

The Digital Dots Wild Format Digital Printing Technology Guides are about providing you with all you need to know about investing in wide format digital printing technology. The Wild Format goal is to create and share objective and independent explanations of key digital production technologies. The Wild Format articles are relevant for all parts of the graphic arts supply chain, especially print buyers and designers. They're for anyone with great ideas who wants to get them into print cost effectively and conveniently.

The Wild Format guides are intended to expand awareness and understanding of the craziness that can be created on wide format digital printing devices, from floors to lampshades and everything in between.

These guides are made possible by a group of manufacturers working together with Digital Dots. Together we hope you enjoy the articles (yes, there will be more) and that you put into practise what you learn. If you want to talk about it, go to our LinkedIn group at

**<http://linkd.in/1pkeLH1>**

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## Colour Basics for Wide Format Digital Printing

Digital printing technologies have made print accessible and cost effective for all sorts of amazing applications. From posters and signage printed on demand for high street entrepreneurs, through to bespoke textiles, flooring and ceramic tiles, digital printing devices can do it, and mostly cost effectively. There are no limits in the craziness of wide format digital printing, so you can let your imagination go wild. The world of wild format digital printing is all about you and getting what you want.

But how do you make sure that you do, especially when it comes to colour?

How you get what you want from wide format digital colour printing, depends on getting the most out of the technology. When it comes to colour accuracy in print, you can take control of your colour data for the best results at the best price. To do this, you need to understand how colour works so that you get the most out of the hardware and the data. Take control of your colour so that things don't get unpredictable and expensive. Combine your technology choices with your understanding of how colour works, and you can trust the process and the results. By taking control you can keep pushing your imagination to new horizons, without trashing the budget and without risk.

Getting accurate colour in wide format digital can be challenging especially for jobs that rely on different technologies and get printed on a range of different substrates. When brand colours don't match and those lovely, itchy edgy designs have about as much energy as a stale sock, it's mostly because the printed colours are rubbish. But how colours look in print depends on how they have been created, long before a file is ready for output. How the colours are created on screen makes a massive difference. Besides the data a colour's appear-

ance in print depends on many different factors, such as lighting conditions, inks and substrates. Control over your data, hard-

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ware and workflow, will ensure that final prints match what you see on screen and in proofs.

## Digital Colour for Inky Fingers

Colour in a digital environment is especially vulnerable to misrepresentation, because it's defined in bits and bytes. Confusion about the difference between raw digital data and controlled colours that are accurate in print is why print buyers and designers still suffer so many expensive colour howlers. Blame the printer, and you're making a mistake. The problem is mostly one of colour data management and communication. What you think your colours will look like in print is not necessarily what the printer prints,

but not because of technical or process limitations. It's because of the nature of colour itself: it's a figment of imagination. This is why colour's more than magical and more than a little bit vulnerable to getting messed up. Colour is an illusion that doesn't really exist, but get the data right and your printed colours can mimic the illusion.

## I See Before Me

We see colour because our eyes respond to wavelengths of light in the red, green and blue areas of the visible spectrum. The surfaces of everything around us, their capacity to reflect or absorb light and how our brain processes the information together make colours. It's all in our heads, so although people can discern many millions of different colours, the theoretical colour of something is almost infinite. The idea's ripe for SciFi movie treatment so it's maybe understandable that colour management can be confusing for designers, print buyers and printers alike. Accurate colour appearance in print media is a tool for protecting margins, getting the most out of marketing budgets and protecting brand integrity. Colour is about more than creative design, it's about money.

Keeping colour appearance under control is also about technology, how well you understand it and control it. Lack of control

is why what you see on your computer screen doesn't really match what your desktop printer prints. If you are a designer creating gorgeous images for a blue chip client, or you are trying to reprint files on lots of different media, being sure that what you see is what will print matters hugely. And if there is a mismatch for a high profile brand, correcting errors can be very

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expensive, especially as you get closer to the press. Fixing the disconnect between what you see on screen and in print is what colour management is all about.

## The Science

If you managed not to doze or daydream your way through science lessons at school, you may remember how the human eye works. The iris expands and contracts to control the amount of light entering the eye. On the retina at the back of the eye are light receptors tuned to respond to red, green or blue (RGB) wavelengths of light. The brain calculates the ratios of

RGB lightwaves and signals the result as a particular colour. If there is no red, green or blue light hitting the back of the eye, say when it is completely dark (or your eyes are shut), colours are lost in black. If you look at something in blazing sunshine, the colours are lost in white. This is because

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black objects or environments absorb all wavelengths of light and white ones reflect them all. In between are myriad conditions where colour is possible depending on the angles of illumination and view. Think of a rainbow created when light is refracted and dispersed through water droplets. Some things such as soap bubbles or peacock feathers, appear iridescent because their surface properties are so sensitive to changes in the composition of the light and how the brain perceives it.

The brain adds up the RGB data summarising it as a perceived colour. This is

an additive system with the scope to create a huge range, or gamut, of colours. It works perfectly well, except that it is very difficult to reproduce, particularly in a digital system or in print. The printing industry has got around this by cheating, using a sleight of hand to create the appearance of colours that seem to match reality. It does this by turning on its head the idea of additive colour.

## Smack Heads

Cyan, magenta and yellow (CMY) inks work as opposites to RGB and are a subtractive system of colour definition. They each absorb and reflect different parts of the visible spectrum, working rather like filters. A subtractive model removes the brightness from light and filters light wavelengths using cyan, magenta and yellow inks. The cyan ink absorbs the red component so that you see an appearance of greens and blues; magenta ink absorbs the green component to tease you with reds and blues; and yellow ink absorbs blue so that you see reds and greens. Look very closely at a piece of offset print and you will be able to see the cyan, magenta and yellow dots.

This system of subtractive colour is an extremely clever way to create the appearance in print of colours that appear to match real world colours. For normal

people red, green and blue are the primary colours but for printers the primary colours are cyan, magenta and yellow. Combined CMY will absorb all the light hitting their surface to appear black, however inks are rarely pure enough to completely absorb the light. Black is added to the mix to get pure blacks, to enhance shadows and for sharper text, which is best printed black. Black is the key colour, the K in CMYK. To this basic set, high gamut inks can be added, especially for wild format digital printing. Colours such as orange, green and purple (or blue) are used to enhance colour gamut. Light cyan and magenta are often used to create smooth vignettes in highlight areas.

## Colour at the Desktop

Professional media workflows depend on the careful control of devices including monitors and digital cameras, plus of course print engines and substrates. The substrate bit can be especially tricky, if you are printing on carpets or wooden boards for instance. Print media workflows also depend hugely on the data in the content file: too much scaling up of low resolution images results in unusable pixellations, for example. Ideally what is captured or created at the desktop will have sufficient data to have the same colour appearance when it is printed, wherever, however, and on whatever it is printed. The print method

could be conventional offset printing or a wide format digital printer.

## Margins

What matters is the return on your print media investment, whether you are a print buyer or a printer. Most of us want to get the colour right, but we may not be prepared to pay for it. A lot of hassle and hidden costs can be avoided if you understand how colour in a digital workflow works. It's a question of who bears the cost and how much. Colour-savvy designers can be confident that proofed colours and what they see on screen will print accurately. Print buyers who understand the importance of colour management, can avoid costly reworking of colour data. Printers with control over how files are specified and colours managed can improve the profitability of individual jobs. Get it right and everyone is happy. Print buyers are happy because they don't waste time and money having to get files fixed or jobs redone. Printers can save lots of unbillable expense because customers submit colour correct files. And creatives can trust that their wild format ideas can really be printed without trashing their budgets.

– **Laurel Brunner**