the spot color and CMYK color models. These color conversions will be ICC compliant and will be repeatable and consistent for all web supported file formats. Remember that the sRGB color space is not wide enough to encompass all the CMYK or spot colors so there will be some color shift in shadows colors, dark greens and blues. However the conversions are as good as possible until the entire process supports either a wider gamut RGB or embedded profiles.

CorelDRAW Graphics Suite X8

Printing Press Work

A file properly prepared for press can contain elements from the two color models, CMYK and Grayscale and one Spot Color Palette. If your work is only spot color use one spot color palette, if your work is black and white use K of the CMYK model for vectors and type and grayscale images, if your work is only CMYK only use the CMYK color model, PERIOD! The document must use CMYK color mode, other controlling factors are screen rulings of the plates, which governs the resolution of images within your document. The general rule is image resolution needs to be twice the plate line screen; example 150 line plates need 300 PPI or DPI images at output size.

The controlling factor for CMYK color is the TIC (total ink coverage) of the press paper combination. This is a technical fact however finding a customer service representative for a printing company that knows this or even knows what a CMYK profile is may be an impossibility. So you're stuck with using regional commercially acceptable CMYK profiles, for example U.S. coated V2 or uncoated for Western Hemisphere. European Fogra coated and uncoated, in Europe, there are just too many to list so consult your regional service provider. Facts that you can count on, press work is postscript color managed, so when you get the information for what CMYK profile your printing company wants you can check the TIC of the profile and use any CMYK profile that has a TIC of equal or lesser value, the printing company will never know and your work will print with no color variation in the electronic part of the process.

Spot color is controlled by using the proper palette, stay within the palette that was used from the beginning. Understand this coated, un-coated, C, U and CVC are designations only for the computer and just for simulated display, the pressman uses the same ink regardless of what you choose. The display and conversion of spot color is by using LAB is the new Pantone specification I suggest we use it. You can use K of the CMYK model for black text as well as for vectors and as the black color duotones in Corel Photo-PAINT.

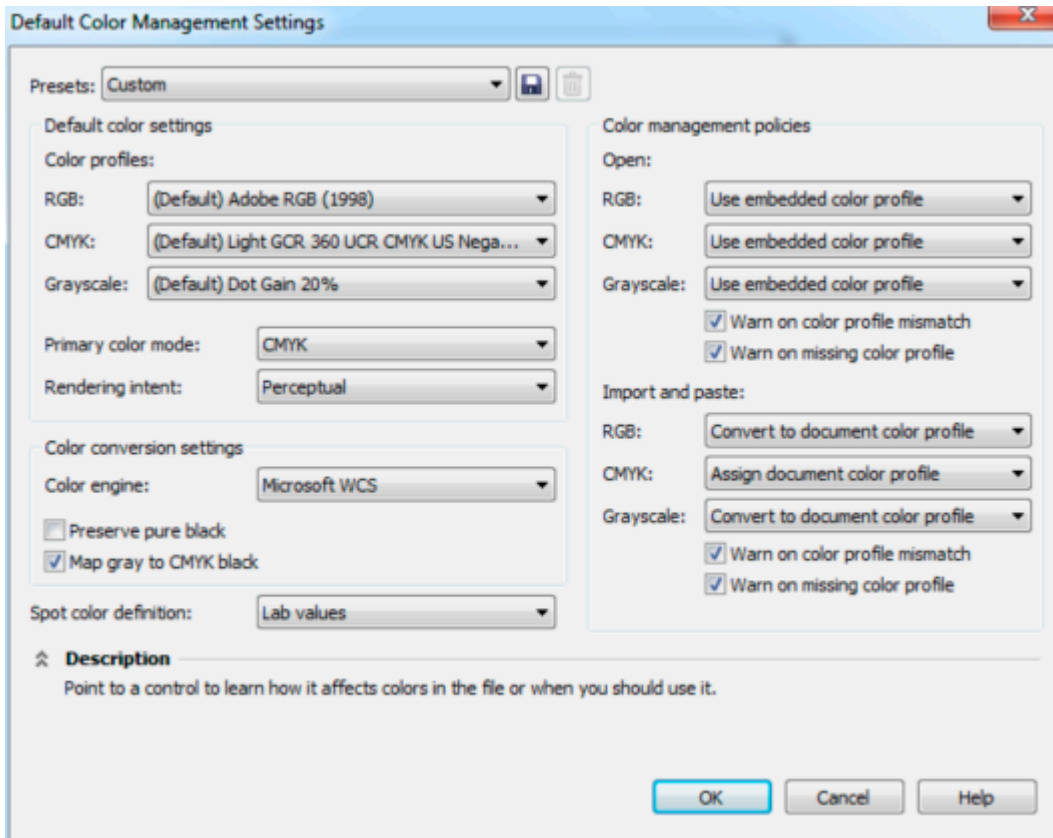
Grayscale profiles are used to control the transition from L MIN (lightness minimum) to D MAX (maximum density) and the naming of them is dubious at best for example a 20% dot gain. Just how exactly is that defined? I can never find an answer that makes sense, so try those available to you and see what you like I stick with the default of 20%. The one aspect of press work for grayscale is this the profiles do not affect L MIN or D MAX and if you export a grayscale file such as an ad for printing at a newspaper they will specify a D MAX and an L MIN, usually this will be 3% L MIN to 85% D MAX. To achieve this simply convert your image to grayscale and edit the image in Corel Photo-PAINT using the tone curve under the adjust menu, read the L MIN and D MAX in the image info docker and adjust the two ends of the tone curve to match the requirements.

On the next page you'll see the default color management dialog and the document color management dialog. The settings therein are what I use for my day to day use, perceptual rendering is my choice because I am converting wide gamut (RGB) color spaces to small gamut (CMYK) color spaces and I want to maintain the perception of the color transition of the images. The warning check boxes are again my choice and you can properly choose not to use them and let Corel make automatic choices for you. The profiles used and the document resolution seen again are what's required for my personal coated paper sheet fed work flow, please remember to use an RGB color space wide enough to utilize all the CMYK gamut of the profile you choose (Adobe RGB 1998) seems to work fine. Consult your local print provider and set your dialogs accordingly.

Set your dialogs and control your color management via proper file creation, it really is just that simple. never place a spot color in your file from more than one palette, use only grayscale and CMYK objects or images in your press file and your color management is correct. This assumes of course that you have some control over the display and creation process, I recommend using Pantone Spot color and Process Color Guides.

CorelDRAW Graphics Suite X8

Printing Press Work

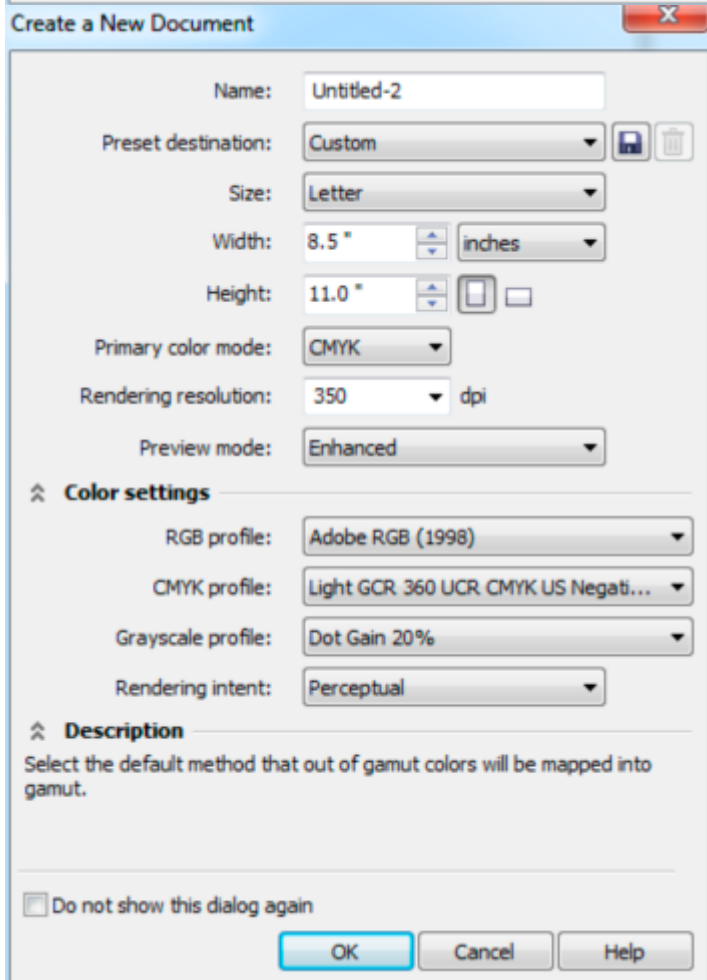


To the left you'll see the default color management dialog and the document color management dialog.

Again consult your local provider as to the regional profiles. Change these profile setting so suit your regional needs.

The warning boxes being checked, the rendering intent, the color engine and the LAB display of spot color are my personal preferences.

Primary color mode of CMYK is an absolute must! As is using one spot color palette, grayscale and CMYK files contents only!



CorelDRAW Graphics Suite X8

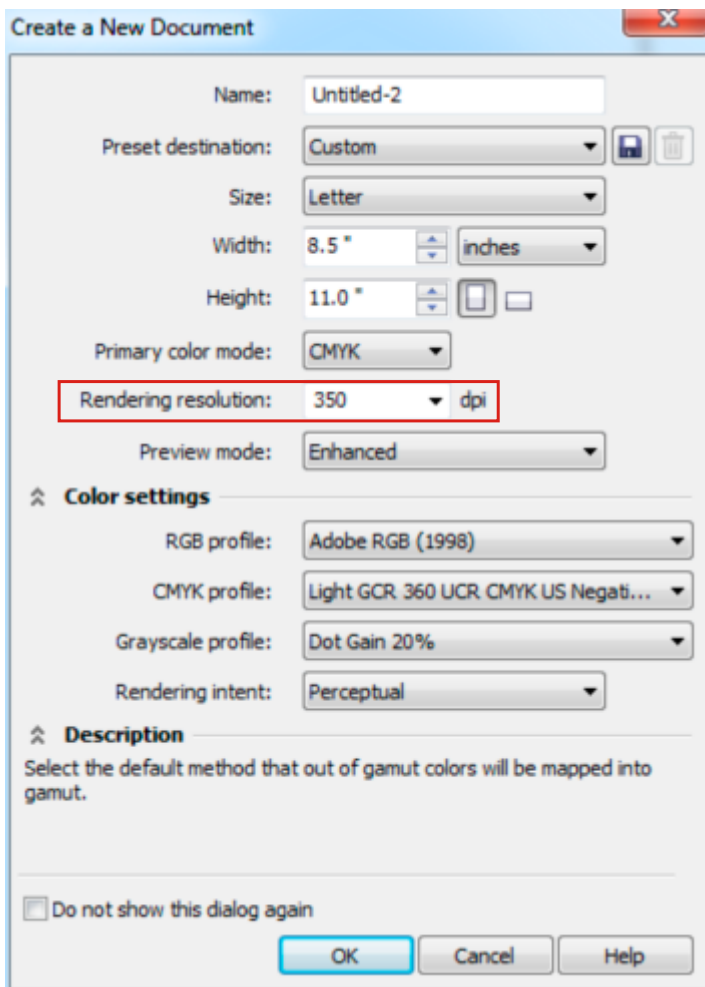
Expanded Gamut Printing Work (Read Printing Press Work on the previous two pages)

What is expanded gamut printing? It's a term that I use to describe printing a file whose color content is from one RGB, one grayscale, one CMYK color models and one spot color palette, allowing the final color conversions to be handled by the output device using the media profile. Many times through a native color PDF or postscript driver base or digital front end process. A native color PS or EPS file is one that contains elements from multiple color models and or a spot color palette. This process is best used with ink jet printing, especially the six and eight color units. How the process works is fairly simple, one can use a Corel published PDF and embed the documents color profiles. The RIP will read the PDF utilizing the embedded profiles for the color conversions. Distiller published PDF requires an assumed color space work flow.

New to X5 is the ability to support RGB vectors in postscript so we can export a native color EPS file or print a composite PS file. CorelDRAW will transmit the color space arrays through the postscript files, the RIP simply has to be set to assume the color spaces used in the CorelDRAW file supplying the proper profile identification for the conversion to the media profile. This is an assumed color space work flow.

Another method of expanded gamut printing would be to rasterize the entire file contents to the documents RGB color space and saving the file in an image format supported by the RIP with the RGB profile embedded. This works as long as you use an RGB color space wide enough to completely encompass the CMYK color space and the spot color palette of the file contents, Adobe RGB 1998 seems to work well for this.

Everything about expanded gamut is identical to printing press work except for the following. You may utilize one RGB color space along with your other color elements. The resolution set in the new document color management dialog is crucial.



Test your output device set the media and quality settings to various setting and send various resolution images to the device. Look at the test output and establish the required minimum resolution of files sent to the unit for the best quality at the various quality settings. Now when you start a new document for output on this device you can set the document resolution to the minimum required, allowing you to print the largest size file possible with the highest quality.

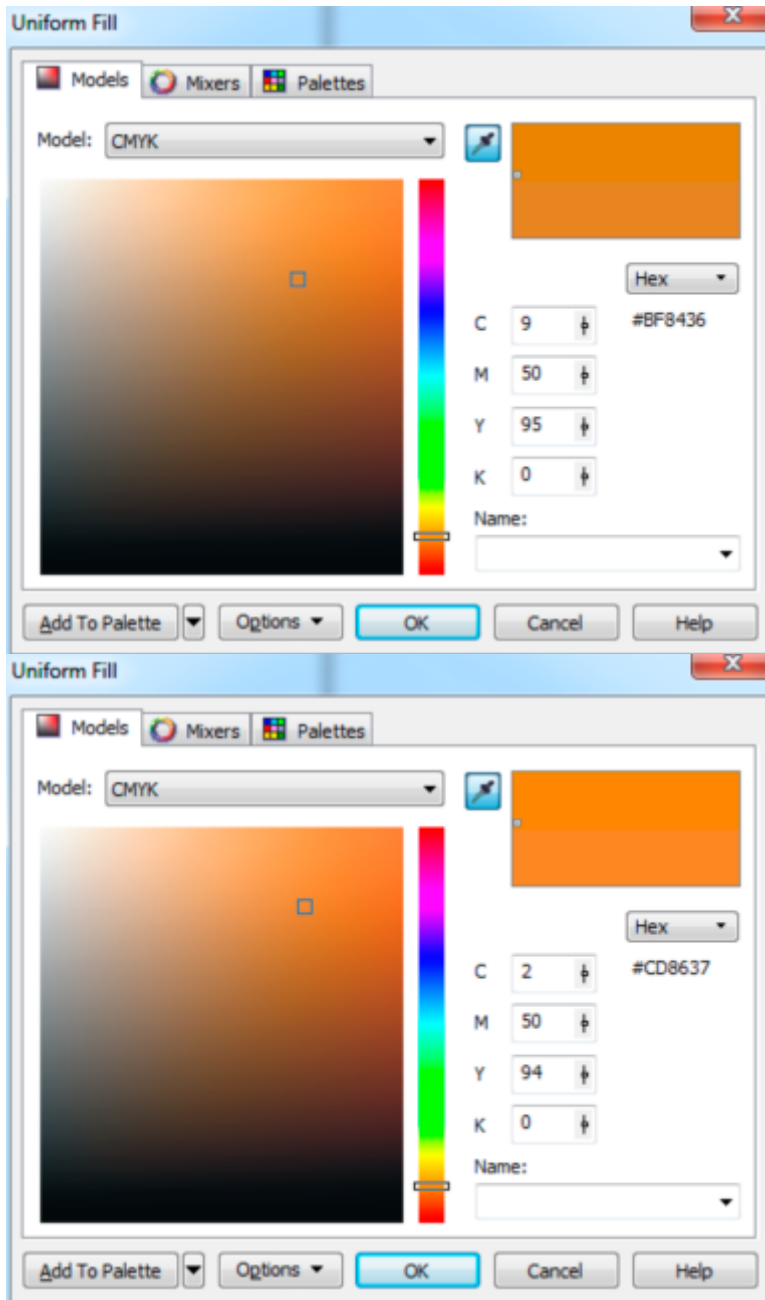
The rendering resolution outlined in red in the capture to the left is critical for managing system resources in large and grand format printing. It also can be critical for proper color managed output on some RIPS. I utilize perceptual rendering because again I am converting wide gamut color spaces to smaller color spaces.

Using the enhanced preview makes the CorelDRAW X8 Graphics Suite the only application to offer expanded gamut output and display with a live high resolution effects preview.

Expanded gamut printing as I call it works very well for the large and grand format printing as well as high quality photographic reproduction.

CorelDRAW Graphics Suite X8

Spot Color



The new spot color management policy governed by Pantone is for graphics applications to use LAB color space values for display and conversion of spot colors. What this means for Corel users is that the default spot color display for X8 is better and different than X4. To match the X4 automated spot color to CMYK conversions in X8 you will need to load the same ICC profiles as X4 and set the default color management dialog under the tools menu/color management to use RGB for spot color. If you displayed your spot colors as CMYK you need to access the default color management dialog and select spot colors as CMYK.

To the left you see two screen captures of the uniform fill dialog from CorelDRAW X8 using Pantone 138C and converting to CMYK. The top one is the default of LAB display and the bottom one is X5 set to the old X4 default of RGB. Notice how the top display of the old and new colors are much closer to the spot color than in the bottom capture using the X4 defaults. Also notice the difference in the resulting spot color builds, C9 and C2, Y95 and Y94 specifically. The 7 point change in the new X7 LAB default is significant and results in a much closer conversion to CMYK from this specific Pantone color.

What's of even more interest is how the display of the original PMS 138C using the LAB default is significantly closer to the Pantone Spot Color Guide itself. The RGB display used in X4 is not even close and the LAB display of X8 is now the Pantone specified method so beware of this.

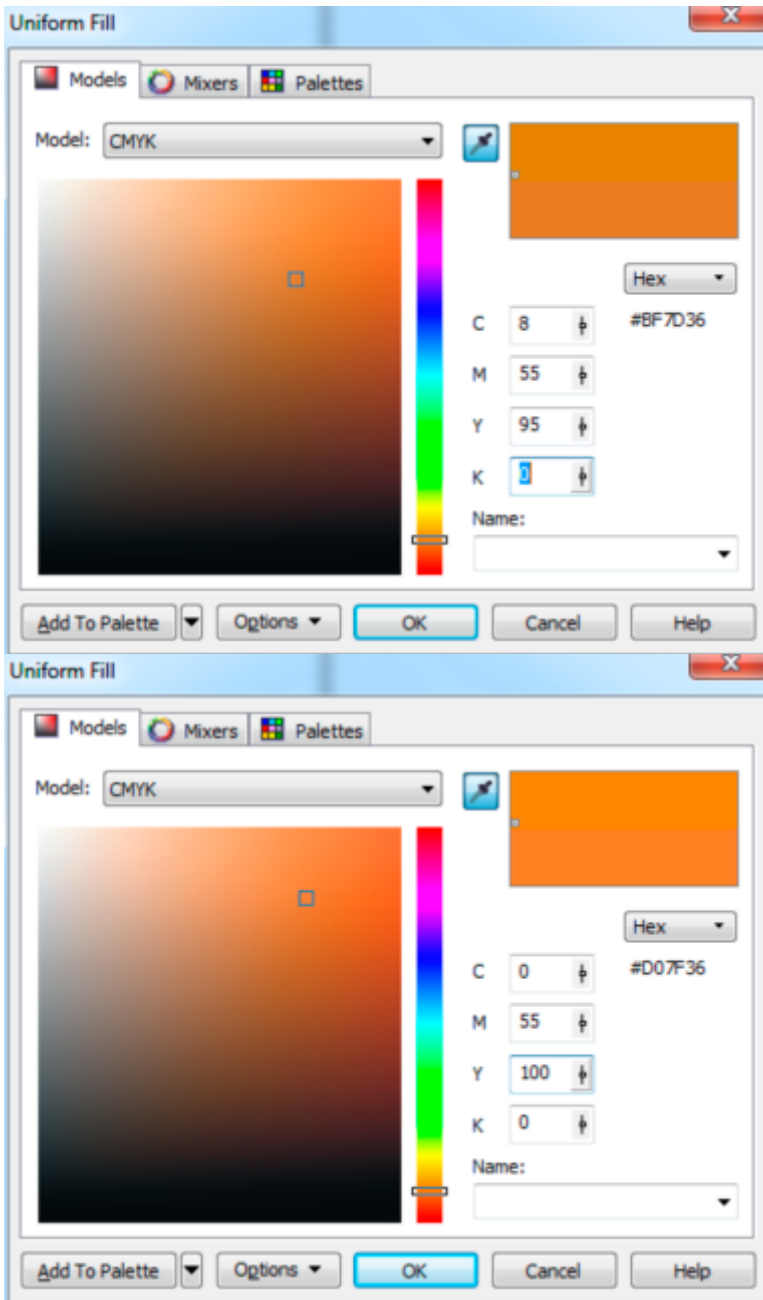
One key issue for spot colors is that even when using LAB for converting spot color to RGB for web use, sRGB will clip some spot colors as the

gamut of sRGB is too small to display all the spot color palette. If you convert spot color to RGB to output for digital printing such as on an ink jet you'll be best served using Adobe RGB 1998. Since Pantone colors are specific mixes there will be no change in how the color prints only in how it displays and how it converts to other color models.

The one true strength of CorelDRAW was always the uniform fill color dialog. It allows the user to see a better quality display of the spot color so that the user when manually converting to CMYK in some cases a much better conversion of CMYK is possible. This gives the Corel user an edge in terms of quality that can't be achieved using Adobe products. Now with X8 using LAB conversions this edge over the competition is even greater.

CorelDRAW Graphics Suite X8

Spot Color



The new spot color capabilities are demonstrated on this page with manual conversions. The fact is this if you want accurate spot colors print in spot colors. If you want the most accurate automated and manual conversion of spot color to RGB or CMYK use CorelDRAW X8.

The dialogs here show the possibilities of manual conversion and the prints seem to bear them out. Especially the conversion using LAB, the middle capture using RGB conversions just cannot hold a candle to those using LAB.

Looking at the bottom capture you see that it is a composite of two sets of captures each made up of three swatches. Each set is composed of a spot color swatch on the left, a automated conversion to CMYK top right and then across the entire bottom a manual conversion to CMYK. The top set of three swatches displays the LAB conversions. The bottom set of three swatches is displaying the RGB spot color conversions.

NOTE PMS: 138 is slightly out of the CMYK gamut but regardless of which process you use LAB or RGB conversions you can get a better conversion in this instance with a manual conversion. Albeit the LAB conversion is much closer to a spot color.

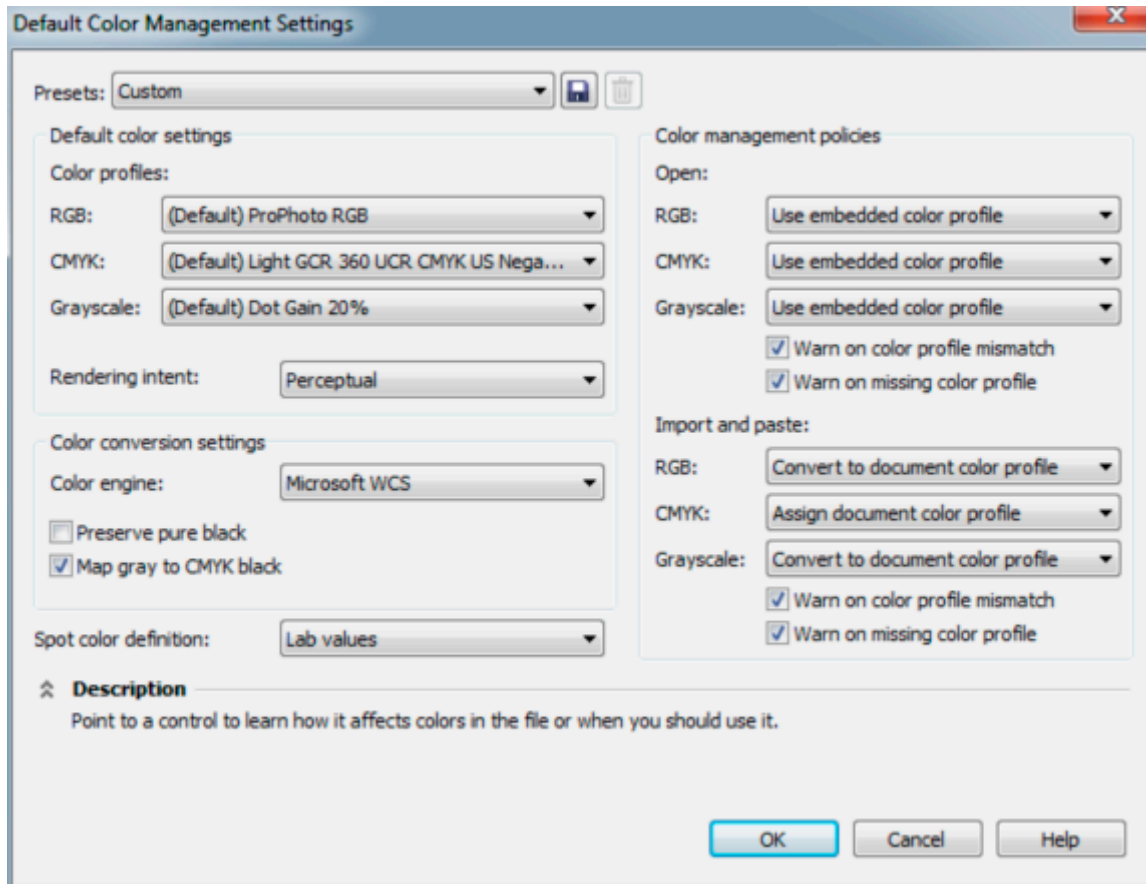
CorelDRAW X8 gives you an enhanced tool for spot color work and I suggest that you make use of it.

CorelDRAW Graphics Suite X8

Photography

Using the CorelDRAW Graphics Suite X8 for photography is a very easy process, using Corel Photo-PAINT X8 there are only four possibilities, opening a file and converting to the default color space, opening a

file in it's color space, opening a file and assigning the default color space and opening a RAW file (for RAW file formats only).



The afore mentioned color management choices are made by me because as shown in the capture to the left I have selected for Photo-PAINT to ask me when any instance occurs except when the images color space matches my default setting. If you uncheck the warning commands the application will automatically do one of three things, it will use the embedded profile, assign the document the default profile or it will convert the image to the

default profile. With the warning boxes checked you're ask to make the decisions but you will have all three choices to choose from instead of one automated choice.

By selecting Prophoto RGB as my default RGB color space I have told the Corel photo-PAINT X8 RAW converter to use that color space when it opens and converts a RAW Image. The RAW converter supports Prophoto, sRGB, and Adobe RGB 1998. I use Prophoto 48 bit because it is an ultra wide RGB gamut for archiving my images.

Digital cameras in general depending on the price range will produce a file the may not have an embedded profile, use a proprietary profile, use one of several pre-set profiles or allow a RAW capture. The low cost devices that do not embed a profile are most likely using sRGB as their color space. To use these files set your default RGB to sRGB and assign the default color space. For cameras that embed a profile you can make your own choice of what to do from the afore mentioned choices. I always open an image in its color space before doing anything to it. Corel Photo-PAINT by default embeds a color profile for all saved files. After color correction or editing is done when you place your image into a CorelDRAW document, CorelDRAW will automatically make color management choices for you or ask for instructions from you based on your default settings.

The rules to follow are set your defaults to match your output intent, import images into CorelDRAW that match the documents color management setting. Do this by either having images converted to the documents color space before hand, or convert the image to the documents color space upon importation. You can only assign the document color space to images that are already in the documents color space or a color shift will occur.

CorelDRAW Graphics Suite X8

Photography

RAW Files

The RAW file format is different for each camera manufacturer and as such it is not an archival file format. All RAW files should be converted to a wide gamut 48 bit RGB or 48 bit LAB color space for archival. The reason for this is that a RAW file you captured in 2000 may be by 2020 a discontinued RAW format and the software you have to open the file may not run on the current operating systems. A converted RAW file can be saved in CPT, JPG or TIF file format and opened later as these formats are application formats sure to be supported going forward.

The RAW capture works like this, the capture device has a Bayer Capture Pattern that consists of Red only, Green only and Blue only sensors, with twice as many Green sensors as Red or Blue and an assigned bit depth some new state of the art high cost capture patterns are 16 bit patterns. These sets of sensors produce a Grayscale image for each sensor bank color, that's three individual Red, Green and Blue grayscale images. All digital cameras work this way, only some allow you to intercept the RAW data before the camera itself converts these three grayscale images into what we see as color.

A RAW converter reads the manufacturers file format and then handles the rendering of the data into color itself. RAW files cannot have a color space nor an ICC profile until after they are converted to RGB

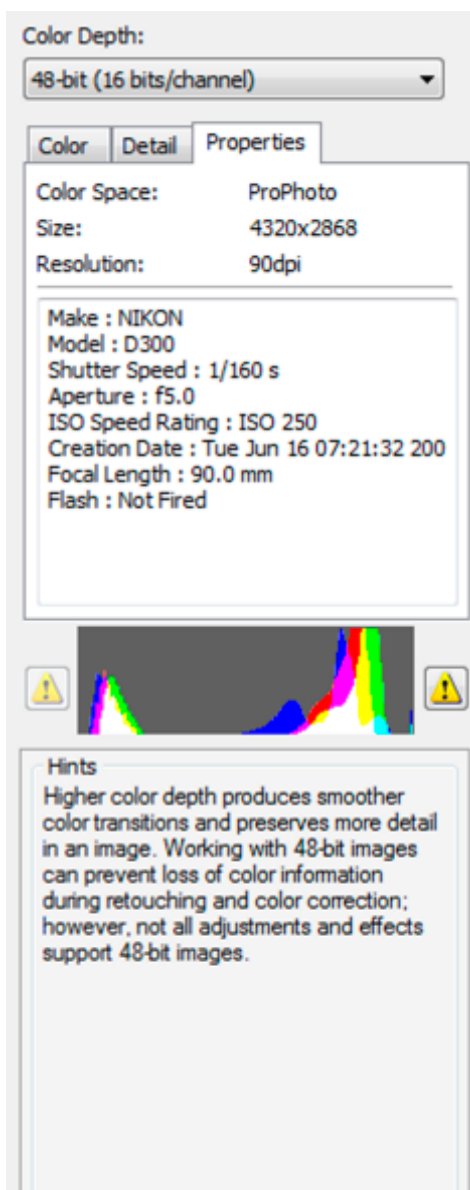
however the RAW converter must have a destination RGB color space in which to create the rendering into. I convert all my RAW files into 16 bit Prophoto RGB files as this is an ultrawide gamut RGB color space that has the potential for some longevity.

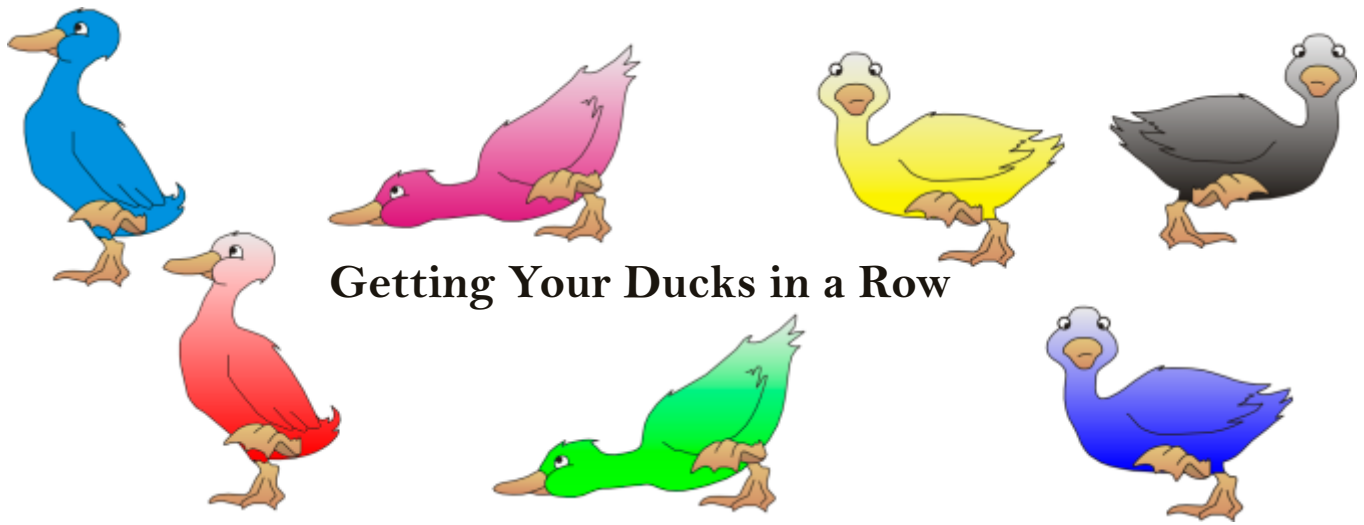
As you can see by the capture to the left the RAW converter in Corel Photo-PAINT displays in the properties tab that I used a 48 bit conversion to the Prophoto color space.

One can argue RAW conversions all day but the facts are what they are, when you get a RAW file you have no visual electronic reference of what that original was supposed to look like. If your discussion is about professional photographic captures you will have a tough time using a laptop computer. A calibrated display, with a controlled ambient lighting conditions is an ABSOLUTE MUST! Unless what you're doing is sRGB web and presentation work I'm talking about using an EYE One Pro spectrophotometer as a minimum with display and print device color calibration for professional level photographic work.

Is Corel Photo-PAINT capable of such work? Yes! Corel Photo-PAINT X8 is the only image editing application that can archive true 48 bit RGB images. I opened and converted as shot (converter defaults) twenty images in all several programs. My test parameters are a twenty two inch high resolution Trinitron CRT calibrated system. I calibrated using Gretag Macbeth Profile Maker Pro, a 5,000 kelvin ambient light condition with print handled by a fully calibrated Epson 4000 Stylus Pro printer.

My results were that sixteen out of twenty images when converted as shot were to my judgement converted to a more pleasing color by Corel Photo-PAINT X8. After all my reading quite frankly I was pleasantly surprised. Basically the same test I did for X5 with similar results.





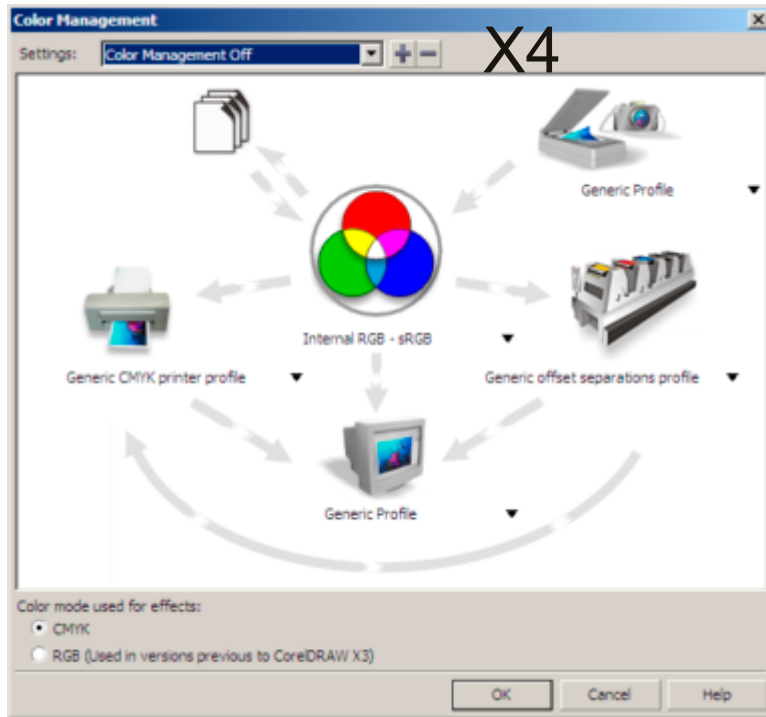
Matching X8 to X4 Preset Color Management Settings

Color coordination between X4 to X8 has a few interesting aspects, namely the fact that the Corel generic profiles that shipped with X4 are no longer shipping in X8, if you are an owner of X3 or X4 they are available on your system or at www.graphicstechnology.com. I have renamed the file names as Windows explorer sees them to the name that X8 will see in the color management dialogs. These profiles displayed under different names in X4 but I have separated them on my web site to make it easy. Also the Kodak Color Engine that has shipped with Corel for many releases is not present in X5, X6 or X7. Lastly CorelDRAW X4 and older versions used automatic rendering which was saturation for vectors and perceptual for images, an error that CorelDRAW X8 and later does not duplicate.

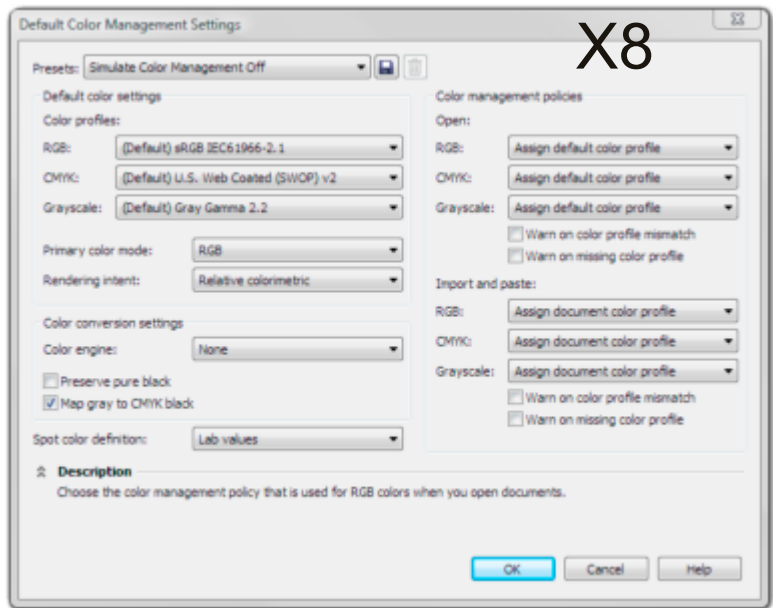
These pages display captures of the main color management dialog from X4 accessed under the tools menu/color management. The X4 captures depict the five preset color management settings that shipped with X4, the corresponding X8 color management settings appear on the same page.

The captures from X8 are of the default color management dialog accessed under the tools menu/color management/default settings, the new document color dialog accessed under the file menu/new document and the options, display dialog accessed under the tools menu/options/display.

Color Management Off



X4

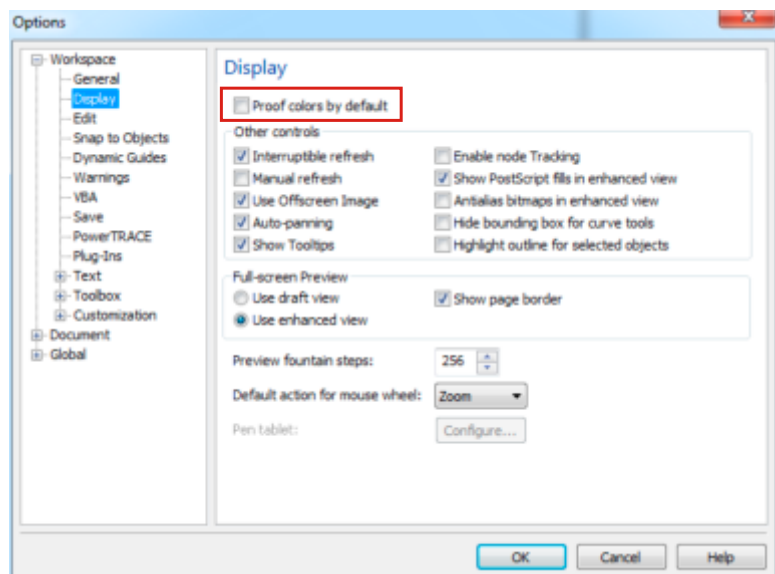
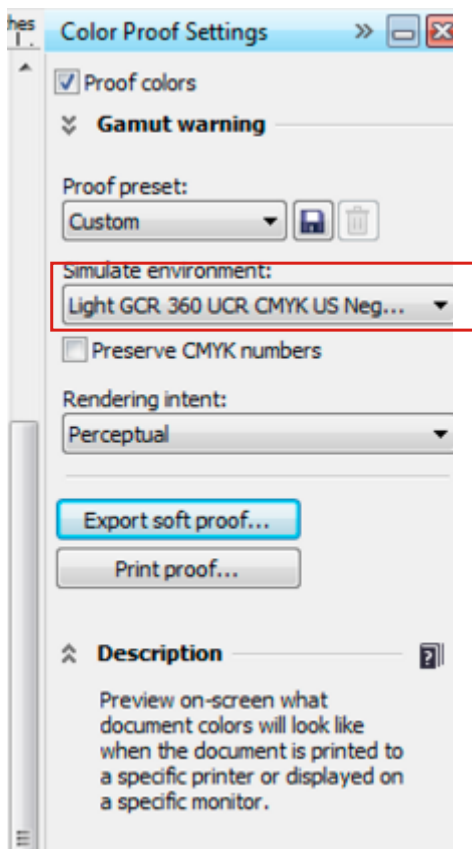


X8

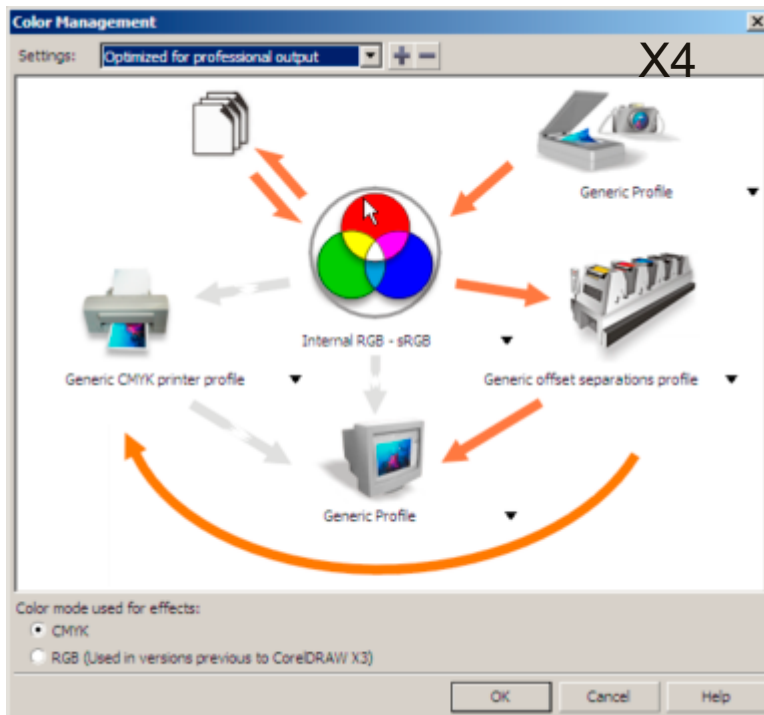
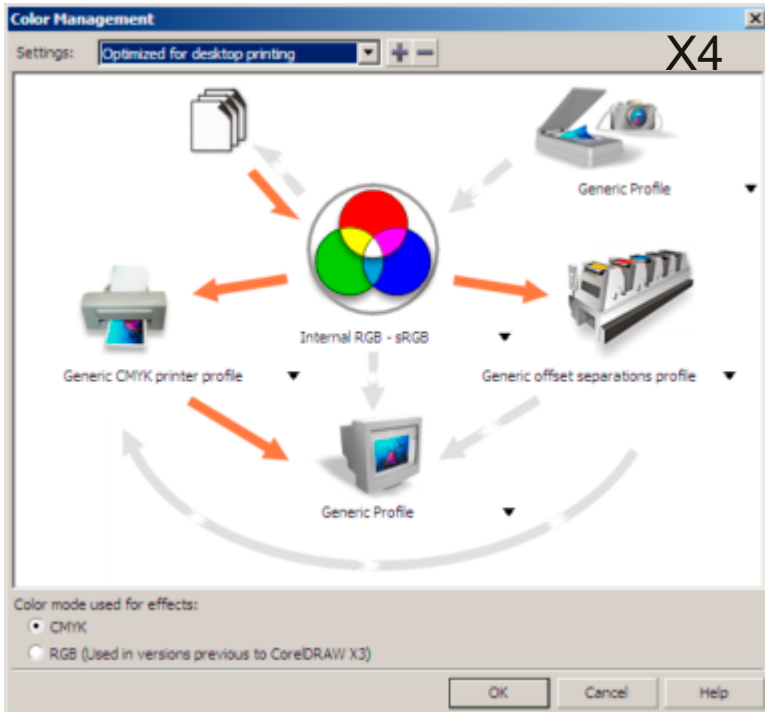
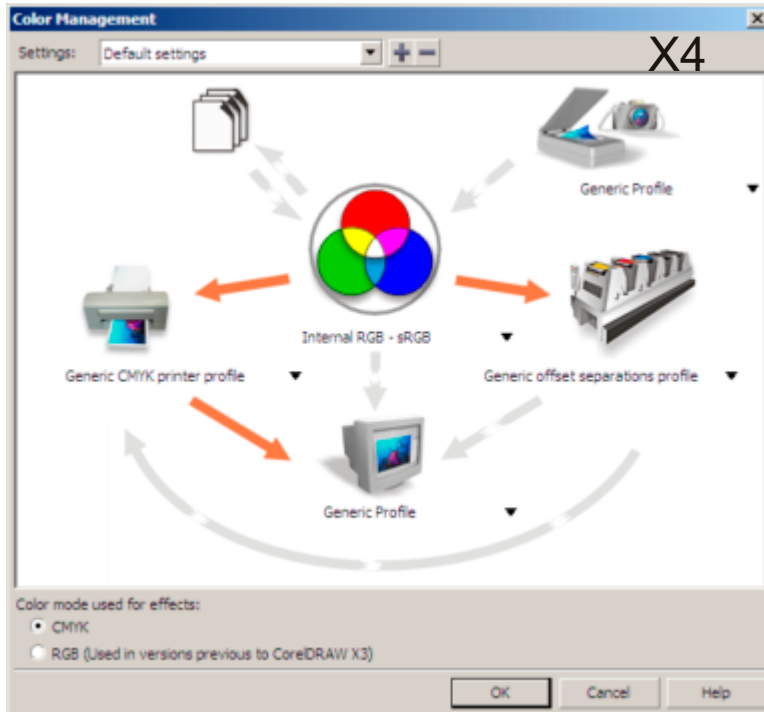
Use for LASER ENGRAVING

To match the default, optimize for professional output and optimize for desktop printing color management settings of X4 in X8 requires that **soft proofing be turned on in X8**. The simulate environment profile selected in the color proof settings docker must match the generic CMYK profile used in X4. In X8 and newer the generic CMYK profile used in X4 displays as Kodak swop proofer cmyk coated stock. ICC the proof color settings and display options dialogs are shown below.

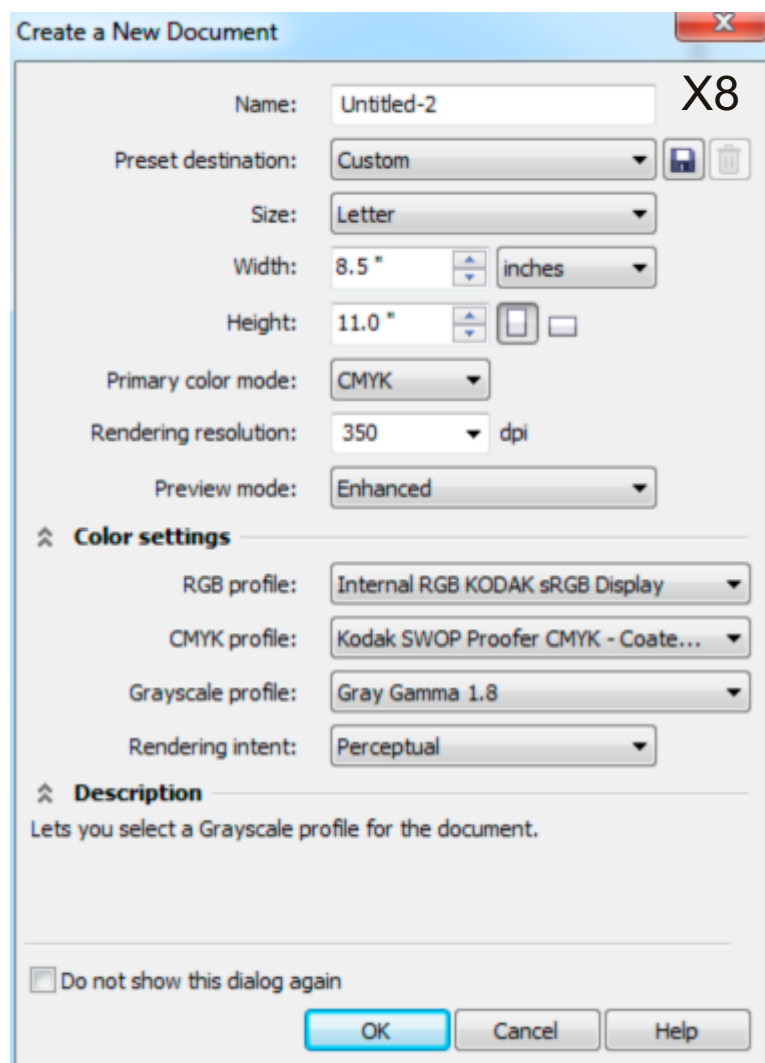
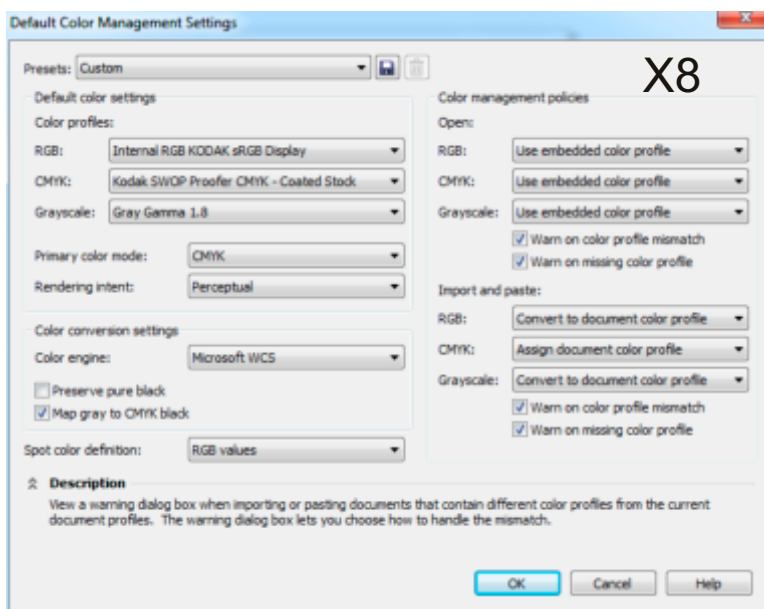
The X4 generic internal sRGB displays in X8 as internal RGB kodak sRGB.ICC this profile must be used in X8 as the RGB color profile if you want to match X4's RGB display, X4 required that the display profile be loaded in the color management dialog, X5 and newer picks up the display profile from the OS.



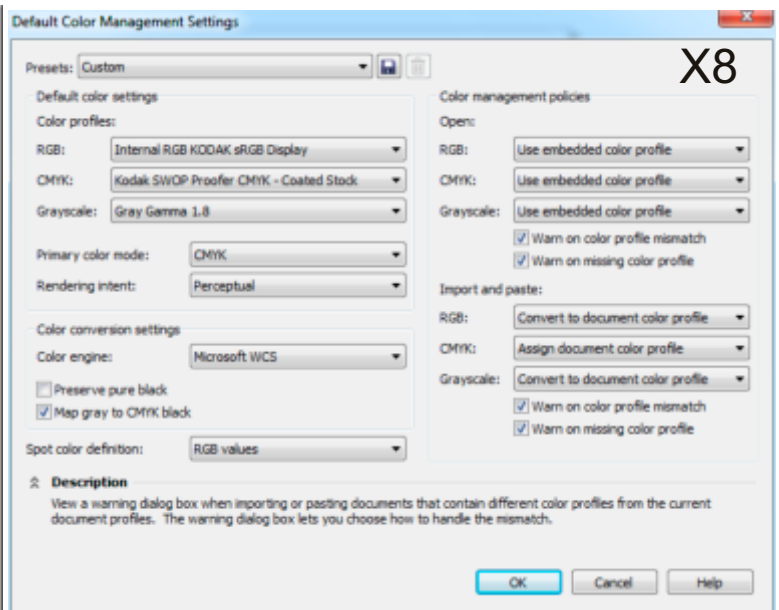
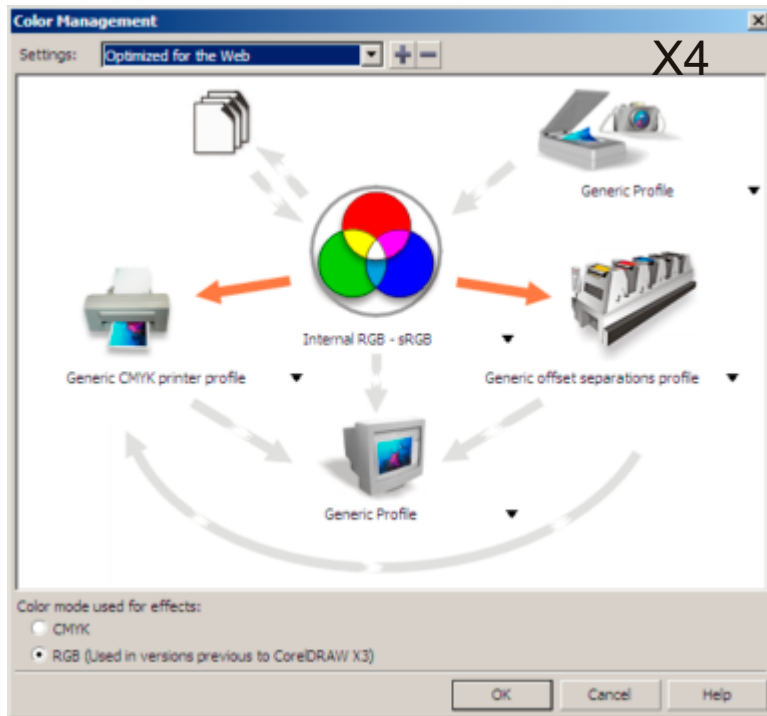
Soft proofing on for all press desktop printing and default X4 color management settings



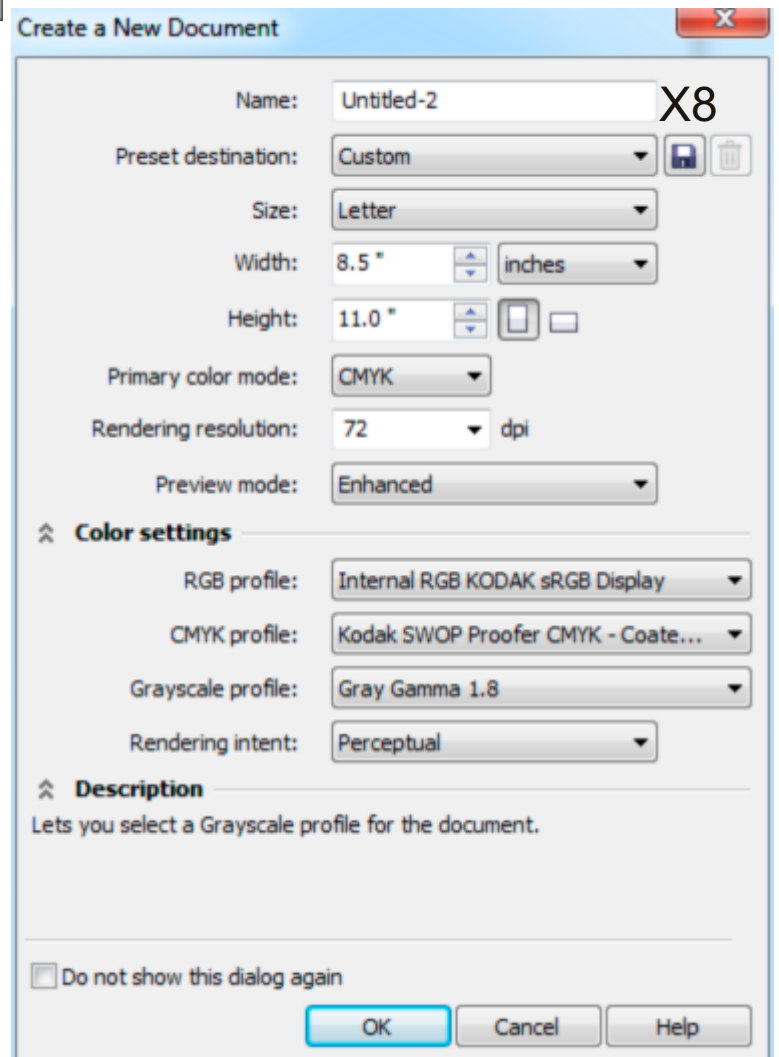
Soft proofing on for all press desktop printing and default X4 color management settings. Match the settings shown in X8 captures below, except the color engine in XP, if you were using Windows XP, if you were using Windows XP then you will have no perfect match option. X8 runs only on Windows 7 through 10.



Web

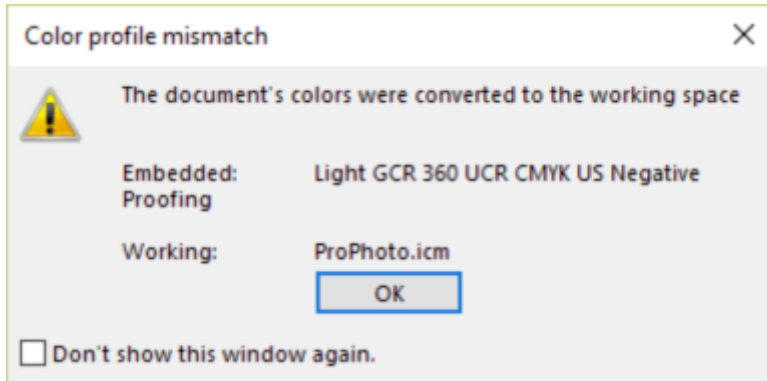


Soft proofing off! Match the settings in these X8 dialogs, except the color engine in XP if you were you will have no perfect match option.



PaintShop Pro X8

PaintShop Pro X8 is an application based color managed image editing application, what that means is that you must change the file to the applications color space or change the applications color space to match the file. For files with embedded profiles it will honor the profile AND CONVERT the images color space to the applications pre selected working color space, RGB only no CMYK support.



As shown to the left by default the Color profile mismatch dialog will appear when you open a file which has an embedded profile that does not match the settings in PaintShop Pro, identifying the color profile of the file that you are opening and the profile PaintShop Pro uses as its working space and it is asking your permission to convert it to the working color space of PaintShop Pro.

I understand that one might think it odd to start this discussion with the mismatched profile dialog that you may get when opening a file.

However with application color managed systems you need to understand that concept before you can understand why you need to make the choices you'll make later in the applications color management dialogs. Experience teaches you that some times to begin you need to consider the end.

With that said before you can consider the color management settings you can reduce that amount of work you need to do by thinking about where your files will go and what color space is required.

**BEWARE USING THE JPG FILE FORMAT IS DESTRUCTIVE TO THE FILE CONTENTS
FOR MULTIPLE SAVING OF THE FILE USE PSP OR TIF
FOR INTER APPLICATION FILE TRANSFERS USE TIF**

Does your work consist only of your photography? If so a RAW work flow will leave your color management options open. Setting PaintShop Pro to prophoto RGB allows you to open and save your files in an ultra wide gamut RGB for archival purposes keeping these files as wide a gamut as possible for use when technological improvements provide better output options. PaintShop Pro X8 has a RAW LAB to accomplish this. You can open those files at any time in PaintSop Pro, converting to a smaller space like sRGB for email or output to a photo LAB. You also can open the files in Corel Photo-PAINT X8 or AfterShot Pro 2 allowing the professional document color managed process for professional level print graphics.

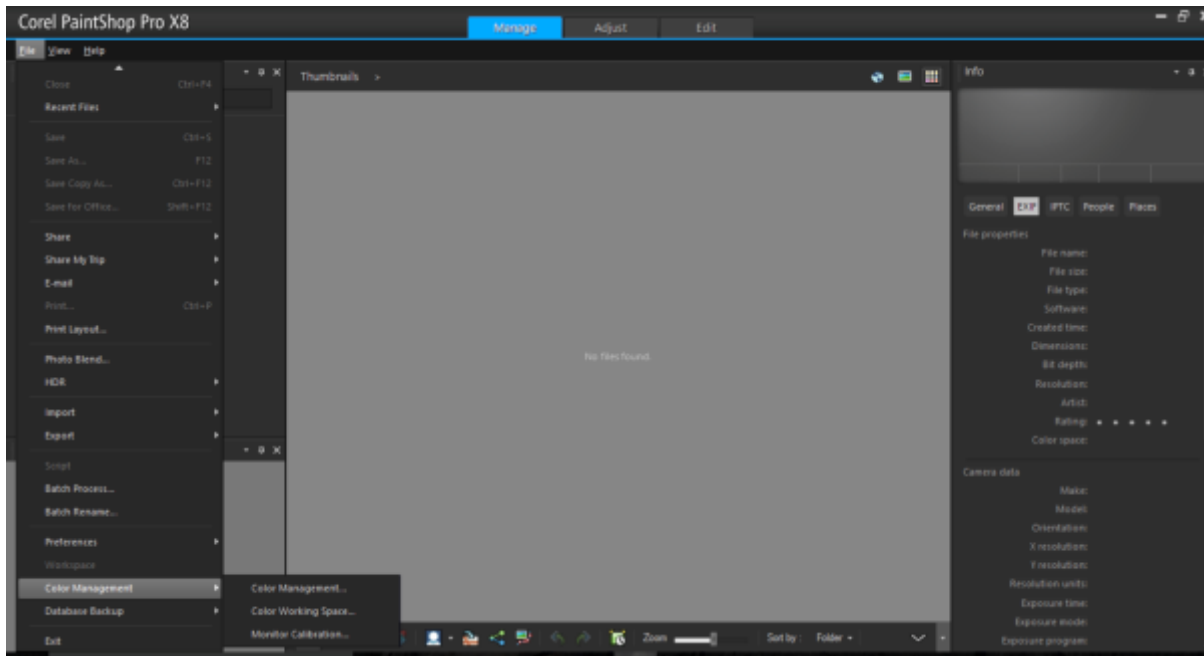
Your camera may not support RAW but it may support a wide gamut color space setting, applying these settings in your camera my allow you to archive the files in a wide gamut space on your hard drive. You can then set PaintShop Pro color management to match that color space for editing you can also set PaintShop Pro to a smaller gamut space like sRGB allowing the conversions to take place when you open the file.

PaintShop Pro X8 can be a significant tool for use in professional graphics for print work flows, while PaintShop Pro has tools specialized for the photographer and hobbyist user many of those filters available for image correction are perfect for use on the modern fast paced images often received for quick banners and other output.

PaintShop Pro is also well suited for use as a front line RGB image editor for high end professionally taken photographs for print production work flows. With proper color management settings files can be opened, specific PaintShop Pro only features can be used on the files and images passed along as TIF files to CorelDRAW, Corel Photo-PAINT or AfterShot Pro 2 for professional for print output.

PaintShop Pro X8

PaintShop Pro X8 color management setting as shown in the capture below are located in the file menu. The easiest way for your color profiles to show up in the application is to make sure they reside in this directory **C:\Windows\System32\spool\drivers\color** - on your computer.

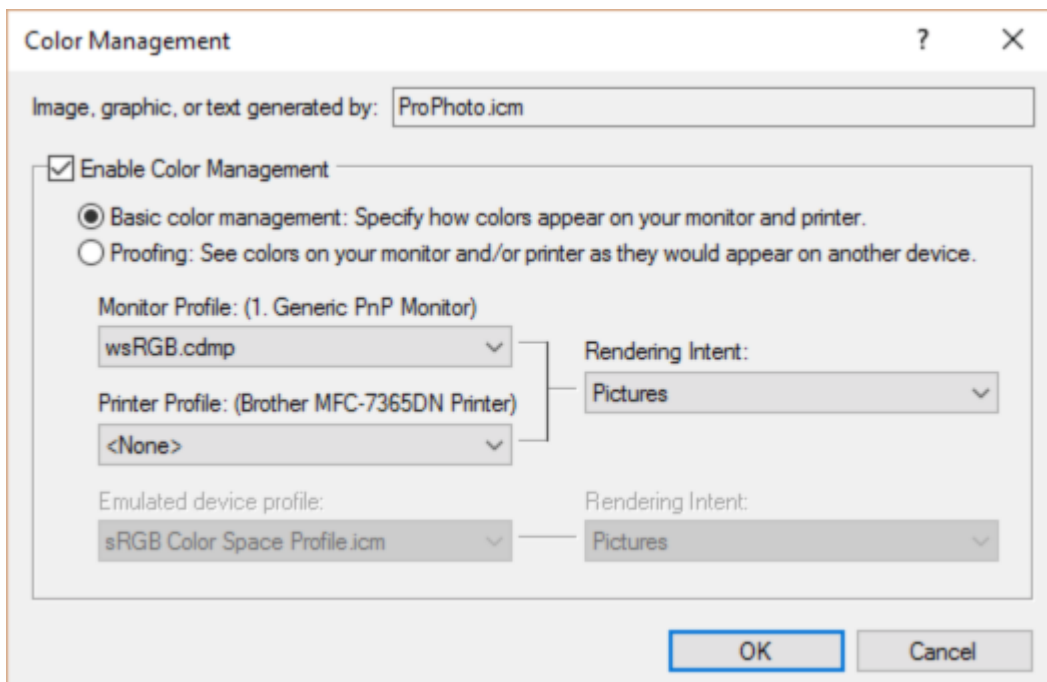


The first selection color management brings up the dialog below, checking enable color management the image, graphic or text generated by ICC profile you see here is actually picked up by the selection you make in the next dialog box, go figure. With that said the monitor profile drop down will show you the profiles available in Windows as is the printer profile. So these setting need to be checked via Windows color management dialog.

The rendering intent choices are pictures, (perceptual) proof, (relative colorimetric) graphics, (saturation) and match (absolute colorimetric). Why the actual proper names for the rendering intents was not used is only a guess as it does not match those listed in Windows. You will find that as you're using

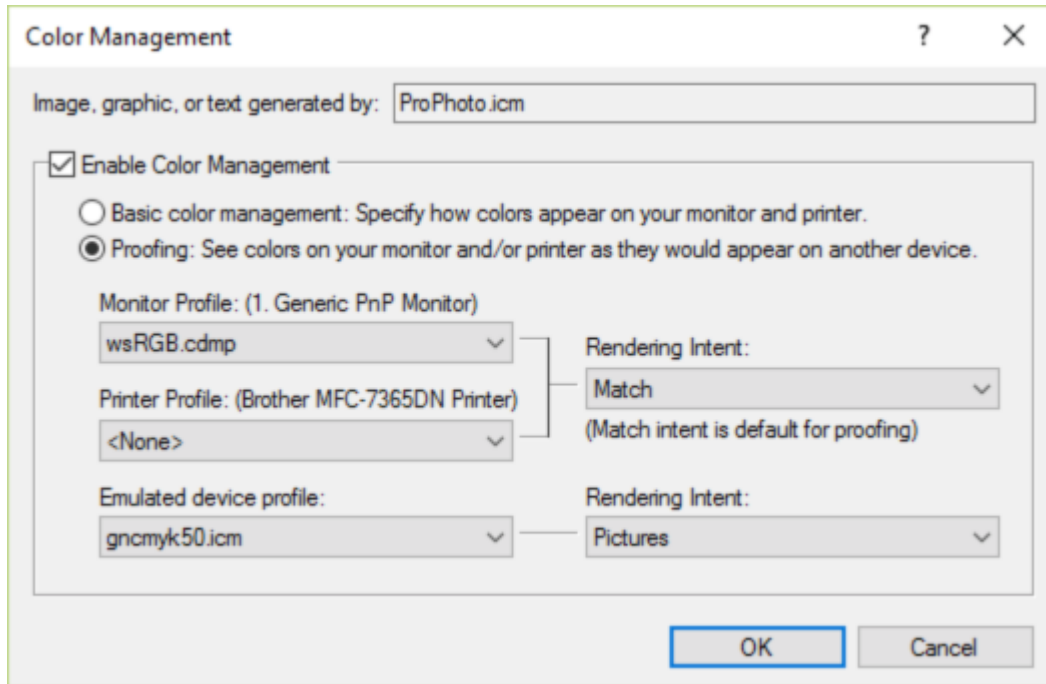
an image editor and as such you are most often using wider gamut color spaces then most printers can reproduce perceptual rendering, Pictures will give you the best results. ‘

You can refer to the section definitions and overviews pages 8 to 15 for more detailed explanations of rendering intents and color spaces.



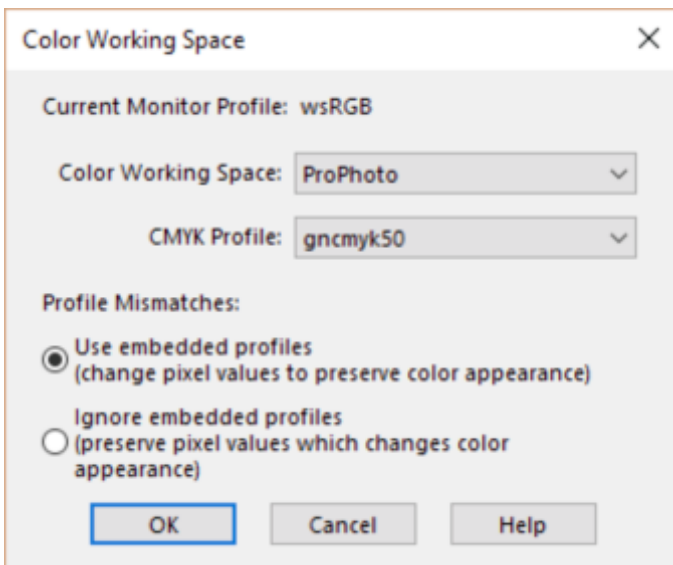
PaintShop Pro X8

The proofing selection from the color management dialog will also show the profiles selected in the



next dialog. I issue a strong warning here, SOFT PROOFING IS A DUBIOUS TASK for systems that are not properly calibrated and for users not specifically trained for it. Also the emulated devices are in general of the CMYK nature and editing to CMYK destinations using RGB controls is not for the untrained. With that said you can select proofing and a profile for a destination, however what you see many times is not always what you get. In PaintShop Pro X8 you cannot convert an image into a CMYK color space. You can emulate other spaces and other displays also the picture

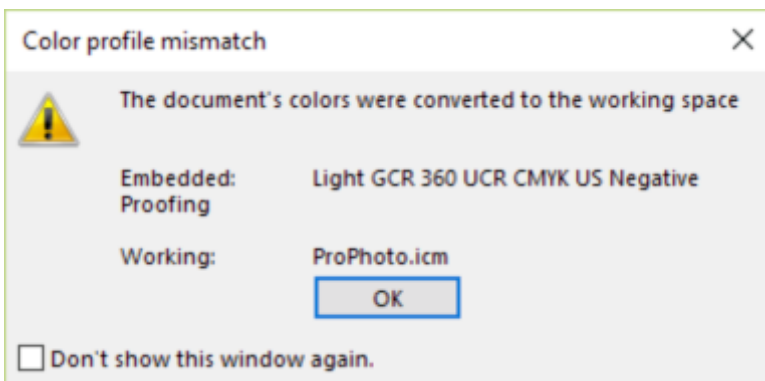
rendering intent is my suggested rendering.



The color working spaces dialog below middle left in my opinion should have been the first one shown in the color management file menu except that you must enable color management first in the color management dialog.

However except for the monitor the choices made in this dialog are the working spaces and soft proofing spaced used in PaintShop Pro X8.

This is the RGB color space where all PaintShop Pro files reside, all files opened into PaintShop Pro that have embedded profiles will be converted to. All images opened into PaintShop Pro that do not have an embedded profile will be assigned this RGB color space.



CMYK profile is the color space used for soft proofing. This dialog is also where you tell the program how to handle profile mismatches when you open files, the explanations in the dialog for how the choices affect the images are correct and self explanatory.

Which brings us back to the Color profile mismatch dialog which is where we started our conversation on color management for PaintShop Pro X8. You will not see this dialog if there is no

mismatch or if the image being opened has no embedded profile. When there is no profile the working RGB space is assigned to the image, the RGB numbers do not change but the display might if the images native color space is different than PaintShop Pro.

PaintShop Pro X8

The color profile settings for traditional work

1. Web, office applications, e-mail and traditional standard photography - sRGB
2. Photo archival RAW files prophoto RGB 16 bit
3. Images for traditional print in the U.S. Adobe RGB 1998 - Europe ECI RGB

The peculiarities of this program is that it's application color managed so when you set up the color management in PaintShop Pro X8 you need to understand that it's going to be project specific.

1. I.E. your working on a project for the internet so you set to sRGB and all you files will then be (in terms of color management) internet ready.

2. If working on images for editing later in Corel Photo-PAINT, set the PaintShop Pro working RGB color space to match the one you'll be using in Photo-PAINT to remove any unnecessary conversions.

3. The process is step two also applies to PaintShop Pro images to be imported in CorelDRAW.

4. If your project is for a photo lab ask the lab their requirement and then set the working RGB in PaintShop Pro to that setting.

AfterShot Pro 3

Corel AfterShot Pro 3 is a professional level non-destructive image editor that can also open JPG and TIF files, it's major function is as a RAW converter published by Corel Corporation, it is a complimentary application to their professional level CorelDRAW Graphics Suite as well as their consumer level PaintShop Pro.

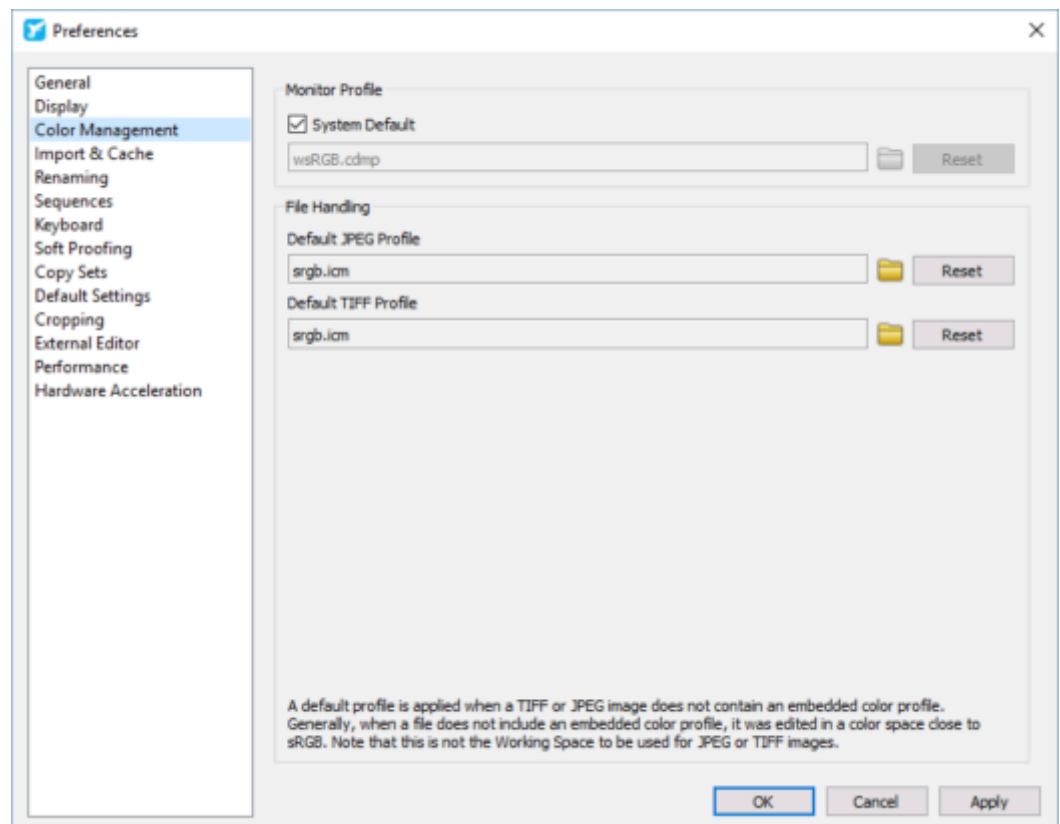
There is no specific RAW file format each camera manufacturer has it's own format and in some cases have individual formats for different cameras.

RAW in general works like this, all color capture devices work via a Bayer capture pattern with Red, Green and Blue receptors, there are twice as many Green receptors as the other colors as humans are more sensitive to green. Essentially the capture pattern produces three grayscale data streams and the software interprets them into a single RGB color data stream. Digital cameras who do not allow the user to intercept the RAW data have built in RAW converters to produce their useable JPG or TIF files.

The advantage of RAW is that the user can receive this unaltered data and manipulate it in a non-destructive way, in short you can always go back to the ORIGINAL CAPTURED DATA, never is anything lost. The major advantage is that the controls available to the user via AfterShot Pro 2 are vastly superior to the conversion to color by any camera. I personally have hundreds of images that I once would have trashed that were saved by AfterShot Pro.

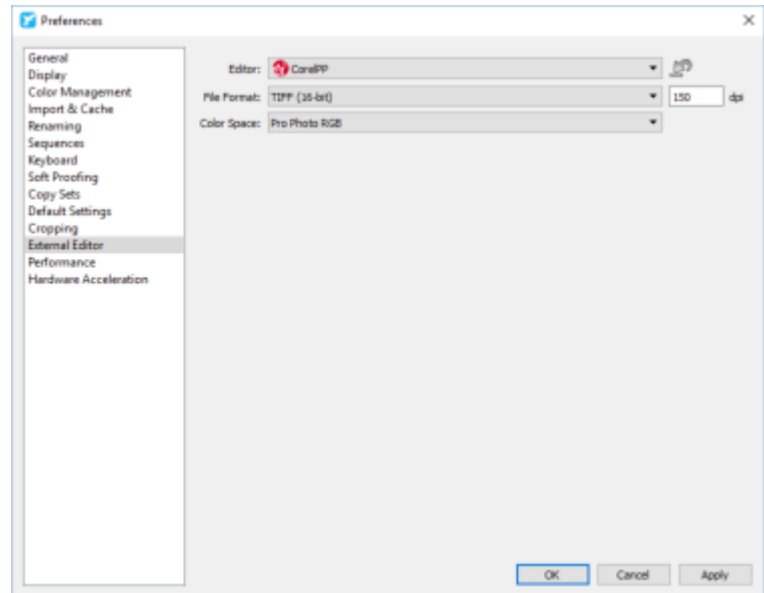
As RAW files require no color management the application has to interface color management into the resulting RGB data stream. The application also allows the editing of TIF and JPG files already converted to RGB so it also has to interface with embedded profiles withing these file formats.

Under the file menu preferences select color management and you'll see the setting shown in the capture below, AfterShot picks up the default monitor profile from Windows and allows you to choose the default color profiles for jpg and tif file formats

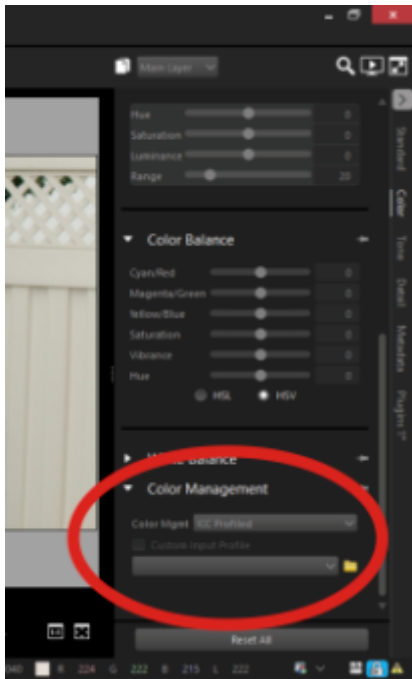


AfterShot Pro 3

Farther down in the preference dialog you'll see the External Editor selection and you can pick the external editing application, the file format and the default color space of that external editor.

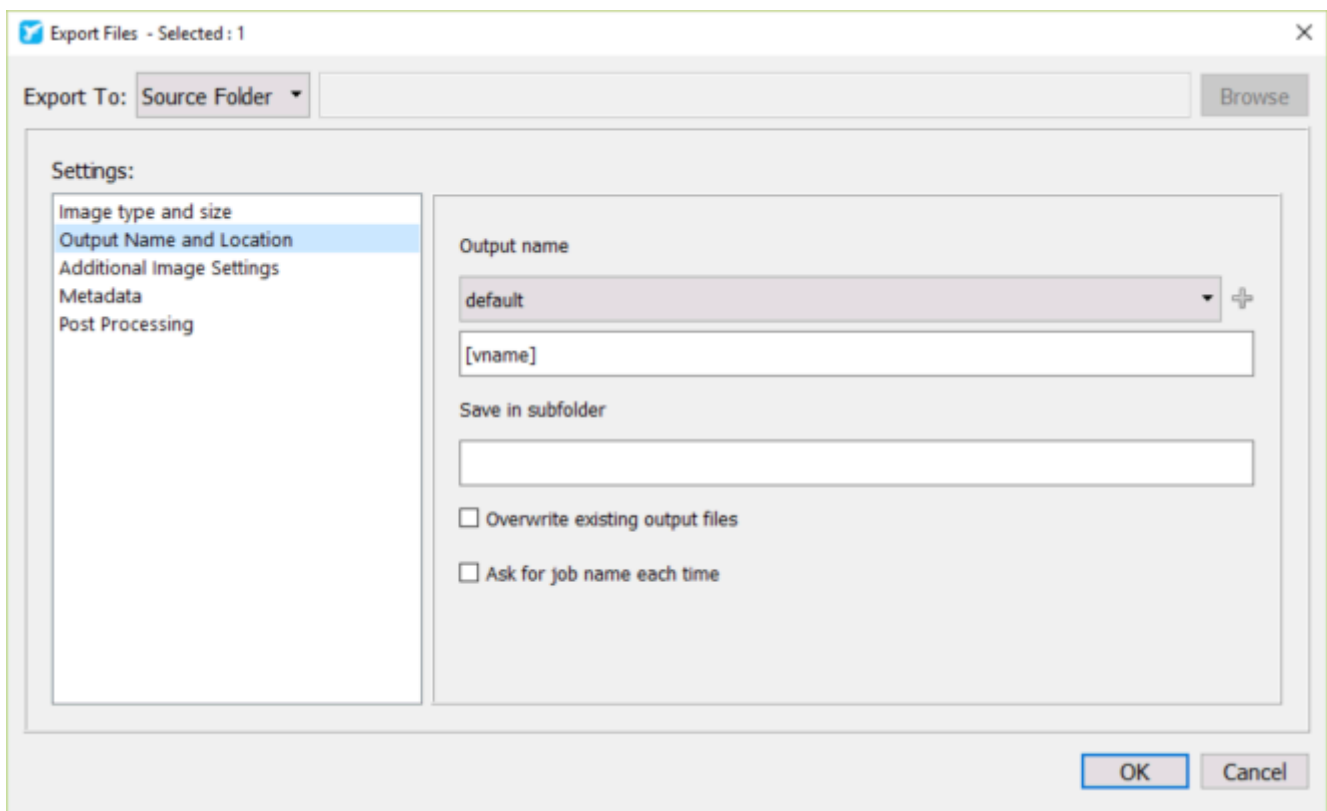
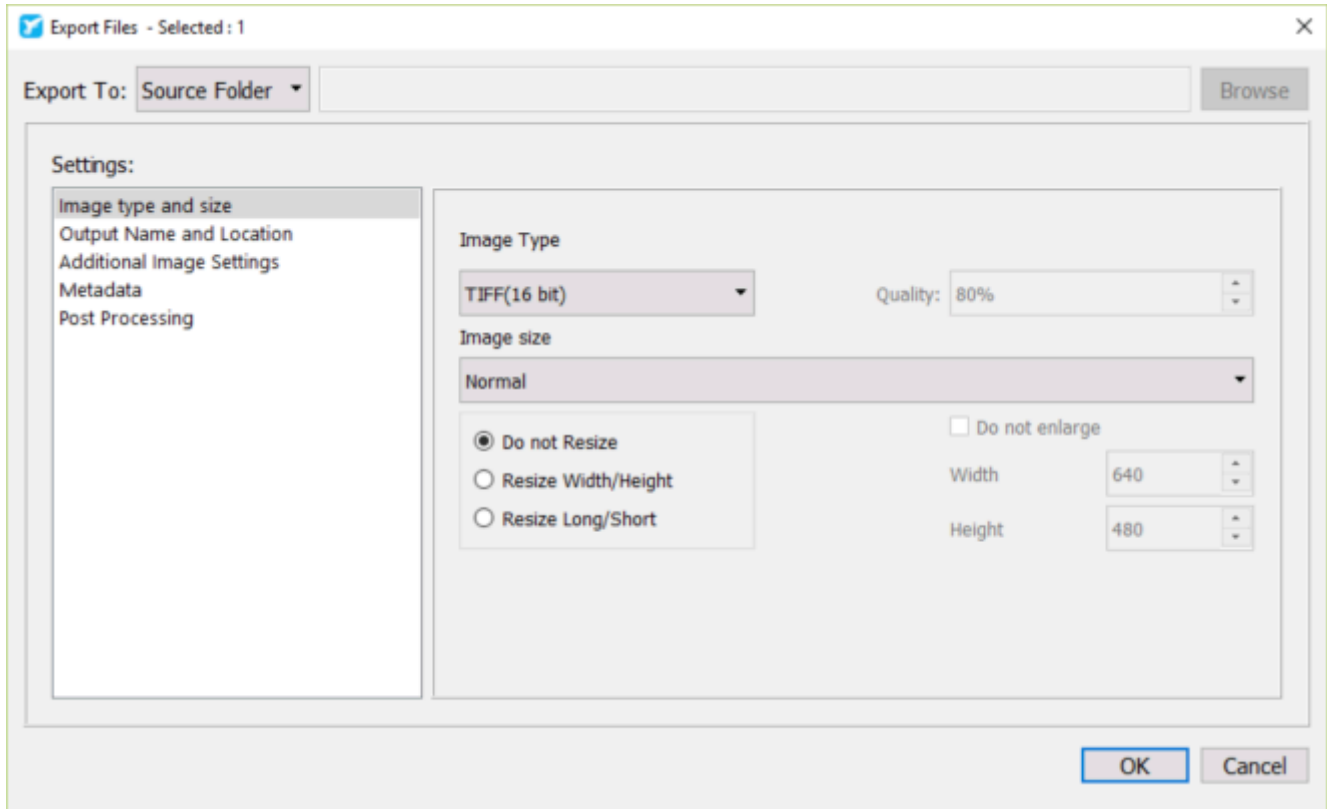


In the application interface shown in the capture directly below, circled in red you choose the application to be ICC profiled and below that you choose the ICC profile of the TIF and JPG files you open into AfterShot Pro. The selection here needs to be the profile for the color space already assigned to the images you're about to open in AfterShot Pro.



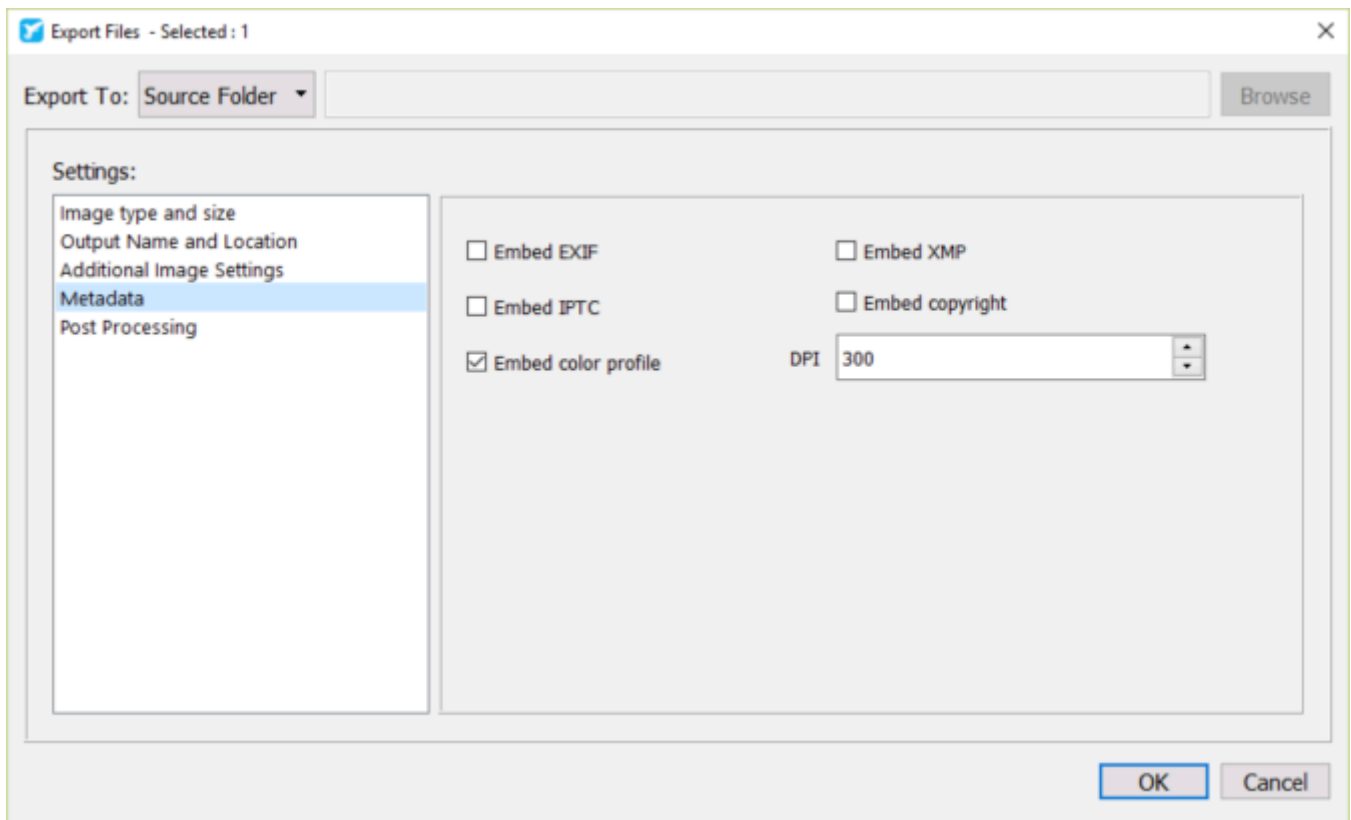
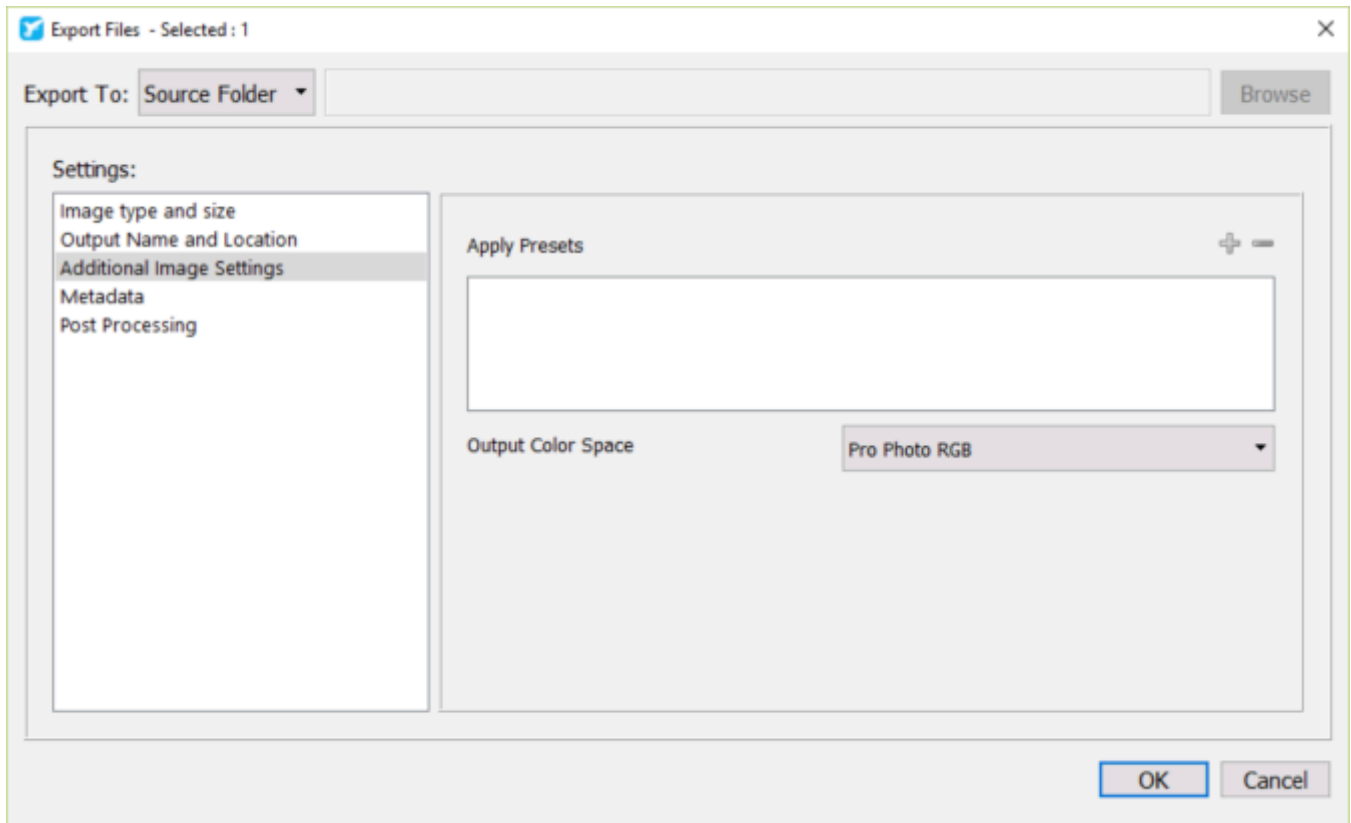
AfterShot Pro 3

From the file menu, export, the export to dialog appears you'll find the dialogs shown below, not all are color management specific but I include them for clarity.



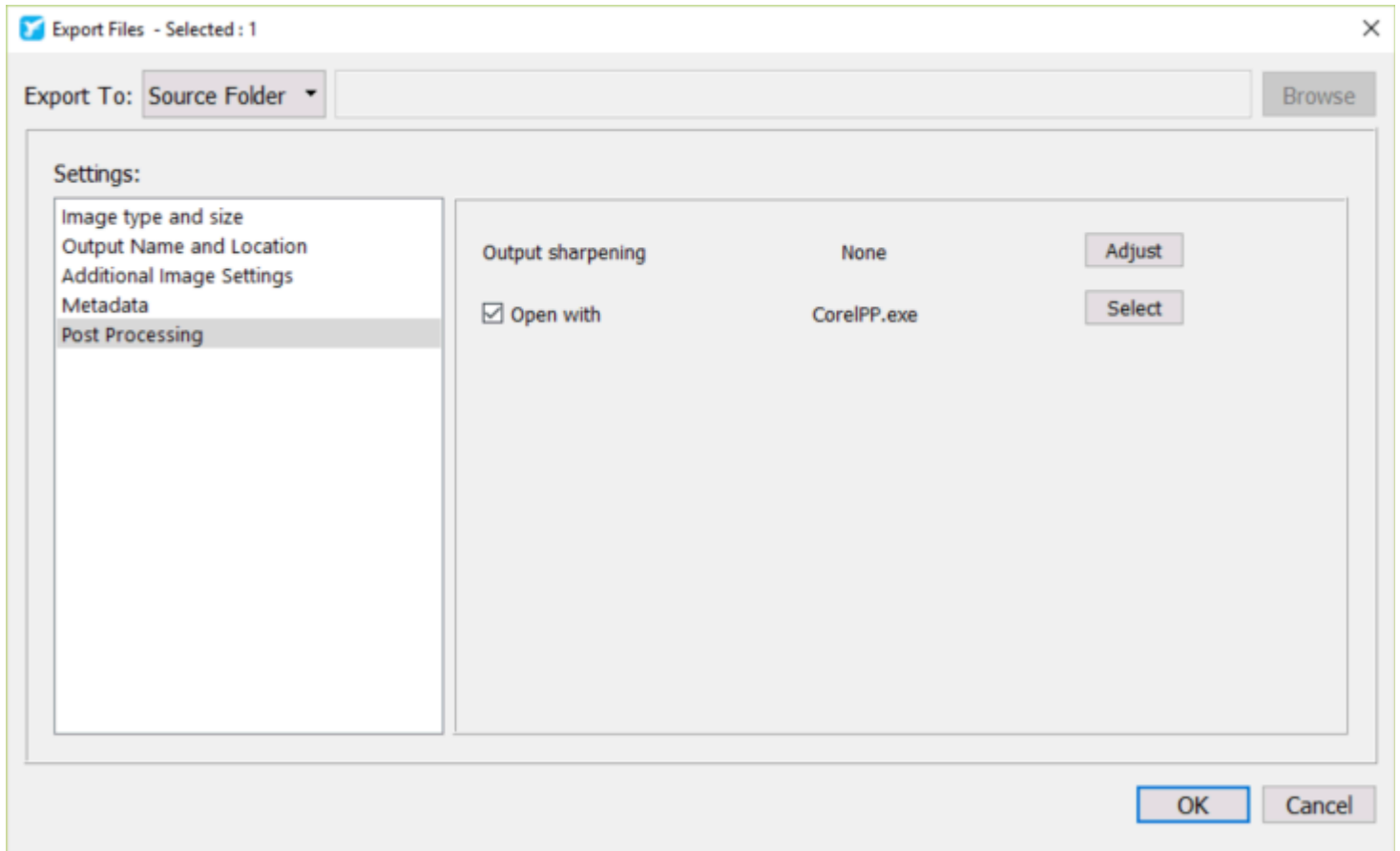
AfterShot Pro 3

Additional settings for the export dialogs are below.. The top one shows the prophoto RGB color space selected for the output file, you may use your preference. The lower dialog shows the embed profile dialog checked. This embeds your selected choice in your output file.



AfterShot Pro 3

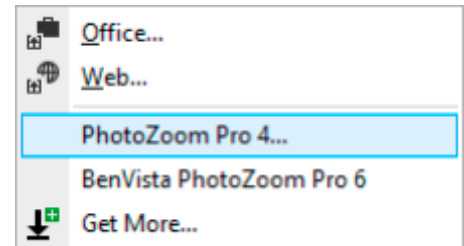
The final dialog below shows the selected external editor.



PhotoZoom Pro 4

PhotoZoom Pro 4 is a utility that ships with CorelDRAW X8 that works with Corel Photo-PAINT X8, it allows the UP SAMPLING, (increasing the resolution) of image files. It is a non-color managed utility and WILL NOT AFFECT THE COLOR of your image. However when you use this utility you must re-save the file, I use the TIF file format and then open it in Corel Photo-PAINT and select save as and assign the color profile used in the original image in Photo-PAINT's color profile to the file, I always use the TIF file format.

PhotoZoom Pro 4 is accessed in Corel Photo-PAINT under the file menu/export for.



The PhotoZoom Pro 4 interface is shown below, it shows the image you're working on, it's self explanatory except for the aforementioned color management. I suggest you test it using small images and during the test process enlarge images slightly to get used to the dialogs. Processing files that exceed 1.2 GB is time consuming.

If your original image is of very high quality to start with you may be able to get a 10X enlargement for use in a banner. I.E. a 6" x 4" 300 PPI image at the 100 PPI will already be 3X, 18" x 12". So you may be able to get a reasonable image at 60" at 100 PPI or 10X original on a banner..

In this case PPI and DPI can be used as interchangeable.

