

The notes below have been developed following research on websites and reading of articles in various camera magazines. What is clear after many hours of research is that Colour Management is not an exact science, with many different opinions about how to go about it. After speaking to professional graphic designers and printers it seems that no matter how much of a professional approach you take with colour management it is virtually impossible to achieve an exact representation of the same image across all platforms of hardware/software configurations and in the final output in print or monitor form. However, with a bit of knowledge it is possible to get results that are perfectly acceptable for most uses. If you do nothing else with regard to your work-flow and approach to colour management, have a look at the articles on [www.northlight-images.co.uk](http://www.northlight-images.co.uk), covering basic through to very advanced technical aspects.

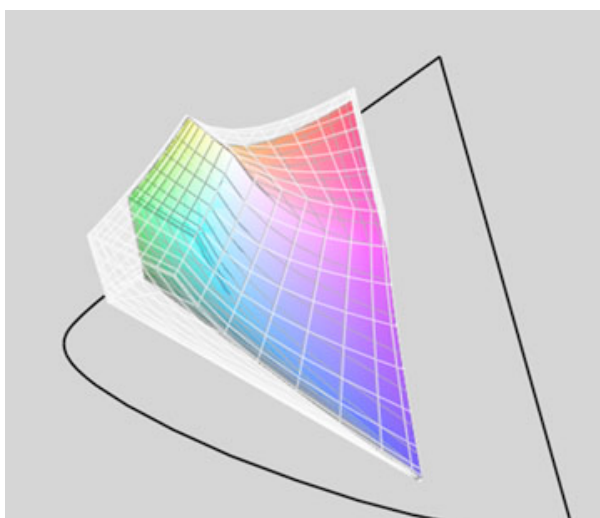
I have extracted bits from various material that reflect my personal experience but my advice would be to experiment with some of the aspects outlined below, find a workflow that works for you and stick with it.

### Background/General Comments

1. We spend heavily on cameras and lenses but view resulting photos on uncalibrated monitors.
2. There are four main elements to your workflow to achieve consistency in colour management.
  - Set your camera **colour space**,
  - **Calibrate** your monitor,
  - Make sure your **Photoshop colour settings** are right,
  - Select the correct **printer settings**.

### Colour Space

1. Colour spaces such as sRGB might hold some 35% of the full CIE range, whilst larger ones such as Adobe98 (aka A98) contain around 50%.



In the illustration left the large ghost diagram shows the *Adobe RGB 98* colour space, while the coloured diagram within represents the sRGB space. It's clear from this that the Adobe 98 space is bigger, and that especially in the greens and reds / oranges, some clipping if sRGB is used.

2. It turns out that there are trade-offs between using them and the choices are not as clear cut as you might first think.
3. In practical terms RGB and sRGB colour space are very close. Generally sRGB is best for home or lab printing.
4. Few monitors can display the whole A98 space.
5. If you are just outputting images for web use, then there is little need to be concerned with colour spaces and profiles - just use sRGB.
6. If you print on a high end inkjet printer (with good paper and icc profiles) then the gamut available comfortably exceeds the range of sRGB in a number of areas. If you print via a lab using the likes of the Fuji Frontier, then it largely fits within sRGB.
7. Understand the differences, experiment with some of your own images and **decide which factors actually matter to you**. It's also worth noting that most people couldn't spot many of the differences unless they had direct comparisons under specially set up lighting ...and had it pointed out to them.

### **Monitor Calibration**

1. An un-calibrated monitor will always display a false representation of your image, making accurate colour printing virtually impossible.
2. Basic monitor profilers start at under £100 but better ones like ColorMunki Display from X-Rite cost about £115.

### **Monitor Calibration – the environment**

3. A monitor hood or surround makes a big difference
4. Professionals set up their workspace in controlled lighting (neutral grey) to avoid unwanted reflections and colour casts.
5. A bit more care in setting up your surroundings will help improve the consistency and accuracy of your work.
6. As an example, most 'energy saving light-bulbs' are useless for critical lighting. The colour is pretty awful and will affect your perception of colours.
7. Your monitor should be brighter than the ambient lighting, thus your vision will automatically see monitor white as 'white'.
8. Ideally your monitor at its brightest (white), should be the brightest white you can see when looking towards the screen. i.e. no bright desk lamp next to the screen where you can see the bulb.
9. Don't set your monitor too bright - this is the classic reason for people getting prints that look too dark.
10. It's no good turning down your monitor while still editing images in a bright daylight lit room - the environment sometimes needs 'turning down' too.
11. My preference is to work in very subdued lighting. Closed curtains in daylight conditions. Low wattage table lamp in a position that avoids glare and reflections at night.

### **Photoshop Settings**

1. As there are many different versions of Photoshop and elements in use. We could not possibly cover all the various settings.
2. Suffice to say that there are some very powerful advanced settings within the software and unless you are an expert these are probably best left at the default settings.

## **Printing**

1. There's no way that a series of ink droplets from your printer can exactly match the colour that appears on your screen but with colour management we can get very close.
2. Just as your monitor only has a limited range of colours that it can display, your printer/ink/paper combination has a limited range of colours that can be printed.
3. The printer profile is part of what can be used to do the translation from what is wanted to what is possible.
4. The range of colours available depends on the type of ink and paper you are using, as well as how these are actually combined in the printer.
5. Suffice to say, there are wide variations between printer models and makes.

What's more there are usually:

- Colours that can be represented in your image, displayed on your screen and printed
- Colours that can be represented in your image, displayed on your screen but cannot be printed
- Colours that can be represented in your image, not displayed on your screen but can be printed
- Colours that can be represented in your image, not displayed on your screen and cannot be printed

## **How white is white in your prints?**

1. With a print, the whitest white you can get (without white ink) is the reflected colour of the paper. This will undoubtedly be different from what your monitor emits when it is displaying white.
2. Different ink types also produce different results on different papers - how black is the deepest black you can get for example?

## **Comparing Prints with a Screen Image**

1. The visible colour of dyes and pigments in the coloured parts of your images also vary with the kind of light you are using.
2. Our visual system is tremendously good at adapting to the ambient lighting conditions. We automatically adapt our own 'white point' to the brightest white in our visual field. We also compensate for colour casts, so for example, you do not see everyone looking slightly green when you are sitting under a leafy tree on a sunny day.
3. As a result of this, the lighting conditions where you work can have quite a noticeable effect on how images on a screen, or a print are perceived.
4. To compare a print with an image on screen, they both need to be similar in brightness.
5. You can get special viewing cabinets, with special adjustable lighting, designed for comparison work (they are not cheap)
6. Following on from this, one of the worst ways to compare a print with an image on screen, is to hold the print up next to the monitor. It is far better to have the print well lit, to one side of the monitor.

## **Nigel Lee Printing Service**

If all of this seems quite daunting, many of our members use commercial printers to avoid the pitfalls of colour management and to attain larger prints than their home printers provide. It is worth knowing that colour correction is an **integral part** of Nigel Lee's professional photo printing service.

The notes below are quotes on how he controls colour management.

- The room used for the colour calibration measurements has all walls painted with a light grey paint selected to approximate with Munsell N8, with 80% nominal reflection. The one window in the room has a similar coloured blackout blind which runs in light-tight channels to remove all extraneous light that could influence the calibration process.
- There is no wall, floor or ceiling furniture to influence the calibration that is coloured differently to N8 spec i.e. no pictures, no lights, nothing other than grey. Even the desk has a light grey covering.
- Images are firstly opened in Photoshop and displayed on an **Eizo CG275W** 27in monitor fitted with light shields.
- Our monitor is set to automatically colour calibrate every two weeks with the photospectrometer which is built into the screen. This ensures repeatability and absolute accuracy.
- We use only large format professional printing equipment and professional print media and ink. This gives us the confidence to offer our customers a 100yr light fastness guarantee.
- Each print run incorporates a colour calibration test strip. The calibration test strip is used to verify the print against a *Granger Colour Chart* and any flaws are picked up at this stage. To date we have not any prints exhibiting correction flaws.
- We generate our own print media ICC profiles for each media type used.
- Reference to Colour Gamut - Images supplied to us are almost always RGB not CMYK. Our preference is for images to use colour profile **Adobe 1998**. This has a wider colour gamut than the more frequently used **sRGB IEC61966-2.1**. However we will print from either. Many printers for home use are not capable of printing to this higher standard. Ours equipment is.
- When printing black & white prints we have our own ICC profiles which have developed after much experimentation. Our print equipment employs 4 black inks. What differentiates our equipment from many others is that during B&W printing it shuts off several of the coloured inks (9 inks are used in total) which could otherwise introduce a slight colour cast.
- When customers send us images that do not exhibit natural colours we will contact them by phone, email, or text message before printing. Often there is a valid reason for a noticeable colour shift i.e. deliberate to enhance an images colour, saturation or vibrance.
- Many of our regular clients, mainly professional photographers, give us the latitude to make corrections deemed necessary without contacting them first as they have the confidence in us to make this judgement and correction.
- Our workshop is fitted with high-end light fittings with tubes which are daylight colour balanced for viewing the final printed images.