

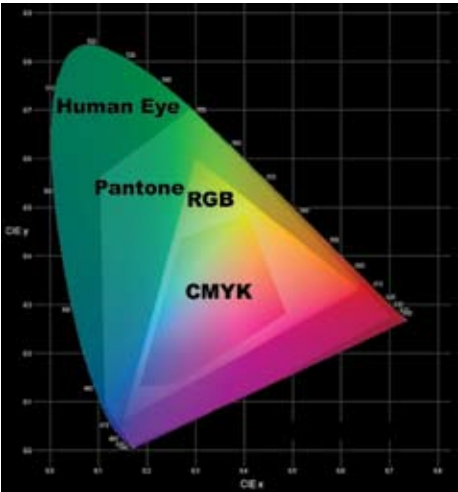
HOW TO GET THE RIGHT #*^! COLOUR ON YOUR LARGE FORMAT DIGITAL PRINTER

By Bob Glenister

Visiting hundreds of customers both in South Africa and in the USA the most common complaint is colour management. I am always surprised at the workflows and workarounds that the customers have developed to solve the problem. What follows is a method that will 99% of the time achieve the results you are looking for. For those other 1% of jobs, this article would become a treatise (if not already). Follow the steps in this article faithfully and you will keep both your hair and your sanity.

For those who like it quick without understanding, cut to Quick Action List at the end of this article.

FIRST MISTAKE: OUT OF COLOUR SPACE (GAMUT)



1. Understand Colour Space.

Human Eye:

The human eye can see far more colours than our fancy technology can produce. Pantone is the one colour system that comes closest to what we can see. RGB (TV, Computer Monitors) produces less and finally the least is CMYK.
NB: Every CMYK ink set is different so the example shown is a hypothetical ink.

Ink set:

Colour capability is not dependent on the printer and the RIP. It is determined by the colour space of the ink.

Yes the printer can make a difference to tonal quality and quality in general and some tonal issues may colour the image.

Now different inks sets (CMYK, CMYKcLm or CMYKOrGr, etc.) made by different manufacturers have different colour spaces. This is why it is critical for colour management that you use matched profiles from the manufacturer that match the media to the ink set (ICC profiles). Certain colours are not reproducible with your ink set, understand and accept this first.

SECOND MISTAKE: WORK IN CMYK SPACE.

2. Understand Colour Space

Traditionally lots of designers work in CMYK without understanding that the application of CMYK requires special attention. Now this is fine when working with Litho-Printers, who can change their ink sets characteristics and can run off samples with different ink sets for your final confirmation. What’s 30 sample prints when you have 10 000 to print?

The digital printer on the other hand has no ability, unless they have lots of money to change their ink set every time they have a colour-matching problem, to fine tune the ink. Plus the customer only wanted 2 prints (how many samples are you going to run?).

The CMYK palette in your software is a hypothetical ink colour space and unless you specifically load an ICC profile that matches your ink colour space into your design software, before you convert the image, you are tying one hand of the RIP behind its back.

To avoid this issue work in RGB colour space, both for Pantone and normal uncalibrated images. Warn your customers that files saved in CMYK colour space severely limit your ability to control the colour. They have already eliminated some important information the RIP needed to enable colour

matching. Converting back to RGB will not restore the lost data.

Your RIP engine has a full understanding of the printers ink colour space (unless you use third party inks with profiles designed for another ink type). The more information you can deliver to the RIP the more likely it will create the colour you are looking for (It’s like asking a donkey to sire a race horse and being surprised at the mule you receive at the end).

THIRD MISTAKE: USE COLOUR MANAGEMENT IN THE DESIGN APPLICATION.

This is fine for devices that do not output via RIP but is inviting disaster if using a RIP engine (It’s like dating two woman at the same time, you loose). Switch off all colour management in the applications you are using when outputting or designing for RIP.

FOURTH MISTAKE; USE GENERIC PROFILES FOR EVERY MEDIA

4. Understand RIP Colour ICC profiles

Every media does not print the same, that is why ICC profiles exist (ICC profile in RIP matches printer, ink set and media). First the white point is not the same. Some are yellow white some are blue white (I have yet to find a media that is 6500k white).

This different white point shifts all the colours, now add the complication that the optical properties are different. You can’t win (it’s like arguing with your wife).

Use product specific profiles, check suppliers web sites for these, if not available ask the media supplier to commission a profile from the printer supplier. If they want you to buy their media they must dance for the piper.

FIFTH MISTAKE: USE WRONG RENDERING INTENT

5. Understand rendering intent

There are four basic rendering intents - perceptual, relative colourimic, absolute colourimic and saturation. (Microsoft in their wisdom, have given them new names, so for those who use RIP programmes with Microsoft naming, they are in order Picture, Proof, Match and Graphic.)

Perceptual rendering intent (picture). This is best for pictures that have tonal changes i.e. photographs. This intent will shift all the colours in an image to fit within the colour space of the ink set. This gives an

impression that the picture is correct, but remember every single colour has shifted. This intent is great for most pictures that are not colour critical but detail critical.

Relative Colourimic rendering intent (proof). This intent takes advantage of the eye measuring everything relative to white, so it shifts the white point and all the colours inside the colour space of the ink around this white point. Colours outside the colour space simply get moved to a point on the edge so tonal changes get lost. Generally I have not had much success with this intent, I would first try absolute then in desperation try relative.

Absolute Colourimic rendering intent (match). The chief difference here is that the white point is not shifted but still colours outside the colour space of the ink will be pulled to the edge. All other colours will be faithfully reproduced. This intent is best for colour critical jobs within the colour space of the ink (no magic available).

Saturation or Spot Rendering intent (graphic). This intent is used primarily where you are using solid colours and want them to be bright and bold when you print. Some colour shifting will occur but impact will be bolder. Not a good intent for colour photos because it does not attempt to maintain colour realism.

Mixed rendering intents. Most good RIP software will allow you to use different intents for both the vector and the raster parts of the file. A good choice for this is perceptual for raster and absolute colourimic for the vector parts. This will give you accurate colours on the logos and better tonal quality on the photographs.

SIXTH MISTAKE: USE WRONG FILE TYPE

6.Understand file types and handling.

Basics: A file’s function is to transfer information from one location to another without adding or subtracting from the original. In reality things like bandwidth, portability and data type get in the way.

In graphics there are two major file types, raster and vector. Raster files (photos, etc.) represent pictures by specifying each and every pixel, these files cannot be enlarged by simply scaling but need special algorithms that exist in RIP software to enlarge and maintain the integrity of the final output. Vector files on the other hand are normally logos and the like which can be scaled to any size without quality loss.

Typical Raster file formats:

JPEG: Joint Photographic Experts Group,

Pronounced jay-peg. This is a raster file format but uses a compression algorithm that loses some of the data. A common mistake to avoid is to save a JPEG as a JPG.

Compress an already compressed file using a lousy filter. No, no, no! Please when downloading the pictures from your camera in JPG format save them as TIF. Only if you need too, convert to JPG for the Web but not for large format printing. Even better is to download the image as RAW. Some cameras when downloading as RAW do not apply light and colour balance, so you would need to take these files to Photoshop or the like and adjust these things yourself. When saving this data, save it as a TIFF not JPG. Bob! these files are huge, yes, remember size does matter and the more info you can give the RIP software the better the result.

TIFF: Tagged Image Format

One of the oldest raster file formats and in my opinion the best.(1983) its creators were wise enough to make the specifications very wide and most programs cannot even produce the amount of colours that this file supports (64 bit definition over 100 billion colours) These files are huge but for photographic printing nothing beats a high resolution TIFF. Remember no compression when saving please.

BMP: Bitmap

Microsoft’s answer to raster files, limited detail and the files are only 16 bit (16.7 Million Colours only) Not my favorite.

GIF: Graphics Interchange Format

Pronounced DJIF by many, including its designer; pronounced GIF with a hard G by many others. It is one of the two most common file formats for graphic images on the World Wide Web. Normally these files are tiny and hold so little information that makes them useless for large format printing. (There is a licensing issue with Unisys so PNG is set to replace this file type)

PNG: Portable Network Graphics

Pronounced ping for) that, in time, is expected to replace the Graphics Interchange Format (GIF). It is useless for large format printing.

The problem with all of the above files is that they are raster files and vector information needs to be rasterised if you want to use these file formats to transfer this information. Now most of you will know the result of rasterising a beautiful A4 file with vector information, blowing it up to 6 metres and your vector data looks like something the cat dragged in.

Hence the creation of files that could support both raster and vector in one file. Postscript (PS) was the first file that combined vector and raster data.

Encapsulated Post Script (EPS) soon followed as well as Adobe Illustrator (AI) file.

Portable Document Format (PDF) has become the defacto standard for files that combine vector and raster into one file and again the format has been written in a way that does not alter the original file in any way. This file with its support of Spot colour is by far the easiest file to allow you to achieve accurate printing with the ability to pull vector data for vinyl cutting. Due to its well documented and freely available export filter direct from Adobe themselves, colour differences from different applications is no longer a concern. Unlike EPS where the export sometimes messes with your colours from some applications, notably CorelDraw.

Due to the wide ranging ability of PDF files one must be careful to remove all compression, down-sampling and optimise for web attributes in the driver. For Print and Cut devices make sure you enable Spot colours. Like all export filters make sure you disable all application of ICC Profiles and check that the filter when exporting matches the original file colour space.

Some RIP’S support layers, do a trial run to determine

the functionality of your RIP. This is useful for transparent objects and text. One last thing about PDF’s make sure your page size matches or preferably is slightly larger than your graphic size otherwise you might be printing a small piece of your graphic, or a huge white print with a tiny graphic in the centre.

Quick Action list:

- 1. Design in RGB.
- 2. Switch off colour management in your application and in the export filters.
- 3. Export using TIF (photos, etc.) or publish to PDF if the image consists of both raster and vector or just vector no ICC and No Compression.
- 4. Use matched media profile (specific not generic).
- 5. Play with rendering intents to determine best compromise.
- 6. Avoid JPG files if you do not know how many times they have been saved.
- 7. Warn your customers that files saved in CMYK colour space severely limit your ability to control the colour. They have already eliminated some important information the RIP needed to enable colour matching. Converting back to RGB will not restore the lost data.

Last but not least:

We humans, although we have a basic idea of how we perceive colour are still discovering new things everyday. Recent experiments have determined that our eyes although seeing a colour combination of slight red and green, and blue and yellow, our central cortex refuses to acknowledge the colour hence we see it but we don’t. Makes you wonder why?

For more info I have included interesting links for those who want to continue the journey into colour.

http://en.wikipedia.org/wiki/Opponent_process
Useful article on adjusting your screen to better represent colours.
http://www.poynton.com/notes/brightness_and_contrast/index.html
<http://www.w3.org/Graphics/Color/sRGB>
<http://www.techmind.org/colour/spectra.html>
http://en.wikipedia.org/wiki/Color_models
http://en.wikipedia.org/wiki/Color_space

Thanks to Bob Glenister for this article.
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