

PRINT PROFILING NOTES

The following notes are a simple and relatively superficial description of print profiling for those not motivated to delve deeply into the science. A very thorough explanation on every aspect can be found at : <http://www.cambridgeincolour.com/color-management-printing.htm> There you can find out, for example, about the difference between Perceptual and Relative Colourmetric Rendering intent and a great deal more.

1. Why are Print Profiles necessary?

Answer: They are not necessary if you do not require your prints to appear the same as how they appear on your computer screen and/or you are not concerned about print accuracy or quality. Alternatively if you are happy to waste paper and ink by continually adjusting image tone, saturation and contrast settings each time you make a new print. Also if you have your prints produced commercially rather than using your own printer.

2. What is the First and Most Important step to print quality?

Answer: Have your screen calibrated and regularly checked. This applies whether you print your own or use a commercial printer.

The subject of screen calibration is covered elsewhere; nevertheless it is important to set up the screen calibration to take account of the ambient viewing conditions. Screens are generally set up by the manufacture to present images with a 'wow factor' (a bright, high contrast saturated image). You cannot produce a print to **exactly** match the standard screen setting under all conditions. This is because on-screen images are viewed by transmitted light from a source behind the screen. Prints are viewed by light reflected off the paper's surface.

3. What can be done?

Answer: 1. Unpredictable and unsatisfactory results can be eliminated by adopting a consistent approach to assessing prints. Because prints images rely on reflected light the image will be influenced by the nature of the light source. Prints will look different if the light used to illuminate the print is, for example, from a tungsten table lamp rather than daylight from a window on a dull day*. Hence in determining print results you must be consistent in the light source you use to view your prints. Many opt for a 'daylight' lamp source which provides a good compromise. After all you may judge your prints using daylight and viewers may judge them in a gallery, or in their home using artificial light.

What you must avoid is using light which is spectrally unbalanced to judge prints. Many fluorescent and 'eco' lamps will be deficient in this respect unless you specify a 'daylight' lamp.

Changes in print appearance are influenced by the colour temperature in several ways.

First by the obvious effect of a 'warm' source' making the whole print appear warmer (or cooler if the light source is 'cool', such as a cloudy day).

Secondly because there are gaps and peaks in the spectral output of many light sources (e.g. fluorescent and discharge lamps) sky and vegetation may appear unnatural and, other colours, shifts in hue.

Thirdly. Depending on the paper and ink combination some of the dyes in the print can display different hues depending on the light source. These changes can be inconsistent for different dyes within the print. These shifts are described as metamerism*

***Note:** *This is very simplistic: Colourimetry is a complex subject. The appearance of surface colours is defined by the product of the spectral reflectance curve of the material and the spectral emittance curve of the light source shining on it. As a result, the colour of surfaces depends on the light source used to illuminate them. metamerism of reflective materials is complex. It is not necessary to understand all this. Just maintaining a consistent wide and even spectrum light source for print evaluation is enough for all practical photographers. Professionals concerned with fashion and food photography must be much more meticulous.*

Answer 2. Reduce the contrast and saturation of the monitor display to more closely match that of your prints which depend on reflecting the incident light off their surface. This means that your slide shows and DVD films will appear rather lackluster. You have to decide what your priority is. Alternatively, as many keen and all professional photographers, use a monitor dedicated to your photographic work. Most monitor calibration tools provide the facility to adjust the screen for brightness, contrast and ambient light.

Answer 3. - Profiles. Now that you have grasped the importance of calibrating, and toning down the lovely vibrant and brilliant screen that makes your pictures so attractive, you can move to the next stage in achieving print quality.

Instructions on how to print an image file are embedded in a directory in your computer.

These instructions are called profiles. Computers come with a generic profile which is set for some notional median printer. The manufacturer has no knowledge about which printer will be used and even less about what paper and whose ink you will use.

Nowadays manufacturing standards are such that an acceptable print quality can be achieved for general purposes. You as a photographer with your own printer do not fit this category.

For accurate printing we need specific profiles for the particular printer, paper and ink combination. Printer manufacturers provide generic profiles which are a reasonable match for each of the paper media types they manufacture, provided you use their inks as well.

What are the options?

1. Use the print manufacturer's settings for the different types of paper (media). This is an automatic process which may work reasonably well if you use the manufacturer's paper and ink.

2. As above, and what follows, applies to all subsequent instructions, set your photo editing application to control print colours. (In Photoshop the dialogue window opens when you select 'Print'. There are three options in PhotoShop: Let **Printer Manage Colours**, let **Photoshop Manage Colours** and **No colour management**. Let **Printer manage colours** is the default.

Select **Let Photoshop manage colours**. Another dialogue window, titled **Printer Profile** is located below. Clicking on this window will open up a large list of profiles, some of which were loaded with the computer's operating system and others when you installed the printer driver software. These profiles will match up with the print manufacturer's media and ink. Deciding which is correct can be a little difficult because they usually employ an abbreviated code. (e.g. for Epson PRO 3800 printer the profile is listed as **pro38PGPP** which translates as PRO 3800 Premium Glossy Photo Paper, similarly **pro38EMP** stands for PRO 3800 Enhanced Mat Paper.

Select the appropriate profile and then click **print**. The next box will ask you to select the correct paper media and offer a choice: **Automatic, Photo Enhance, or Custom**. Since you are in control you select **Custom** followed by **Advanced**. On clicking **Advanced** another window with a large number of options opens up. Move to the **Colour Management** buttons and select **No Colour Adjustment**. This is very important. If you leave as automatic the printer and Photoshop profiles will interact in an UNPREDICTABLE WAY!

Now all this may seem complex but will become simple with practice. Furthermore if you are never going to vary the print media or just use two or three, say Gloss, Lustre and Mat you can save settings with your own easily remembered description.

The method described in **2.** above will give you excellent and consistent quality if you have properly profiled your monitor and never deviate from the manufacturer's media and ink. However if you wish to use other manufactures papers and inks, for best results, you need to use appropriate profiles. What are the next options?

3. Download from the paper manufacturer's web site generic profiles. All paper manufacturers supply profiles for their range of papers matched to all the popular photo printers. You have to scroll through the options and select what is appropriate. Often the profile is in a 'zipped' folder and you should save to your desk top and then open the file. Usually this is automated and the file is loaded in the appropriate directory location on your computer. Take note of the profile descriptor before you load it since you might have difficulty recognising it when you open the 'select profile' window. (e.g. APJ_OEM3800PK_Oyster_PLPP_v1 stands for Permajet generic profile for their 'Oyster' brand paper when printed on an Epson PRO3800 printer set to Premium Lustre Photo Paper and using Photo Gloss ink).

You may have to do this yourself with some suppliers. (for example, for Windows 7, Vista & XP, 32bit OS, select *directory\windows\system32\spool\drivers\color* FOLDER).

Since you are using generic profiles no account has been taken of your actual printer. Printers, especially the more expensive photo printers, are manufactured to very close tolerances. Nevertheless if you want the best possible results you can take things a stage or two further.

4. Obtain a custom profile. Some manufactures like **Permajet** offer a free profiling service, if you buy their papers, and a modest charge if you want them to profile a competitor's paper. You simply download from their site a special file which enables you to print a series of colour patches onto A4 paper. You print this with all colour controls disabled and send the prints with full details of the printer, paper and ink used to Permajet. They analyse your print using expensive spectrometry equipment and email you back a custom profile for that print/paper/ink combination. (e.g. APJ_MC Nab_OEM3800_FBDISTINCTION_EPG is my personal profile for printing with Epson ink on enhanced photo glossy paper setting and printing on Permajet Fibre based *Distinction* Paper).

Permajet provide clear instructions on their web site.

http://www.permajet.com/30/ICC_Profiles.html

5. Do your own print profiling. This requires you to use some form of spectrometer device, appropriate software and calibration colour patch files similar to the type referred to above. Sometimes this facility comes bundled with the monitor calibration tools. Print patch files are printed on a selected paper and then scanned with the spectrometer and analysed against a calibrated source. The software then constructs a profile for your computer. Since there are many forms of this type of equipment a detailed description is not possible.

Soft Proofing.

This is a facility in Photoshop which enables to view how your print will look when printed on a particular paper. It reproduces the paper characteristics (surface colour as well as accommodating the specific paper's profile).

To view select **Proof Setup** in **View** and then select **custom**. This will open up another **Device to Simulate** window. The drop down list will then give you access to the profile list from which you select the appropriate paper profile.

The display will seem rather lackluster compared with the screen but will give you a better idea of what to expect. You can toggle between standard and proof view by selecting **Ctrl + Y**.

Gamut

Without attempting to define gamut in terms of the conventional 3 dimensional colour space model (sRGB, Adobe RGB 1998, etc.) it is sufficient to recognise that a computer monitor cannot reproduce all the colours of the spectrum. Expensive monitors designed for professional graphic/photographic work can make a good attempt at nearly (95 -98%) replicating the colour space of Adobe RGB and even closer to the slightly less demanding sRGB standard. No printed paper and ink contribution can approach anywhere near this. If you spent a lot of money on your camera and take printing seriously, buy the best monitor you can afford.

So what happens if you have an image on screen which has 'out of gamut colours'?

The screen will pick the colours nearest to those specified and you may not even notice unless you switch on the gamut warning, **shift + Ctrl + Y**. Should you worry if parts of the image are out of gamut? Probably not unless your image includes fashion clothes, botanical specimens, etc., where accuracy is important. The problem is that, even with landscape images, large out of gamut areas will print with unpredictable results. Sky tones, early and late, can present the greatest challenge. Perhaps it is just as well to recognise that nature's beauty can be capture but can never be replicated in all its amazing glory.

No matter how hard you try some colours just cannot be reproduced as you see them. Bluebells are an example. Nevertheless it is worth switching on the gamut warning and adjusting the hue and saturation of the areas which display 'out of gamut' warnings to reduce or eliminate the challenged parts of the print. If you do this you will have more control over the final result. Just accept that, even as a perfectionist, you cannot achieve perfection.

Summary

1. Don't make your task more difficult than it need be – Calibrate your monitor including reducing the brightness and contrast and view under subdued consistent ambient light.
2. Use daylight or a 'daylight light' to assess your prints.

3. Use Photoshop to manage colours, not the printer.
4. Use the appropriate profiles for each paper type and ink set you use.
 - (a) Use generic profiles provided by the paper manufacturer, or:
 - (b) Use custom profiles for even more accurate results.

If you still cannot obtain prints which are close to what you see on your screen it is almost certain that your monitor is still not calibrated.

Final Test

Using a standard test print.

Download from the Inkjet Art site <http://www.inkjetart.com/custom/> the test image and print it on a white paper of your choice..

If you have calibrated everything correctly the print should be a very close match to the standard print issued to club members by Steve Campbell.

It will not be an exact match since the standard print was printed on photographic paper by a commercial company using very high quality colour control technology and you have printed yours using an inkjet printer. It is even possible that your print is even more accurate.