A fanatic is one who can't change his mind and won't change the subject.

– Winston Churchill

Dear Reader,

We are thrilled that at the beginning of the summer ISO published ISO 16759 (Quantification and communication for calculating the carbon footprint of print media products). We're even more thrilled that at the end of the summer the first carbon calculator received formal certification for Print Media Certification! Ricoh has added an ISO 16759 certified carbon calculator to its suite of Carbon Balanced Printing programme tools.

What makes this particularly exciting is the speed at which it has been achieved. We wrote the first draft of the standard document in September 2010 so in ISO terms it has reached publication very quickly. WG11 (the environmental impact of graphic technology), the working group responsible for turning our messy draft into a robust document, battled against considerable opposition. Most of this opposition came from vested interests that did not want this standard to see the light of day. It was never wholly clear why, apart from the anxiety that inevitably comes with transparency in business.

Transparency and accountability are becoming increasingly important parts of doing business these days. However, a means of demonstrating print's sustainability was clearly needed, so battling on was the only option. A great team stuck to its task and Ricoh's certification confirms that WG11's dedication was worth it. Let's hope there are more companies with the same environmental commitment as Ricoh.

Enjoy!

Laurel, Nessan, Paul and Todd

In This Issue

Impressive PressOn

Laurel Brunner visited PressOn, a wide format printer in the UK that was the first company to invest in HP's latest latex printer, the LX3000. The company provides a complete service from ideas through to recycling, so the ability to remove signage after use is one of the factors considered when buying new kit.

Replicate this

3D printing may sound like something out of a sci-fi movie but it is coming of age with a number of affordable desktop machines now available. Nessan Cleary finds that as well as prototyping the technology is also used to create specialised spare parts.

Tested: the Vutek QS3 Pro

Paul Lindstrom tests EFI's Vutek QS3 Pro, a 3.2m wide UV curable wide format hybrid printer. It boasts a maximum production speed of 111 m²/h at the equivalent of 600 dpi print mode but how well did it do on our test?

Regular Features & Special Treats

News Focus

Digital Dots has published Standardised Print Production (SPP) – a series of four, easy-to-understand guides that simplify ISO 12647-2 implementation.

The SPP guides are ideal companion documents for use with any printing industry certification scheme and essential for companies who want to prepare for ISO 12647-2 certification from organisations such as Fogra, UGRA, BPIF, Swedish Printers Federation and IDEAlliance.

The Standardised Print Production series explains in plain language what print firms need to do to achieve compliance to ISO 12647-2. SPP comprises four parts: Document Preparation and Prepress; Setting up the Press; Quality Management, and an Executive Summary. Each guide explains what the ISO 12647-2 standard covers and what a printer or print buyer needs to do in order to achieve ISO 12647-2 compliant print production. http://digitaldots.org/standards/spp

Ricoh has launched a new monochrome digital printer, the Pro 8100s series. There are three models, distinguished only by different output speeds of 95, 110 and 135ppm. All come with scanning, printing and copying as standard and all boast a duty cycle of up to three million impressions per month. The series also use an intermediate belt transfer system that takes papers from 40 to 300 gsm.

Quark has launched QuarkXPress 10 with over 50 enhancements, mainly aimed at speeding up the way that designers work with the program, and the performance of the software itself. There's a new faster Xenon graphics engine and a new interface. We'll have a full review later this year.

Agfa has published its second quarter results, which show the impact of weak economic conditions and the decline of the classic film businesses. Revenue has dropped six percent to €732m. Recurring EBIT rose to €36m while net cash from operating activities has improved considerably to €51m.

EFI has reported record revenue figures for its second quarter of this year. EFI's revenues for the quarter ended June 30, 2013 were $180.3 million, up 10% compared to second quarter 2012 revenue of $163.9 million. Second quarter 2013 non-GAAP net income was $18.3 million or $0.38 per diluted share, compared to non-GAAP net income of $14.2 million or $0.30 per diluted share for the same period in 2012. GAAP net income was $9.4 million or $0.20 per diluted share, compared to $7.0 million or $0.15 per diluted share for the same period in 2012.

Global Graphics has launched a new version of the Harlequin RIP, developed to help print shops expand into digital print. Harlequin MultiRIP 10 boasts faster processing of PDF/VT files and uses extensive multi-threading to squeeze maximum processing from multicore CPUs to feed pages to digital presses at a high rate. Now in its 25th year, the Harlequin RIP can be used to drive most digital devices including platesetters, digital presses and wide format printers.

FFEI has launched a new UV inkjet label press called Graphium after a genus of vibrantly coloured swallowtail butterflies. It boasts a high opacity white ink and uses specialist Uvijet Graphium UV curing inks developed by Fujifilm Speciality Ink Systems. These inks combine the functional performance, colour gamut and adhesion needed for label printing with reliable jetting performance required for consistency. Fujifilm will distribute the

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Graphium in Europe, North America and Mexico, and show it at LabelExpo in Brussels next week.

Kodak, now safely out of Chapter 11, has launched Prinergy Workflow 6, which boasts a new streamlined productivity-focused interface, called Workspace giving an at-a-glance overview of prepress production. It has Manage, Plan and Track modules to drive standard sheetwork jobs to press. Workspace can be accessed from any web browser.

Avanti has launched its next generation Print MIS, Slingshot. It can be cloud-based or hosted onsite and is a browser-based system with a modular architecture. The system ships with a QuickStart Database, an Estimating Standards Library, and migration and import tools, dramatically streamlining the transition from an existing system.

Shimizu Printing of Japan has joined our Verdigris initiative as an Associate Member. Headquartered in Tokyo with its printing plant based in Gunma prefecture, Shimizu Printing specializes in environmentally sustainable packaging printing solutions using an advanced high-resolution UV waterless printing process. The company has developed its own green printing programme, PGG Cloud, to identify the environmental impact of a particular print project. Dr Hirokazu Shimizu, president of Shimizu Printing, commented: "The drive to produce high-quality printing with as low an environmental impact as possible is at the core of every part of our company's activities."

Punch International has reached agreement with Bencis Capital Partners Belgium NV to sell its 65.68% share interest in Xeikon at a price per share of €5.85. Assuming that this goes ahead as an unconditional sale, then Bencis will be obliged under the Belgian Act on Financial Supervision to make a mandatory offer for all the remaining shares in Xeikon. In the meantime Punch and Xeikon are attempting to sever their existing ties prior to any sale going ahead.

Ricoh has updated its TotalFlow workflow to v2. This is aimed at small to medium sized printers and inplants and features greater automation. It includes PrintManager, which supports up to five printers and automates tasks such as scheduling and finishing. There's a web-based submission tool and it supports JDF and integrates with the Fiery media catalogue.

GMG has launched a new service, CoZone Collaborate, to enable users to work together for proofing and approving projects online. CoZone is the name of an overall platform that extends the company's existing colour management tools to include a cloud-based element, which will be modular, with Collaborate being the first module. This allows project participants to manage, review, proof and approve graphic arts content and by the end of 2013 – multimedia content – within an online Amazon Cloud Service hosted soft-proofing environment.

The Huber Group has expanded its MGA inks to cope with demand for low migration inks for food packaging. The ink bases, formerly produced at the subsidiary in Ireland, will from now on be ground at Michael Huber München, where they can be finished to form process colour inks as well as spot colour inks. The production of MGA water-based coatings, characterised by a special material composition and by its GMP compliance, has been expanded as well.

Corel has released the English version of its art illustration program, Painter X3, known for its hundreds of brushes, paper textures and media that perfectly emulate real-world art materials. New tools include Jitter Brushes, which add random elements and new Perspective guides which can draw an object in 1-, 2-, or 3-point perspective and accurately portray spatial depth.

Riso is to launch an inline automated perfect binder. It can be combined with either the 9150 or 7150 models of the ComColor X1 Series of colour inkjet printers, turning them into a self-contained book manufacturing solution for both short runs and high-volume production.

Lumejet has won €300,000 in funding through the Technology Strategy Board's Smart programme for its LumeBar technology, which extends the existing patented photonic print head technology to a page wide digital print bar. It exposes directly onto designated areas of photosensitive media. Individual LumeBars

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are custom-built, tailored for wavelength and spot size, and specifically designed for fast throughput and higher output powers.

Scodix has launched its Ultra Press. The Scodix machines are designed to enhance prints by adding clear polymer for a range of different effects such as added glossiness and texture. The new model is capable of producing 1,250 B2+ size sheets per hour.

EFI has declared victory in a Spanish patent struggle with KeraJet over EFI's Cretaprint ceramic inkjet printer. Tomas Claramonte, the head of KeraJet, had claimed that Cretaprint infringed his patent - a claim the Commercial Court in Valencia rejected earlier this year. That court ruled that the infringement claims were meritless and that the patent is invalid because it lacks an inventive step. However, KeraJet appealed this decision but the appeals court has upheld the earlier ruling, confirming that the patent is null and void as it relates to EFI Cretaprint.

Vincent Pilette has resigned as Chief Financial Officer of **EFI** to pursue another opportunity. Marc Olin, Senior Vice President and General Manager of EFI Productivity Software, will cover as interim Chief Financial Officer while the company searches for a replacement.

Patrick Martell, Chief Executive of **St Ives Group,** has accepted the honourary role of Ipex 2014 President. His predecessor, David Preskett of Canon Europe, stepped down when Canon joined the long list of vendors who have pulled out of Ipex.

Finally, our publisher **Laurel Brunner** is one of 11 women to have been inducted into the print industry's Women of Distinction program for this year. The program has been running for 12 years and recognizes and celebrates the numerous achievements of exceptional women in the print communications and graphic arts around the world.

News Analysis

Kodak has emerged from Chapter 11, having taken the opportunity to reorganise its debts and to restructure the company into a much leaner organisation. Kodak originally filed for Chapter 11 bankruptcy protection in January 2012.

But now Kodak has reinvented itself, waving goodbye to its iconic film business, as CEO Antonio Perez made clear: "We have emerged as a technology company serving imaging for business markets – including packaging, functional printing, graphic communications and professional services."

Kodak completed the final steps in its Chapter 11 restructuring, including the spin-off of its Personalized Imaging and Document Imaging businesses to Kodak Pension Plan, a longstanding pension plan of Kodak's U.K. subsidiary. The company also closed on its agreement for $695m in term exit financing, paid off its DIP (Debtor in Posession) lenders and second lien noteholders in full and completed its rights offerings, receiving approximately $406m of new equity investments from participating unsecured creditors. It appears that Kodak's main creditors now own it.

Kodak has a number of strengths, particularly its Stream inkjet technology as seen in the Prosper presses and the S-series imprint modules. Kodak is looking to develop higher capacity presses, having developed a 124.5cm print bar and is working on an even wider 152cm version. It is also hoping to expand the inkjet technology into the packaging market.

However, Kodak lacks any wide format capability and it remains to be seen if it can translate its inkjet technology into industrial applications, though Kodak is hopeful of addressing the functional printing market.

Kodak has a large presence in the CtP market, and its Flexcel NX plates have gained a good market share in the packaging sector. According to Perez, up to 80 percent of the company's revenues come from the sale of annuities such as ink, media, plates and services. Revenues coming from international markets have played a large part in getting Kodak out of the weeds.

The company has already said that most of the current management team will continue in post, apart from Perez, who will serve as CEO for one year and may remain with the company for up to 18 months as a consultant.

The company has filed notice of the effectiveness of its Plan of Reorganization with the U.S. Bankruptcy Court for the Southern District of New York. Upon the effectiveness of the Plan, all previously issued and outstanding shares of Kodak common stock were cancelled, as were all other previously issued and outstanding equity interests. Kodak issued shares of a new class of common stock to participants in the rights offerings and will issue additional shares of this new class of common stock to unsecured creditors as provided in the Plan of Reorganization. Kodak expects to make initial distributions on account of general unsecured claims by the end of September.

Kodak now has 8,500 staff worldwide, a fraction of the 145,000 it once employed. Its HQ will remain in the USA, in Rochester but it will be relocating its European offices to a brand-new, state-of-the-art building in Eysins, Switzerland. This will also house its inkjet demo facilities, currently based in Belgium.
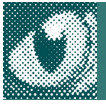
Green Shoots

We have had a busy summer blogging on a range of topics related to the environment. In case you missed them on our website, you can peruse them here.

Sustainability Policies Reaching Far and Wide

Companies who reckon that the environment and sustainability are not high on corporate agendas are missing an important trick. Actually, there is no trick to it because sustainability policies add value as well as saving money for the business. According to McKinsey & Co, a consultancy, sustainability is a permanent management fixture for 70 percent of CEOs. McKinsey get this number from the results of their annual global survey. This work looks at how businesses manage sustainability and related policies to improve a company's growth prospects and add value to the business.

The number of companies implementing sustainable practices in this way within the graphic arts is rising, and it seems the same is happening beyond the boundaries of printing and publishing. Sustainability activities for corporates include such things as developing green products, managing energy consumption and keeping employees in tune with environmental impact reduction policies. The interesting thing about the McKinsey work is the reasoning underlying the survey responses. Companies want to have a lively and active sustainability policy because executives recognise their importance: sustainability programmes make a tangible difference to a company's short- and longterm value. So this could mean that the growing cohort of printers who have implemented some sort of environmental accountability will find sustainability echoes amongst their corporate customers. A sound sustainability policy could be a route to improved competitiveness in all areas of print.

The report's authors reckon that more and more it will be the case that businesses will chase sustainability opportunities in order to add value. This could also start

Verdigris

The Verdigris project is supported by Agfa Graphics, Digital Dots, drupa, EFI, Fespa, Heidelberg, Kodak, Mondi, Pragati, Ricoh, Shimizu Printing, Splash PR, Unity Publishing, and Xeikon.

applying to companies in the printing and publishing industries. It could be an important differentiator for companies serving the general public: consumers may start thinking through their shopping habits and opt to make more sustainable purchase choices.

Sustainability and environmental impact reduction rhetoric is becoming more sophisticated. Green arguments are moving away from the emotional space to be framed in more commercial language. Environmental policies are no longer presented as part of a moral or philosophical position, for instance to support a company's reputation or appealing to a customer's environmental values. Instead more and more companies are keen to put into place practices that reduce costs and improve efficiencies.

The printing industry has been doing this for decades, resulting in massive savings and huge improvements in the industry's performance, with sustainability improvements an added if incidental benefit. Printers and publishers have had the sustainability habit for years, making changes to production processes that have steadily eroded environmental impacts. That their customers and related players in the supply chain are doing the same is good news all round.

Taking the IT

Getting rid of electronic stuff that is no longer cost effective is a major problem for all users of digital technologies. There are only so many relations on whom you can offload your creaking mobile phones and decrepit laptops. When it comes to bigger kit such as servers and

▶ desktop computers, businesses in all parts of the print media supply chain have some hard choices to make.

In the graphic arts industry there is already a culture of recycling and a mentality that sees waste as a potential revenue source. From silver and aluminium through to cardboard, we have had many years to hone our recycling and revenue converting skills. But the growing volumes of electronic equipment used in modern printing and publishing companies is not so easily dealt with. For a start there are various legal requirements for the disposal of electronics. For instance in Europe the WEEE (Waste

There is still a serious problem with growing mountains of IT waste finding its way to countries such as Nigeria and Ghana where it poses a severe health risk to local people.

Electrical and Electronic Equipment) directive supplements general waste legislation and is designed to prevent the dumping of electronic and electrical equipment, at least in Europe.

There is still a serious problem with growing mountains of IT waste finding its way to countries such as Nigeria and Ghana where it poses a severe health risk to local people. Efforts in the developed world are being made to mitigate the problem, for instance with WEEE in Europe. Elsewhere companies recognise the commercial potential of recycling IT equipment. New companies specialised in the disposal of electronics are springing up and there is a growing cohort of organisations that specialise in the recycling of old IT equipment both in their home countries and abroad. These organisations offer customers a valuable service and a means of soothing consciences.

If you are considering working with companies such as EcoSystems Group in the UK or Electronic Recyclers International (ERI) in the USA, start the conversation with

costs and destinations for the recycled goods. Find out how the company clears the data from your devices and what assurances they can give data protection on how and where they recycle machines. How closely do European companies follow the WEEE directive and how much of what they collect does end up in landfill?

Cost is obviously the main consideration for most companies. You may be prepared to pay someone to take away your old computers, scanners and desktop printers. But how much are you prepared to pay to provide raw materials for another company's product? Environmental considerations and contributing to improving resource use and management should be enough, but the dialogue between price and value has to happen. The alternative is for printing and publishing businesses to set up their own schemes for IT disposal. Better for most to work with specialists, and for printers and publishers to stick with what they know best.

Green Shoots or Are You in the Weeds?

If you're in the northern hemisphere, are you enjoying sleepy summer days, when not much seems to be happening? Or perhaps you're struggling through cold and rain in the southern hemisphere. Either way your business hopefully is part of the busy cohort that is helping to produce signs of growth in the world economy. Worldwide economic data points to slender signs of improvement and this can only be good news for printers and publishers.

Mixed in with the financial improvements there are signs of a revived environmental impact reduction awareness. The two go hand in hand. The most dramatic environmental news we've heard lately is that the Chinese government has committed a staggering $275 billion to cleaning its extremely dirty air over the coming five years. This is almost the total GDP of Norway!

Not many organisations, governmental or otherwise, have the scope to spend the readies on such a scale as China, but change comes through lots of little investments as well as the massive ones. Canny printers and publishers who want

to take advantage of improving growth prospects should be considering their next round of investments. Now is the time to consider upgrading equipment and processes so that the business can take advantage of improving confidence in their markets. Now is also the time to take the opportunity to invest in kit that reduces a company's environmental impact.

Many companies are planning new hardware investments, from computers to energy efficient printing systems, in the hope that banks will make good on promises of easier credit. But we often overlook the improvements that software upgrades can make, for instance in RIP systems which drive output devices such as platesetters and

Now is also the time to take the opportunity to invest in kit that reduces a company's environmental impact.

digital printing engines. Software upgrades can be a less expensive and less risky option than new hardware, and although the disruption to the business is about the same the return on investment is likely to be faster.

This is because software developers are improving their systems all the time to help customers improve cost controls. Sticking with the RIP example, developers are adding process management modules such as tools that help manage consumables cost effectively. They've added techniques to maximise media usage by nesting or ganging jobs thereby minimising substrate waste. This saves money and waste through using inks and substrates more efficiently. Ink control software modules can also help improve colour consistency, producing a superior printed product.

The problem for many companies though is understanding what their software actually does and in having the confidence to invest. RIP technologies designed to manage multiple output devices are more efficient and use less energy to manage several machines than a hodge-podge of

RIPs each driving a single device. Using a single powerful RIP system to drive them all is a way of improving process control and energy efficiency however, it requires an understanding of what the technology does and how it can improve workflow efficiency.

Recognising a problem is easy enough, but working out how to solve it is not necessarily simple. Understanding that investment into new technology will improve a company's environmental impact is the start. The next step is working out what the best option will be for the business, something that takes rather more effort.

Ricoh First Company to Attain ISO 16759 Accreditation

It is great news to hear that Ricoh has achieved accreditation to ISO 16759 for the Ricoh carbon calculator. ISO 16759 (Communicating and calculating the carbon footprint of print media products) is a framework methodology that provides developers with the information necessary to create sound and reliable carbon calculators for use in the graphic arts. It was published only in July and is relevant for all players in a print media product supply chain, from designers through to printing and distribution. ISO 16759 is not a calculator but a set of requirements for what specific criteria should be taken into account for calculators used in printing and publishing applications. It applies for all markets and all industry sectors.

The accreditation was conducted by Print & Media Certification, a UK body that works with an international client base. Print & Media Certification is the only formally recognised accreditation company specialised in printing industry certifications. We understand there are other certifications for calculators that follow ISO 16759 in the pipeline, and we hope that they too will want to achieve formal certification. In the meantime Ricoh has stolen quite a march.

Ricoh has long been an industry leader in sustainability. Its carbon calculator, which we have not seen, was developed as part of the Ricoh Carbon Balanced Printing programme. The basis of this programme is an optimisation plan that

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takes a structured approach to reducing a company's carbon footprint. It is designed to educate printers and raise their knowledge of sustainable printing and related practices. The project has been underway for about a year and a number of printers have adopted the programme.

ISO 16759 outlines what is required in a carbon calculator and although it can be used to calculate print's carbon footprint, it is not in and of itself a calculator. So it does not compete with carbon calculators on the market, but instead is designed to provide a common reference point. Print buyers will be able to trust the data gathered for any carbon footprint study that complies with ISO 16759.

When two studies are identical in goal and scope it will be possible to make direct comparisons. In such situations they will be in a position to make media investment decisions based on carbon footprint data. We are a long way from that at present, but at least there is one carbon calculator that complies to the standard. This is a great start!

The Ricoh accreditation is also fantastic news for the ISO working group responsible for the development and content of ISO 16759. Ricoh's development of a calculator that follows the standard's guidance is a reward for all its hard work. The accreditation is also an excellent endorsement of the standard's robustness and relevance.

For more green news, check out The Verdigris Project:

Verdigris

http://verdigrisproject.com
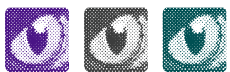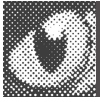
A Review

A challenger among high end monitors

The number of manufacturers of high end monitors has been dramatically reduced in the last few years, surprisingly so considering the fast development in monitor technology. LG hopes to join the prestigious group of monitor manufacturers that deliver computer monitors that can be fully calibrated in hardware.

The new LG IPS ColorPrime 27EA83 comes with a colorimeter and software at a quite reasonable price. The IPS prefix stands for In Plane Switching LCD panels and

The LG IPS ColorPrime 28EA83 monitor can be hardware-calibrated using the software True Color Finder (but Windows only, no Mac OSX version available). Thanks to the use of IPS panels it is non-sensitive in regard to viewing angle, which is good. What was not good in the monitor we tested is the uniformity over the whole screen – it was 16 percent maximum deviation but it should ideally be well below 10 percent.

this should guarantee that the appearance of the colours doesn't change because of the operator's screen viewing angle. So at the outset this initiative from LG looks very promising.

There are five main criteria to consider in a monitor for colour critical work. The first is to ensure that the monitor has a large enough colour gamut to match the printing

condition for which you want to proof. A good rule of thumb says that if a monitor matches the gamut of Adobe RGB, preferably with some margin, it will also match the gamut of offset-based printing on coated quality paper. If you want to match spot colours you need a considerably larger colour gamut than that of Adobe RGB. The LG ColorPrime 27EA83 is said to achieve 99 percent of Adobe RGB, so should be enough for proofing offset printing, but not a wide enough gamut to reproduce the most colourful spot colours as often used in packaging production.

The second criteria to check is if the monitor has high enough brightness and contrast, to match the viewing condition in a viewing booth. While most LCD-based monitors can achieve quite a high brightness of 300 cd/m^2 or more, you need to reach up to about 700 cd/m^2 to really match the brightness of a viewing booth. The LG ColorPrime 27EA83 has a maximum brightness of 350 cd/m^2, so like most other proofing monitors you will need to dim the light in the viewing booth slightly if you want to make side-by-side comparisons of prints or hardcopy proofs with the softproof on screen.

The third, and perhaps the most critical aspect, is to be able to do a full hardware-based calibration of the monitor. This term is often misunderstood, and compared to making a software-based calibration. In reality we, of course, always use software to perform the calibration, and hardware-based calibration doesn't only mean that we use a measuring device in the calibration process. What's important here is that the monitor can be fully controlled by the calibrating software, so no manual intervention is needed from the operator once the settings have been decided on. The calibration should also be made with 10 or 12-bit signal processing to achieve a smooth gradual tone reproduction, and high level of accuracy.

The LG ColorPrime 27EA83 comes with True Color Pro software (though this is called True Color Finder in the screen window when you start it), and as long as you use the DVI, HDMI, or better still, the Display Port, you can perform a full hardware calibration of the monitor. But, and this is unfortunate, this calibration software only works in Windows. It's a bit strange that LG doesn't recognise the large photo and design community that often use

One of the main features of the ColorPrime 27EA83 monitor is the possibility of performing a true hardware calibration. LG includes a colorimeter and software for this, and the user can choose between a range of presets, or create a customised preset.

Macs as an important target group for the ColorPrime 27EA83. But there we are. Of course, you can calibrate the ColorPrime monitor on a Mac using some other software, but not with full hardware control, so you drop down in accuracy, and out of the high end group of monitors for quality softproofing tasks.

A fourth point to investigate is the uniformity of the monitor, so the colour reproduction across the whole monitor surface is stable and even. Only monitors built to tight tolerances will pass this test. The LG ColorPrime 27EA83 we tested was a bit over the edge here, and showed a maximum deviation of 16 percent across the surface. This should ideally be below 10 percent. This is another area where LG needs to make some improvements to reach into the high-end class of monitors.

The fifth criteria, often overlooked, is that the appearance of the colours has to be independent of the viewing angle

you use. Since the LG ColorPrime 27EA83 uses IPS panels the colours shown don't vary the angle you look at the monitor with, so this is very good.

An additional, and sort of given criteria for professional image editing, is that the monitor should be equipped with a hood to screen off incoming light. Unfortunately LG has overlooked this entirely, and the LG ColorPrime 27EA83 doesn't come with a hood, and you can't even order it as an option. We strongly suggest that LG include this in the standard package or at least offer it as an option.

How the test was done

We test four of the five main criteria using the UGRA analysis tool U-DACT v 2.0, while view angle sensitivity is tested through visual evaluation of a test form developed by Digital Dots. We give marks between 1 and 5, where 3 means acceptable view angle sensitivity, and 5 means the

After a successful calibration the user is presented with the result in numbers. Green circles mean an acceptable result, but what the tolerances are is a bit unclear. It would have been better to be able to validate the conformance towards ISO standards, like 12646 and/or 12647 – commonly used in standards-based print production.

colours and tone values don't change their appearance even if you move sideways or up and down in front of the monitor.

The colour gamut is calculated using the Chromix ColorThink Pro software, where the total number of colours is extracted from the ICC profile. Monitors at or above the gamut of Adobe RGB will also do well when doing softproofing of spot colours and multicolour printing.

The results in numbers

We summarise our test results on the following page. For colour gamut we use Adobe RGB as the reference, since it's very common and is the preferred reference among professional photographers. But Adobe RGB has a white point close to 6500 K, and for softproofing prints according

to ISO standards you should calibrate the monitor to the D50 standard whitepoint (5000 K). So we show the results after having made calibrations to both of those common white point references.

While the IPS ColorPrime monitor has a lot going for it – IPS LCD panels, a larger colour gamut according to our analysis than LG promise (111% of Adobe RGB while LG only promise 99% of Adobe RGB) – it doesn't qualify for high end softproofing according to the UDACT analysis tool. The non-uniformity is also an issue – you can't retouch images with confidence if the monitor isn't uniform over the surface. The lack of a monitor hood can be fixed by buying a hood from some third party manufacturer, but that the calibration software TrueColor Pro is Windows only is a big minus in our eyes. There is only one LG software for Mac OSX for the ColorPrime

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Test results: Colour gamut

Model	Total colours at D50	Total colours at D65	% of Adobe RGB at D50	% of Adobe RGB at D65
Adobe RGB 1998	–	1,207,000	–	100
LG IPS ColorPrime 27EA83	1,383,000	1,313,000	111	108

Test results: U-DACT validation and view angle

Model	Multi Color	ISO 12647-2*	Uniformity (average)	Uniformity (max)	View angle (1-5)
LG IPS ColorPrime 27EA83	No	Yes	5%	16%	5

* ISO 12647-2 Offset printing on coated paper

Specifications and approx price

Model	Screen size (inch)	Resolution	Price EU (approx)*
LG IPS ColorPrime 27EA83	27	2560x1440	600

*VAT excluded. Calibrator not included in the price.

27EA83, and that is a little app to split the screen into several sections. It's a nice feature, but not as crucial as the calibration software. When we used the True Color Finder software on a PC we got some strange readings for achieved brightness (see screen dump on previous page). While the monitor is said to offer a maximum brightness of 350 cd/m^2, the calibration software reported a final brightness of 581.2 cd/m^2, which perhaps isn't correct.

If LG makes sure to only use panels that are checked for high uniformity and adds a monitor hood at least as an option, there is a good chance that the IPS ColorPrime monitor series can qualify for high end proofing and image retouching. We strongly suggest LG to develop a Mac OSX version of the calibration software, and add a validation check of conformity to ISO standards for monitor calibration, for example according to ISO 12646 and 12647.

Impressive PressOn

Finding an edge in the graphics business isn't easy. It depends on imagination, confidence and a bold approach to risk.

PressOn is a small wide format digital printing company in Rochester in the UK, founded by Andy Wilson and Nigel Webster, which has all these characteristics. The company is a producer of visual display projects, creating signage and display work with a difference and providing a complete service from ideas through to recycling.

PressOn recently purchased two new machines, the EFI Vutek QS2 that was introduced last year at drupa, and the HP LX3000 that was launched a couple of months ago. Together these machines now handle all the work previously done on a mix of engines. The new kit provides PressOn with additional capacity and more streamlined production management.

PressOn's €270,000 investment with HP is already paying off because "it is half the cost to print and run, than the other machines we had" according to PressOn co-founder Andy Wilson who adds: "We spent £170,000 on latex ink last year". He believes that PressOn could have added £50,000 to its bottom line had it bought the LX3000 last year. For example, latex signs are easier to remove so PressOn can remove signage from six rather than four shopping centres in the same amount of time, saving €1500 in costs.

Another recent acquisition is the Esko Kongsberg cutter, which cuts through vinyl and board at phenomenal speeds, taking just three minutes to cut out a vinyl taxi wrap! Printers who think they don't need to keep up to date with new technology should think again.

Speed & Service

The installation of the new digital printers was swift and straightforward and both were productive within hours of being set up, which is good because PressOn likes things to happen without hassle. Service is a driving principle

for the company and has been since its two founders set up shop in 2000 to specialise in digitally printed bespoke sign and display work. Their specialty is to print, install, remove and send materials for recycling, "the work that no

Andy Wilson founded PressOn in 2000 with his partner Nigel Webster, and since then the company has gone from strength to strength.

one else would do" as Andy Wilson puts it. The formula has worked and PressOn now employs 14 people and has an impressive client list. PressOn also provides trade services, which make up about 15 percent of its turnover.

Trust

Customers trust PressOn for its technical knowledge of materials and experience at getting the most out of media. Customers also have confidence in the company's ability to come up with creative ideas for achieving what they want and in solving problems. This includes removing signage that a competitor may have installed but cannot remove!

This degree of commitment is a unique advantage and a core USP for PressOn: "We are very much about

accountability", says Wilson. And good news spreads: much of the PressOn business, such as instore graphics and vehicle wraps, comes through word of mouth and is

> HP hasn't submitted the HP LX3000 to us for official testing but PressOn kindly agreed to output some test files which we have measured.
>
> The measured colour gamut is 507,000 which is good, with a colour uniformity with an average deviation of ΔE 0.3 and a maximum of ΔE of 0.6, which is very good.
>
> We also ran some informal tests on the EFI Vutek QS2 which achieved a colour gamut of 324,000. Uniformity deviation was ΔE 1.1 with a maximum of 1.5 which isn't bad.
>
> We didn't look at much more than this, so you should take these numbers with a pinch of salt. As a quick guide they are definitely not bad indicators for either machine.

bespoke work. PressOn has no need to rely on its web to print system: customer recommendations are its greatest source of new business.

Putting on the Ritz

Customers include Harrods, for whom PressOn does window displays, as well as building companies in need of building wraps. When the Ritz in London was undergoing refurbishment PressOn produced hoarding coverings that replicated the Ritz's façade, right down to the cracks that were being repaired. PressOn also produces vehicle graphics for thousands of London cabs, work that prompted the company to invest in latex technology in the first place.

PressOn's relationship with HP began some years ago when it was the north European beta site for HP's baby latex, the LX26500. Much of PressOn's work is printing on self-adhesive vinyl and latex prints are relatively easy to remove as the ink does not make the vinyl go brittle and friable. PressOn's initial investment into latex helped expand the company's scope of business where solvent options are out for many installations as they take too long to dry and to install because the prints tend to be overly malleable.

The new investments have helped PressOn to develop a focused workflow, because "getting rid of all the smaller machines means we can print everything on the Vutek and the LX3000". PressOn has one of the best managed colour workflows we have seen. The company's ability to guarantee common colour appearance across devices is key to how it can manage to produce a very wide range of work on just two machines.

PressOn has worked closely with GMG to develop its colour management system. The investment of €35,000 and six months of learning how to get the most out of the GMG software has paid off handsomely. PressOn's production staff understand how to manage data and the


Tristan Harold is having a lovely time with his new machines!

production environment to be able to guarantee colour accuracy for the company's clients. The team has also developed its own job booking system based on FileMaker Pro with a link to Sage accounting software.

Quality Control

This is a story of quality control in every aspect of the business, from how bills are generated and colour is controlled, through to client services. Customers and prospects can call at any time and know they will get the service they need. Of course it sometimes comes at a price but if you are expected to open your store to the national press at 09:00 and there has been a disaster removing old window graphics, almost any price is worth it.

Managing the technology well helps ensure cost effective production as well. For instance, GMG's ink savings tool
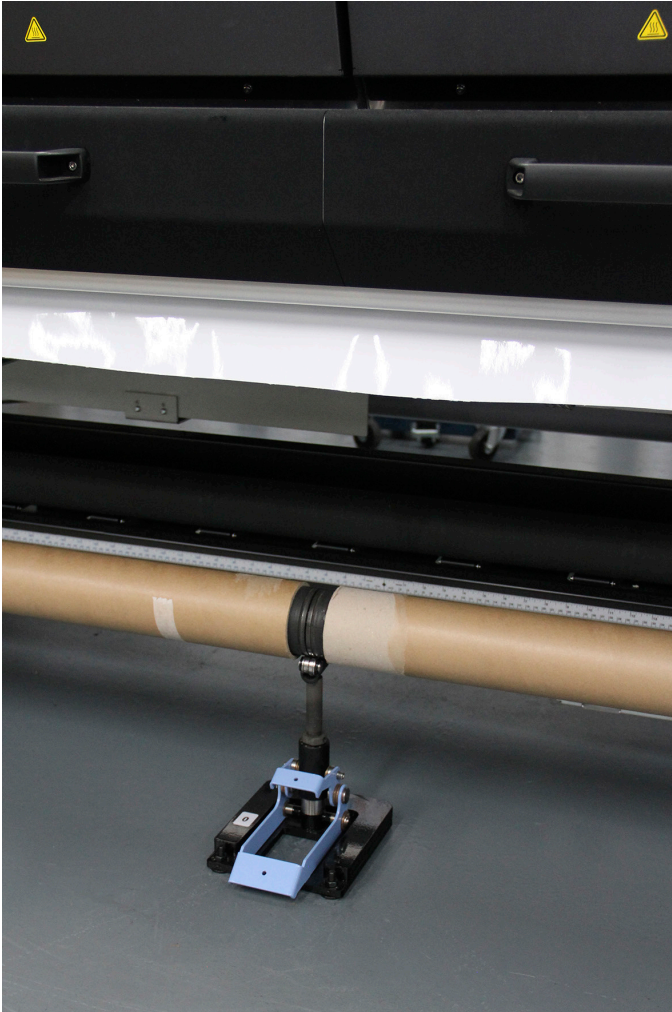
Thw media bar is supported so that there are no head strikes. Note how beautifully clean the PressOn floor is!

ensures that ink is carefully managed for colour control. It can help cut ink usage on the EFI Vutek QS2 by up to 15 percent depending on the job content. Achieving vibrant colour through overinking costs more and can make substrates take longer to gas off and harder to remove because they become very brittle.

PressOn has found that the only problem with ink savings is in solids on the edge of the gamut. The colour management system also improves time management because operators no longer waste time fiddling with proofs. The environment is also tightly managed for colour control. PressOn has installed an environmental control system that keeps the press hall at 26ºC all the time "because it affects the colour".

The new HP machine collects water rather than emitting it so does not increase humidity. The drying process in the LX3000 uses IR lamps rather than resister heaters to generate less heat. The LX3000 also has five litre instead of three litre ink tanks so it can be left running unattended for longer, plus the new 180KG carbon fibre spindles hold two 150m rolls and are strong enough not to bow when fully loaded. The weight of the bar dictates how long a machine can run so this is an important aid to productivity.

The EFI Vutek QS2 does everything that the HP LX3000 does except for the vehicle graphics, a huge part of PressOn's business. The Vutek however, prints straight to substrates up to 5cm thick and is incredibly productive. Wilson says of the QS2: "This machine we're really, really pleased with it".

Print on the Up

When people speak of the decline of print it seems that their view is somewhat blinkered. Traditional print business models are certainly in decline, and rightly so in the digital age. However, digital technology has made possible some very successful businesses, and PressOn is a prime example. In Andy Wilson's opinion the technology is there to succeed: "You need roll-to-roll flatbed hybrid printers, you need Latex and Kongsberg, you need GMG". And we would add you also need the willingness to go more than that extra mile for your customers.

– Laurel Brunner

Replicate this

Every so often a technology that started out in popular science fiction becomes an every day reality. We've seen this with mobile phones and tablets and now 3D printing is starting to take off.

Earlier this year 3D printing made headlines around the world for all the wrong reasons when some fool in America – where else – printed a gun. But the issue did highlight the way that 3D printing is maturing and becoming a more affordable and acceptable technology. 3D printing is also known as additive manufacturing because of the way that it is used to build up objects in layers, unlike many manufacturing processes where materials are milled or cut down.

The technology's been around for a while, with Chuck Hull of 3D Systems corp demonstrating the first 3D printer back in 1984, which used stereolithography. This involves a laser and a tub of liquid photopolymer with a perforated platform. The laser draws a shape on the surface of the liquid, which hardens a thin layer on top of the polymer. The perforated platform is then lowered, revealing more of the liquid, and another layer of the object is then cured with the laser and the process repeated one layer at a time until the finished object can be removed from the tub.

There are several other types of 3D printing. For example, the material jetting method involves heating up a polymer-like plastic until it melts and can be jetted through an inkjet head, rather as with hot melt glue. Again, objects are built up in layers, jetted one on top of another. Another variation is the fused filament method, which jets semi-liquid materials, including ABS and thermoplastic.

Then there is binder jetting, in which an inkjet head jets a glue that is used to stick different layers of powders together, most commonly a gypsum-based composite. An alternative to this is to use a laser rather than glue to bind the powders together.

Practical uses

3D printing is still mainly used for rapid prototyping, where it can enable designers to quickly realise their concepts, considerably speeding up the design process. Having a tangible product makes it a lot easier to demonstrate an idea to everyone involved before anyone has to commit to an expensive decision. It also allows designers to check that different parts will fit together.

But nowadays 3D printing is also used to create all sorts of objects. This could, for example, include spare parts where it's difficult or expensive to produce a particular
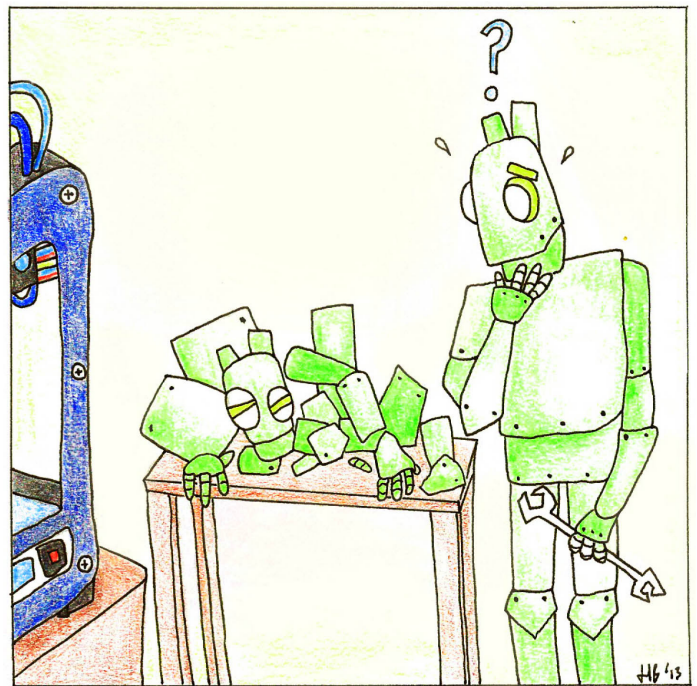
After printing Fred's last finger, Herbert soon realised he'd forgotten to print the instruction manual..

shape, particularly for older machines such as classic cars. But it also includes highly specialised applications. For example, surgeons have printed replacements bits of patient's skulls, where a part of the skull has been removed for an operation, and the technology has also been used to rebuild people's faces, including repairing broken jaws.

Even NASA has taken notice, announcing that it is planning to ship a 3D printer to the International Space Station next year, and hopes that it will print up to 30 percent of the spare parts needed on-board. Indeed, NASA has said that the ability to print parts in space will be critical to any future long distance space travel.

But 3D printing is also coming to the masses. In the States UPS is trialling 3D printing in its stores allowing custom-

ers to print out their own designs. It's a bold move given that 3D printing potentially challenges the delivery business – no need to order spare parts to be delivered if you can simply print your own. Meanwhile in London there are now several high street shops selling 3D printers, such as iMakr, which has 3D printers starting at around €790.

Printheads

Ricoh has been supplying print heads for 3D printers for some years now. Joe Ryan, Business Development Manager of the Inkjet Technology Division of Ricoh Printing Systems America, says that there's a growing range of materials that can be jetted, noting: "You have to be able to take whatever material you are jetting and get it down small enough to squeeze it through a very small opening and that's where a lot of progress has been made." He adds that new methods such as nano technology have been a big factor in helping to make solid particles jettable. This includes rubber-like materials, which have been used for creating prototypes of items such as the soles of tennis shoes, which have intricate tread patterns.

Ryan says that so far 3D printing is mainly limited to prototyping. He explains: "It depends on the stress that's going to be on the part. If you look at a water valve in a home then the water pressure is going to be relatively low and most of those parts are made of plastic so you could use whatever you print. But a gear set, which has a fairly high torque, would be different."

He goes on to say that one of the most exciting recent developments is in relatively low cost desktop units which has led to many more people using the technology, noting: "So now you have people that are thinking in terms of 3D rather than machining."

Ryan says that the Ricoh print heads can produce a 16 micron drop: "You want to get as much material flowing through the printer as possible but at the same time you want the drops to be small enough to give you fine detail. You can control how big the drop gets when it hits the object because you can control when you hit it with the UV light and cure it."

The main limitation on the printhead is the need to control temperature as Ryan explains: "We are dealing with a very heavy viscous fluid so you need to heat that up so you need a high temperature printhead. Our heads are stainless steel and have built-in heaters so that you can keep the heat up. Our heads are piezo and the piezo element is separated from the material being jetted by a stainless steel diaphragm so we can jet just about anything that is compatible with stainless steel."

One of Ricoh's customers is Stratasys, which has been producing 3D printers for over a decade now and is one of the best known vendors around. It produces several different ranges, including the entry-level Ideas series,

Stratasys has developed a range of 3D printers including this Objet 1000, aimed firmly at the manufacturing end of the market.

the Design series, for producing prototypes and the more heavy-duty Production series for manufacturing short runs and one-offs. HP's range of Designjet 3D printers are actually rebadged models from Stratasys.

Stratasys has just acquired another 3D vendor MakerBot in a stock for stock transaction said to be worth around €305m. MakerBot has concentrated on the hobbyist end of the market, which has seen considerable growth in recent years.

Andy Middleton, Stratasys EMEA General Manager, says that the development of materials will be a major factor in the future: "The ability to print multi-material models in a single-build is an increasingly sought-after requirement from product design professionals and is something that differentiates our offering at Objet over other market providers."

Amongst the Stratasys models is the Objet Convex series, which can mix two materials together to help designers produce very realistic feeling prototypes. The combination of rubberlike, flexible and rigid materials can result in models that better emulate the look, feel and function of the final product. Middleton says: "As materials continue to develop I believe 3D printing technology will move further and further into short-run rapid manufacturing."

Printing in metal

Dr. Bernhard Buck, vice president technology product qualification for Heidelberg, says that it's possible to produce metal shapes using a process very similar to sintering. "This is an old production process where you use metal powder and you press it into the shape that you need and then heat it to a very high temperature and the powder parts are cemented. It's traditionally used for very complex parts or where you want to combine several different metals."

This powder can be jetted in thin layers and then heated with a laser to cement the powders. It's possible to produce quite robust parts in this way and is used for objects such as aircraft turbines, which have complex shapes that are difficult to make cost-effectively otherwise. Buck says that this isn't as strong as using raw metal but is within an acceptable range, adding: "It has a lot to do with metallurgy and how you heat up and cool down the powders and how you use the laser."

Printing in 3D

Heidelberg has been working on 3D printing but has taken a different approach. Buck says that while there is a lot of hype around creating 3D objects, there is a big opportunity in printing to 3D objects such as cars or sports shoes. Buck says that nowadays people print to a 2D foil but it is complex and expensive to then apply this to the 3D surface, adding: "But we can print direct to many objects with an inkjet system and using a robot system that moves the object. So with sports shoes it's easier to move the object than the printing system."

Normally inkjet heads are located very close to the media surface but this is difficult with curved objects so that it's necessary to print in small strips. Buck says: "We have invested some work in printing over bigger distances and how to run the robots to define the path that the robot has to make because robots are not usually made for precise enough movements for printing."

Printing direct to objects such as cars will allow vehicle manufacturers to offer bespoke decorations as part of the highly automated manufacturing process, which will

Heidelberg has been developing inkjet systems for printing to 3D shaped objects, as Dr. Bernhard Buck, vice president technology product qualification, explains.

bring considerable cost savings over current methods, such as vehicle wrapping with wide format printed laminate films. Currently, most printing to curved objects is limited to small areas of print such as a company logo on a pen or a golf ball but Heidelberg is aiming for much larger items, though it's much easier to print to convex surfaces then concave ones.

▶

For now Heidelberg is printing in monochrome though Buck says that four colour 3D printing is possible: "We would have to do some geometric calculations to make sure that the colours all landed in the right place." For the most part Heidelberg is using off the shelf inkjet heads, with no intention of developing specialised heads. The inks are mainly UV, with different formulations for each specific surface to be printed to, and with some exceptions such as thermal ink.

Clearly Heidelberg also sees other possibilities such as packaging, where printing direct to a complex shape can add to the shelf impact of the packaging and reduce the cost.

Both these approaches - creating 3D objects and printing to 3D shapes - are industrial processes and likely to be outside the scope of most commercial printers. Yet most printers do have the skills and the infrastructure, if not the vision, to offer a 3D service. This could be anything from personalising objects to printing out items that would otherwise have to be shipped long distance. For now the technology is still in its early stages but it's clearly worth keeping an eye on.

- Nessan Cleary

Tested: the Vutek QS3 Pro

Both high print speed and photographic image quality are essential to today's large format printers, especially the UV-curable models. The Vutek QS3 Pro printer from EFI is designed to meet such demands. The QS3 Pro offers a larger output format, up to 3.2m, than the QS2 Pro, which is a 2m wide printer.

In terms of technical specifications, the Vutek QS3 Pro offers variable droplet greyscale printing head technology with a maximum resolution equivalent to 1000 dpi. It uses variable sized ink droplets, between 0-36 pL and has a maximum production speed of 111 m²/h at the equivalent of 600 dpi print mode.

The six base colour ink set is complemented with white and you can print up to three layers of white inline. It is a hybrid printer, since it handles both rigid and flexible roll-to-roll media, up to 3.2m wide and up to 5.08 cm thickness.

Typical production is displays, banners and POP materials, both for indoor and outdoor use.

The QS3 Pro can be controlled through a number of RIPs, but EFI offers a tightly integrated version of the Fiery XF RIP as the main choice. It's possible to print multiple jobs at once, and the system can be integrated with MIS and W2P solutions.

How the test was done

Our test requires the participant to provide output samples from test files supplied by Digital Dots. For the colour gamut test, we use a standard IT-8 CMYK profiling chart; for the resolution test, we use a specially designed chart with line pairs at a wide range of spacing. The participant prints these under optimum conditions onto the two types of substrates, glossy vinyl and uncoated paper. In the test a QS2 Pro was used, but it shares the same technical specifications as the QS3 Pro, except for the maximum printing width.
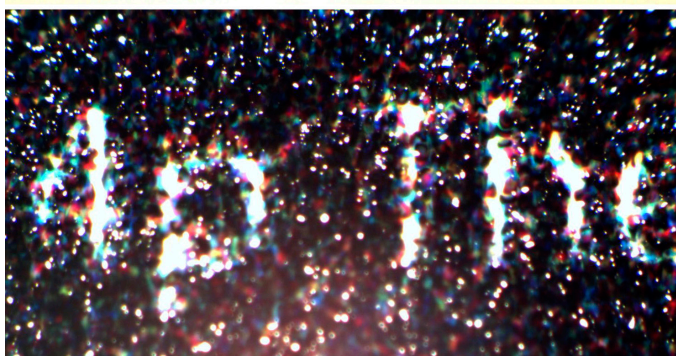
For visual evaluation of general image quality and smooth reproduction of tonal graduation, we also asked for an output of a poster size 70x100cm. This poster was also used to evaluate the uniformity of ink density across the whole width of the substrate. We take five measurements of full tone cyan and then use the SpectroShop software to compare the colour deviation between the first sample and the other four. As a threshold we decided on 2.5 ΔE, the same value suggested in the ISO 12647-2 standard for when printing solid spot colours.
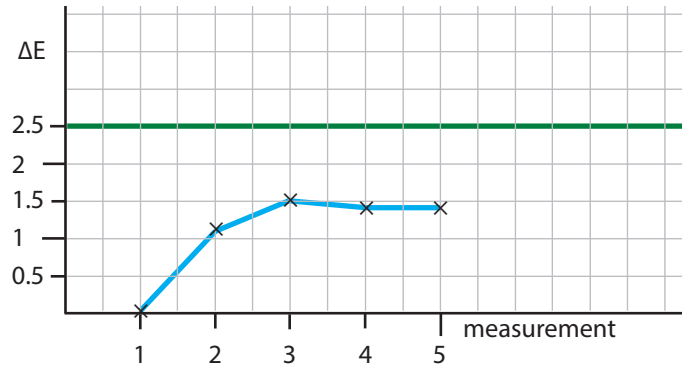

The Vutek QS3 Pro large format printer from EFI is a hybrid UV curable printer for both rigid and flexible media.
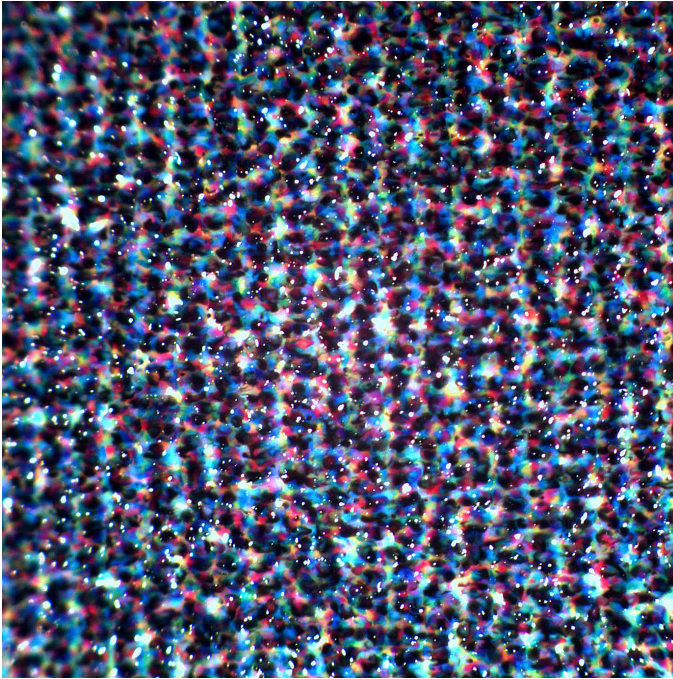
In the resolution test the QS3 Pro showed identifiable line pairs up to the equivalent of 250 dpi, both in the horizontal and vertical direction. Here an image of the sample as seen using a digital microscope at about 500x enlargement.

When measuring all five samples of full tone Cyan across the width of a 70x100 cm poster, the uniformity of the ink density was good. We use the threshold of 2.5 ΔE, as suggested in the ISO 12647-2 standard, as when printing solid spot colours. Any colour deviation lower than 1 ΔE is invisible for the human eye to detect. The first sample is compared with itself, so will give a zero colour deviation.

We measure colour gamut by creating a standard CMYK ICC profile from the IT-8 colour chart data. This was done using an X-Rite i1 Pro spectrophotometer and professional profiling software. The profile was then analysed with Chromix ColorThink Pro to yield a figure for the total number of discrete colours contained within the gamut. We define discrete colours as separated by a delta-E value of 1, using the CIELab colour space as reference.

To measure resolution we viewed the prints of the line pairs chart under a digital microscope. We wanted to determine the point at which the lines could no longer be differentiated as distinct pairs. We call this the resolving power of the printing system, and this is often different than the stated addressable resolution, as per the technical specification. The resolving power is a combination of the native resolution of the print heads, droplet size and mechanical precision when moving the print heads and/or media while printing. As a complement to the line pair chart we also print text, both positive black on white and inversed white on black, in a small font (down to 4p).

Results in numbers

EFI submitted test samples produced using the CMYK plus light versions of cyan and magenta, at 1000 dpi mode on 3M FS40 glossy vinyl with the 'heavy smoothing' option selected. Our gamut test indicated a total of around 324,000 colours, which is a bit lower than the

The QS3 Pro could reproduce small text of 4pt size, especially as black on a white background. The inversed white text on black background was a bit thin, but still visible. Here, an image of the sample as seen using a digital microscope at about 500x enlargement.

▶

Technical specifications, summary

Vendor	Model	No. of Inks	Ink Set	Max Media Size	Max Media Thickness	Resolution (dpi)	Print Speed
EFI	VUTEk QS3 Pro	6+1 + white	CMYKcm	3.2m	5.08cm	1000dpi	111 m²/h*

* at 600 dpi

approximately 400,000 colours when using offset print technology on coated stock). For the uncoated substrate, printed on Ilford paper, the gamut was measured to be slightly lower still, 315,000 colours. But this was expected, since prints on uncoated stock normally produce a less vivid and less colourful result than those printed on coated glossy stock.

In the resolution test, which was printed on the same 3M FS40 glossy vinyl and with the same resolution settings as the colour gamut chart, distinct line pairs could be seen at up to 250 dpi in both the horizontal and vertical direction. The output should ideally be printed in black only, but we could still judge the resolving power by focussing on the black part of the output. The small text was clearly reproduced down to 4pt, especially the positive text in black on white. The inversed text with white on black background was a bit thin, with the black area swelling into the white text, but still clearly visible.

Regarding uniformity, the QS3 Pro showed a maximum deviation across the page of 1.5 ΔE (and in average 1.1 ΔE), which has to be seen as very good. By comparison a colour deviation of 1ΔE is impossible for the human vision to detect.

Conclusions

The VUTEk QS3 Pro has high image quality and can print on a large variety of substrates, so for companies that don't need the speed of more costly printing systems this should be a suitable printer for many applications.
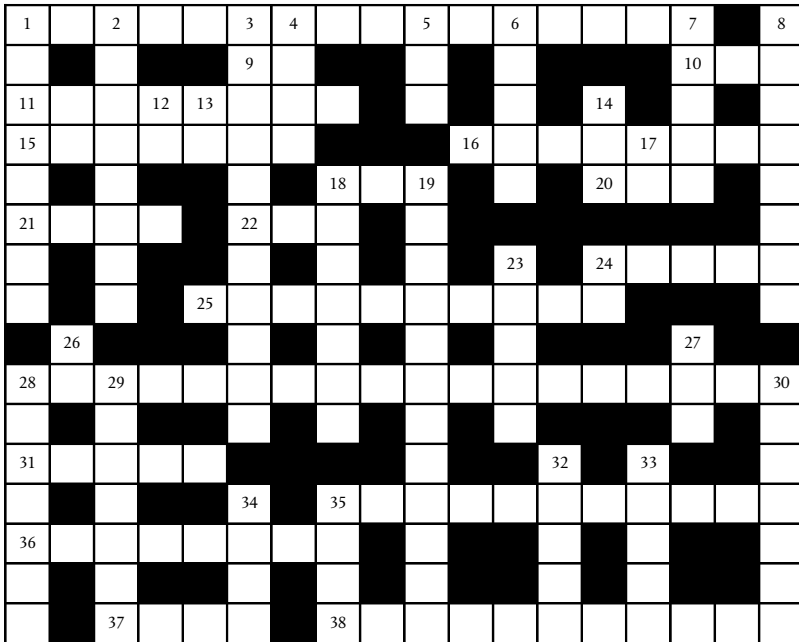
– Paul Lindström

X-word Puzzle

Number 45*

The old grey matter is a little less grey and a tad more shimmering after a wonderful summer, with free time spent mostly outside. And here in East Sussex the sun is shining still.

Across

1. One of the three cornerstones of ICC colour management and it ain't profiling or conversion. (16)

9. Alcoholics Anonymous. (2)

10. Estimated arrival time? (3)

11. Shiny ink? (8)

15. To overcome or win. (7)

16. Coping or the process of keeping prepress data under control. (8)

18. Not green or blue. (3)

20. US spelling for 1000 kilos. (3)

21. They can trip up most plans, I think. (4)

22. Caviar? (3)

24. An electronic teddy; vastly inferior to the real thing. (5)

25. Up there with lies and damned lies according to Disraeli. (10)

*Answers in the next issue

28. Every business and individual is liable for one, other or all of these. (7, 3, 3, 5)

31. Words to learn, paths to follow, especially for coke-heads. (5)

35. The slender and highly efficient person in charge. (4, 7)

36. Excess in the substrate's a definite hassle. (8)

37. Not a switch. (4)

38. Metal printing plates or standardised concepts of people, thing.? (11)

Down

1. To finish a task. (8)

2. A minor planet but not a comet. (8)

3. The ICC likes to encourage this as well as 1 Across. (10)

4. You don't want to see one of these on an inkjet droplet. (4)

5. What gets smeared on dead trees. (3)

6. From the Far East. (5)

7. Lately arrived. (3, 2)

8. Wobbly signs that hang from shelves. (7)

12. Audio Visual. (2)

13. Lalaland? (2)

14. Touch softly. (3)

17. Leave. (2)

18. Fidgety and unsettled. (7)

19. Establish this for the black above all. (7, 5)

23. King cats. (5)

24. Extra Sensory. (2)

26. Quantitative Easing. (2)

27. To cut the same implement. (3)

28. Plastic. (7)

29. The future for the digital printing industry? (4, 3)

30. Tales, narratives, scoops? (7)

32. A capture of electro-magnetic waves? (5)

33. Total, to add up. (5)

34. To impede or block. (4)

35. Not more. (4)

Number 44 – Answers

A		E		S		F		A		U	P			H		B
C	R	Y	S	T	A	L	B	A	L	L		L		I	L	L
K		E		A	T	E			L			E		G		A
N	Y	L	O	N		X	E	R	O	G	R	A	P	H	I	C
O		E		D		O		C		S		D				K
W	E	T		A		G		A		U				O	D	D
L		M		R	A	R	E		T	O	U	R		T		E
E		A	N	D		A		D	E		E			G	U	N
D		K		I		P		I				A				S
G	R	E	A	S	E	H	I	S	P	A	L	M		I		I
E		R		A		I		P		U		A		N	E	T
M			B	T		C		L	A	T	E	X		S	A	Y
E		G	U	I		S	E	A		U		I			T	
N			R	O				Y		M		M	O	N	E	Y
T	R	A	N	N	Y		O	S		N		S			N	