On Test

PAPER CHASE

FOTOSPEED QUILL CIS & PLATINUM PAPERS

This is a complex testing task as we are trying to compare more than one variable, namely the Fotospeed UCK 4 ink set operating with their continuous ink flow system along with two new papers, one of which is brand new. To give perspective we also tried various things out with previously tested Fotospeed Art papers and OEM inks.

The CIS System

This is a pigment ink system, designed to overcome one of the objections that raises its head with some Epson K3 printers – the switching between Matte Black ink and Photo Black ink. Whilst both types of ink were carried on the Epson 4000 system, Epson decided to leave this extra slot out for the new '800' series of printers (along with the 2400 we used for testing – but see the Epson 3800, launched after we wrote this piece!). This means that you have to switch between black inks if you are seeking the ultimate in black density and gamut – you use Matte Black (MK) for the art papers and Photo Black (PK) for most others. The basis of the Quill CIS system is that a spare cartridge is carried in a storage slot on the carriage and the swap-over is effected by simply removing one cartridge and replacing it with the other. Thus you get the benefits of continuous flow (lower cost) along with a quick ability to service the requirements of both art and gloss/lustre papers.

We decided to test the new DWFB Platinum papers, one of which is neutral tone, the other is brand new and warm toned. These use the PK ink and to test the MK ink we reverted to the previously tested Fotospeed Natural Textured and Natural Soft Textured papers. This provided us with a comparative baseline of the actual inks.

DWFB Platinum Gloss – Neutral

This is Fotospeed's offering of the new technology coatings that have created a huge amount of interest, especially within the monochrome fraternity. That the media are also producing gorgeous colour prints, especially in the skin tones, is a double bonus!

The base paper is a 290gsm, 100% acid free, buffered product with a neutral pH. It is lignin free and was initially claimed to be free from optical brightening agents. It is quite a stiff media which gives it a quality feel. However, it was a bit of a problem to feed rolls into the wider format machines and the spectrophotometers. We also had slight problems with the curl of the paper at A3+ sizes when the edges of the paper were caught by the ink-head, to produce some smudging near the edges. The surface properties are very similar to a silver halide, unglazed, gelatine print: variable, slightly undulating and not too glossy. For practical purposes it is a very close mimic of the old-fashioned Record Rapid we used to know and love. It thus complies with the requirements of the specialist fraternity for art printing.

Initially, the product box carried a 'no OBA' tag (since removed), there has been some confusion with this class of papers from when they first came out. They **do** contain OBA's, the base material shows a lift from 96.1% to 101.7% in spectral power distribution at 440nm and the paper glows in the UV booth. This is not true of the newer, Warm Tone product, which is optically dead in the UV booth. It seems therefore that there are OBAs in the Neutral product but none in the Warm Tone product. The neutral paper is slightly cool, the warm tone is cream coloured.

MEDIA	Base White			Dmax	440nm OBA Lift	Gamut Volume
	L	*a*	*b*			
Neutral	96.1	1.36	-3.4	2.16	5.6%	817,160
Warm Tone	97.3	-0.3	3.0	2.14	0%	812,559

The base data are summarised in the table.

TOP: The black cartridge which is not in use is stored in a plastic holder.
ABOVE: The bottle design of the Quill is very neat and tidy, even the lid of the printer can be closed.
RIGHT: The comparison between Neutral and Warm Tone surfaces in the UV booth.

Installation

We set the printer up using OEM cartridges to ensure that all was as it should be. We then followed the instruction sheet to remove the existing cartridge set and replace it with the CIS. This went reasonably smoothly although you are advised to read all the instructions carefully before you start. As with all matters concerning inkjet ink it is best to wear old clothing; we managed to get a few spots of stray ink on ourselves.

Once everything was in place we ran three nozzle checks with a clean cycle between each. This had not quite cleared the nozzles so we waited for 30 minutes, ran another clean cycle and everything was fine. We started with the Photo Black option but changed about 10 times in all. Changing from one ink type to the other usually required a couple of cleaning cycles to get everything going.

continued on page 72 »

Fotospeed *Quill* CIS & Platinum Papers

» continued from page 71

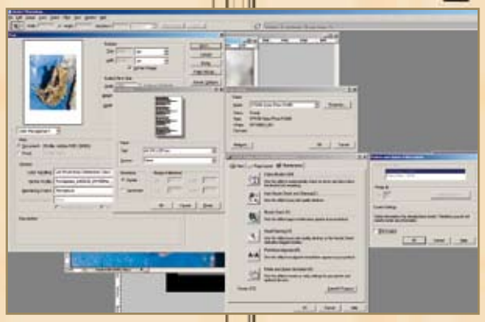
Colour Performance

It should not be assumed that the new Platinum papers will only be used with the Quill ink set. To look after this eventuality we first tested the paper using the OEM inks of the Epson 2400 – the K3 UltraChrome set. This also provided a baseline to compare the Quill ink and the Epson K3 ink set on a common printer and profile set-up. We used the default Epson profile *SPR2400 PremiumSemigloss.icm*, with the quality set to *Best Photo* and the colour management turned off. The media was set for *Epson Premium Semigloss*.

The table compares the data from the audit of the ink sets. This shows, unsurprisingly, that the Epson ink is a closer match to the Epson profile. Visually the Epson ink produced a more saturated result and less shadow blocking (15RGB points on K3 compared with 25RGB points Quill K4). The K3 ink print was about 5% too dark, compared with the Quill K4, which was closer to optimum. Having said that, a great many people would happily accept prints from either ink set. The average error across the Macbeth chart was 6.9 ΔE ***Lab***/4.5ΔE200 for K3, compared with the 9.3/4.6 we obtained with the Quill K4 ink set.

The Quill K4 ink showed a higher gamut volume than Epson K3 although the difference (1.5%) would not be detectable by any observation-based test. For the record, the values were 805,508 for K3 UltraChrome and 817,160 for Quill K4.

Colours		Epson K3		Quill K4 Ink set	
		MEAN	WORST	MEAN	WORST
MACBETH	***Lab*** ΔE	6.9	12.4	9.3	20.4
	ΔE 2000	4.5	6.1	4.6	11.3
GREYS	***Lab*** ΔE	4.6	6.6	3.2	5.7
	ΔE 2000	3.5	5.6	2.6	3.4
FLESH TONES	***Lab*** ΔE	4.9	6.0	4.0	8.5
	ΔE 2000	4.0	5.3	3.7	6.6
EARTH TONES	***Lab*** ΔE	7.5	12.6	9.7	17.1
	ΔE 2000	3.9	6.1	4.2	6.9



Monochrome Performance

This is a paper that is rapidly gaining a following amongst the monochrome fraternity. With good rich blacks and a near identical 'look' to an unglazed silver halide print it is hardly surprising. In our tests the greyscale linearity ran straight and true down to a 6% lightness value (Dmax 2.2), the profile mapped the greys into the base colour and there was no evidence of any gloss differential or bronzing. The rendering of detail was such that no banding could be observed under a 10x loupe.

Large prints

Large monochrome prints are a searching test of print neutrality. The big area accentuates any error in the base tone or the metamerism (which is why colour spectrophotometers measure at 2° or 10° viewing angle). This is why it is important to test a printer/paper combination on real work using big prints that matter (or look very hard at your audit data!). We made some A3+ prints. The prints looked like a slightly warm, selenium-toned traditional print in tungsten light, but exhibited a slight green/cyan cast in daylight. (See Metamerism call-out.)

DWFB Platinum Warm Tone

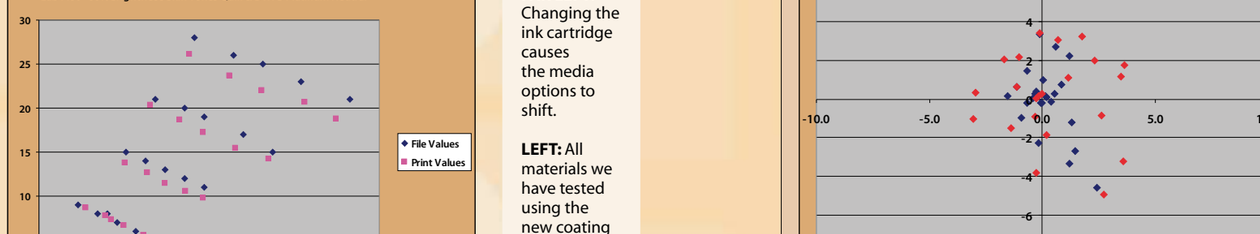
This is the same base paper as the Platinum Neutral except that the base tone is cream and there are definitely no OBAs in either the coating or the base papers. As such it will be of more interest to the purists (who hate OBAs) but for the ordinary mortal it also carries the benefit of creating a lovely warm mono for portraiture and this carries through to full colour prints. For the mono fanatics it reminds us a lot of Kodak *Ekalure* in tone and Agfa *Record Rapid* in texture.

Colour Performance

This was another excellent result. The average error was 4.1***Lab*** ΔE/2.51ΔE2000, well inside the average we find for profiled devices of 3.3 ΔE 2000. The warmth of the base mixes well with flesh tones (errors of 1.3 Δ***Lab***/1.3 ΔE2000), they were essentially perfect.

Monochrome

Once again we made big prints from the media. Using all the colour inks produced a print that was warm in tungsten light and slightly green in daylight. We then moved on to test The Advanced Black and White drivers with both the Neutral and Warm Tone media. Using Premium Semigloss Photo Paper as the media setting and neutralising all other settings created a slightly warm print that was a good match to the base cream of the paper. As expected, the print to the neutral paper was cooler. Both prints we would rate as excellent and this indicates that the Quill ink set is actually a good colour match to the OEM ink. Comparing the digital prints with that originally made onto Multigrade was an interesting exercise. The digital prints were smoother in terms of image grain and the sharpening from the scanner (Epson V700 and 35mm Kodak T-Max 400 negatives) gave an apparent increase in detail, especially in the texture of the black socks of the players.



continued on page 73 »

FAR LEFT: Large mono prints reveal any colour bias or metamerism far more than other tests. From the left, Platinum neutral using a bespoke profile, the image made using Advanced B&W settings and Platinum Warm Tone. The error in the centre print alerted us to a problem in our initial profiling.

FAR LEFT: Changing the ink cartridge causes the media options to shift.

LEFT: All materials we have tested using the new coating technology perform well on skin tones.

THE ART PAPERS
Natural Soft & Natural Soft Textured

Both the *Natural Textured* paper and the *Natural Soft Textured* papers required a change to the Matte Black ink. The printer driver recognised the change and offered a different, art media set in the printer dialogue box. The main difference between the two papers is in the surface finish. The NST has a more undulating, "watercolour surface". Both finishes are quite soft and easily damaged so they should be handled with care. For testing and profile making we used the Archival Matte Paper media setting in the printer driver.

Comparison of the colour data shows that there is little to choose between the Matte Black variant in the Epson 4000 and the Quill CIS, certainly insufficient to be able to detect by eye. The gamut volumes obtained from Quill were less than those from Epson Ultrachrome.

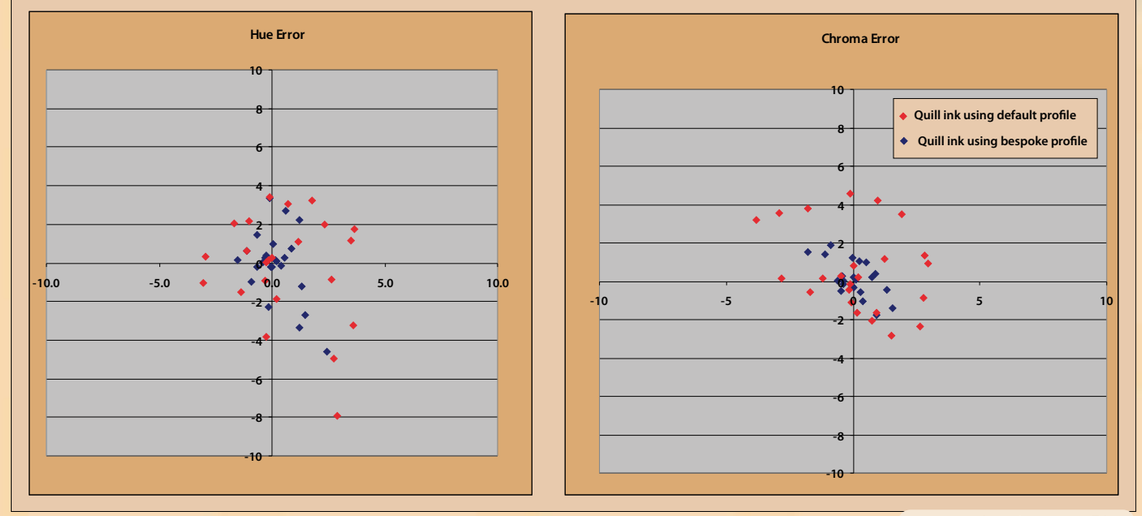
"The enthusiasm with which this new type of paper finish has been received is well justified"

THE EFFECT OF INK TYPE ON THE FOTOSPEED ART PAPERS					
COLOUR SET	Error Unit	Quill		Epson 4000	
		Nat Tex	NST	Nat Tex	NST
MACBETH		MEAN VALUES			
	Lab ΔE	5.2	5.5	6.1	6.0
	Δ E2000	3.1	3.2	3.0	2.9
GREYS	***Lab***ΔE	6.1	6.4	6.0	5.8
	ΔE 2000	4.6	4.9	4.4	4.3
FLESH TONES	***Lab*** ΔE	3.3	3.4	2.9	3.0
	ΔE 2000	1.9	2.0	2.1	2.1
EARTH TONES	***Lab*** ΔE	8.4	8.7	10.4	10.0
	ΔE 2000	4.1	4.3	4.9	4.7

Surface	Base White			Dmax Quill UCK4	Dmax Epson UC K3	Gamut Volume
	L	*a*	*b*			
Natural Textured	97.25	-0.32	3.39	1.62	1.57	508,921
Natural Soft Textured	97.61	-0.41	2.83	1.62	1.55	514,693
Natural Soft Textured	Epson 4000 MK					527,141

ABOVE LEFT: Prints made with both Platinum Warm Tone and Neutral easily stand alongside an original silver halide print from the same negative.

BELOW: The general tightening of errors after bespoke profiling is indicated by the reduced spread of the blue (bespoke) data points. While the Quill ink performs well with the default profiles, you will always obtain a better result with a bespoke profile for your own set-up. Fotospeed, will create a profile for you FREE of charge when you buy a box of media. Visit their website ***www.fotospeed.com***, for details.



continued on page 74 »

Fotospeed *Quill* CIS & Platinum Papers

» continued from page 73

Paper Transport Issues

We have had the opportunity to test a number of papers typified by Fotospeed's Platinum series. They have been trialled on Epson 2400, 4800, 7600 and 7800 printers. The stiffness of the new papers gives them a certain presence, but brings along a couple of things that you need to watch carefully. On the 2400 we found, on several occasions, that the stiffness of the paper (or its curl) impeded its smooth transport over the final inches of the print resulting in twisting and double imaging. You must ensure as a minimum that all the paper-supporting guides of your printers are fully deployed – you may get away with it on other papers, but not these! The curl of the paper on cut sheets was frequently across the short edge so that the paper curled up to clash with the passing print head, wiping ink onto the edges of the print (this happened on both the 2400 and the 4800). Finally we observed that there was a lot of cutting debris around the edges of sheet media and the ends of rolls. These are a real problem if they get out onto the printed surface and mask the image to leave a white imperfection as they fall off. At the moment it seems that these are problems you have to endure for the privilege of using these fine papers; it's a small price to pay and responds to extra care and attention.

LEFT: Damage and mis-alignment at the end of the print.
RIGHT TOP: Ink smudging due to paper curl.
RIGHT: Debris from the sheet and roll cutting at the mill can be a problem and care is needed to remove it.

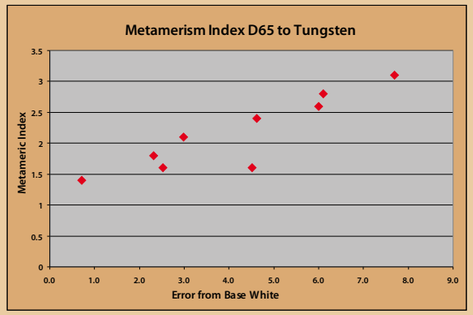
Metamerism

In case anybody is unfamiliar with the term, *metamerism* results in a colour shift when a print is viewed in different types of light. At *Professional Imagemaker* we standardise on measuring the *metameric index* of a mid-tone grey as the light is changed from Daylight (D65) to Tungsten Light (Illuminant A). This is not a perfect measure but serves to provide a baseline for comparison. Metamerism is influenced mainly by the ink – it is higher in a pigment ink than a dye ink, for example. It is also influenced by the media, some papers produce higher readings than others due to coating make-up or differences in ink absorption. Beyond that it gets even more complex and we recently spent quite a long time in dicussion with the ink engineers at Hewlett Packard trying to converge our views on the best way to measure the parameter. They think (almost certainly correctly) that the measure should account for the shift in human perception called *chromatic adaptation*. This provides a better match to human experience regardless of what the spectrographic data shows. Our own measure is deficient in this regard but we ran out of mathematical steam trying to develop the very complicated sums. Nevertheless we show here what we found, reserving the option to make a carefull study when we get our hands on the new Hewlett Packard Z-technology. (since done – see report)

The figures obtained with the inks from the Quill CIS (the so-called Fotospeed Ultra 4K ink) are tabled. Overall, the metameric index for the Ultra 4K ink set hovers between 2 and 3 Lab points. This compares with around 4.5 measured on Neutral Textured and Neutral Soft Textured using Epson UltraChrome Inks (on the Epson 4000) and 1.5 for the UltraChrome K3 ink set (using a variety of papers on 4800 and 7800 printers). The index measured on print samples provided by Fotospeed were 2.8 and 2.3 for DWFB Neutral and Warm Tone.

In trying to unravel the meaured value for metameric index we tested both "neutral" and slightly off neutral swatches for metamerism. By plotting the relationship between the colour bias (from *neutral* base white) and the corresponding metameric index we were able to predict what the lowest acheivable value would be. However, while there was a distinct relationship for DWFB Platinum Neutral, the data for NST was less ordered. We show the graphs for completeness but the matter obviously deserves some more investigation.

Our overall impression is that Quill K4 is more metameric than Epson UC K3 and that the tendency is for a nominally neutral Quill print to shift towards green in daylight. However, the effect was more pronounced when all the inks were employed. Using the Advanced Black and White driver of the Epson 2400 eradicated the effect, presumably because some of the offending, full cyan, magenta or yellow inks are sliced out by the driver.

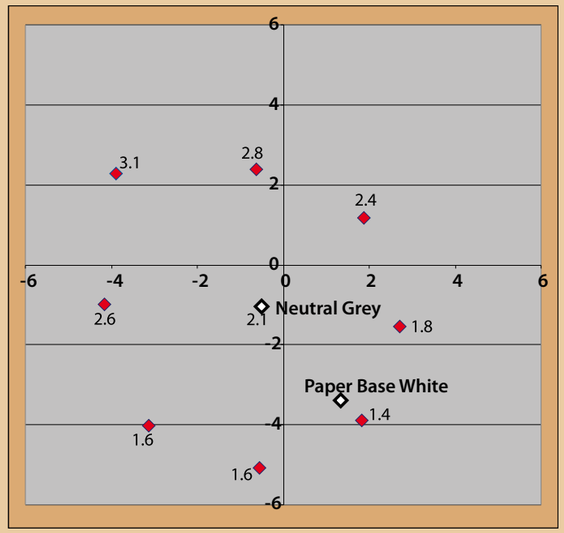


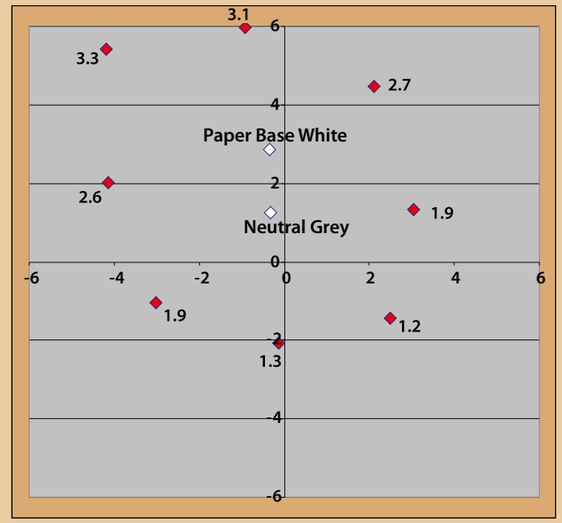
Media	MI
DWFB Neutral	2.1
DWFB Warmtone	2.9
Natural Soft Textured	2.0
Natural Textured	2.0
DWFB Neutral Epson UC K3	2.1

continued on page 75 »

"Prints made with both Platinum Warm Tone and Neutral easily stand alongside an original silver halide print…"

» continued from page 74





You may have wondered what the dancer surrounded by slightly off-greys was all about in our colour audit target. The portion of the image, shown left, has been artificially boosted in saturation to ensure that you can see what we are up to! About 4 ***Lab*** points bias each of the swatches, so that the off-greys lie evenly around the colour wheel, spaced at equal distances from a true neutral. We can use the swatches to explore in which direction true neutral lies and also measure each swatch to investigate the effects of metamerism. The swatches are deliberately close to the neutrals normally associated with monochrome images or slightly toned monochromes. The graph on the left is for Platinum Neutral. The bespoke profile has placed the neutral (ie 128 red, green and blue) in the cyan part of the ***Lab*** plot, not too far from the base-paper neutral. The red diamonds are the measurements from the swatches surrounding the dancer. The values by each diamond are the measured metameric indices. The metamerism appears to be worse in the green and green yellow part of the gamut and lowest in the blue, blue-magenta part. This pattern is repeated in the graph on the right, which is taken from Natural Textured art paper, the peak value is again in the green, green-yellow part of the ***Lab*** plot. Thus the combination of these graphs and the one on the opposite page confirm that the metameric index gets bigger as you move away from neutral and bigger still towards the greens.

"Comparing the digital prints with that originally made onto Multigrade…the digital prints were smoother in terms of image grain and the sharpening from the scanner"

SUMMARY

The Quill CIS system performed well and was easy to install. If you have a need to swap between art papers and gloss/lustre papers it represents a very economical way of going about it, especially as you achieve considerable savings in your ink costs. There is a small penalty in metamerism but otherwise the Quill K4 ink performs well and, in combination with the Platinum Neutral, it created spectacularly accurate skin tones. The CIS costs £171.17 ex VAT. Replacement inks cost £24.95 per 125ml. The Platinum papers work out at around £1.67 for A3 sheets. The papers are available in a comprehensive range of sheet and roll sizes. The enthusiasm with which this new type of paper finish has been received is well justified.