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Spindrift

...Scavenging The Graphic Arts Industry Since April 2003

News Focus • Opinion
Reviews • Techno-Babble
Attitude

Volume 5, Number 10
7th March, 2008

Droop • verb **1** bend or hang downwards limply. **2** sag down from weariness or dejection.

– From the Compact Oxford English Dictionary

Dear Reader,

Despite the excitement of Spring approaching and the gentle encouragement of lengthening days, the weight of drupa is already starting to feel heavy. Never has there been such a complexity of options at the show. The myriad of activities, from the drupa Innovation Parc to the drupacube, plus all those hectares of densely packed exhibits, reflects the industry's growing diversity and complexity.

Growth in our industry has followed fast on the heels of digital technologies and new applications developments. Digital processes now affect every aspect of the printing and publishing industries. This has led to the decimation of whole swathes of suppliers and print service providers, but it has also created exciting new opportunities. Most of those are emerging because of advances in digital printing technologies, and developers are queuing up to help printers work with customers to develop new applications, from building wraps to textiles.

Added to this are workflow innovations that continue to help many print applications migrate to the internet. As these mature and as IT boffins start to look at ways of producing accurate print-on-demand across multiple locations, we can expect to see the magic triumvirate of print, IT and the Internet really start to deliver. drupa will mark the beginning of that journey.

Enjoy!

Laurel, Nesson, Paul and Todd

PS: Last month we promised you the first in our series of articles looking at the carbon footprints of different publishing and print workflows. Well, needless to say, this has turned into a much bigger and harder project than we thought. Hopefully, the first of these articles will appear in next month's issue.

In This Issue

Slouching towards Düsseldorf

In the first part of our drupa preview coverage, Laurel Brunner finds a number of interesting trends. This includes a much stronger emphasis on partnership between the different and competing vendors, as each tries to build in support for rapidly developing digital printing without having to reinvent existing technologies.

see page 9

Monitor test 2008

Monitors are one of the basic building blocks of any graphic arts related activities, as you can't expect to do good work if you can't see properly what it is that you're doing. The latest crop of LED backlit monitors all feature much larger colour gamuts so that it is now possible to proof both CMYK process colours and many spot colours, as Paul Lindström finds out.

see page 16

Delta E Blues

One of the big problems in talking about colour, and colour management issues, is that it's hard to find objective ways of describing what is often a subjective experience. In this story Paul Lindström explains the difficulties of choosing a standard formula to measure Delta E and outlines the various options and our own preferences.

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News Focus

Fujifilm's new Acuity HD 2504 flatbed wide-format UV digital printer is now available. The device is based on a new imaging technology enabling each print head to produce variable-sized dots from 6 to 42 picolitres instead of fixed-size droplets. The Acuity can print 8 to 16 metres per hour and up to 1.25 metres wide. It prints extremely sharp text, smooth graduations and uniform solids. It prints on both rigid and flexible materials for point-of-purchase sign and display graphics. It uses Fujifilm Sericol's environmentally-friendly Uvijet range of UV curing inks which are chemical and abrasive resistant and have exceptional adhesion for both interior and exterior applications.

Kodak has announced its intent to buy Design2Launch, a small company which has developed a collaborative end to end digital workflow solution for marketing and creative teams in various markets, including pharmaceutical, food and beverage, automotive, and consumer packaging.

EFI is extending its QS line of superwide format printer, with 4- and 6- colour configurations for entry level buyers. The QS 4C and 6C models are field upgradeable, so customers can enhance printer capabilities as needed. EFI is also bundling its Fiery XF RIP with Raster Printers' newly introduced Daytona H700UV 72-inch wide flatbed

UV printer due to be introduced at the International Sign Expo later this month.

Meanwhile, EFI and **3M** have teamed up to release the new 3M Piezo Inkjet Ink Series 2800 UV for use with EFI's VUTEK QS2000 and QS3200 superwide printers, for which a wide range of opaque, clear and translucent 3M media is already.

Amongst its numerous heavy metal introductions, **Komori** (see Expandocs for further details) is presenting its KHS-AI advanced intelligence system for sheetfed presses at drupa. This technology has been available for web presses for a while and is used to progressively update press settings throughout a print run.

In addition Komori will introduce inline cold foiling, coating and embossing on its Lithrone SX629 press at the show. Two added units on the press coat first glue and then foil onto the printing plate and paper, to add all sorts of possibilities for metallic effects. Quite what happens to the colour management, we aren't sure, but this is one of those advances that keeps offset printing technology a step or three ahead of digital printing.

Heidelberg has upgraded its Suprasetter platesetter range with more powerful laser diodes for faster imaging speeds, particularly on processless plates which now image some 35% faster. The Suprasetter models 74 and 105 are now available in three and four speed versions respectively, and this will increase after drupa to four and five levels for a maximum throughput of 38 plates an hour. Upgrades can be done on site. Heidelberg has approved some 40 different printing plates for use in Suprasetter models, including some processless plates.

Enfocus has announced major upgrades to PitStop Server 4.5, Instant Barcode 1.5 and Instant PDF 4.1. All three are now Adobe CS3 compatible and the user interface for PitStop Server 4.5 has been completely revamped. It can run as a service on Windows and a log-in item on Mac OS X 10.4 so job processing can start without the user launching the PitStop Server 4.5 user interface. PitStop Server WatchDog operates as a background application to keep the workflow constantly active. Also Instant PDF 4.1 has improved email Server Account Settings and is now fully compatible with OS X 10.5. ▶

Spindrift

ISSN 1741-9859

A very special newsletter for Graphic Arts, Prepress, Printing & Publishing Professionals, published monthly (sort of) by:

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Subscriptions:

Spindrift is a digital only publication, distributed in Adobe .pdf format. A ten issue subscription (our version of a year) costs €190 and can be obtained by going to www.digitaldots.org and subscribing. We strongly suggest doing this as it is the only way to legally obtain this publication and we know you all want to be legal, especially at this sort of price. Discount multiple subs are available. If you're undecided and require some high-powered sales encouragement, ring Laurel at the number above.

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▼ **Global Graphics** has launched version 2.0 of its Jaws PDF Desktop Suite which supports Windows Vista and includes both Jaws PDF Creator and Jaws PDF Editor for only €69.

The **Automated Content Access Protocol** people (ACAP) have published the ACAP implementation guide and are encouraging publishers to start using the protocol as soon as possible, <http://www.the-acap.org/implement-acap.php>

Canon is to acquire a 24.9% stake in Hitachi Displays, Ltd. a wholly owned Hitachi subsidiary making small and medium-sized LCD panels. The investment is valued at approximately ¥43.2bn, and is expected to conclude by the end of March, pending regulatory approval. The acquisition price is based on an evaluation of Hitachi Displays' value, including a 50% shareholders' equity stake in IPS Alpha Technology, Ltd. owned by Hitachi Displays. Canon plans to acquire Hitachi Displays' shares owned by Hitachi and Matsushita and to make Hitachi Displays a Canon subsidiary. Additionally Canon's 2007 revenues were ¥4,481,346m, with a net income of ¥488,332m.

Océ has opened a new technology centre in Singapore. Océ Technologies Asia (OTA) is the hub of Océ's Asian activities and incorporates research and development, product demonstration facilities, supply chain management and procurement. Océ employs 120 people in Singapore, and is developing its distribution network in Asia. The Founder Group in China will sell Océ printers in the Chinese market and Fuji Xerox will be selling Océ wide format colour printers throughout Asia.

EFI's Advanced Professional Print Software (APPS) business delivered record growth for the fourth year in a row: 8 percent topline growth in 2007, compared to 2006, from €37m to €40m in full-year revenues. This business unit comprises MIS, web-to-print, and inkjet proofing and production workflow solutions.

Screen has appointed Schneider Grafiska AB as its distributor to sell and support Screen's industrial and wide format inkjet printers in Denmark, Sweden, Norway and Finland. Schneider is a well established supplier of large format technologies, as well as prepress, finishing and consumables.

Presstek has announced an alliance with Press-sense, leading developers of web-to-print tools for the print

industry such as iWay. Presstek will offer the Press-sense portfolio of web-to-print and business management software as both licensed software and hosted versions.

Canon has entered into a partnership with Bitstream to provide its PageFlex technology with Canon production printers. Bitstream is now an Alliance Partner within the Canon Workflow Programme. PageFlex is a powerful variable data and web store front suite of software products, for both print and HTML communications.

Punch Graphix, the folks behind the Xeikon digital press, have announced 2007 sales of €115m and a net loss of €-4.9m, which was slightly better than expected. The results for the year are heavily influenced by the purchase of Punch Graphix plc in July 2007 and the sale of the RMS and EMS divisions. Punch has also announced the appointment of Paul Willems, ex of McKinsey & Co, Nexpress and Agfa, as chief marketing and strategy officer.

Dainippon Screen is opening a 700m² exhibition space for printing industry technologies, including inkjet printers. Screen has invested about ¥700m into the Media Square which is located at Screen's printing and prepress R&D centre in Kyoto. It is designed to raise awareness and appreciation of print-on-demand applications and to promote the development and use of inkjet printers for such applications.

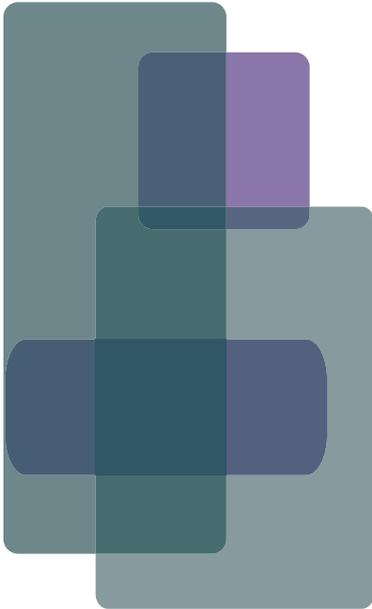
The installation of **Goss's** first Flexible Printing System (FPS) 90,000 copies-per-hour press is now underway in Holland. Newspaper publishers F.D. Hoekstra Boom in Emmeloord expect the press to be in full production on schedule this spring.

Alwan Color Expertise has released a report comparing Dynamic DeviceLink profiles (DVLPS) and conventional ones. Written by Amélie Trichon, a French print engineering student, the report evaluates the performance and possible differences between dynamic and static device link profiles. The methodology is based on numerical and objective, and visual and subjective testing techniques.

CIP4 has announced its CIPPI Awards for 2008. Any printer, publisher or prepress services provider can enter and this year's awards will be presented at a dinner reception on the 4th June at the drupa Innovations Parc. The award categories along with further information about entering are available at the CIP4 website.



▼
Ifra has announced this year's IFRA XMA Cross Media Awards for newspaper publishing houses. The theme is "Cross-media Advertising" and interested publishers should sign up for the awards by 30th June at IFRA's website. Publishers can enter work produced between 1st July 2007 and 30th June 2008.



Say What?

(Iffy Writing Award Presented in the Ether for Obfuscation, Confusion, Misinformation or All Out Pretentiousness)

This month's Say What award goes to Colin Thompson at Cavendish, a consulting firm, for his extremely long sales pitch entitled 'Wake up the print industry'. It starts with a rather gloomy outlook for the economy, which appears to have been culled from a quick five minute perusal of the headlines from any week of this year so far.

We loved the insightful analysis, such as: "We expect that the slowdown in global growth will help to keep UK inflation under control and that the BoE (Bank of England) rate throughout 2008 will be static!" which will no doubt be news to anyone doing economics at school. Other gems included: "Digital is not just for high tech people anymore - it's part of the printers' armoury, if not, being successful in the future will be very difficult for Commercial Printers."

All of this hyperbole and poor grammar are aimed at persuading people to buy various 'in-depth' reports, with which you can learn to 'navigate the seas of new and newer media' (Don't write in - we don't know what this means either).

Still, we were particularly grateful for this as we've been having trouble sleeping at night, but reading a few paragraphs from this tosh does the trick every time.

Acrobites

(Something to get your teeth into)

DVI

Digital Visual Interface is a video interface standard to connect monitors such as flat panel LCD displays to a computer. There are several generations and versions of DVI cables and connectors, where a single channel DVI link can carry up to 2.75 megapixels of image data. This equals 1915 x 1436 pixels at 60 Hz standard proportions, or 2098 x 1311 at widescreen ratio.

If higher resolution is needed, a dual link can be used which supports up to 4 megapixels of image data. A dual

link cable can also be used to transfer higher bit depth than 24 bits per pixel. There are three main types of DVI connectors: DVI-D is for digital signals only; DVI-A for analogue connections (for example to a VGA graphics card); and DVI-I which stands for integrated digital and analogue signals.

The DVI video interface is partially compatible with the HDMI interface (High-Definition Multimedia Interface). As well as using the DVI cable to carry image data, some vendors have started using part of the DVI signal capacity to carry control data between the monitor and calibration software on the computer. This can be used to perform a so-called hardware calibration of the monitor.

NTSC

The National Television System Committee has given its name to this analogue television standard, brought in place by a US standardisation body. In addition to specifying resolution and frame rates for the TV signal, the NTSC standard also defines a possible colour gamut for the image. This analogue colour gamut is actually quite large, in theory at least, as very few monitors can reproduce it. If measured as possible colours it is equivalent to roughly 1,428,700 colours.

The NTSC standard is to be abandoned in 2009 in the US, to be replaced with HDTV standards. While the NTSC standard is more or less obsolete in regard to digital imaging, it's still quite often referred to when it comes to comparing colour gamuts. But of late, the Adobe RGB colour gamut, and for that matter, sRGB, is more commonly used as a target gamut to achieve in a monitor.

Expandocs

(Casting some extra light on a recent news story)

It isn't generally part of Spindrift's remit to cover conventional presses, except where they are affected by digital advances. And so for this reason we have decided to take a closer look at a recent announcement from Komori. There's nothing new about Komori's KHS-AI technology, having been introduced for web presses at

▼ drupa 2004. At this year's drupa, Komori is introducing a version for sheetfed presses.

The Komori Hiper (for high performance) System is about achieving standardised print procedures, with standard ink densities and digitised quality control. It can help reduce makeready and waste and generally improve print to productivity ratios by reducing waste sheets prior to printing. The technology does this by automating ink removal between jobs by running a few sheets through the press. Automatic ink key selection and re-inking is a standardised process.

The addition of automatic intelligence, which works by applying what actually happens on the press to the rules that drive process automation, takes KHS a step further. Komori claims its technology can help a printer reach production-quality level almost immediately, even when changing between jobs with vastly different ink coverage, formats and paper characteristics.

The net result is a further reduction in already short makeready times. Pre-inking processes are self-learning, based on the variables involved and how they change over time, and might compromise the device profile's accuracy. This constant re-evaluation of process variables gives the press operator feedback throughout the print run. Most importantly it helps reduce makeready from around 200 to 20 sheets.

This technology will be demonstrated at drupa on the Lithrone S40 and extends Komori's existing fast print press start systems. The company claims that the S40 can get up to an accurate 12,000 sheets per hour within seconds.

Spindocs

(Where the spinner gets spun!)

We received a rather long-winded article which claimed "The Advantages Continue to Stack up for Electronic Information Transmission and the eBook". We rather doubt this, having only just recovered from the near coronary induced by laughing at the Amazon Kindle.

According to this document: "it remains a curious question as to why the publishing industry has been so slow to embrace the electronic book". No mystery there - it's because most electronic readers are rubbish (see above remark on the Kindle). Let's face it - there are some things that paper is really good for, and books are right up there at the top of the list. They're cheap to manufacture, can be read anywhere, don't need to be recharged, last for hundreds of years, and it's easy to scribble notes in the margins.

The article claims that almost all books are printed abroad "using other cheaper ink which is produced where there are little or no environmental laws covering the use of toxic base pigments and petro-chemicals." Little surprise that this treatise also claims that printed books, which are biodegradable, will end up being a burden on the environment, without mentioning about the doubtful benefits of dumping electronic readers into landfill sites.

The good news is that the latest book from the author of this rubbish, Dr Silvia Hartmann, is only available in 'electronic transmission format', so there's very little chance of it finding its way into the local bookshop.

Driftwood

(Useful stuff washin' up on our shores)

Colour management and quality control is an everlasting theme on Spindrift's pages, and there is constant progress in this area. One interesting concept that has entered the late stages of beta testing is the Maxwell online colour repository from Chromix. Maxwell is basically a web interface to a database full of information about the company's colour critical devices, be it monitors, proofers or presses. Most of all it is a repository for common reference files and agreed upon colour standards.

The user can set what tolerances a certain device should operate within, and be notified if this device is operating out of those limits. Chromix already offers its customers analysis tools like ColorThink, and much of this technology will be brought into Maxwell.

▼
Understanding the colour behaviour of a device often demands more than statistics, and Maxwell can display 3D rendering of colour gamuts and overlay one device gamut on another to check if there are areas that aren't included by, for example, a proofer or softproofing monitor.

Another feature planned for Maxwell is to build colour profiles, both conventional ICC profiles and the new profiles for Windows Vista, WCS profiles. If you aren't sure how to create optimised profiles you can link up to the Chromix measurement service, and be notified when profiles are ready to use.

The web interface uses Ajax and other Web 2.0 technologies, and can be accessed through Widgets for Mac OS, Windows Vista and Apple iPhone, as well as any modern web browser. We are currently using the beta version of Maxwell for evaluation, and will come back with more info when this promising technology is launched in a commercial version.

Boomerangs

(Your feedback fed back)

The first of this month's Boomerangs agreed with our take on Xerox's new logo...

Hi Laurel,

Nice to see your comments on the cringe-worthy Xerox thingy. I thought it looked like a cricket ball, but they don't know what that is I suppose.

And the nondescript typeface is also used as a house face by Focus (DIY stores). They at least acknowledge the nondescript-ness since they allow Arial as a stand-in!

Very best wishes.

Name supplied *(and not revealed except under threat of defenestration)*.

...however, our second Boomerang disagrees with our views of Apple:

Hi Todd,

Couldn't help laughing at the line on page 7 (latest Spindrift): "However, we feel that Apple can sometimes take the ease".

Is the last word a spelling mistake? I think it should say "However, we feel that Apple can sometimes take the piss".

Well, they certainly do with regards to iPods. My son is now on his fourth with the first three all 'self-destructing' a week or so after the warrant expired. The last one 'died' just a day or two after its first birthday so I sent it back to an approved Apple repairer. They phoned me to say that it was not repairable by Apple but that I might find somebody on the internet that could repair it! They obviously don't give a shit about support and their customers. They are only interested in bringing out the 'next' model and hope that all the kids out there will buy another one when their original model gives up the ghost.

Of course, my son has no choice but to buy another iPod because of all the songs that he bought on iTunes which will not play on any other MP3 player. Proprietary systems - what you gonna do?

I hate Apple with a passion and would be more than happy to tread on your new 'wafer thin' laptop given the chance.

Pass this on to Laurel as I don't have her e-mail on this laptop which, incidentally, is four years old and still going strong which is probably why 92% of people don't buy from Apple.

David Howes

Dave,

No spelling mistake - we did indeed mean "ease of use" - though a little tongue in cheek given the lack of adjustments with the Cinema Display. The piece was written by Paul Lindström, with some additions by myself, and we both chose Macs after a long time working with PCs. But each to his own...

And I do fully agree with you that Apple does sometimes behave rather badly towards its customers, and the

▼
have been issues with iPod batteries not lasting very long (not to mention the current furore over Time Machine which rather looks as if those people who bought the Airport Extreme Base Station for wireless back-ups have been royally screwed). In fact, Apple can be absolutely infuriating and there are times when I swear that I will never buy another Mac, but it usually ends in tears as I am forced to admit that my addiction to the shiny laptops is even more powerful than my love of chocolate.

But then it always seems to surprise people that Apple should be like any other corporation in that it aims to make money for its shareholders. And of course, despite knowing all this, we still like working with Macs, which in truth, may not say very much about our judgement! (But in my defence I don't think the competition is much better.)

BTW, iTunes uses the AAC format, which is not proprietary to Apple, although it does have Apple's FairPlay DRM (Digital Rights Management), which in fairness to Apple was forced on it by the record industry, and I believe they are now selling DRM-free music. I think they recently introduced an option to 'upgrade' existing iTunes tracks to higher quality DRM-free versions, which although annoying in that it commits you to spending yet more money with Apple, would at least allow you to switch to a different music player. In theory other music players could be designed to use AAC, which does offer smaller file sizes for comparable quality to MP3.

I have been told, but have not tested this, that one workaround is to rip an audio CD with your iTunes tracks and then import the music from the CD as MP3s. And of course there are several third party programs available on the Internet that will crack the DRM and convert the files for you, though this will break the copyright rules and as 'responsible' publishers we couldn't possibly condone this.

Nessan

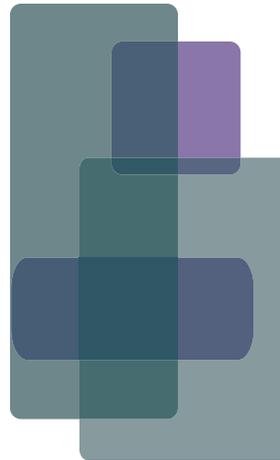
Our daughter doesn't seem able to hang onto the iPods for long enough for them to stop working. The latest, a handmedown from a friend, is however still going strong despite looking as if it's been trampled by a herd of buffalo in hobnailed boots.

It's probably a Marmite thing, but I've an ancient Mac SE that's still going strong. Our daughter was really

impressed with it the last time she used it, because it boots up with lightning speed.....

Thanks for the mail, and we appreciate the feedback!

-Laurel.



Slouching Towards Düsseldorf

The long slow build up to drupa has started with a bevy of introductions at AD Communications' mammoth Media Week event, an event definitely not for the fainthearted! Numerous companies presented their ideas about drupa to a selection of the world's press during formal presentations and informal gatherings. Understandably many companies were quite cautious about making new product announcements, however there were several hefty hints as well as actual products and already some interesting trends are emerging.

First off, although drupa is a technology show, this time around there is a lot of emphasis on sharing and partnerships, such as the worldwide reseller agreement between Fuji and Xerox, and the latter's deal with EskoArtworks. Xerox will announce further relationships at drupa (mainly with Heidelberg). Partnerships are in place between Canon and EFI, Ricoh and Screen, Dalim and UPM Kymmene, and so it goes on. Screen is expanding its partnerships, making its Trueflow front end technology for print-on-demand available to drive partner devices from HP Indigo, Canon and Konica Minolta.

It seems that everyone is adjusting their business models to leverage their respective strengths to support new digital printing applications. We can expect a real muddle of new digital press technologies to emerge over the coming weeks, including technology demonstrations for products that won't be released for a while such as Kodak's Concept press, based on Stream technology (see last issue) which will be demonstrated at drupa with availability in 2010. Xerox will show a new wide format offering, new continuous feed products and its inkjet technology developments for as yet unspecified products, plus toner developments for xerographic colour output at 500 plus pages per minute. These innovations will sit alongside relatively new products that have already been introduced including Xerox's FX980, Screen's Truepress Jet520 and Océ's Jetstream.

New Presses

Following its Fespa preview last year, Screen is also launching the Truepress Jet2500 digital press at drupa. This is a wide format flatbed or rollfed printer for rigid and flexible substrates, so it will work for a wide range of applications. It has multiple greyscale heads and new screening algorithms (AM and FM), with additional light cyan and light magenta inks and two whites. It supports speeds of up to 70 square metres per hour. There are five output resolutions from 300 dpi to 1500 dpi for top quality output including lenticular printing and photo quality output. The company will also be working more closely with its Inca division, developers of the megafORMAT Onset device.

It seems that everyone is adjusting their business models to leverage their respective strengths to support new digital printing applications. We can expect a real muddle of new digital press technologies to emerge over the coming weeks, including technology demonstrations for products that won't be released for a while...

▼
Xerox has come a very long way in a very few years and at this drupa will have both its own substantial presence and cooperations with Fuji-film and Heidelberg. Heidelberg's answer to the variable data questions is to send people to Xerox and HP Indigo, however there seems to be a greater degree of intimacy with Xerox. drupa will see the launch of the 650, Xerox's and possibly the world's, fastest digital monochrome output engine. A continuous feed printer with LED imaging and Xenon cold flash fusing, the 650 prints up to 91.4 metres per minute, which is 1232 A4 impressions, at 1200 x 600 dpi. This a dry toner device and can print on 200-600 gsm substrates and is IPDS native with support for PDF, Postscript, PCS and VIPP, via a FreeFlow Docucolor SP front end. Xerox is already taking orders for the machine.

Other digital press highlights include a new Versamark from Kodak designed for datacentres. The VL2000 Printing System is for printers with volumes of from one to five million A4 impressions per month and prints 1090 A4 impressions per minute (76 metres per minute). Kodak has also enhanced its Digimaster Ex monochrome line with expanded support for Prinergy 4.1 and there will be a next generation Nexpress technology. The Nexpress S-Class presses are (up to) five colour devices that print from 2100 to 3000 A4 sheets per hour. There are three machines in the series, all modular and available with three different front end systems, a range of front end system options, input and output additions and onsite upgradeability.



Kodak Versamark VL2000

Ricoh will unveil two new high speed colour printers the rather unimaginatively named Pro brand (so eighties). There are two models, the C900 and C900s (for scanning) both of which print at 90 pages per minute duplex, and are a big jump up from the 55 page per minute Aficio 5560C, currently Ricoh's fastest engine. Ricoh is working with EFI for its Digital Front Ends and intends to become a major player in the graphic arts market.

Ricoh was founded 1936 and comprises 322 companies employing 81,900 people and it has very deep pockets: turnover to March 2007 was around US\$ 17,688.5m. Ricoh Europe operates in 19 countries with 36 operating companies and employs 15,000 people. A dedicated division with its own research and development has been set up to support the graphic arts industry. Ricoh won't say how many people are involved, but it is determined to capture a substantial slice of the digital printing business. Ricoh is a relatively late arrival to the digital printing scene and it has a lot of catching up to do, particularly compared to Canon, Océ and Xerox and traditional suppliers who understand grown-up print as well as the upstart that is digital printing.

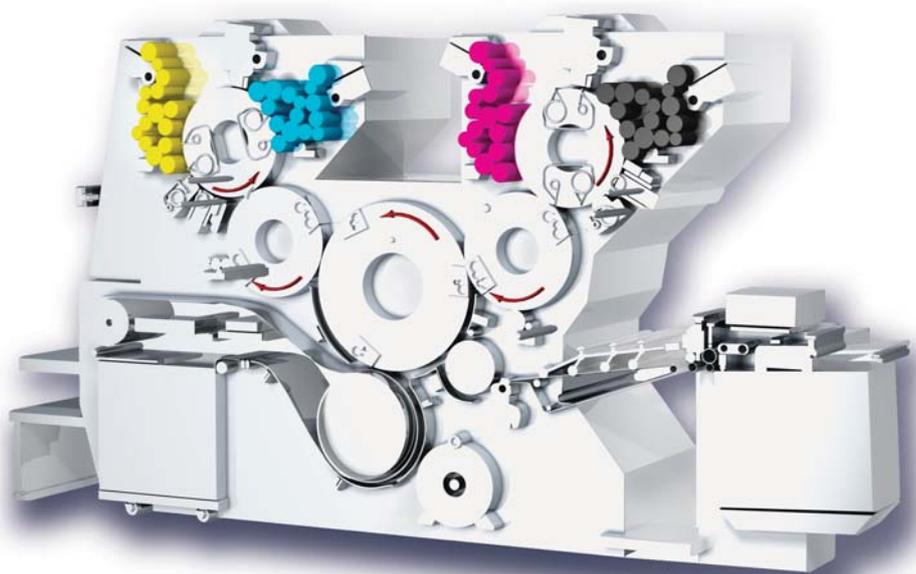
▼ One such lion is Screen, a quite amazingly nimble company which has recognised that the logical destination for pages is direct-to-press. Despite being potentially blinkered by its market leading position in computer-to-plate, Screen's reaction to changing market needs has been both rapid and bold. At drupa a new corporate strategy will be in evidence, positioning the company as a supplier of output technologies for both conventional and digital print workflows. There will, for example, be new CTP technologies to support the new generation of very large format presses, alongside print-on-demand engines for packaging, signs, commercial and industrial applications.

CTP developments

Screen is introducing new machines for flexo and newspapers with a new generation VLF device for the new generation of presses. Kodak is also launching a new platesetter, the Magnus 800Z Quantum, which images 60 8-up plates per hour. Any printer who has not yet gone to CTP but plans to will surely be able to drive some hard bargains at drupa to get new or replacement CTP devices at knockdown prices. And there will be new processless plates from all the major suppliers, including processless violet plates from Fujifilm which is introducing the Pro-V plate, Agfa and Kodak. Only Ipagsa and Presstek appear to be opting exclusively for thermal for imaging processless plates.

Presstek has stated that it wants a 10% share of the plate market and that it is continuing to develop its processless plate technology. At drupa Presstek too will emphasise new partnerships, including one with an unnamed inkjet technology developer with whom the company is working. It has said there is a strong possibility to develop a hybrid technology for short run on-demand variable data newspaper production.

Fujifilm had already shared its plans with us for reinvention along the same lines as Screen (see Spindrift SP0507 November 2007), however it made public its plans at Media Week. At drupa Fujifilm will present itself as a developer of offset and digital print technologies, with the introduction of the Pro-V violet photopolymer plate, and a new range of pressroom chemistries, plus a focus on direct to press output. The company is introducing new Fujifilm inkjet technology plus various wide format systems using its Sericol inks. This includes the Acuity HD 2504 device, which Fujifilm claims is the world's first high resolution UV flatbed printer, imaging at up to 16 square metres per hour. There will also be a suite of digital printing systems based on Xerox engines ▶



Presstek 34DI Schematic

▼ and Fujifilm workflow and colour management technologies. Over the next few weeks we should be hearing more news of further digital press introductions.

Workflow

EFI has its fingers in many workflow pies and has promised to introduce “a very special Fiery” at drupa, presumably to support some of these new engines. But there will be many other exciting front end announcements at the show. Fujifilm is introducing version 2 of XMF, which adds collaborative online proofing and web tools, plus support for hybrid workflows. Imposition and colour management have been enhanced and Fujifilm is launching XMF C-Fit, an intelligent image optimisation module.

This technology is designed to drive any Fuji Xerox device and has the scope to drive more engines, so it should give both Creo and Efi technologies a run for their money. between them, Creo and EFI have pretty much sewn up the choice for variable data front ends and both will have new stuff on show in Germany, although Creo has been rather more forthright. Creo technology is to be standard across the Kodak line so Kodak is no longer an EFI partner. Creo’s Nuevo technology is a Windows and dual Xeon-based line of servers providing up to a ten-fold increase in power, to serve data to digital printers at rated speed. These scaleable and parallel RIP architectures can output up to 1000 pages per minute and support high quality colour and image handling, variable data output and connectivity between Kodak’s Prinergy and Insite workflow systems. Creo has also introduced versions of this technology for its OEMs: HP Indigo, Ikon, Konica Minolta and Xerox. The servers are variously configured to include RAID arrays, versions of the Creo Colour Server Fusion Board and port switching to support multiple presses.



Kodak Magnus 800Z Quantum Platesetter.

But neither EFI nor Creo, nor indeed any company that we are aware of, has a data management technology to match Fujifilm’s Taskero Universe. This colour consistency and quality control system monitors multiple devices in a workflow, wherever they are, to capture performance data and ensure that every device is performing to a prescribed set of target parameters. Essentially a suite of diagnostic tools, Taskero Universe provides data reports of every operation throughout the print production process. There are three parts to the technology all of which operate via the internet. Users can set colour targets, manage servers, and monitor devices and the environments in which they function. This holistic approach to system diagnostics and device management has the poten-▶

▼
 tial to really change expectations and applications for on-demand print applications and print delivery to multiple destinations using different printing technologies. If ever there was a technology that should be shared, this is it!

A few years ago workflow systems were treated as a technology class of their own, however, we have all come to realise that this is silly because workflow is all about helping people to get their jobs done with the minimum fuss. Tools to achieve this vary from the very ambitious such as Taskero, to cheap and cheerful plug-ins, and will be another key focus at drupa. In addition to technology, there will be all sorts of business support and consulting tools introduced to help people better manage their changing business and market needs. Xerox has announced new modules for its Profit Accelerator programme, plus added modules for FreeFlow. There will be numerous clever tools to support both remote production and on-demand delivery.

It unfortunately doesn't do much to remind the world that it exists, but Dalim is one of the industry's most creative and imaginative workflow technology development companies. It employs around 60 people and is one of the few organisations that seem to get the idea that the internet is the environment for all players in a production workflow, regardless of its complexity. Dalim's Twist management system is a library of 120 tools and the engine is behind not just ad agency print workflows, but also their websites where Twist is used to drive job management.

Softproofing

Dalim has now introduced a JDF Connectivity package which allows Twist to interact with other technologies, such as Alwan's CMYK Optimiser or Dalim's Dialogue soft proofing technology. The package is basically a remote control for JDF devices. The Dialogue proofing tool now has a text extraction function for easier commenting and corrections, and for making suggested changes. It supports both non-Roman and Roman character sets. Dialogue also now includes closed loop calibration, checking that a remote production environment was correctly calibrated ie within tolerance. If it isn't, Dialogue can block approvals or allow them only with notification of the fact that the press is not calibrated to the correct tolerances. This is the first such web-based calibration tool we've seen for automatically checking system settings as part of the proofing process.

Following the release of FFEI's groundbreaking RealVue technology, Dalim will preview a potentially competitive tool called Virtual Library, which was also originally designed as a proofing tool. It is used in conjunction with Mistral, Dalim's flat planning tool based on the Ajax web environment and using Javascript and XML to deliver small amounts of data to web pages dynamically. In an Ajax environment web pages don't have to completely reload, just the data that changes, so they are very quick. On the basis of this technology, the Virtual Library can provide a realtime remote view of complete magazines, with pages accessed from ▶



Dalim's Dialogue soft proofing technology

▼ the Mistral server for visualising the final magazine, prior to printing. Virtual Library has an extremely slick user interface that has more than a whisper of Apple's iTunes about it.

Like FFEI, Dalim has used gaming techniques to provide the speed and interactivity. The technology is touch screen ready and has gatefold and two byte character support, pulling data and collected metadata off of the Mistral server, via RSS. Dalim is partnering with UPM Kymmene to use this technology to accurately render the physical characteristics of different papers for a magazine. The technology could be available for mobile devices such as iPods for publication distribution, although Dalim is keen to stress that this is not an e-book reader technology.

Virtual Library is about maintaining communities of readers involved in print production and is also relevant for people who want to use both print and a digitally rendered magazine. So saying, there just has to be a business for on-demand print production using this to drive it when people are out and about: Mistral pages and publications could be routed to a web-based syndication server and delivered to multiple users of the Dalim Virtual Library for on-demand digital print. Like FFEI's RealVue, this technology has fascinating possibilities for on-demand print delivery. Both technologies, if managed sensibly, could have huge potential for on-demand content delivery across media. Another technology that's ripe for sharing and OEM deals!

Conclusions

Although the apparently complex cooperations and technology sharing seems very muddled it isn't really, it's an inevitability of technology and industry maturity. Players long established and those coming into the business are wisely not trying to reinvent the myriad wheels and cogs that are the foundation of many digital workflows. We seem to be settling down to a world where there are only a handful of developers for particular technologies, but a multiplicity of implementations, all with different business models and different propositions for their customers. This is great because it creates an environment for invention that exploits the efforts of engineers far removed from the grubby business of print media. Consider the distance between the inventors of violet diodes, and the many companies developing computer-to-plate technologies based on violet imaging for instance. Or the boffins at Adobe and Global Graphics working on RIP technologies and data formats, or Xaar and Dimatix and their greyscale heads. Or Apple and Microsoft whose technologies are the very foundation of countless workflow systems.

At drupa it might be difficult to sort out who's using whose technology, but this doesn't matter. Is there really any point to knowing whose heads are used in an inkjet printer, as long as the technology works and is properly supported? These days the underlying technology is not the most important part of buying decisions. It's the configuration, the cost model and the company supporting the technology that should be the focus for printers and print buyers visiting Düsseldorf this Spring. This is ►

We seem to be settling down to a world where there are only a handful of developers for particular technologies, but a multiplicity of implementations, all with different business models and different propositions for their customers. This is great because it creates an environment for invention that exploits the efforts of engineers far removed from the grubby business of print media.



particularly true for CTP systems and digital presses, where consumables represent substantial post sale income for suppliers and costs for printing companies. For any business the technology, workflow and business model makes or breaks it.

– **Laurel Brunner**



Monitor test 2008

When LED backlit monitors came to market in force last year, we saw a sudden and definite jump to larger colour gamuts. Now the question is – can we expect monitors to proof not only CMYK process colours properly, but also many of the spot colours?

Since we started testing monitors for high end graphic arts production some years ago, the CRTs have more or less disappeared from the market, replaced by the much brighter LCD monitors. While a CRT had problems reaching more than around 120 cd/m², many LCDs offer 400 cd/m² or more. This increased brightness is useful when a monitor is placed in an office environment with quite strong ambient light conditions, or next to a viewing both.

Evaluating monitors used to be somewhat subjective, so we started to measure both the colour gamut and the colour accuracy, using our own proprietary test methodology. But when UGRA introduced its monitor testing software, the UDACT (Ugra Display Analysis and Certification Test), we switched to that instead. It contains the same test procedures as our own old test, and works in a similar way. But we have added one test – evaluating if the colour is sensitive to the angle from which you view the monitor. On some monitors the colours change in appearance quite considerably if you view the picture from straight ahead, or at an angle. The latter is, of course, not acceptable in high end colour retouching and softproofing.

Hardware monitor calibration

There are several different explanations as to what is meant by the expression ‘hardware calibration’ of monitors. To us it means that you can fully control the monitor from a control software on the computer, without the need to manually modify monitor settings through the menu system for the monitor (often called the On Screen Display, or OSD). It’s often quite cumbersome and time consuming to use the OSD, and the result isn’t very precise. It’s much faster and better to use either a separate USB-cable or the DVI-cable to control the monitor.

Using a separate USB-cable is faster, and this is what, for example, Eizo and Quato do. Other vendors have started to use the capacity of the DVI-cables (Digital Video Interface) to set brightness, contrast, colour balance, gamma – all the settings necessary to calibrate the monitor. But using the DVI-cable for this is slightly slower, and more sensitive to how well the graphics card and OS handles the DVI-data. We had some problems with the DVI-connection to both the NEC and Samsung monitors, but finally made the calibration work (although not on a MacBook Pro with Intel processor, but we were told that this problem should be fixed by Apple in the next update of the Leopard OS).



Samsung XL20



Apple Cinema Display 23

How to measure colour accuracy

Measuring colour gamut is one thing, and several LCD monitors now reach the colour gamut of Adobe RGB, or even a larger gamut. But when using a monitor for colour accurate softproofing it's not so much Adobe RGB we are after, but accurate rendering of the process colours CMYK. And since the primary colour space for a monitor is RGB, it's not at all certain that it will render CMY correctly, since this is its secondary colour, produced when mixing the RGB-channels.

Fogra, the German research institute, offers a colour strip to evaluate hardcopy proofs, and what Ugra has done is to take the same 46 colour patches and generate a series of digital colour patches to display on the monitor. By evaluating how close a colour match the displayed patch comes to the reference value (the equivalent to the colour patch on the proof or in print), we can then judge if a monitor can be used for colour accurate softproofing. This is expressed as colour deviation, and is measured in Delta E (often written ΔE). For hardcopy proofs the maximum average colour deviation that is acceptable according to ISO 12647-7 is $3 \Delta E$, and the allowed colour deviation for monitors is calculated in a similar way.

The UDACT software calculates the colour deviation and classifies monitors as to whether they are valid for softproofing of print according to ISO 12647-2 in three categories: on coated papers, on uncoated papers, or for newsprint. If the monitor doesn't qualify in any of those three categories it's stated to only be useful for general layout purposes.

But when evaluating the colour gamut of the monitor, the UDACT software also measures the maximum gamut possible, and as an extra information, only given as a side comment in the full test report, some monitors are considered useful for simulating colour gamuts larger than that of conventional CMYK process colours. This is called softproofing of 'Multi Color printing', or 'High Body printing'. Printers and publishers who want to proof Hexachrome printing or spot colour printing should consider using monitors that pass the Ugra test with clearance for Multi Color softproofing capacity.

The uniformity of the monitor surface is measured at nine different points, and an average colour deviation is calculated. This test is not used to judge the monitors proofing capacity, but presented as side information in the report. It's not good if the colours are uneven over the surface, and a monitor with poor uniformity should not be used for high end softproofing.

The monitors tested

We invited manufacturers of monitors targeted for professional graphic arts production, which often meant that they offer calibration software in the bundle, as well as a calibration device and a monitor hood. An exception is Apple, which doesn't offer either (and the old built-in monitor calibration software in the Mac OS is crap), but since the Apple Cinema



Eizo CG324W



Lacie 324

Display monitors are so popular among designers, photographers, and within the graphic arts industry as a whole, we wanted to test them again. And this time we actually found a software package that can do hardware calibration on an Apple Cinema Display.

We used the Color Solution application Basiccolor, and could perform an automatic and 'hands free' successful calibration of the Cinema Displays. There are special softproofing systems on the market that can calibrate the Cinema Displays as well, like ICS Remote Director, Kodak InSite et cetera, but the Basiccolor stand alone calibration software is the first to our knowledge that manages the DVI signal processing back and forth to the Cinema Displays.

Eizo, La Cie and NEC are among the monitors we tested again, but Quato isn't ready with its LED backlit model, so we will come back to that later. Quato says that the challenge is to manage the increased heat when using LEDs as a light source, at the brightness levels that those monitors offer. Quato doesn't want to sell a monitor that keeps its calibration over time.

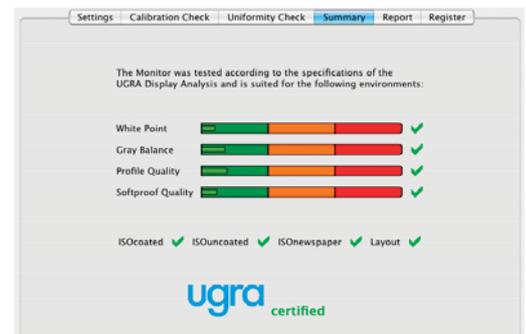
A newcomer in this illustrious group is Samsung, with its XL20 model. This is a 20ins LED backlit LCD monitor that is bundled with a monitor hood and an X-Rite Display 2 calibrator, controlled by special Samsung software called Natural Color Expert for automated hardware calibration of the monitor through the DVI-cable. While we noticed some instability over time, as well as not perfect uniformity over the monitor surface, the XL20 passed within the margins of the UDACT test, and even reached the status of being suitable for Multicolour proofing.

It is claimed to offer the full Adobe RGB colour gamut, and our test confirms this – it has about 106% of Adobe RGB when calibrated at 6500K whitepoint (D65), but for proofing we calibrate the monitors at 5000K. Lowering the whitepoint value from a monitor's native whitepoint, often at 6500-8000K, to a 'warmer' white of 5000K by necessity limits the colour gamut somewhat. But all printing standards, be it SWOP or ISO 12647, assume a whitepoint identical to that of a viewing booth, and this is 5000K, so this is what proofing devices should be set to. For some monitors the operator may need to tweak the monitor whitepoint to perhaps 5500 or even 5800K in order to better match the appearance of paper white, as it appears when viewed in a viewing booth. But we perform our tests at 5000K and a gamma setting of 2.2 for all monitors, in order to have a common reference.

For brightness we put 160 cd/m², and the black point is set to 0.6 cd/m² in order to simulate printed black on paper (monitors can produce a black point close to zero luminance, but this doesn't match how black appears in print). The above settings are not absolutes, and can be modified to taste. There are, for example, good reasons to stick to the classic gamma of 1.8, but in a mixed PC and Mac environment a common gamma setting of 2.2 may be a functional compromise.



NEC 2690W



The monitor test software from Ugra checks if a monitor qualifies for softproofing of the ISO standards. If the Delta E measured exceeds a certain limit, the monitor fails to be certified.

The results in numbers

It's really pleasant to conclude the results from this test round. All the monitors passed the UDACT test for proofing ISO printing on coated paper, and several were cleared to be able to proof Multi colour printing. In the table we compare the gamut of the monitor with Adobe RGB 1998, and there is a correlation between reaching 85% or more of the Adobe RGB, and being suggested for multicolour proofing by UDACT. It's not very difficult to assume that future development of monitors will produce even larger colour gamuts on screen.

Fig 1 – Test results: Colour gamut and view angle

| Model | Total colours* | % of Adobe RGB | View angle (1-5) |
|-------------------------|----------------|----------------|------------------|
| Adobe RGB 1998 | 1306820 | 100 | – |
| Apple Cinema Display 23 | 910294 | 70 | 4 |
| Eizo Coloredge CG301W | 1205630 | 92 | 4 |
| Eizo Coloredge CG241W | 1121020 | 86 | 4 |
| La Cie 324 | 1163600 | 89 | 4 |
| NEC Spectraview 2690 | 1077050 | 82 | 4 |
| Samsung XL20 5000K | 1249430 | 96 | 4 |
| *at 5000K | | | |

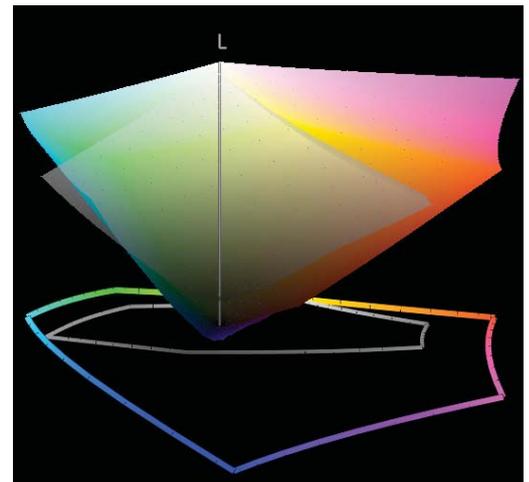
The uniformity over the surface of the monitors was acceptable, although there is still room for improvement on some models. One slight concern is that all the monitors are a little sensitive to the angle at which the operator views the image. It's not a big problem, but here too there is some room for improvements.

Fig 2 – Test results: UDACT test of softproofing capacity

| UDACT test | Multi Color proofing | ISO 12647-2 coated | Uniformity |
|-------------------------|----------------------|--------------------|------------|
| Apple Cinema Display 23 | No | Yes | Good |
| Eizo CG241W | Yes | Yes | Good |
| Eizo CG301W | Yes | Yes | Medium |
| Lacie 324 | Yes | Yes | Good |
| NEC 2690 | No | Yes | Good |
| Samsung XL20 | Yes | Yes | Medium |

Fig 3 – Specifications and approx. price

| Model | Screen size (inch) | Resolution | Price EU (approx.)* |
|-------------------------------|--------------------|------------|---------------------|
| Apple Cinema Display 23 | 23 | 1920x1200 | 750 |
| Eizo CG241W | 24 | 1920x1200 | 1900 |
| Eizo CG301W | 30 | 2560x1600 | 3600 |
| Lacie 324 | 24 | 1920x1200 | 945** |
| NEC 2690 | 26 | 1920x1200 | 1250 |
| Samsung XL20 | 20 | 1600x1200 | 1100** |
| *VAT excluded | | | |
| ** including calibration tool | | | |



While Adobe RGB is a colour gamut that many monitor manufacturers aim to reach, it doesn't entirely include all the printable colours in ISO 12647-2 on coated paper. As can be seen in this 3D illustration made with Chromix Colour Think, a small portion of the Cyan tone values (light gray areas) aren't included in the Adobe RGB colour gamut. A proofing monitor actually needs to have a slightly larger colour gamut in some areas than the Adobe RGB.



Hardware calibration is now standard, be it through a special USB cable or through the DVI cable, and this mean a comfortable automatic 'hands free' and accurate calibration procedure.

By using the UDACT software any designer, publisher or printer can check if the monitor is good enough for accurate proofing. If your monitor is not up to the task, then this test shows that there are many monitors to chose among, at reasonable prices, that are fit for this purpose.

– **Paul Lindström**



Delta E Blues

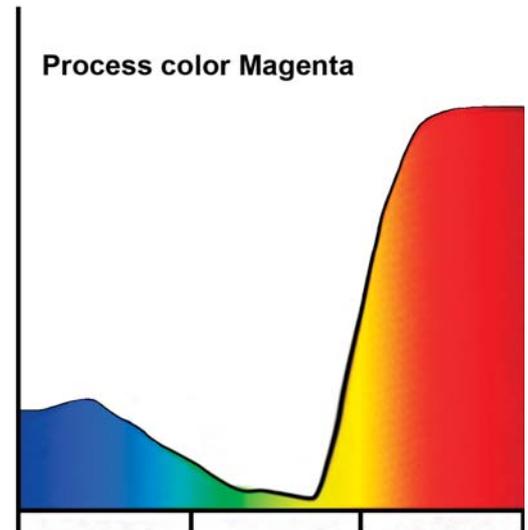
It has never been easy to communicate colour information, and most of our trials are approximates of variable quality. The introduction of the spectrophotometer to graphic arts production in the nineties was a major step forward, but there are still many challenges involved in accurately describing a specific colour. Many of us have heard about the Delta E value for expressing colour difference, however it's not that simple because there are several versions of Delta E to choose from.

Colour is a stimuli sensation in the human visual system. It is perceived when the retina detects mixtures of incoming light waves and forwards the data to the brain where it is analysed and distinguished as colours. The instrument that best emulates the human eye's ability to measure the appearance of light and colour is the spectrophotometer. This device also analyses the spectral components of light in a similar way to that of the human brain.

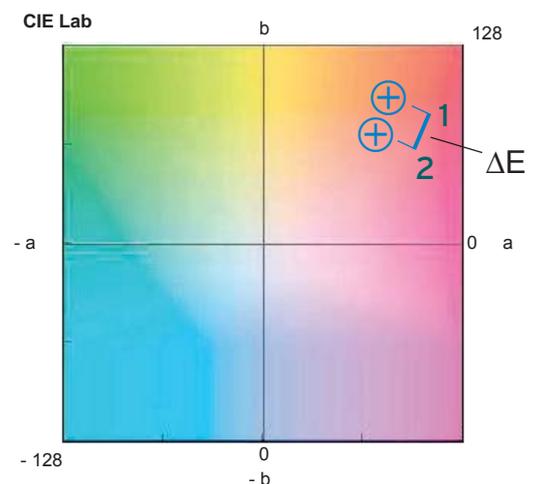
Prior to the introduction of the spectrophotometer in graphic arts production it was the densitometer that helped us control colour on press. But the densitometer is actually colour blind, and it assumes that the incoming light is either filtered through a thin ink film which may consist of either cyan print, or yellow, magenta or black. If those inks called cyan, magenta, yellow and black really do comprise the correct and assumed colours, the densitometer can't tell. The print will be expected to look good, assuming that we print with the correct target ink densities, and also assuming that the ink manufacturer has delivered ink with the correct colour appearance, and that the paper supplier has provided paper of good quality and whiteness. But if it is the exact colours that we wanted, we can't know just by relying on a densitometer.

Well then, if a spectrophotometer mimics the human colour perception system, a spectrophotometer should do the trick admirably. A spectrophotometer detects all the wavelengths that are visible for the human eye, which is roughly between 385nm (nanometer) to 720nm. But the problem is that most colours are made up of a mixture of light waves at different frequencies, and we need to choose a formula to describe a certain colour with a single set of precise numbers. One such popular formula is CIEL*a*b – a three dimensional colour model which defines colours numerically according to their degrees of blueness to yellowness along the a axis, and redness to greenness along the b axis and their degrees of luminance along the, er, L axis (it's colour science remember) which is a lightness to darkness vertical measure.

So when printing according to SWOP or ISO 12647 you can check if your cyan ink, for example, conforms to the colour defined in those standards. If it doesn't, you can detect the colour difference using a spectrophotometer



A spectrophotometer analyses light and defines a colour by its spectral components. The process colour magenta shown here, actually consists of a combination of wavelengths over the entire spectrum.



The colour difference, expressed as ΔE , is the distance between the measured colours 1 and 2, when mapped in a CIEL*a*b diagram.

▼ and report the colour deviation between measured colour and expected colour as a Delta E value (see illustration 2). Traditionally a Delta E value (often written ΔE) of one or lower is considered to be undetectable by human vision, while ΔE values of 2-4 are just noticeable. For people with normal colour discrimination capacity colour differences of ΔE 5 and just above are easy to detect, and at around ΔE 10 and above you start suggesting that it's actually not the same colour anymore, because it doesn't match at all.

Delta E_{76}

$$\Delta E = \sqrt{(L_2^* - L_1^*)^2 + (a_2^* - a_1^*)^2 + (b_2^* - b_1^*)^2}$$

Delta E_{CMC}

$$\Delta E = \sqrt{(\Delta L/S_L)^2 + (\Delta C/cS_c)^2 + (\Delta H/S_H)^2}$$

Delta E_{00}

$$\Delta E = \sqrt{\left(\frac{\Delta L'}{K_L S_L}\right)^2 + \left(\frac{\Delta C'}{K_C S_C}\right)^2 + \left(\frac{\Delta H'}{K_H S_H}\right)^2 + R_T \left(\frac{\Delta C'}{K_C S_C}\right) \left(\frac{\Delta H'}{K_H S_H}\right)}$$

So far we have used the term ΔE as if there is only one formula to use when calculating a colour difference. But in fact colour scientists have come up with a series of alternative formulas over the years, so today we should actually specify what formula we use when calculating ΔE . In the above example we referred to the formula from 1976 using quite straightforward CIELab values. But in the same year it was also suggested we use CIELuv, a perceptually uniform colour space, when calculating the ΔE . So that is a second way to calculate colour difference.

*Three formulas for how to calculate colour difference using CIEL*a*b. Without going into details on what all of the different letters in the formulas mean, it still illustrates that the complexity increases in the latest formulas.*

But a third formula came about in 1984 when the Colour Measurement Committee of the Society of Dyes and Colourists of Great Britain presented a formula that should correspond closer to the eye's sensitivity to hue, chroma and lightness. This formula is called the ΔE CMC, but it is a little tricky to refer to, since you have the ability to weight the ratio between lightness and chroma. The default ratio is 2:1, but you may use 1:1 as well. A variation of the CMC formula came about in 1994, and is referred to as CIE 94, or ΔE_{94} . This also has different weighting functions for lightness and chroma.

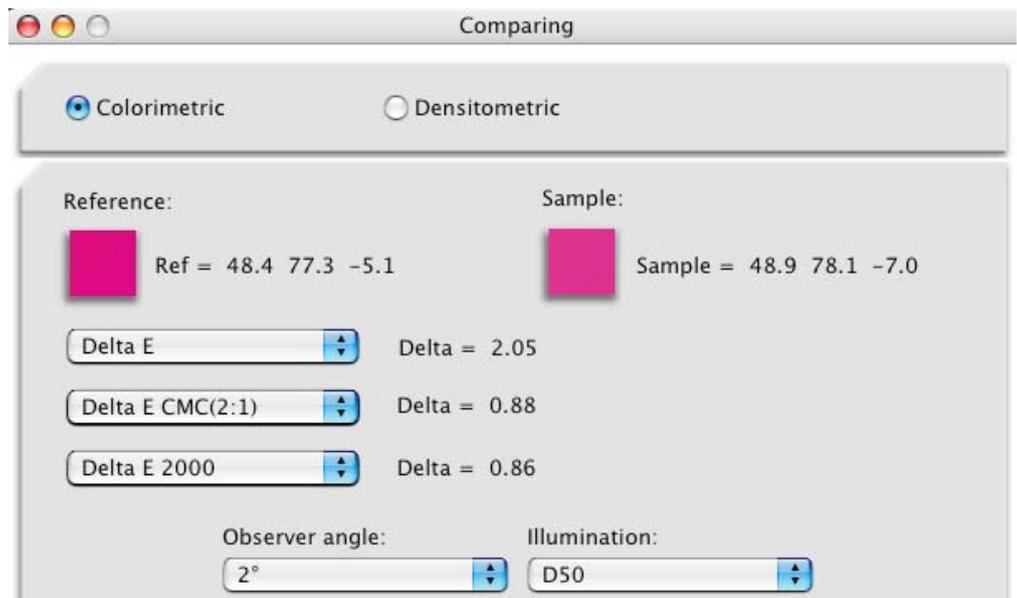
▼
The CIE 94 in turn was revised in the year 2000, and the ΔE formula of 2000, often written ΔE_{00} , varies the lightness settings depending on the actual colour. For example the spot colour Pantone Reflex Blue has its maximum chroma at a low value of L (it's a dark colour), while the process colour yellow has its maximum chroma at a high value for L (it's a light colour).

While the ΔE_{00} formula perhaps is the least used of the above mentioned, it's been adopted for use within the graphic arts by IFRA, the organisation for newspaper publishing, technology and newsprint. Newspaper publishers who want to make sure they print according the ISO standard 12647-3, can enrol in the IFRA Color Club quality control program. Measurements made in this procedure are calculated according the ΔE_{00} formula in regard to colour deviation.

When switching between different formulas for ΔE , you soon notice that when using the older formula from 1976, the value for ΔE is normally significantly higher than when using newer formulas. This is because the newer formulas try to better simulate the actual appearance over the whole gamut. So we need to interpret what a certain value really means, when deciding on tolerances. It's not much use in selecting, for example, ΔE_{CMC} just because it seems to give lower values than when using the formula for ΔE_{76} .

So what formula should one use and does it really matter? Well, if you ask colour scientists, it does matter, but the reasons for why vary and the explanations are quite difficult to understand for a lay person. We asked Robin Myers at RM Imaging, a well known and respected colour 'guru', which ΔE formula he would recommend? He told us: "It is still not clear to me which is best. There is a group of people trying to get ΔE_{2000} accepted by everyone, but when the difference exceeds 5 ΔE some studies have shown it is no better than the CIE 1976 $L^*a^*b^*$ ΔE for predicting perceived colour differences. Also, the CIE 1994 ΔE has a similar problem of being useful below 5 ΔE units but not as useful for larger differences.

"There is also a problem with any metric where values can be changed by the user which affect the result. For instance, the weighting factors in ΔE_{94} , ΔE_{CMC} , and ΔE_{00} . Often in use people will quote the ΔE value, but fail to mention the weighting factor values, with the result that the people involved are comparing different things without knowing it. For instance, some people will quote a CMC ΔE without mentioning whether they are using (2:1) or (1:1) for the weighting factors. Since many indus-



The same actual colour difference will yield different ΔE values depending on which formula is used. Here ΔE_{76} versus ΔE_{CMC} and ΔE_{00} for two measurements of a printed magenta colour patch.

▼
tries have problems getting their processes controlled to get down to a 5 ΔE difference, it is hard to definitively state which one is the best to use”.

We asked Dr Philip Urban at the Munsell Color Science Laboratory at RIT, the same question – which formula for calculating colour difference would he suggest? He answered: “The CMC colour difference equation corrects the major deficiency in CIELAB (so it is better than the ΔE_{76} formula) but the large number of constants suggests a level of precision and accuracy that cannot be supported on statistical grounds. A mathematical drawback is that the formula is not symmetric, but depends on a standard and a test colour. Switching standard and test colour changes the difference. The CIE ΔE_{00} formula is symmetric but it has some (small) discontinuities. The complexity of the formula can not be justified statistically as well. On the other hand the formula accounts for the non-hue-linearity of the CIELAB space in the blue area (around hue angle 270 degree) by using a rotational term.

“The CIE ΔE_{00} formula outperforms the CMC formula in terms of fitting accuracy to various visual datasets. The main problem is that the observer variability is so high that it is possible that single observers prefer the CMC formula. However, the CIE ΔE_{00} should perform better in general.”

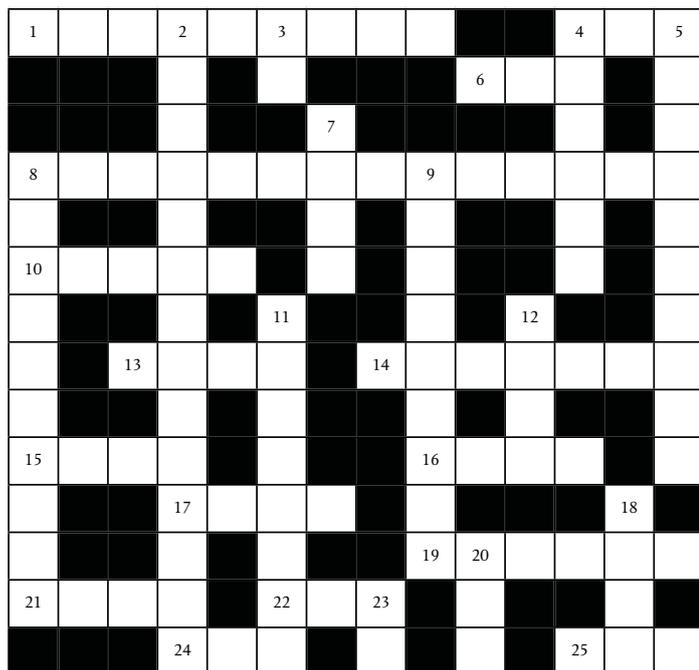
The conclusion for us is that for most designers, publishers and printers, the classical ΔE formula from 1976 will work well when defining colour tolerances for proofs and print. The important thing is to familiarise yourself with how to use a spectrophotometer and correctly interpret the results. After a while you will develop a feel for what a certain value of ΔE means in terms of visual colour difference, depending on which formula you use. But make sure you communicate which formula you use when executing this quality control for printing!

– **Paul Lindström**



Graphic Arts Crossword Puzzle **Number 8**

If you get stuck, go to the [IGAEF](#) website for some hints. For those of you that really get lost, answers will be in the next issue of Spindrift. **The answers for last issue's puzzle are on the next page.**



Across

- 1 Designers love to use reversed type to create these. (5, 4)
 4 Forestry Stewardship? (3)
 6 Application Programming? (3)
 8 What every environmentally aware company strives for. (14)
 10 Thermal energy does this to a plate surface. (5)
 13 Having but one colour. (4)
 14 To do this in imposition software compensates for page creep. (7)
 15 Application Service Providers (4)
 16 This kind of storage is a must have for data intensive work. (4)
 17 Ensuring an image will print on a standard sheet, means making sure that it does this. (4)
 19 Not double or treble, but this. (6)
 21 Good pages are fit for it. (4)
 22 What's not at the beginning. (3)
 24 What started it all for Microsoft. (3)
 25 Dry ink values are different if this is their condition. (3)

Down

- 2 The digital press equivalent of web fed. (10, 4)
 3 Decent sheets coming of press are said to be this. (2)
 4 In the end, it can be a bind. (6)
 5 Before digital communications they took down copy dictated over the 'phone. (4,6)
 7 Single and complete, it's also part of a whole. (4)
 8 The foundation for all prints. (10)
 9 Glossy, multiple pages used as sales collateral or similar. (9)
 11 The visible sign of conventionally screened four-colour print. (8)
 12 The opposite of pro. (4)
 18 Used to bind things together. (4)
 20 It makes its mark. (3)
 23 Direct imaging. (2)

Answers for Graphic Arts Crossword Puzzle Number 7

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | P | P | L | E | C | O | M | P | U | T | E | R | |
| | N | | I | | V | | N | | R | | R | | E | A |
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